



CHEMISTRY

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR CHEMISTRY

15TH GROUP ELEMENTS

W.E

1. Give reason why elemental nitrogen exists as diatomic molecule whereas elemental phosphorus is a tetraatomic molecule.



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2. Red phosphorus is denser, less volatile and chemically less reactive than white phosphorus. Explain ?



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3. What is maximum covalency of nitrogen?

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4. PH_3 has lower boiling point than NH_3 . Why?

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5. Basic strength order $NH_3 > PH_3 > AsH_3 > BiH_3$.

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6. (a) Write the reaction of the thermal decomposition of sodium azide.

(b) Why does NH_3 act as a Lewis base ?

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7. When compared to CN^- , NO^+ and CO , N_2 is chemically inert.

Explain.

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8. Describe being odd electron molecule, NO is colourless. Explain.

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9. (a) Why does NO_2 dimerise ?

(b) In what way can it be proved that PH_3 is basic in nature ?

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10. NO_2 and N_2O_4 are two forms of nitrogen dioxide. One exists in gaseous state while other in liquid state. The nature of NO_2 and N_2O_4 forms are

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11. N_2O_3 , N_2O_4 and N_2O_5 are anhydride of which oxyacids.

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12. PCl_3 is an electrical conductor in its aqueous solution. Explain

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13. 'P' forms pentahalides and not pentahydrides. Explain

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14. All five bonds of PCl_5 are not equivalent and PCl_5 is less stable.

Explain.

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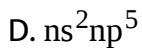
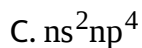
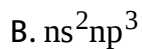
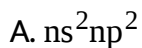
15. How is the reduction ability of H_3PO_2 and H_3PO_3 accounted on the basis of structures of molecules

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16. Aqua-regia can dissolve noble metals. Explain.

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1. The outer electronic configuration of group VA elements is



Answer: B



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2. VA group elements are known as

A. Halogens

B. Normal elements

C. Chalcogens

D. Pnictogens

Answer: D



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3. The most abundant element in the earth's crust among the following is

A. P

B. As

C. Sb

D. Bi

Answer: A



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4. Which one of the following has the lowest melting point ?

A. N

B. P

C. As

D. Sb

Answer: A

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5. The molecular formula of Phosphorous is

A. P

B. P_4

C. P_2

D. P_5

Answer: B



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6. The elements present in Flourpatite are

A. Ca, N & O only

B. Ca & P only

C. Ca, N, O, F

D. Ca, P, F, O

Answer: D



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List-I

List-II

- | | |
|----------------------|--------------------------------|
| A) Phosphorite | 1) KNO_3 |
| B) Bengal salt petre | 2) $Ba(NO_3)_2$ |
| 7. C) Fluoroapatite | 3) $NaNO_3$ |
| D) Chile salt petre | 4) $3Ca_3(PO_4)_2 \cdot CaF_2$ |
| | 5) $Ca_3(PO_4)_2$ |

The correct match is

- A. A B C D
1 2 3 5
- B. A B C D
2 4 3 1
- C. A B C D
4 3 5 2
- D. A B C D
5 1 4 3

Answer: D



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8. Which is the most thermodynamically stable allotropic form of phosphorus ?

- A. Red P
- B. Yellow P
- C. Black P
- D. All are stable

Answer: C



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9. Which of the following Group 15 elements do not show allotropy?

- A. N
- B. As
- C. Sb

D. Bi

Answer: D

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10. Nitrogen shows allotropy in ----- state

A. gaseous

B. liquid

C. solid

D. Liquid and solid

Answer: C

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11. The element which shows large number of allotropes among VIA group elements

A. N

B. P

C. Bi

D. Sb

Answer: B



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12. In the compound NCl_3 , negative oxidation state is exhibited by

A. Nitrogen

B. Chlorine

C. Nitrogen & Chlorine

D. Neither nitrogen nor chlorine

Answer: A

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13. What is the highest oxidation state exhibited by group 17 elements ?

A. +1

B. +3

C. -3

D. +6

Answer: D

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14. The bond energy of $N \equiv N$ in KJ per mole is

- A. 180
- B. 945
- C. 350
- D. 120

Answer: B



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15. Anomalous behaviour of nitrogen is due to.

- A. Small size and high electronegativity
- B. Non availability of d-orbitals in valency shell
- C. Ease of multiple bond formation
- D. All are correct

Answer: D

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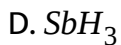
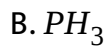
16. The trend in the hydrides from Bi to N is

- A. Bond length increases
- B. Bond length decreases
- C. Acidic nature increases
- D. Bond energy decreases

Answer: B

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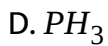
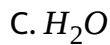
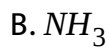
17. Which of the following hydrides has the lowest melting point



Answer: B

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18. The largest bond angle in

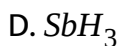
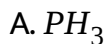


Answer: B



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19. Among the following which one is more stable ?

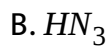


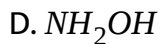
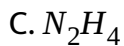
Answer: B



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20. The formula of the Hydride of nitrogen that is acidic in nature is





Answer: B

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21. Which of the following elements will form an acidic oxide ?

A. Nitrogen

B. Phosphorus

C. Arsenic

D. Antimony

Answer: A

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22. Which of the following is correct about 15th group Hydrides (from ammonia to Bismuthine)

- A. Their thermal stability gradually increase
- B. Their ease of preparation gradually increase
- C. The electron pair donating Nature gradually decrease
- D. The bond energies gradually increase

Answer: C

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23. Which of the following is a Hydride of Nitrogen

- A. NH_3
- B. N_2H_4
- C. HN_3

D. All

Answer: D

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24. The oxidation state of nitrogen is a fractional value in

A. Hydroxyl amine

B. Hydrazoic acid

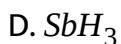
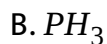
C. Nitrate ion

D. Hydrazine

Answer: B

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25. Which of the following is both neutral and paramagnetic

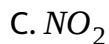
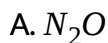


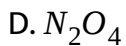
Answer: A



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26. Which of the following is both neutral and paramagnetic

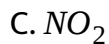
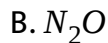




Answer: B

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27. Oxide of nitrogen formed in the atmosphere during the lightening is



D. None

Answer: A

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28. A colourless paramagnetic gas among the following

- A. Nitric Oxide
- B. Nitrous Oxide
- C. Nitrogen dioxide
- D. Dinitrogen trioxide

Answer: A

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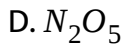
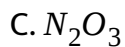
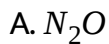
29. A blue liquid among the following is

- A. N_2O_3
- B. N_2O
- C. N_2O_4
- D. NO_2

Answer: A

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30. The three electron bond is present in the structure of



Answer: B

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31. The laughing gas is

- A. Nitrous oxide
- B. Nitric oxide
- C. Nitrogen oxide
- D. Nitrogen pentoxide

Answer: A

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32. $FeSO_4$ forms brown ring with

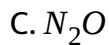
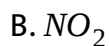
- A. N_2O
- B. NO
- C. NO_2
- D. N_2O_3

Answer: B



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33. Ammonium nitrate decomposes on heating into

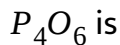


Answer: C



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34. The number of oxygen atoms bonded to one phosphorus atom in



A. 6

B. 4

C. 3

D. 2

Answer: C

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35. Which of the following is paramagnetic

A. NO

B. NO_2

C. ClO_2

D. All

Answer: D

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36. Acidic para magnetic oxide of nitrogen

A. NO

B. N_2O_3

C. NO_2

D. N_2O_5

Answer: C

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37. The wrong statement about N_2O is :

A. It is called laughing gas

B. It is called nitrous oxide

C. It is a linear molecule

D. It is a more reactive oxide

Answer: D

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38. Which of the following exist as dimer

A. NO

B. NO_2

C. P_2O_3

D. All

Answer: D

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39. Though nitrogen exhibits +5 oxidation state, it does not form pentahalide, because

- A. Nitrogen atom is very small
- B. Nitrogen atom has no vacant orbitals in valency shell
- C. Electronegativity of nitrogen is very high
- D. Nitrogen molecule contains a very strong triple bond

Answer: B



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40. Which of the following trihalides is not hydrolysed

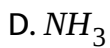
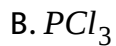
- A. NF_3
- B. PCl_3
- C. $AsCl_3$



Answer: A

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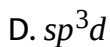
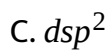
41. Which one of the following exceeds octet rule ?



Answer: C

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42. The hybrid orbitals used by Phosphorus in the formation of PCl_5 are

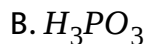
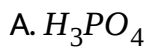


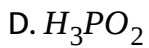
Answer: D



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43. PCl_3 on hydrolysis gives

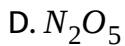
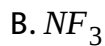




Answer: B

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44. Which is the most explosive?



Answer: A

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45. Which of the following undergoes Hydrolysis most easily:

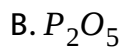
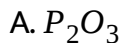


Answer: A

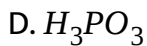


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46. PCl_3 is prepared by the action of Cl_2 on



C. White P



Answer: C

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47. Which of the following pentahalides of Bi exists



Answer: D

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48. Which chloride is not appreciably hydrolysed by water



Answer: D

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49. The shape and hybridisation of PCl_3 molecule



D. Planar trigonal and sp^3

Answer: B

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50. In hyponitrous acid the number of Hydroxyl groups present are

A. 1

B. 2

C. 3

D. 4

Answer: A

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51. Phosphorus has the oxidation state +3 in

- A. Orthophosphorus acid
- B. Orthophosphoric acid
- C. Pyrophosphoric acid
- D. Metaphosphoric acid

Answer: A

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52. A tribasic acid with peroxy bond is

- A. H_3PO_2
- B. H_3PO_3
- C. H_3PO_4

D. H_3PO_5

Answer: D

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53. The salts of phosphorous acid are called

A. Phosphates

B. Phosphites

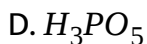
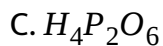
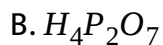
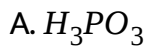
C. Hypophosphites

D. Phosphides

Answer: B

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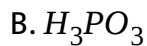
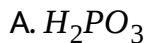
54. Which contains O-O linkage ?

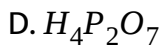


Answer: D

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55. The formula of meta phosphoric acid is

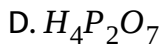
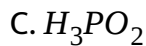
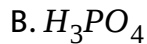
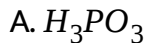




Answer: C

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56. Phosphorous has the oxidation state of +1 in:



Answer: C

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57. The number of hydroxyl groups in pyrophosphoric acid is ____ .

A. 1

B. 2

C. 3

D. 4

Answer: C

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58. Which of the following is an acid

A. Ca(OH)_2

B. P(OH)_3

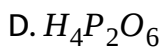
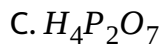
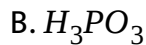
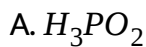
C. NH_4OH

D. NaOH

Answer: B

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59. The oxyacid of phosphorous which has more non-ionisable hydrogens



Answer: A

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60. Mixture of conc. HNO_3 and conc. H_2SO_4 is known as

- A. Sulphonating mixture
- B. Nitration mixture
- C. Explosion mixture
- D. Fusion mixture

Answer: B

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61. Iron is rendered passive by treatment with

- A. aquaregia
- B. conc. H_2SO_4
- C. conc. HNO_3
- D. conc. HCl

Answer: C

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62. Industrial preparation of nitric acid by Ostwald's process involves.

- A. reduction of NH_3
- B. oxidation of NH_3
- C. hydrogenation of NH_3
- D. hydrolysis of NH_3

Answer: B

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63. The catalyst used in the manufacture of NO by Ostwald's process is

A. Pt

B. Fe

C. V_2O_5

D. Ni

Answer: A

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64. The catalyst used in the manufacture of ammonia by Haber process is

A. finely divided Nickel

B. finely divided molybdenum

C. finely divided iron

D. finely divided Platinum

Answer: C

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65. The catalytic promoter used in Haber's process is

A. Mo

B. Ni

C. Pt

D. V_2O_5

Answer: A

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66. NH_3 on burning in oxygen gives

A. NO and H_2O

B. NO_2 and H_2O

C. N_2 and H_2O

D. N_2O and H_2

Answer: A

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67. An aqueous solution of ammonia consist of

A. Ammonium ions

B. Hydroxy ions

C. both of them

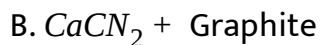
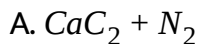
D. H^+ ions

Answer: C



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68. Nitrolim is



Answer: B



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69. In the preparation of HNO_3 by Ostwald process ammonia is

A. reduced

B. oxidised

C. reduced and oxidised

D. hydrolysed

Answer: B

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70. NH_4Cl on heating with NaOH liberates

A. $NaCl$

B. NH_3

C. HCl

D. $NaOCl$

Answer: B

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71. Ammonia gas is dried by

A. Quick lime

B. conc. H_2SO_4

C. P_2O_5

D. $CaCl_2$

Answer: A

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72. Which of the following substances is used as fertilizer?

A. Ammonium sulphate

B. Urea

C. Calcium super phosphate

D. $Ca_3(PO_4)_2$

Answer: D



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73. Which of the following elements can form both ionic and covalent bonds ?

A. Liquid ammonia

B. H_2O

C. Benzene

D. CCl_4

Answer: A



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74. Teeth and bones are made of mainly

- A. Calcium silicate
- B. Calcium phosphate
- C. Calcium silicon phosphate
- D. Calcium hydrogen phosphate

Answer: B

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75. Superphosphate of lime is

- A. Calcium containing substance
- B. Soluble in water
- C. Containing gypsum
- D. None of these

Answer: B



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Level-I (C.W)

1. A metalloid of nitrogen family is

A. N

B. As

C. P

D. Bi

Answer: B



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2. The element having the higher boiling point is

A. P

B. As

C. Sb

D. Bi

Answer: D

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3. The structure of phosphide ion is smaller to that of

A. Nitride ion

B. Chloride ion

C. Fluoride ion

D. Sodium ion

Answer: B



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4. Which of the following phosphorus is the most reactive?

A. White P

B. Red P

C. Black P

D. Scarlet P

Answer: A



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5. Which of the following is oxidised in air?

A. White P

B. CH_4

C. H_2O

D. SO_2

Answer: A



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6. Which of the following exist in mono-atomic state

A. Phosphorus

B. Nitrogen

C. Antimony

D. Bismuth

Answer: D



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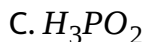
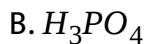
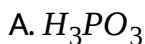
7. Which of the following properties of white phosphorus are shared by red phosphorus ?

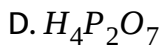
- A. It burns when heated in air
- B. It reacts with hot caustic soda solution to give phosphine
- C. It shows chemiluminescence
- D. It is soluble in carbon disulphide

Answer: A

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8. Oxidation state of +3 for phosphorous is found in





Answer: A

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- | | List-I | List-II |
|----|---------------|--------------------------|
| | A) HNO_3 | 1) -3,+5 oxidation state |
| | B) NH_4NO_3 | 2) -1/3 oxidation state |
| 9. | C) N_3H | 3) +5 oxidation state |
| | D) H_3PO_3 | 4) +3 oxidation state |
| | | 5) + 1/3 oxidation state |

The correct match is

- A. A B C D
3 1 2 4
- B. A B C D
5 2 3 4
- C. A B C D
1 2 3 4
- D. A B C D
4 3 2 5

Answer: A



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10. Most stable oxidation state of iron is

A. +1

B. +5

C. -3

D. +3

Answer: D



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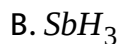
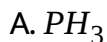
11. Fixation of nitrogen means

- A. reaction of nitrogen with oxygen
- B. conversion of free atmospheric nitrogen into nitrogen compounds
- C. the action of denitrifying bacteria on nitrogen compounds
- D. decomposition of nitrogenous compounds to yield free nitrogen

Answer: B

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12. Non combustible hydride is

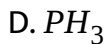
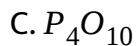
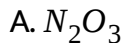




Answer: C

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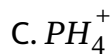
13. The substance that is neutral to litmus



Answer: D

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14. Which of the following is least stable



Answer: B

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15. Which statement is false

A. NH_3 is Lewis base

B. NH_3 molecule is triangular planar

C. NH_3 does not act as reducing agent

D. NH_3 (liquid) is used as a solvent

Answer: B

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16. Which of the following is used to produce smoke screens?

A. Zinc sulphide

B. Calcium phosphide

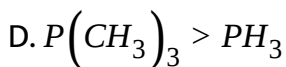
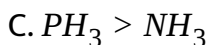
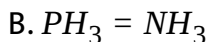
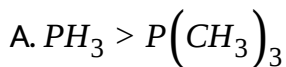
C. Zinc phosphate

D. Sodium carbonate

Answer: B

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17. Which one of the following statements is correct with respect to basic character?

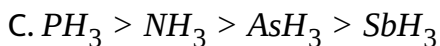
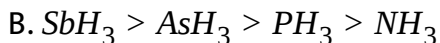
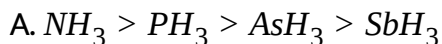


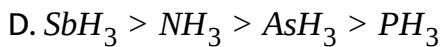
Answer: D



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18. Boiling/melting points of the following hydrides follow in order.

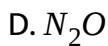
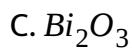
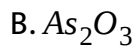
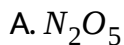




Answer: D

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19. Amphoteric oxide among the following is



Answer: B

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20. Which of the following exists as monomer molecules only

- A. Nitrogen (III) Oxide
- B. Phosphorus (V) Oxide
- C. Arsenic (III) Oxide
- D. Antimony (V) Oxide

Answer: A

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21. Nitrogen (i) oxide is produced by

- A. Thermal decomposition of Ammonia Nitrate
- B. Decomposition of NO_2
- C. By the decomposition of $NaNO_2$

D. By the interaction of Hydroxyl amine and Nitrous acid

Answer: A

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22. In P_4O_{10} the number of oxygen atoms bonded to each phosphorus atom is.....

A. 2

B. 3

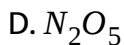
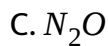
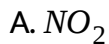
C. 4

D. 5

Answer: C

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23. Which of the following oxide is brown coloured gas



Answer: A

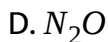
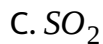


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24. The gas not having oxidizing as well as bleaching properties is

A. Chlorine

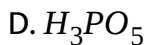
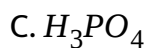
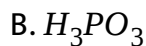
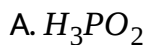
B. Ozone



Answer: D

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25. P_4O_{10} is the anhydride of the following



Answer: C

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26. Which of the following trihalides give unique products on hydrolysis

A. NCl_3

B. PCl_3

C. $AsCl_3$

D. $SbCl_3$

Answer: A

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27. The element which gives explosive halides is

A. Phosphorus

B. Nitrogen

C. Arsenic

D. Bismuth

Answer: B



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28. Which of the following is most stable



Answer: B



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29. Among NCl , PF_5 and NF_5 why NF_5 is impossible ?

A. N has high electronegativity

B. N has high ionisation energy

C. N has lowest atomic size

D. N has no vacant d-orbital

Answer: D

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30. Which of the following is not correct ?

A. Hydrolysis of NCl_3 gives NH_3 and $HOCl$

B. NH_3 is less stable than PH_3

C. NH_3 is a weak reducing agent compared to PH_3

D. Nitric oxide in solid state exhibits diamagnetic property

Answer: B

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31. An element X belongs *I, II, III* or *V* groups. Its oxide reacts with water to produce highly acidic solution the element X belongs to

A. I groups

B. II group

C. III group

D. V group

Answer: D



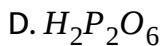
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32. The anhydride of orthophosphoric acid is

A. P_4O_6

B. P_2O_4

C. P_4O_{10}



Answer: C

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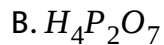
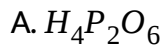
33. The oxyacid of phosphorous which exists as a dimer in vapour phase is

- A. Hypophosphorous acid
- B. Pyrophosphoric acid
- C. Peroxy phosphoric acid
- D. Metaphosphoric acid

Answer: D

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34. Salt of the following is used as a water softer



Answer: C



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35. Basicity of orthophosphoric acid is

A. 2

B. 3

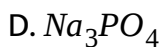
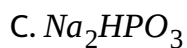
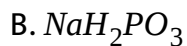
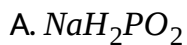
C. 4

D. 5

Answer: B

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36. Which of the following is an acidic salt –



Answer: B

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37. Ammonia and air are the starting materials for the manufacture of Nitric acid in

A. Birkland-Eyde process

B. Ostwald's process

C. Haber's process

D. Hasen Clever method

Answer: B

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38. Moles of oxygen that can oxidise one mole of NH_3 to NO

A. 1

B. 1.25

C. 2.5

D. 5

Answer: B



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39. Percentage of nitric acid obtained in Ostwald's process is

A. 61 %

B. 68 %

C. 74 %

D. 82 %

Answer: A

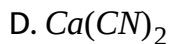


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40. Which does not give ammonia with water

A. Mg_3N_2

B. AlN

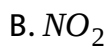


Answer: D

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41. A mixture of ammonia and air at about 800°C in the presence of

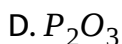
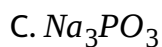
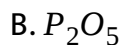
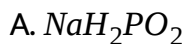
Pt gauze forms



Answer: A

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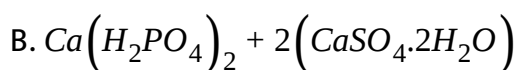
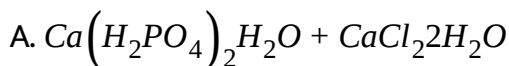
42. Aqueous NaOH reacts with white Phosphorous to form Phosphine and

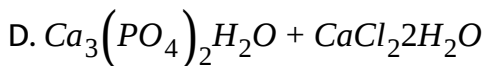
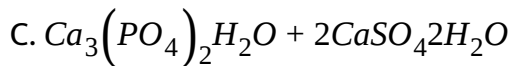


Answer: A

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43. Superphosphate is a mixture of





Answer: B

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44. Superphosphate of lime is obtained by treating

A. Calcium phosphate with HCl

B. Calcium phosphide with HCl

C. Calcium phosphate with H_2SO_4

D. Calcium phosphate with NaOH

Answer: C

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1. The number of covalent bonds made by phosphorus atom never exceeds

A. 3

B. 5

C. 2

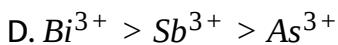
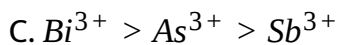
D. 12

Answer: B

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2. Ionic radii (in Å...) of As^{3+} , $Sb(3+)$ and $Bi^{(3+)}$ follow the order

A. $As^{3+} > Sb^{3+} > Bi^{3+}$



Answer: D

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3. The shape and bond angle of white phosphorous molecule is

A. Linear and 180°

B. Trigonal planar and 120°

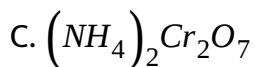
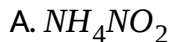
C. Tetrahedral and $109^\circ 28'$

D. Tetrahedral and 60°

Answer: D

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4. Nitrogen liberated by the thermal decomposition of only



D. all the three

Answer: D

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5. The cyanide ion CN^- and N_2 are isoelectronic, but in contrast to CN^- , N_2 is chemically inert, because of

A. low bond energy

B. absence of bond polarity

C. unsymmetrical electron distribution

D. presence of more number of electrons in bonding orbitals

Answer: B

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6. Which of the following has maximum complex forming ability with a given metal ion?

A. PH_3

B. BiH_3

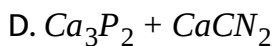
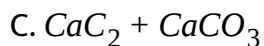
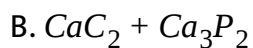
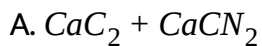
C. NH_3

D. SbH_3

Answer: C

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7. Holme's signals can be given using :



Answer: B



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8. The bond energies (in KJ mole^{-1}) of P-H, As-H and N-H respectively

?

A. 247, 318 and 389

B. 247, 389 and 318

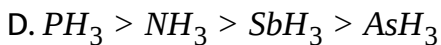
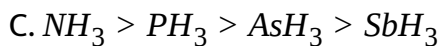
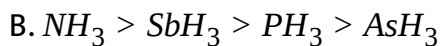
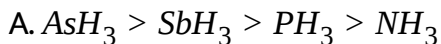
C. 318, 389 and 247

D. 318, 247 and 389

Answer: D

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9. The basic character of hydrides of the V-group elements decreases in the order



Answer: C

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10. White phosphorous reacts with caustic soda to give phosphine and sodium hypophosphite In this reaction phosphorous undergoes

- A. Oxidation
- B. Reduction
- C. Both
- D. None of these

Answer: C

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11. They hybridization of phosphorous atom in P_4O_6 and P_4O_{10} is

- A. sp
- B. sp^2

C. sp^3

D. sp^3d

Answer: C



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12. The bonds present in P_4O_{10} are

A. Ionic and covalent

B. Ionic acid dative

C. Covalent and dative

D. Only covalent bonds

Answer: C



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13. Which of the following oxides of nitrogen is the anhydride of nitrous acid?

A. NO

B. N_2O_3

C. N_2O_4

D. N_2O_5

Answer: B

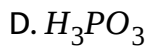
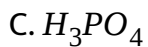


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14. Which acid is not formed by the action of water on phosphorus pentoxide ?

A. HPO_3

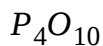
B. $H_4P_2O_7$



Answer: D

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15. The arrangement of oxygen atoms around each phosphorous in



A. Pyramidal

B. Octahedral

C. Tetrahedral

D. Square planar

Answer: C

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16. When NH_4NO_3 is gently heated, an oxide of Nitrogen is formed.

What is the oxidation state of Nitrogen in this oxide ?

A. +4

B. +2

C. +3

D. +1

Answer: D



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17. The following are aresome statement about oxides of VA group element

I) N_2O molecule is linear

II) NO_2 molecule is angular

III) N_2O_5 molecule is angular

The correct combination is

A. All are correct

B. I & III are correct

C. II & III are correct

D. I & II are correct

Answer: D

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18. The trihalide which forms oxocations on hydrolysis is

A. NCl_3

B. PCl_3

C. $SbCl_3$

D. AsCl_3

Answer: C

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19. Bismuth forms the only pentahalide with the halogen

A. Bromine

B. Fluorine

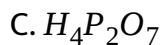
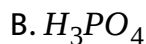
C. Chlorine

D. Iodine

Answer: B

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20. Acid having peroxide linkage in its structure is



Answer: D

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21. Two oxides of Nitrogen, NO and NO_2 reacts together at 253 K and form a compound Nitrogen X. X reacts with water to yield another compound of Nitrogen Y. The shape of the anion of Y molecule is

A. Tetrahedral

B. Triangular planar

C. Square planar

D. Pyramidal

Answer: B

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22. Oxidation state of +1 for phosphorus is found in

A. H_3PO_3

B. H_3PO_4

C. H_3PO_2

D. $H_4P_2O_7$

Answer: C

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23. The number of hydroxyl group in pyrophosphoric acid is

A. 3

B. 4

C. 5

D. 7

Answer: B

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24. H_3PO_2 is the molecular formula of an acid of phosphorus. Its name and basicity respectively are

A. Phosphorus acid and two

B. Hypophosphorous acid and two

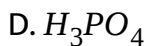
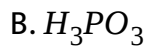
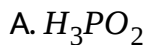
C. Hypophosphorous acid and one

D. Hypophosphoric acid and two

Answer: C

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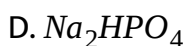
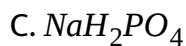
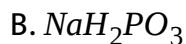
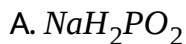
25. The acid that forms primary, secondary and tertiary phosphates is



Answer: D

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26. Which of the following is not an acidic salt ?



Answer: A

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27. The reducing strength of oxyacid of the Phosphorous depends on

A. The number of H-atoms directly attached to P

B. The number of H-atoms attached to oxygen atom

C. The number of O-atoms attached to P-atoms

D. The number of P-atoms

Answer: A

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28. Regarding H_3PO_5 the wrong statement is

- A. It's basicity is three
- B. Oxidation state P in it is +5
- C. It contains O-O linkage
- D. It can form a dimer

Answer: D

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29. The following are some statements about HNO_2

I) Its undissociated forms are tautomers

II) Its undissociated forms are resonance structures

III) Its anhydride in pure state exists as pale blue solid and that melts to deep blue liquid

The correct combination is

A. All are correct

B. I, III are correct

C. II, III are correct

D. I,II are correct

Answer: B



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30. The statements regarding oxyacids of phosphorous are

- I) HPO_3 molecule is monobasic acid
- II) $H_4P_2O_6$ molecule has P-P bond
- III) $H_4P_2O_7$ molecule has P-O-P linkage

The correct combination is

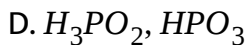
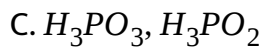
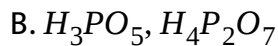
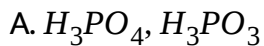
- A. All are correct
- B. Only II is correct
- C. II & III are correct
- D. I and II are correct

Answer: A



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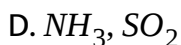
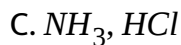
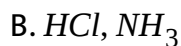
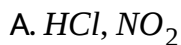
31. Which pair of oxyacids of phosphorous contain 'P-H' bonds ?



Answer: C

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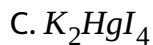
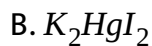
32. A & B are two gases 'A' is identified with the glass rod dipped in NH_3 and 'B' is identified with the glass rod dipped in HCl. Then A, B are



Answer: B

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33. Nessler's reagent is used to detect trace amounts of ammonia. Its formula is



Answer: C

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34. Cyanamide process is used to prepare

- A. Cyanide
- B. Isocyanide
- C. Ammonia
- D. Nitric acid

Answer: C

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35. Conc. HNO_3 is treated with iron. The metal is passive because

- A. It is transition metal
- B. It forms protective oxide metal
- C. It is reduced
- D. It liberates laughing gas

Answer: B



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36. $4Zn + 10HNO_3 \rightarrow 4Zn(NO_3)_2 + NH_4NO_3 + 3H_2O$. In this reaction one mole of HNO_3 is reduced by

A. 32g Zn

B. 64g Zn

C. 128g Zn

D. 256g Zn

Answer: D



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37. $[CaO \cdot Ca(NO_3)_2]$ is the chemical composition of the substance, commonly used as

A. Fertiliser

B. Explosive

C. Perfume

D. Medicine

Answer: A

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38. Which of the following is not correct ?

A. Ammonia is used as refrigerant

B. A mixture of $Ca(CN)_2$ and C is known as nitrolim

C. A mixture of $Ca(H_2PO_4)_2$ and $CaSO_4 \cdot 2H_2O$ is known as superphosphate of lime

D. Hydrolysis of NCl_3 gives NH_3 and $HOCl$

Answer: B

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39. Assertion (A) : P_4 is more reactive than N_2

Reason (R) : $P - P$ bonds are relatively weaker than $N \equiv N$

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: A

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40. Assertion (A) : Bismuth compounds are stable +V oxidation state than in +III oxidation state

Reason (R) : Inert pair effect is observed Bismuth compounds

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: D

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41. Assertion (A) : The hydrides of VA group elements are good reducing Agents

Reason (R) : NH_3 is a weak reducing Agent among the hydrides of VA group

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: B

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42. Assertion (A) : P_2O_3 is more basic than N_2O_3

Reason (R) : Metallic nature of the central atom increases down the group

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: A

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43. Assertion (A) : Ortho phosphoric acid is tribasic acid

Reason (R) : Orthophosphoric acid forms three series of salts.

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: B



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44. Assertion (A) : In the synthesis of Ammonia by Habers process mixture of potassium and aluminium oxides can be used as

promotor

Reason (R) : Promotor enhances the activity of catalyst

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: A

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45. Assertion (A) : Anhydrous Calcium chloride is used catalyst in cuanamide process

Reason (R) : Catalyst increases the rate of reaction.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: A

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46. Assertion (A) : The basic nature of VA group hydrides decreases from ammonia to bismuthine

Reason (R) : Availability of lone pair on the central atom in hydrides decreases down the group.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: A

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47. Assertion (A) : Stability of NH_3 is greater than PH_3

Reason (R) : M-H bond energy increases down the group in the hydrides of pnicogens.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: C

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48. Assertion (A) : PH_3 is more basic than NH_3

Reason (R) : EN of N is more than that of P

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: D

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49. Assertion (A) : NH_3 is liquid while the other hydrides V-A group elements are gases at room temp

Reason (R) : NH_3 possess inter molecular H-bonds in liquid state

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: D

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Level-III

1. Which of the following statements is not true

- A. Nitrogen differs markedly from the other members of its family
- B. Nitrogen has five valency electrons
- C. Nitrogen shows covalency greater than four
- D. Nitrogen shows great stability as a free element

Answer: C

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2. The correct statement is

A. High reactivity of white phosphorus is due to small bond angle

(60°) in P_4 molecule which causes large strain

B. Low reactivity of red phosphorus is due to polymeric structure

C. Black phosphorus conducts electricity

D. All the above

Answer: D

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3. Which of the following statement is wrong ?

- A. The stability of hydride increases from NH_3 to BiH_3 in group 15 of the periodic table
- B. nitrogen cannot form $d\pi - p\pi$ bonds
- C. single $N - N$ bond is weaker than the single $P - P$ bond
- D. N_2O_4 has two resonance structures

Answer: A

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4. Nitrogen can be purified from the impurities of oxides of nitrogen and ammonia by passing through

- A. Conc. HCl
- B. Alkaline solution of pyragallol
- C. A solution of $K_2Cr_2O_7$ acidified with H_2SO_4

D. A solution of KOH

Answer: C

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5. Animals die in pure nitrogen atmosphere because

- A. It destroys haemoglobin
- B. Nitrogen form stable complex with hemoglobin than oxygen
- C. It is heavier than air
- D. It is poisonous

Answer: B

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6. $PCl_5 + Cl^- \rightarrow PCl_6^-$. The wrong statement regarding the above the equation is

- A. Hybridisation of P changes from sp^3d to sp^3d^2
- B. Oxidation number of P changes from +5 to +6
- C. Covalency of P changes from 5 to 6
- D. Here PCl_5 is a Lewis acid

Answer: B

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7. When sodium metal is dissolved in liquid ammonia, blue colour solution is formed. The blue colour is due to

- A. Solvated Sodium
- B. Amide Ion

C. Solvated electron

D. Lone pair of electrons on Nitrogen in NH_3 molecule

Answer: C

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8. In Nitrogen family the H-M-H angle in the hydrides MH_3 gradually becomes closer to 90° on going from N to Sb. This due to

- A. The basic strength of the hydrides increases
- B. Due to the increase in the size of central atom M and increase in its electronegativity
- C. The bond energies of M-H increase
- D. Pure P orbital participating in the bonding

Answer: D

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9. $NH_4Cl(s)$ is heated in test tube. Vapours are brought in contact with red litmus paper, which changes to blue and then to red. It is because of :

- A. Formation of NH_3 , H_2O and HCl
- B. Formation of phosphoric acid
- C. greater diffusion of NH_3 than HCl
- D. greater diffusion of HCl than NH_3

Answer: C

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10. Ammonia is not a product in the

- A. Hydrolysis of nitrolim
- B. Hydrolysis of Aluminium nitride
- C. Decomposition of Ammonium nitrite
- D. Hydrolysis of urea

Answer: C

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11. Which of the following statements is correct?

- A. All the hydrides of VA group elements are pyramidal in shape
- B. The bond angle decreases from NH_3 to BiH_3 down the group because of bond pair-bond pair repulsion
- C. The basic strength decreases from NH_3 to BiH_3 , because of decreases in the availability of lone pair of electrons

D. All are correct

Answer: D

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12. Treatment of NH_3 with excess of ethyl chloride gives:

- A. the nitrogen atom of NH_3 gains electrons
- B. NH_3 can give a pair of electrons
- C. A proton in HCl can accept an electron pair from NH_3
- D. The Cl^- ions gas a stable configuration of 8 electrons.

Answer: A

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13. Phosphine is not obtained by the reaction

- A. White P is heated with NaOH
- B. Red P is heated with NaOH
- C. Ca_3P_2 is heated with water
- D. Phosphorus trioxide is boiled with water

Answer: B

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14. It is recommended that ammonia bottles be opened after cooling in ice for sometime. This is because

- A. Has high vapour pressure at room temperature
- B. Is corrosive liquid
- C. is an explosive

D. Brings tears in eyes

Answer: A

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15. The dipole moment of NF_3 is less than NH_3 because

A. NH_3 forms associated molecules

B. F is more reactive than H

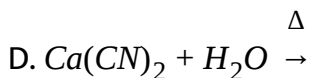
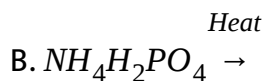
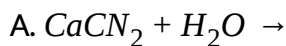
C. The resultant of bond polarity is less

D. The resultant of individual polarities is opposed by the polarity of lone pair in NF_3

Answer: D

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16. Ammonia will be obtained in

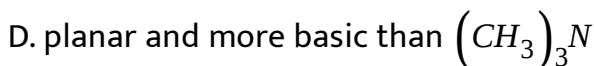
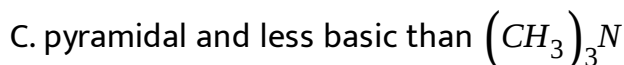
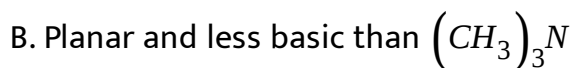
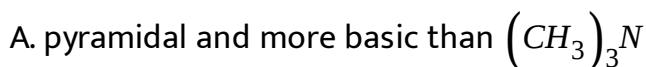


Answer: A



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17. The compound $(\text{SiH})_3\text{N}$ is expected to be



Answer: B

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18. The number of P-O-P bonds present in P_4O_6 and P_4O_{10} are respectively

A. 4 and 5

B. 4 and 6

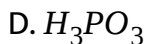
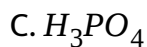
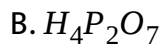
C. 6 and 6

D. 3 and 6

Answer: C

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19. One of the acid listed below is formed $P_2O - (3)$ and the rest are formed from P_2O_5 . The acid formed from phosphorus (III) oxide is



Answer: D



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20. Group 15 of the periodic table consists of the elements N, P, As, Sb and Bi. On passing from N to Bi, the oxides of the elements of general formula M_2O_3 become

A. Strong reducing agents

B. More ionic

C. More basic

D. More volatile

Answer: C

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21. The number of bond in P_4O_{10} is

A. 6

B. 16

C. 20

D. 7

Answer: B

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22. The nitrate which when heated gives off a gas (or) a mixture of gases which cannot relight a glowing splinter is

- A. Sodium nitrate
- B. Ammonium nitrate
- C. Lead nitrate
- D. Potassium nitrate

Answer: B

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23. Ammonia can not be obtained by

- A. heating of ammonium nitrate or ammonium nitrite
- B. heating of ammonium chloride or ammonium carbonate

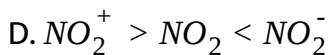
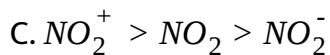
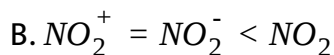
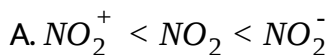
C. heating of ammonium nitrate with sodium hydroxide

D. reaction of AlN or Ga_3N_2 or CaNCN with water

Answer: A

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24. The correct order of bond angle of NO_2^+ , NO_2 and NO_2^- is

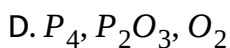
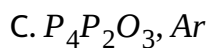
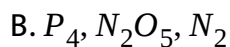
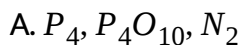


Answer: C

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25. A tetra-atomic molecule (A) on reaction with nitrogen (I) oxide, produces two substances (B) and (C). (B) is a dehydrating agent while substance (C) is a diatomic gas which shows almost inert behaviour.

The substances (A),(B) and (C) are



Answer: A

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26. Bottle of PCl_3 is kept stoppered because it

A. explodes

B. gets oxidized

C. is voltalised

D. reaction with mositure

Answer: D

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27. What may be expected to happen when phosphine gas is mixed with chlorine gas ?

A. PCl_3 and HCl and formed and the mixture warm up

B. PCl_3 and HCl are formed and the mixture cools down

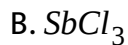
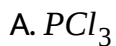
C. PH_3 , Cl_2 is formed with warming up

D. The mixture only Cools down

Answer: A

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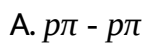
28. Which of the following halides is most acidic ?



Answer: A

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29. In the compounds of the type POX_3 , P atoms show multiple bonding of the type



B. $d\pi - d\pi$

C. $p\pi - d\pi$

D. no multiple bonding

Answer: C

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30. BCl_3 molecule is planar while NCl_3 is pyramidal because

A. $N - Cl$ bond is more covalent than $B - Cl$ bond

B. $B - Cl$ bond is more polar than $N - Cl$ bond

C. nitrogen atom is smaller than boron

D. BCl_3 has no lone pair but NCl_3 has a lone pair of electron

Answer: D

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31. The correct statement in respect of structure of hypophosphorous acid is

- A. 2-OH groups, 2-H atoms are attached directly to P
- B. One OH group and 2-H atoms are directly attached to P
- C. One OH group and 3-H atoms are directly attached to P
- D. Three OH groups are attached directly to P

Answer: B

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32. In NO_3^- ion, the number of bond pair and lone pair of electrons on nitrogen atom are:

- A. 2,2

B. 3,1

C. 1,3

D. 4,0

Answer: D

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33. Match the List-I and the List-II and select the correct answer using the codes given below the lists :

List-I (Compounds of Nitrogen)	List -II (Valency)
A. N_2O	1. 1
B. NO	2. 2
C. N_2O_5	3. 3
D. NO_2	4. 4
	5. 5

A. A B C D
1 2 3 4

B. A B C D
3 2 4 1

A B C D

C. 2 5 3 4

A B C D

D. 4 2 1 5

Answer: D



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34. By the reduction of HNO_3 to NO_2 the number of moles of electrons involved per mole of HNO_3 is

A. 8

B. 6

C. 3

D. 1

Answer: D



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35. Sodium hexametaphosphate is known as

- A. Calgon
- B. Permutit
- C. Natalite
- D. Nitrolim

Answer: A

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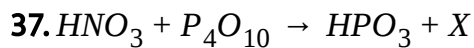
36. Polyphosphates are used as water softening agents because they

- A. Form soluble complexes with anionic species
- B. Precipitate anionic species
- C. Form soluble complexes with cationic species

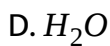
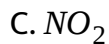
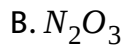
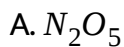
D. Precipitate cationic species

Answer: C

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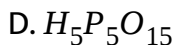
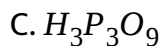
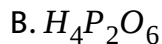
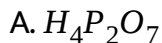
in the above reaction the product X is :



Answer: A

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38. Which of the following is a cyclic oxoacid



Answer: C

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39. When rain is accompanied by a thunderstorm, the collected rain water will have a pH :

A. Slightly higher than that when the thunder storm

B. uninfluenced by occurrence of thunder storm

C. which depends on the amount of dust in air

D. slightly lower than that of rail water without thunderstrom

Answer: D

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40. The following are some statements about oxyacids of VA group elements

i) The salt of Nitric acid contains NO_3 ion

ii) The salt of phosphoric acid contains PO_4^{3-} ion

iii) Salt of meta phosphoric acid contains $H_2PO_3^-$ & HPO_3^{2-} ions

The correct combination is

A. i and ii are correct

B. ii and iii are correct

C. all are correct

D. only ii is correct

Answer: A

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41. The halide which does not release an alkaline gas on hydrolysis ?

a) NCl_3

b) PCl_3

c) $AsCl_3$

d) $SbCl_3$

A. a,b,c & d

B. b,c & d

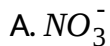
C. c & d

D. a & d

Answer: B

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42. Among the following ions the $p\pi - d\pi$ overlap is present in .



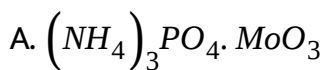
D.

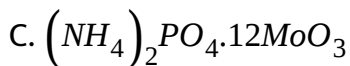
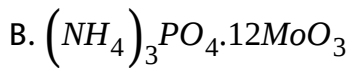
Answer: B

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43. Phosphate + conc. $HNO_3 + (NH_4)_2MoO_4$ so In \rightarrow Yellow precipitate

The composition of yellow precipitate is

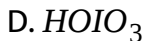




Answer: B

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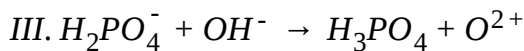
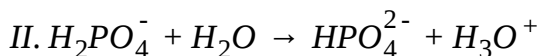
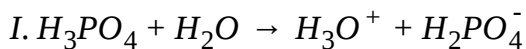
44. Concentrated HNO_3 reacts with iodine to give:



Answer: C

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45. Three reactions involving $H_2PO_4^-$ are given below



In which of the above does $H_2PO_4^-$ act as an acid?

A. (i) only

B. (ii) only

C. (iii) only

D. (i) and (ii) only

Answer: B



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1. In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl, a black precipitate is obtained. On boiling the precipitate with dil. HNO_3 , it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia to this solution gives

- A. deep blue precipitate of $Cu(OH)_2$
- B. deep blue precipitate of $[Cu(NH_3)_4]^{2+}$
- C. deep blue precipitate of $Cu(NO_3)_2$
- D. deep blue precipitate of $Cu(OH)_2 \cdot Cu(NO_3)_2$

Answer: B

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2. In a cyclotrimetaphosphoric acid molecule, how many single and double bonds are present?

A. 3 double blue bonds , 9 single bonds

B. 6 double bonds , 9 single bonds

C. 3 double bonds , 12 single bonds

D. Zero double bonds , 12 single bonds

Answer: C

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3. Which of the following elements can be involved in $p\pi - d\pi$ bonding

?

A. carbon

B. Nitrogen

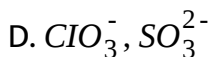
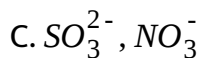
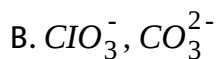
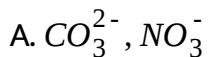
C. phosphorus

D. boron

Answer: C

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4. Which of the following pairs of ions are isoelectronic and isostructural ?



Answer: A

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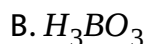
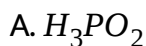
5. On heating with concentrated NaOH solution in an inert atmosphere of CO_2 , white phosphorus gives a gas. Which of the following statement is incorrect about the gas?

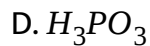
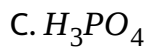
- A. It is highly poisonous and has smell like rotten fish
- B. Its solution in water decomposes in the presence of light
- C. It is more basic than NH_3
- D. It is less basic than NH_3

Answer: C

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6. Which of the following acids forms three series of salts?





Answer: C

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7. Which of the following elements does not show allotropy ?

A. Nitrogen

B. Bismuth

C. Antimony

D. Arsenic

Answer: A

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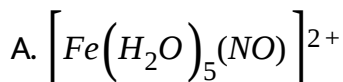
8. Which of the following statement is wrong ?

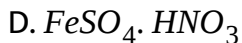
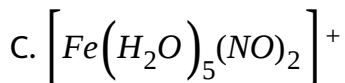
- A. Since N - N bond is stronger than the single P - P bond
- B. PH_3 can act as a ligand in the formation of coordination compound with transition elements
- C. NO_2 is paramagnetic in nature
- D. Covalency of nitrogen in N_2O_5 is four

Answer: A

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9. A brown ring is formed in the ring test for NO_3^- ion. It is due to the formation of

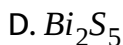
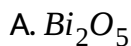




Answer: A

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10. Elements of group 15 form compounds in +5 oxidation state. However, bismuth forms only one well characterised compound in +5 oxidation state. The compound is



Answer: B

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11. In the preparation of HNO_3 , we get NO gas by catalytic oxidation of ammonia . The moles of No produced by the oxidation of two moles of NH_3 will be

A. 2

B. 3

C. 4

D. 6

Answer: A

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12. Strong reducing behaviour of H_3PO_2 is due to

- A. low oxidation state of phosphorus
- B. presence of two-OH groups and one P-H bond
- C. presence of one-OH group and two P-H bonds
- D. High electron gain enthalpy of phosphorus

Answer: C

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13. On heating ammonium dichromate and barium azide separately we get

- A. N_2 in both cases
- B. N_2 ammonium dichromate and NO with barium azide
- C. N_2O with ammonium dichromate and N_2 with barium azide
- D. N_2O with ammonium dichromate and NO_2 with barium azide

Answer: A

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14. White phosphorus (P_4) has

- A. Six P-P single bonds
- B. Four lone pairs of electrons
- C. P-P-P angle of 60°
- D. P valency is 4

Answer: A::B::C

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15. The lightning bolts in the atmosphere causes the formation of nitric oxide.

A. NO

B. HNO_2

C. HNO_3

D. NH_3

Answer: A::B::C



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16. Pyrophosphorous acid, $H_4P_2O_5$

A. It is dibasic acid

B. It is strongly reducing in nature

C. It contains one P-O-P bond

D. P is sp^3 hybridised

Answer: B::C::D



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17. Which of the following elements combines directly with nitrogen to form its nitride ?

A. Mg

B. Al

C. Li

D. Fe

Answer: A::B::C



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18. White phosphorous may be removed from red phosphorus by :

A. sublimation

B. heating with alkali solution

C. distillation

D. steam distillation

Answer: A::B::C

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19. The species having pyramidal shape is

A. PH_3

B. NH_3

C. NCl_3

D. PCl_5

Answer: A::B::C

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20. Which of the following are correct statements

A. Solid PCl_5 exists as tetrahedral $[PCl_4]^+$ and octahedral

$[PCl_6]^-$ ions

B. Solid PBr_5 exists as $[PBr_4]^+ Br^-$

C. Solid N_2O_5 exists as $NO_2^+ NO_3^-$

D. PCl_6^- is octahedral in shape

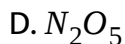
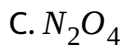
Answer: A::B::C::D

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21. The nitrogen oxide (s) that contain (s) $N - N$ bonds (s) is (are).

A. N_2O

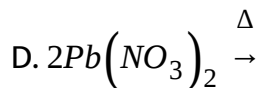
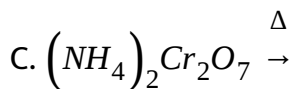
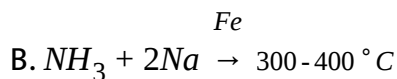
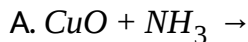
B. N_2O_3



Answer: A::B::C::D

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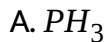
22. Which of the following reaction yield elementary gases like N_2 , H_2 , O_2 as the byproducts ?



Answer: A::B::C::D

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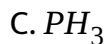
23. Which of the following hydrides is most thermally stable?



Answer: C

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24. Which of the following is most basic hydride ?



D. AsH_3

Answer: A

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25. The following are some statements related to VA group hydrides

- I) Reducing property increases from NH_3 to BiH_3
- II) Tendency to donate lone pair decreases from NH_3 to BiH_3
- III) Ease of replacing H with Cl decreases from NH_3 to BiH_3
- IV) Ease of formation of hydrides decreases from NH_3 to BiH_3

The correct statement are

A. NH_3

B. BiH_3

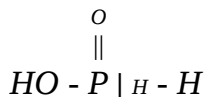
C. PH_3

D. AsH_3

Answer: B

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26. Regarding H_3PO_3 , its structure is as follows



Its basicity is one. Its salts are known as hypophosphites

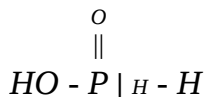
In the above structure the no. of $P\pi - d\pi$ bonds

- A. 1
- B. 2
- C. zero
- D. 3

Answer: A

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27. Regarding H_3PO_3 , its structure is as follows



Its basicity is one. Its salts are known as hypophosphites

In the above structure the no. of $P\pi - d\pi$ bonds

A. sp

B. sp^2

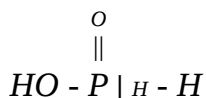
C. sp^3

D. sp^3d

Answer: C

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28. Regarding H_3PO_3 , its structure is as follows



Its basicity is one. Its salts are known as hypophosphites

In the above structure the no. of $P\pi - d\pi$ bonds

A. 1

B. 2

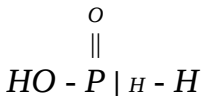
C. 3

D. zero

Answer: A

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29. Regarding H_3PO_3 , its structure is as follows



Its basicity is one. Its salts are known as hypophosphites

In the above structure the no. of $P\pi - d\pi$ bonds

A. Reducing agent

B. Dehydrating agent

C. Drying agent

D. Pickling agent

Answer: A::D

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List-I

List-II

30. A) Anhydride of HNO_2 P) N_2O_3
B) Anhydride of HNO_3 Q) NO
C) Neutral oxides R) N_2O_5
D) Paramagnetic S) NO_2
T) N_2O

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Level-I (H.W)

1. Atomicity of white phosphorus is

A. 4

B. 3

C. 2

D. 8

Answer: A



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2. Which of the following is able to form ionic compound

A. Bi

B. As

C. Sb

D. P

Answer: A

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3. The percentage of p-character in the orbitals forming $p - p$ bonds in P_4 is

A. 25

B. 33

C. 50

D. 75

Answer: D

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4. Which of the following exists in more number of allotropic forms

A. Nitrogen

B. Bismuth

C. Arsenic

D. Phosphorus

Answer: D

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5. Red phosphorous is less soluble and less volatile than white phosphorous because its structure is

A. polymerised chains

B. hexagonal rings

C. tetrahedral

D. Planar sheets

Answer: A

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6. In $Ba(H_2PO_2)_2$ the oxidation number of phosphorous is

A. +5

B. +1

C. +3

D. +4

Answer: B

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7. The oxidation state of nitrogen in hydrazine is

A. -1

B. -2

C. +1

D. +2

Answer: B

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8. Match the following :

Column-I

Column-II

a) Laughing gas

p) $H_2N_2O_2$

b) Anhydride of nitric acid

q) N_2O_3

c) Anhydride of nitrous acid

r) N_2O_5

d) Hyponitrous acid

s) N_2O

t) HNO_2

Itbgt The correct match

is

A. A B C D
s r q p

- A B C D
- B. s q r p
- A B C D
- C. s r p q
- A B C D
- D. q p r s

Answer: A

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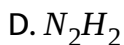
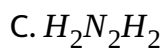
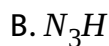
9. Nitrogen forms N_2 but phosphorus forms P_4 due to

- A. Triple bond is present between phosphorus atoms
- B. $P\pi - P\pi$ bonding is weak
- C. $P\pi - P\pi$ bonding is strong
- D. Multiple bond is formed easily

Answer: B

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10. Which of the following is least stable



Answer: D



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11. The bond angle decreases from NH_3 to BiH_3 due to

A. The decrease in basic strength

B. The decrease in bond dissociation energy

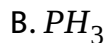
C. The decrease in electronegativity of the central atom

D. All of these

Answer: C

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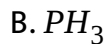
12. Which one of the following can more readily donate the lone pair ?



Answer: A

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13. The most polar compound among the following is :



Answer: A



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14. Phosphine is not obtained by the reaction

A. White P is heated with NaOH

B. Red P is heated with NaOH

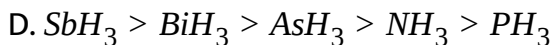
C. Ca_2P_3 reacts with water

D. Phosphorus trioxide is boiled with water under pressure.

Answer: B

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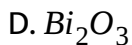
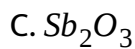
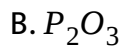
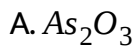
15. The correct order of reducing abilities of hydrides of group 15 elements is



Answer: A

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16. Which of the following is most acidic?



Answer: B

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17. Which of the following is a mixed acid anhydrid

A. Nitrogen (III) Oxide

B. Nitrogen (II) Oxide

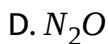
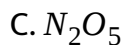
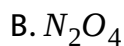
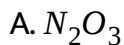
C. Nitrogen (V) Oxide

D. Nitrogen (IV) Oxide

Answer: D

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18. Which of the following oxides of nitrogen is anhydride of nitric acid ?



Answer: C

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19. Which one of the following elements does not form the compound, M_4O_{10} (M = element) ?

A. P

B. Sb

C. As

D. Bi

Answer: D

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20. Nitrous oxide is

A. Soluble in cold water

B. Soluble in hot water without decomposition

C. Acidic in nature

D. Basic in nature

Answer: A



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21. N_2O_4 reacts with water to produce

- A. N_2O and HNO_3
- B. HNO_3 and N_2O_3
- C. HNO_2 and NO
- D. HNO_2 and HNO_3

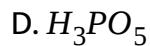
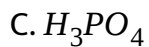
Answer: D



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22. P_4O_{10} is the anhydride of the following

- A. H_3PO_2
- B. H_3PO_3



Answer: B

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23. The V A group element that doesn't directly react with chlorine

A. N

B. As

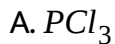
C. Sb

D. Bi

Answer: A

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24. Which of the following compounds on alkaline hydrolysis gives ketone ?

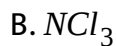
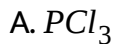


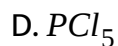
Answer: C



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25. Which of the following molecules does NOT contain a lone pair of electron ?

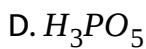
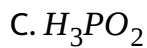
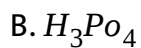
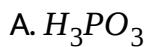




Answer: D

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26. PCl_5 on hydrolysis gives



Answer: B

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27. H_3PO_2 is the molecular formula of an acid of phosphorus. Its name and basicity respectively are

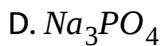
- A. Metaphosphorous acid and one
- B. Hypophosphorous acid and one
- C. Metaphosphoric acid and two
- D. Hypophosphoric acid and two

Answer: B

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28. Which of the following is a mixel salt ?

- A. Na_2HPO_4
- B. NaH_2PO_3
- C. NaH_2PO_4



Answer: D

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29. Which of the following is a tetrabasic acid?

- A. Orthophosphoric acid
- B. Orthophosphorous acid
- C. Metaphosphoric acid
- D. Pyrophosphoric acid

Answer: D

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30. The formula of meta phosphoric acid is

A. 6

B. 5

C. 4

D. 3

Answer: B

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31. The starting material used for the manufactured of HNO_3 by Ostwalds process is

A. Ammonia and N_2O

B. Ammonia

C. Air only

D. Ammonia and nitrogen

Answer: B

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32. Which of the following is rendered passive by conc. HNO_3 is

A. Al

B. Au

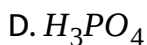
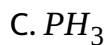
C. Zn

D. Sn

Answer: A

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33. Which of the following is used in pyrotechniques

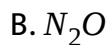


Answer: B



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34. Which of the following gas is most soluble in water ?



D. NH_3

Answer: D

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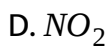
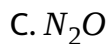
35. calcium cyanamide on treatment with steam under pressure gives ammonia and

- A. Calcium carbonate
- B. Calcium hydroxide
- C. Calcium oxide
- D. Calcium bicarbonate

Answer: A

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36. Gas obtained by heating a mixture of ammonium chloride and slaked lime is



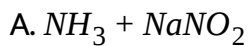
Answer: A

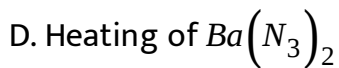
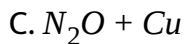
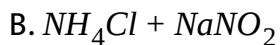


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Level-II (H.W)

1. How do we get pure N_2 gas





Answer: D

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2. One mole of calcium phosphide on reaction with excess of water give:

A. 1 mole of phosphine

B. two moles of phosphoric acid

C. two moles of phosphine

D. one mole of phosphorous pentoxide

Answer: C

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3. The p-p bond energy is x' KJ/mole. Then the energy needed for the dissociation of 124g of white phosphorous is

A. x KJ

B. $4x$ KJ

C. $6x$ KJ

D. $8x$ KJ

Answer: C

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4. The following are some statement about VA group element

I) All elements exhibits allotropy

II) Boiling points decrease down the group

III) They contain five electrons in their valency shell The correct combination is

- A. All are correct
- B. Only III is correct
- C. I & II are correct
- D. II & III are correct

Answer: B

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5. With reference to protonic acids, which of the following statements is correct

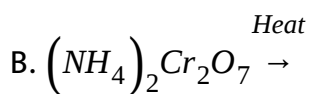
- A. PH_3 is more basic than NH_3
- B. PH_3 is less basic than NH_3
- C. PH_3 is equally basic as NH_3

D. PH_3 is amphoteric while NH_3 is basic

Answer: B

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6. A diatomic gas will be obtained in

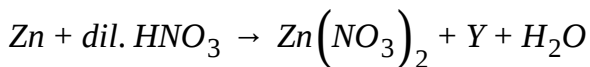
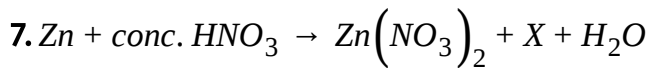


C. Both 1 & 2

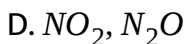
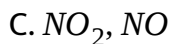
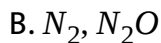
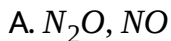


Answer: C

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Compounds X and Y are respectively:



Answer: D

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8. The statements regarding N_2 molecule are

I) The Bond energy is 945.4 KJ/mole

II) It has triple bond

III) It contains 2σ and 1π bond

The correct combination is

- A. Only II is correct
- B. I & II are correct
- C. II and III are correct
- D. All are correct

Answer: B

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9. Which of the following is not correct ?

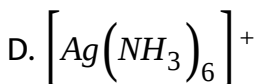
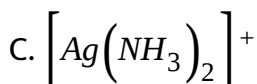
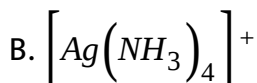
- A. Hydrolysis of NCl_3 gives NH_3 and $HOCl$
- B. NH_3 is less stable than PH_3
- C. NH_3 is weak reducing agent compared to PH_3

D. Nitric oxide in solid state exhibits diamagnetic property

Answer: B

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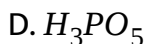
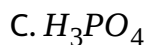
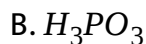
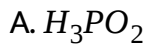
10. Silver chloride dissolves in excess of NH_4OH . The cation present in solution is.



Answer: C

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11. The oxyacid of phosphorous which has more non-ionisable hydrogens



Answer: A

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12. The following are some statements related to VA group hydrides

I) Reducing property increases from NH_3 to BiH_3

II) Tendency to donate lone pair decreases from NH_3 to BiH_3

III) Ease of replacing H with Cl decreases from NH_3 to BiH_3

IV) Ease of formation of hydrides decreases from NH_3 to BiH_3

The correct statement are

A. I,II,III,IV

B. I,III and IV

C. I, II and IV

D. I and IV

Answer: A

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13. The number of Oxygen atoms surroundings each Nitrogebn atom in N_2O_5 is

A. 2

B. 3

C. 4

D. 5

Answer: B

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14. Oxide of nitrogen used as one of the constituents in making anesthetics is

A. Nitric Oxide

B. Nitrogen dioxide

C. Nitrous Oxide

D. Dinitrogen Pentoxide

Answer: C

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15. The number of bridge oxygen atoms present in both P_4O_6 and P_4O_{10} are respectively

A. 4, 6

B. 4, 4

C. 6, 6

D. 6, 4

Answer: D



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16. The number of of P-O bonds and lone pair of electrons present in P_4O_6 molecule

A. 12, 16

B. 12, 12

C. 8, 8

D. 12, 4

Answer: A

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List-1

List-2

- A) NO 1) Colourless and paramagnetic
B) NO_2 2) Greenish yellow gas
17. C) N_2O_3 3) Reddish brown and paramagnetic
D) N_2O_5 4) Anhydride of Nitric acid
 5) Anhydride of Nitrous acid

The correct match is

A B C D
A. 2 4 5 1

A B C D
B. 1 3 5 4

A B C D
C. 3 2 1 5

A B C D
D. 1 4 4 3

Answer: B

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List-1

List-2

18. A) $HCl_3 + H_2O \rightarrow$ 1) $HOCl$
B) $PCl_3 + H_2O \rightarrow$ 2) H_3PO_3
C) $PCl_5 + H_2O \rightarrow$ 3) H_3PO_4
D) $PF_3 + H_2O \rightarrow$ 4) H_3PO_2

The correct match is

- A B C D
A. 1 2 3 5
B. 2 4 2 5
C. A B C D
3 2 1 4
D. A B C D
5 3 2 1

Answer: A

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19. When orthophosphoric acid is heated to 873K, the product formed is

- A. Phosphine, PH_3
- B. Phosphorous trioxide, P_2O_3
- C. Phosphorous acid, H_3PO_3
- D. Metaphosphoric acid, HPO_3

Answer: D



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20. N_2 forms NCl_3 whereas P can form both PCl_3 and PCl_5 . Why?

- A. P has d-orbitals which can be used for bonding but N_2 does not have
- B. N atom is large than P in size

C. P is more reactive towards Cl than N

D. None of the above

Answer: A

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21. The number of P-O-P bonds in cyclic trimetaphosphoric acid is :

A. zero

B. two

C. three

D. four

Answer: C

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22. The following are some statements about HNO_2

I) Its undissociated forms are tautomers

II) Its undissociated forms are resonance structures

III) Its anhydride in pure state exists as pale blue solid and that melts to deep blue liquid

The correct combination is

A. All are correct

B. i,iii are correct

C. ii,iii are correct

D. i,ii are correct

Answer: B

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23. In H_3PO_3 molecule

A. P-atom is surrounded by three -OH groups

B. P-atom is tetrahedrally surrounded by two -OH groups, one oxygen atom and one hydrogen atom

C. P-atom is surrounded by four -OH groups

D. P-atom is surrounded by two -H atoms

Answer: B



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24. The following are some statements about oxyacids of VA group elements

I) The salt of nitric contains NO_3^- ion

II) The salt of phosphoric acid contains PO_4^{3-} ion

III) Salts of meta phosphoric acid contains HPO_3^{2-} ion

The correct combination is

- A. All are correct
- B. I, III are correct
- C. II, III are correct
- D. I, II are correct

Answer: D

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25. In solid state PCl_5 exists as ionic solid i.e., $[X]^+[Y]^-$, shapes of X^+ and Y^- are respectively

- A. Tetrahedral, Pyramidal
- B. Tetrahedral, Octahedral
- C. Octahedral, Linear
- D. Octahedral, Trigonal bipyramidal

Answer: B

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26. Which of the following is incorrect ?

- A. NO_2 is acidic paramagnetic oxide
- B. NO gas is formed during lightening state
- C. N_2O_4 is a mixed anhydride
- D. Heating of ammonium nitrate forms a brown coloured paramagnetic gas

Answer: D

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27. The number of $P - O - P$ bonds in cyclotrimetaphosphoric acid, $(HPO_3)_3$ is

A. phosphoric acid is

B. 3

C. 9

D. 6

Answer: D

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28. A mixture of potassium nitrite and ammonium chloride on heating liberates the gas

A. O_2

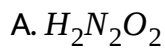
B. N_2O



Answer: D

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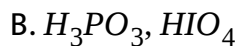
29. Which of the following act both as oxidant & reductant :-



Answer: B

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30. Concentrated nitric acid oxidises phosphorous and iodine, respectively to



Answer: C

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31. (A) : HN_3 on gently heating gives N_2O

(R) : N_2O is acidic in nature

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: C

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32. Assertion : HNO_3 is a stronger acid than HNO_2

Reason: In HNO_3 , there are two nitrogen to oxygen bonds while in HNO_2 there is only one.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: B



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33. Statement -1 : Na_2HPO_3 is not an acid salt.

Statement -2 : Na_2HPO_3 on heating decomposes to give phosphine gas and a mixture of phosphates.

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: B

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34. The structures of O_3 and N_3^- are:

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: B

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35. Mixture of conc. HNO_3 and conc. H_2SO_4 is known as

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: D

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36. Halogen with lowest bond dissociation energy is

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: C

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37. (A) : White phosphorous is less reactive than red phosphorous

(R) : White phosphorous has more bond angle strain than red phosphorous

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: D



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38. The neutral oxide is

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: B



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39. Among the oxides of nitrogen N_2O , NO and NO_2 , molecules with unpaired electrons are:

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true and (R) is false
- D. (A) is false but (R) is true

Answer: C



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40. (A) : The basicity of orthophosphorous acid is two

(R) : In orthophosphorous acid, two replacable hydrogen atoms are present

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

D. (A) is false but (R) is true

Answer: A



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41. (A) : Nitrogen cannot form pentahalides

(R) : Nitrogen cannot expand its octet configuration, due to absence of empty d-orbitals.

A. Both (A) and (R) are true and (R) is the correct explanation of

(A)

B. Both (A) and (R) are true and (R) is not the correct explanation

of (A)

C. (A) is true and (R) is false

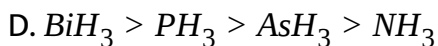
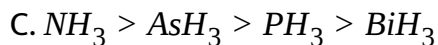
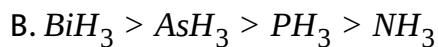
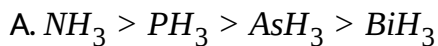
D. (A) is false but (R) is true

Answer: A

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Level-V

1. The correct order of ease of formation of hydrides, and their stabilities is :



Answer: A

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2. Which readily form $p\pi - p\pi$ multiple bonds with itself and with C and O among VA group elements ?

A. P, As

B. N, As

C. N, P

D. N

Answer: D



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3. All of the following are bases except

A. N_2H_4

B. NH_2OH

C. NH_3

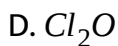
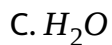
D. N_3H

Answer: D



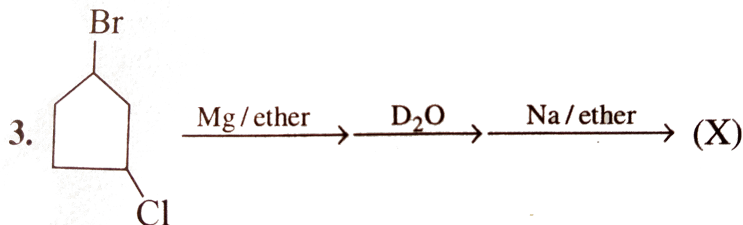
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4. Molecule with a three electron bond is :



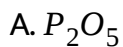
Answer: B

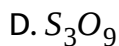
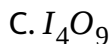
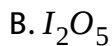
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5.

The compound (X) is:





Answer: A

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6. $(NH_4)_2Cr_2O_7$ on heating gives a gas which is also given by :

A. heating NH_4NO_2

B. heating NH_4NO_3

C. treating Mg_3N_2 with water

D. heating H_2O_2 and $NaNO_2$

Answer: A

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7. P_4O_{10} has short and long $P - O$ bonds. The number of short $P - O$ bonds in this compounds is

A. 1

B. 2

C. 3

D. 4

Answer: D



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8. Number of hybrid orbitls around phosphorous in $Ca_5[PO_4]_3[OH]$

A. 3

B. 4

C. 5

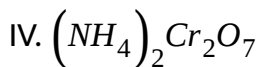
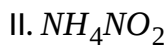
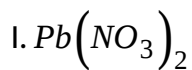
D. 6

Answer: B



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9. Which of the following salts produces nitrogen by decomposition ?



A. I and III only

B. II and III only

C. I, III and IV only

D. II, III and IV only

Answer: D

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10. Pickout incorrect statement ?

- A. Pyrophosphoric acid can be obtained by heating orthophosphorus
- B. Orthophosphorous can be obtained by reacting P_4O_6 with water
- C. Orthophosphoric acid can be obtained by reacting P_4O_{10} with water
- D. Metaphosphoric acid is obtained by the dehydration of orthophosphoric acid at $316^\circ C$

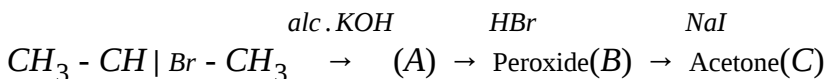
Answer: A

11. Which of the following statements is not correct ?

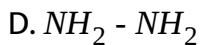
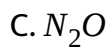
- A. NO_2 is the mixed anhydride of nitrous acid and nitric acid
- B. $CaC_2 + Ca_3P_2$ mixture is used as Holme's signal
- C. The P-P-P bond angle in white phosphorous is 120°
- D. A mixture of NH_3 and air and at about $800^\circ C$ in the presence of Pt catalyst, forms NO

Answer: C

12. In the reaction ,

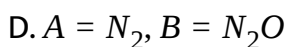
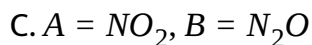
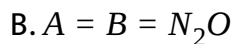
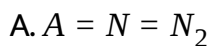
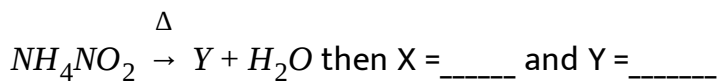
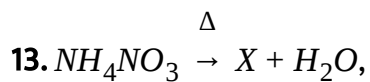


The compound (C) is :



Answer: A

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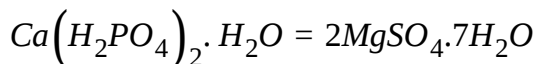


Answer: D

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14. Choose the correct combination of the following

A. Superphosphate of lime :



B. Triple phosphate : $Ca(H_2PO_4)_2$

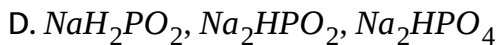
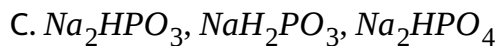
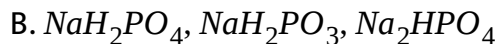
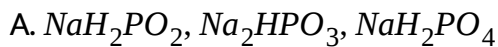
C. Thomas slag : $P_4O_{10} + Ca_3(PO_4)_2 + Ca(NO_3)_2$

D. Nitrophosphate : $Ca_3(PO_4)_2 + 2Ca(NO_3)_2$

Answer: B

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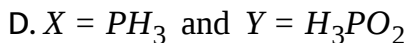
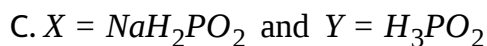
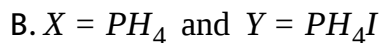
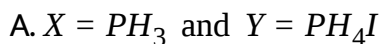
15. Which is a set of acid salts and can react with base?



Answer: B

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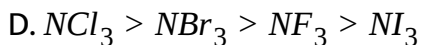
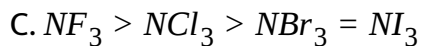
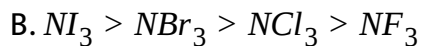
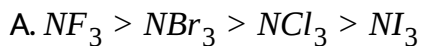
16. A white solid X reacts with dil. HCl to give colourless gas which is used in fire extinguishers. The solid X is



Answer: A

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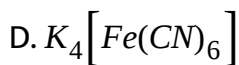
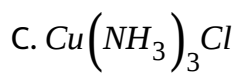
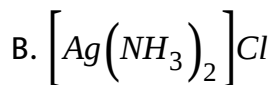
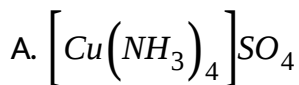
17. The tendency of nitrogen halides to act as Lewis bases decreases in the order



Answer: B

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18. Schweitzer's reagent is :



Answer: A

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19. The tendency to form complexes is maximum for

A. N

B. Bi

C. As

D. P

Answer: A



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20. Which readily form $p\pi - p\pi$ multiple bonds with itself and with C and O among VA group elements ?

- A. oxides of nitrogen
- B. halides of nitrogen
- C. oxides of phosphorous
- D. halides of phosphorous

Answer: A



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21. A metal 'M' reacts with aqua regia gives corresponding acid but does not react with nitric acid. The metal is :

A. Cu

B. Hg

C. Au

D. Ag

Answer: C

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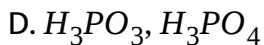
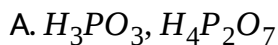
22. Which of the following statements is not correct ?

- A. Nitrogen forms triple bonds whereas phosphorous does not exisy (unstable) as $P = P$
- B. The N - N (single) bond is stronger than P - P (single bond)
- C. Red phosphorous is less reactive than white phosphorous
- D. The catenation capacity of nitrogen is less than phosphorous

Answer: B

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23. What is the hydrolysis product of hypophosphoric acid ?



Answer: D

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24. Which phosphine is bubbled through a solution of silver nitrate, the compound formed is :

A. Silver phosphide

B. Silver oxide

C. Sylvine

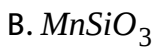
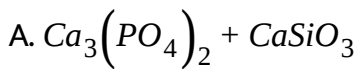
D. Horn silver

Answer: A



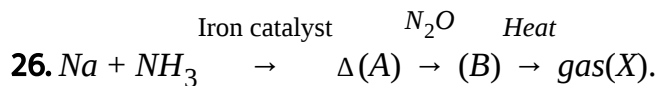
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25. Thonas Slag is



Answer: A

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Which of the following is correct ?

- A. (B) is an amphoteric oxide
- B. (X) is a colourless, diamagnetic gas which combines with *Al* on heating
- C. (X) can be produced by action of (Zn+NaOH) on $NaNO_2$
- D. (X) is coloured, paramagnetic gas which combines with *Al* on heating

Answer: B

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27. Identify the incorrect statement from the following

- A. N_2 is formed when ammonia reacts with excess of Cl_2
- B. Ammonia on passing over hot CuO , liberates nitrogen gas
- C. When chlorine reacts with excess ammonia, nitrogen is liberated
- D. P_4O_{10} is known as phosphoric anhydride

Answer: A



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28. Solid N_2O_5 consists of

- A. Linear NO_2^+ and planar NO_3^-
- B. Nonionic polymeric units

C. NO^+ and tetrahedral NO_4^-

D. Nonionic and diameric units only

Answer: A

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29. Choose incorrect statement :

A. NO is a paramagnetic gas

B. NO_2 is paramagnetic and coloured

C. NO_2 is a mixed anhydride

D. N_2O forms hyponitrites with alkalies

Answer: D

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30. Using *MOT* predict which of the following species has the shortest bond length ? .

A. NO

B. NO^-

C. NO^+

D. N_2O

Answer: C



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31. Which of the following compounds does not liberate nitrogen with HNO_2 ?

A. ammonium dichromate

B. ammonium carbonate

C. ammonium nitrite

D. barium azide

Answer: B

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32. Dinitrogen tetroxide (N_2O_4) has _____.

A. two unpaired electrons and is paramagnetic

B. two unpaired electrons and is diamagnetic

C. one unpaired electron and is paramagnetic

D. no unpaired electrons and is diamagnetic

Answer: D

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33. Red phosphorus is chemically less reactive because

- A. it does not contain P - P bonds
- B. It does not contain tetrahedral P_4 molecules
- C. It does not catch fire in air even upto $400^\circ C$
- D. It has a polymeric structure

Answer: D

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34. Phosphine reacts with copper sulphate solution to form

- A. Copper phosphide (Cu_3P_2)
- B. Copper phosphate
- C. Copper phosphite
- D. Copper pyrophosphate

Answer: A

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35. Bones glow in dark. This is due to

- A. the presence of red phosphorous
- B. conversion of white phosphorous to rest phosphorous
- C. slow combustion of white phosphorous in contact with air
- D. conversion of red phosphorous into white phosphorous

Answer: C

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36. Nitrozen (i) oxide is produced by

- A. thermal decomposition of sodium nitrite at low temperature
- B. thermal decomposition of ammonium nitrite
- C. disproportionation of N_2O_4
- D. interaction of hydroxyl amine with nitrous acid

Answer: D

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37. PH_3 is purified by

- A. Adsorbing on HI to form phosphonium iodide which on heating with KOH gives pure phosphine
- B. Adsorbing on Nu surface
- C. By passing over CaO
- D. All the above

Answer: A

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38. In solid state PCl_5 is a

A. i,ii,iii

B. i,iii,iv

C. i, iii

D. i,ii,iii,iv

Answer: C

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39. White $P_4 \xrightarrow{NaOH} H_2OA + B, B \xrightarrow{O_2} C$ Which of the following is correct for the reaction, if 'C' is tribasic oxyacid of phosphorus

A. Both A and B are have same basicity

B. Both A and B have P-P bonds

C. A has P - P bond and its basicity is 4

D. B has P - P bond and its basicity is 1

Answer: C

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40. Oxidation state of phosphorus in pyrophosphoric acid is

A. +3, + 5, + 5

B. +1, + 3, + 5

C. +3, + 3, + 5

D. +5, + 5, + 1

Answer: B

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41. Correctly matched :

	P = O	P - OH	P - H
	bonds	bonds	bonds
A.	H_3PO_3	1	3
		0	
	P = O	P - OH	P - H
	bonds	bonds	bonds
B.	$\text{H}_4\text{P}_2\text{O}_6$	2	4
		1	
	P = O	P - OH	P - H
	bonds	bonds	bonds
C.	H_3PO_2	1	1
		2	
	P = O	P - OH	P - H
	bonds	bonds	bonds
D.	$\text{H}_4\text{P}_2\text{O}_7$	2	2
		0	

Answer: C

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42. Incorrect statements about cyclotrimetaphosphoric acid are

- (i) six π bonds
- (ii) three π bonds
- (iii) absence of P - O - P bonds
- (iv) absence of P - P bonds
- (v) Three P - H bonds

A. i,iii,v

B. i,iv,v

C. ii,iii,iv

D. i,iii,iv

Answer: A



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43. Which of the following is true about prions

- A. Hydrolysis of urea does not give ammonia
- B. Moist ammonia can not be dried by CaO
- C. In Haber process, Fe catalyst is promoted by small amounts of a mixture of K_2O and Al_2O_3
- D. In the cyanamide process, nitrolium mixture is formed.
- Nitrolium is a mixture of calcium cyanide and graphite

Answer: C

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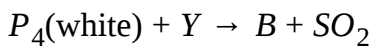
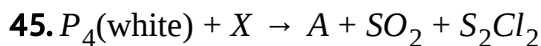
44. Bond angle in PH_3 is

- A. i,ii,v
- B. i,ii,iii,iv,v
- C. ii,iv,v

D. i,ii,iv,v,vi

Answer: C

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Then identify Y and A ?

A. $Y = SOCl_2$, $A =$ colourless oily liquid

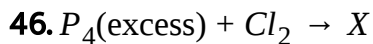
B. $Y = SO_2Cl_2$, $A =$ colourless oily liquid

C. $Y = SOCl_2$, $A =$ Yellowish white powder

D. $Y = SO_2Cl_2$, $A =$ Y Yellow white powder

Answer: B

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Then the correct statement is

- A. Hydrolysis of X and Y forms oxyacids of phosphorus having equal reducing nature
- B. Hydrolysis of X and Y forms oxyacids of phosphorus contains equal number of π bonds
- C. Hydrolysis of X and Y form oxyacids of phosphorus which have equal basicity
- D. Hydrolysis of X and Y form oxyacids of phosphorus of X and Y form oxyacids of phosphorus which have equal oxidation state of phosphorus atoms.

Answer: B



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47. Which of the following statements is//are correct?

I. B_2O_3 is an acidic oxide

II. Ga_2O_3 and Al_2O_3 are amphoteric oxides.

III. In_2O_3 and Tl_2O_3 are basic oxides.

A. i,ii & iii

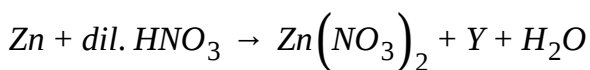
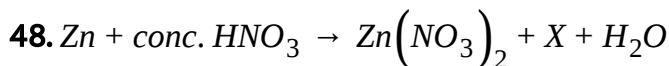
B. ii, iii & iv

C. i,ii & iv

D. i,ii,iii,iv

Answer: B

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Compounds X and Y are respectively:

A. NO_2 , NO , N_2O , NO

B. NO , NO , NO_2 , NO_2

C. NO_2 , NO_2 , NO_2 , NO_2

D. NO , NO_2 , N_2O , NO_2

Answer: D

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49. On treatment with cold water, an element (A) reacts readily liberating a colourless, odourless gas (B) and a solution (C). Lithium is reacted with (B) yielding a solid product (D) which effervesces with water to give a strongly basic solution (E). When CO_2 gas is bubbled through solution (C), a white ppt. (F) is formed but this redissolves forming solution (G) when more CO_2 is passed. Precipitate (F) effervesces when moistened with conc. HCl and give

deep red colouration to Bunsen burner flame. (F) on heating with excess of carbon at 2000°C give (H).

Answer the following question on the basis of above passage.

Q. Solution (G) contains a salt which

(i) causes permanent hardness of water

(ii) can not be obtained in solid state

(iii) causes temporary hardness of water

(iv) can be obtained in solid state

Select the correct statements :

A. i,ii, iv

B. ii,iv

C. i,ii,iii

D. i,ii,iii,iv

Answer: D



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50. Which of the following is incorrect ?

A. NO_2 is acidic paramagnetic oxide

B. NO gas is formed during lightening state

C. N_2O_4 is mixed anhydride

D. Heating of ammonium nitrate forms a brown coloured paramagnetic gas

Answer: D



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51. Which of the following is correct for P_4 molecule of white phosphorus ?

A. i,ii,iii

B. iii,iv

C. i, iv

D. ii, iii,iv

Answer: C



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52. Name the two parts of a plant through which its gaseous waste products are released into the air

A. i,iii

B. ii,iii

C. ii,iv

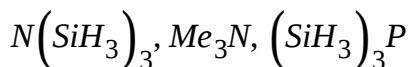
D. i,iv

Answer: D



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53. The geometry with respect to the central atom of the following molecules are



- A. planar, pyramidal, pyramidal
- B. pyramidal, planar, pyramidal
- C. planar, pyramidal, planar
- D. planar, planar, planar

Answer: A



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54. Which of the following would produce cyclic silicon on hydrolysis?

- A. NF_3, PCl_3

B. PF_3, PCl_3

C. $PCl_3, AsCl_3$

D. NF_3, NCl_3

Answer: C

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55. Which of the following is/are correct statement(s)?

A. Phosphine is readily obtained when red phosphorus is reacted with NaOH at room temperature

B. At room temperature N_2O_3 dissociates into two neutral oxides of nitrogen

C. Hydrolysis product of pyrophosphoric acid is orthophosphoric acid

D. Solid PCl_5 and PBr_5 are ionic and exists as $PX_4^+ PX_6^-$ while PI_5

does not exists as such

Answer: C

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56. Select the incorrect statement

- A. N_2O with sodium metal in liquid ammonia forms sodium azide and nitrogen gas is liberated
- B. Ammonia is oxidised to nitrogen by dilute solution of $NaOCl$ in presence of glue
- C. $(NH_4)_2Cr_2O_7$ on heating decomposes to give nitrogen and a green coloured compound.

D. CaNCN on hydrolysis produces a white precipitate and a gas which turns filter paper moistened with copper sulphate solution deep blue

Answer: B

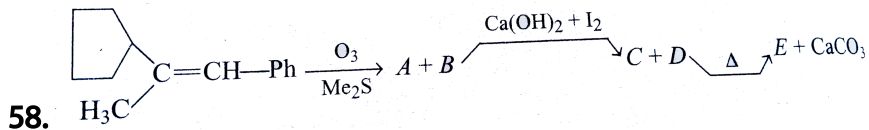
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57. Which of the following statement is incorrect ?

- A. PCl_5 produces POCl_3 as intermediate product during hydrolysis
- B. BCl_3 produces B(OH)_3 during alkaline hydrolysis
- C. SiH_4 gives rise to hydrogen gas during alkaline hydrolysis
- D. One molecule of N_2O_5 produces two molecules of HNO_3 during hydrolysis

Answer: B

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\xrightarrow{NaOH}
 $A + B \rightarrow \Delta$ Product :

A. (i) > (ii) > (iii)

B. (iii) > (ii) > (i)

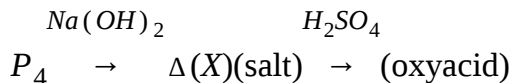
C. (ii) > (i) > (iii)

D. (ii) > (iii) > (i)

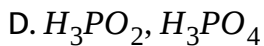
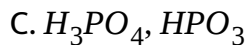
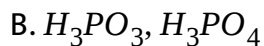
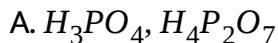
Answer: B

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59. Consider the following sequences of reaction :



In the above sequence of reactions Y and A are respectively :



Answer: D

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60. In which of the following reactions is there a change in the oxidation number of nitrogen atom?

A. heating of ammonium nitrate

B. Heating of barium nitrate

C. Reaction of Ca_3N_2 with HCl

D. Heating of ammonium nitrite

Answer: C

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61. Tetrametaphosphoric acid and tetrapolyphosphoric acid have same

A. number of P-O-H bond

B. number of P = O bonds

C. number of P - O - P bonds

D. number of P - H bonds

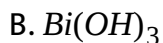
Answer: B



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62. A solution of $BiCl_3$ in conc. HCl when diluted with water gives white ppt.

$BiCl_3$ is insoluble in dil. HCl

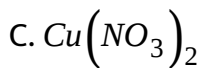
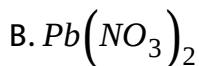


Answer: D



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63. NO_2 can be obtained by heating



Answer: B::C::D

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64. Correct statement(s) among the following is/are :

A. Solid PCl_5 exists as tetrahedral $[PCl_4]^+$ and octahedral $[PCl_6]^-$ ions

B. Solid PBr_5 exists as $[PBr_4]^+ Br^-$

C. Cold, dilute HNO_3 on reaction with copper gives nitric oxide

D. Oxides of phosphorous exist as monomers

Answer: A::B::C

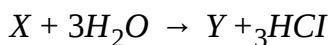
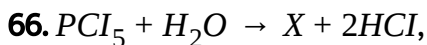
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65. When white phosphorous is reacted with caustic soda.

- A. PH_3 and NaH_2PO_2 are formed
- B. P_2O_5 and Na_2HPO_3 are formed
- C. This reaction is an example of oxidation and reduction
- D. This reaction is an example of neutralisation

Answer: A::C

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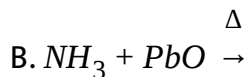
X and Y have same

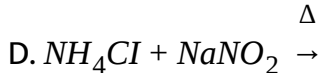
- A. shape
- B. hybridisation for central atom
- C. same number of σ bonds
- D. same number of π bonds

Answer: A::B::D

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67. Which of the following will not liberate nitrogen gas on treatment with HNO_2 at $0.^\circ C$?





Answer: A::B::C::D

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68. N_2O_4 reacts with water to produce

A. It can give the brown ring test for nitrate

B. It reacts with $AgNO_3$ to give white ppt

C. It decolorises $KMnO_4$ solution

D. After treatment with $AgNO_3$, ppt is filtered and filtrate is treated with $Zn + AcOH$, and the resulting solution does not respond towards Grignard test.

Answer: B::C

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69. Which of the following on hydrolysis produces ammonia?

A. CaNCN

B. Borazine

C. Li_3N

D. NCl_3

Answer: A::B::C::D

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70. Which of the following undergoes hydrolysis ?

A. NCl_3

B. CCl_4

C. PCl_3

D. SiCl_4

Answer: A::C::D

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71. Nitrogen dioxide can be obtained by heating

A. $\text{Pb}(\text{NO}_3)_2$

B. LiNO_3

C. AgNO_3

D. $\text{Ca}(\text{NO}_3)_2$

Answer: A::B::C::D

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72. On strong heating lead nitrate gives

A. PbO

B. NO_2

C. O_2

D. NO

Answer: A::B::C

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73. Select correct order between following compounds:

A. $NH_3 > PH_3$: bond angle

B. $NH_3 > NF_3$: dipole moment

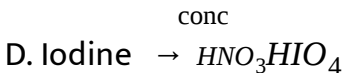
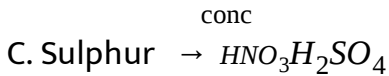
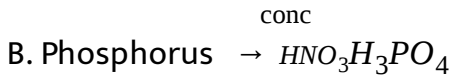
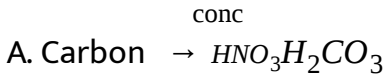
C. $NH_3 > NF_3$: reactivity towards Lewis acid

D. $NH_3 < NF_3$: dipole moment

Answer: A::B::C

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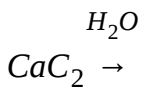
74. A test particle is moving in a circular orbit in the gravitational field produced by a mass density $\rho(r) = \frac{K}{r^2}$. Identify the correct relation between the radius R of the particle's orbit and its period T:



Answer: A::B::C

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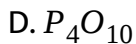
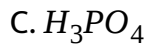
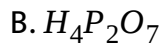
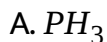
75. Complete the following :



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76. $\text{H}_3\text{PO}_4 \xrightarrow{\Delta} X \xrightarrow{\Delta} Y$ gives a white precipitate with silver nitrate solution.

X is a



Answer: C::D

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77. Which of the following pairs produce same gas?

- A. NH_4NO_3 on heating and $Hg(NO_3)_2$ on heating
- B. NH_4Cl on heating and $CaCN_2 + H_2O$
- C. $Ca_3N_2 +$ dilute HCl and NH_4NO_2 on heating
- D. $(NH_4)_2Cr_2O_7$ on heating and NH_4NO_2 on heating

Answer: B::D



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78. Which of the following are dissimilarities between $H_4P_4O_{12}$ and $H_4P_2O_7$?

- A. Total number of atoms directly bonded by each phosphorous atom

B. Type of linkage ($X - O - X / X - X$) ($X = P$)

C. Number of $P - O - P$ linkages

D. Structure

Answer: C::D

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79. Select incorrect statement(s)

A. Bismuth (III) compounds are more stable than antimony (III) compounds

B. Bismuth (III) compounds are less stable as compared to its compounds in its other oxidation state.

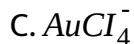
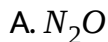
C. Bismuth (III) chloride acts as strong reducing agent

D. Bismuth (III) chloride solution on dilution produce bismuth hypochlorite

Answer: B::C

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80. Mixture of gold and platinum when react with aqua regia it produce



Answer: B::C::D

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81. Ammonium nitrate decomposes on heating into

A. conce HNO_3

B. NH_4OH

C. dilute HNO_3

D. very dilute HNO_3

Answer: C::D



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82. Which chloride is not appreciably hydrolysed by water

A. $BiCl_3$

B. PCl_3

C. $AsCl_3$



Answer: A::D

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83. Match each of the reactions given in Column I with the corresponding product(s) given in Column II.

Column I

- (A) $Cu + dil\ HNO_3$
- (B) $Cu + conc\ HNO_3$
- (C) $Zn + dil\ HNO_3$
- (D) $Zn + conc\ HNO_3$

Column II

- (p) NO
- (q) NO_2
- (r) N_2O
- (s) $Cu(NO_3)_2$
- (t) $Zn(NO_3)_2$

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84. Match the following:

Match the following:

Column I

- a) NO_2
- b) N_2O
- c) NO
- d) N_2O_5

Column II

- p) paramagnetic
- q) neutral oxide
- r) acidic oxide
- s) mixed anhydride
- t) contains N-N linkage



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85. Match the following:

Match the following:

Column I

- a) $\text{Mg} + \text{dilHNO}_3 \rightarrow$
- b) $\text{Zn} + \text{dilHNO}_3 \rightarrow$
- c) $\text{Sn} + \text{dilHNO}_3 \rightarrow$
- d) $\text{Pb} + \text{dilHNO}_3 \rightarrow$

Column II

- p) NO
- q) H_2
- r) N_2O
- s) NH_4NO_3



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86. Match the following:

Match the following:

Column I

Column II



p) monobasic



q) dibasic



r) tribasic



s) sp^3 – hybridised central atom



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87. Match the following:

Match the following:

Column I

Column II



p) aqua fortis



q) acts as both reducing and oxidising agent



r) photosensitive



s) stabilizer for H_2O_2

t) transparent glassy solid



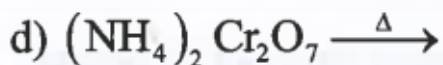
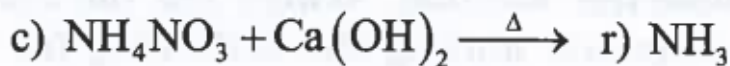
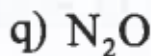
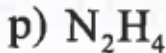
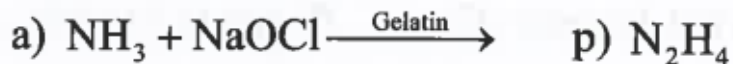
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88. Match the following:

Match the following:

Column I

Column II



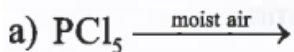
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89. Match the following:

89. Match the following:

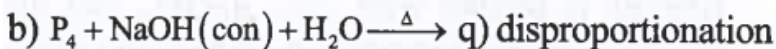
Column I

Column II

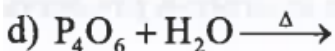


p) one of the product

has sp^3 hybridisation



r) hydrolysis



s) One of the product

has $\text{p}\pi - \text{d}\pi$ bonding

t) One of the product is tribasic



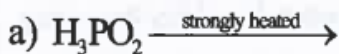
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90. Match the following:

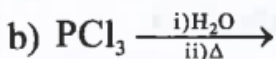
90. Match the following:

Column I

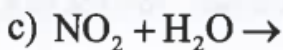
Column II



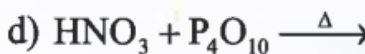
p) One of the products acts as reducing agent



q) One of the products is tribasic



r) Dehydration



s) In one of the products the central atom is in + 5 oxidation state

t) Disproportionation

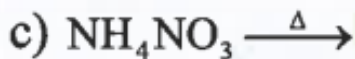
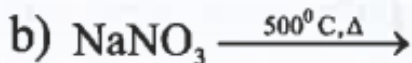
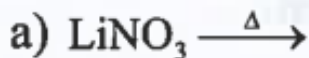


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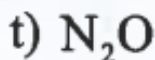
91. Match the following:

Match the following:

Column I



Column II



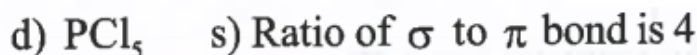
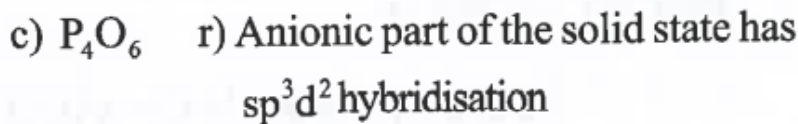
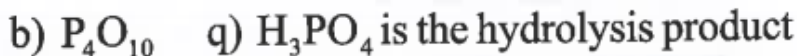
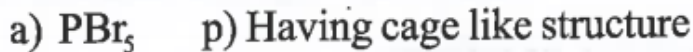
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92. Match the following:

Match the following:

Column I

Column II



93. Match the following:

Match the following:

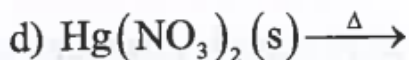
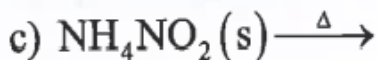
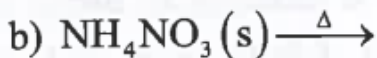
Column I **Column II**

- | | |
|---------------------------|--|
| a) NO_2 | p) Diamagnetic |
| b) N_2O | q) Neutral to litmus |
| c) N_2O_5 | r) Mixed anhydride |
| d) NO | s) $\text{N}-\text{O}-\text{N}$ bond is present in its structure |
| | t) produced when very cold blue liquid(binary compound is placed at room temperature |

94. Match the following

Match the following:

Column I:



Column II:

p) no residue is obtained

q) Brown gas is produced

r) Same gas is obtained by reaction of calcium nitride with water

s) N_2 is not produced

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95. Assertion NCl_3 reacts with water but NF_3 is inert towards hydrolysis

Reasoning Nitrogen does not possess vacant d-orbitals.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: A

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96. Assertion (A) : PH_3 is more basic than NH_3

Reason (R) : EN of N is more than that of P

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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97. Assertion : Bond energy and bond dissociation energy have identical value for diatomic molecules.

Reason : Greater the bond dissociation energy, less reactive is the bond.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: D

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98. Liquid ammonia is used for refrigeration because

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: B

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99. N_2O is an acid anhydride of HNO_3 .

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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100. Assertion: White phosphorous is more stable than red phosphorous

Reason: Red phosphorous exists in polymeric state

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: D

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101. Why is N_2O_5 more acidic than N_2O_3 ?

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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102. Assertion: Nitric oxide is paramagnetic in the liquid and solid states.

Reason: Nitric oxide is an odd electron molecule and the gas is paramagnetic.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: D

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103. Ammonium salts give a brown precipitate with Nessler's reagent due to the formation of _____.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: B

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104. Assertion: Na_2HPO_3 is an acidic salt

Reason: An acidic salt contains an ionisable proton.

- A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: B

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105. Anisole with conc. HNO_3 and conc. H_2SO_4 gives

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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106. The State of hybridisation of phosphorus ($Z=15$) in phosphate ion

(PO_4^{3-}) is the same as

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: C

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107. Assertion: Phosphorous acid is a dibasic acid

Reason: In phosphorous acid, there are two H-atoms directly attached to phosphorous.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: C

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108. Assertion BF_3 has greater dipole moment than H_2S

Reasoning Fluorine is more electronegative than sulphur .

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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109. Assertion: White phosphorous is more stable than red phosphorous

Reason: Red phosphorous exists in polymeric state

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: B

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110. The sum of basicities of H_3PO_4 , H_3PO_3 and H_3PO_2 is

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: D

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111. The neutral oxide is

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: B

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112. In $H_6P_6O_{18}$, P_4O_{10} how many $P - O - P$ bonds are present respectively?

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113. Number of σ and π bonds present in :

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114. Boric acid on heating at 100°C , gives (X). (X) on heating at 160°C gives (Y) and (Y) on heating at red hot gives (Z). Identify (X), (Y) and (Z).

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115. White phosphorus when heated with conc. NaOH solution in an inert atmosphere of CO_2 , forms phosphine and a sodium salt of oxoacid of phosphorus X. The oxidation state of phosphorus in X' is

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116. Among the oxyacids of phosphorous the dibasic acid is

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117. Explain the bond lengths of all P-Cl bonds in PCl_5 molecule.

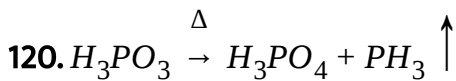
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118. Number of explosive products formed when NH_3 react with excess chlorine

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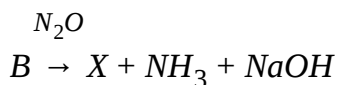
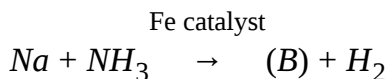
119. Find the total number of P-S-P linkages in P_4S_{10} ?

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121. Let us consider the following conversion:

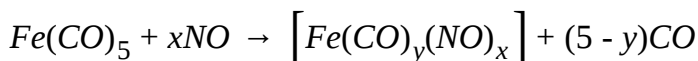


In one molecule of X how many atoms of nitrogen are present?

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122. Nitric oxide (NO) which often acts as a three electron donating ligand reacts with

$Fe(CO)_5$ as follows:



The value of $x + y$ is:

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123. The number of peroxy bonds present in pyrophosphoric acid:

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124. How many moles of PH_3 can be obtained by disproportionating 1 mole of P_4 (white) in an $NaOH$ solution?

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125. Basicity of boric acid + Basicity of H_3PO_2 + Basicity of H_3PO_3 is:

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126. Orthophosphoric acid + Phosphoryl chloride \rightarrow Strong acid
+ weak acid Oxidation state of phosphorus atom in weak acid is:

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127. Number of $B - O - B$ linkages in borax is 'x' and number of
 $P - O - P$ linkages in P_4O_{10} is 'y', then $(y - x)$ is:

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128. How many moles of PH_3 gas is produced when 1 mole of calcium
phosphide reacts with excess of water?

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129. Nitrogen forms largest number of oxides in which oxidation state of nitrogen varies from +1 to +5 N_2O , NO , N_2O_3 , N_2O_4 and N_2O_5 respectively. The largest number of oxides are formed due to capability of forming stable multiple bonds by nitrogen with oxygen.

Q. Which of the following statements is/are correct regarding oxides of nitrogen?

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130. Number of moles of $NaOH$ required for complete neutralization of H^+ in solution which is formed by complete hydrolysis of 1 mole of PCl_5

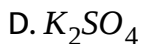
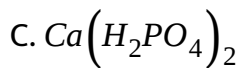
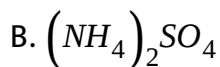
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131. Total number of moles of $P - H$ bond(s) in product(s) when one mole of white P_4 completely reacts with KOH solution:

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132. Compound 'A' with -3 and +5 oxidation states on the central atom (s) gives +1 oxidation compound 'B' on heating. 'B' is a stable neutral and linear molecule and isoelectronic with CO_2 . On heating 'B' at $500 - 900^\circ C$, a molecule 'C' is obtained. 'C' can also be prepared by heating a mixture of NH_4Cl and $NaNO_2$. 'C' is mixed with excess of hydrogen gas and heated at $450^\circ C$, 200 atm pressure in the presence of Fe/Mo to produce 'D'. 'D' on heating with liquefied CO_2 at $150^\circ C$ and 15 atm pressure, an important fertilizer 'E' is produced. 'C' on heating with CaC_2 at above $500^\circ C$ and 6-8 atm pressure another important fertilizer 'F' is obtained.

Compound $D + H_2SO_4 \rightarrow x$, x is



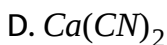
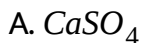
Answer: B

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133. Compound 'A' with -3 and +5 oxidation states on the central atom (s) gives +1 oxidation compound 'B' on heating. 'B' is a stable neutral and linear molecule and isoelectronic with CO_2 . On heating 'B' at $500 - 900^\circ\text{C}$, a molecule 'C' is obtained. 'C' can also be prepared by heating a mixture of NH_4Cl and NaNO_2 . 'C' is mixed with excess of hydrogen gas and heated at 450°C , 200 atm pressure in the presence of Fe/Mo to produce 'D'. 'D' on heating with liquefied CO_2 at 150°C and 15 atm pressure, an important fertilizer 'E' is produced.

'C' on heating with CaC_2 at above 500°C and 6-8 atm pressure another important fertilizer 'F' is obtained.

The compound 'F' is:



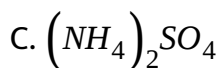
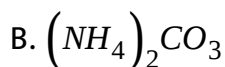
Answer: B

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134. Compound 'A' with -3 and +5 oxidation states on the central atom (s) gives +1 oxidation compound 'B' on heating. 'B' is a stable neutral and linear molecule and isoelectronic with CO_2 . On heating 'B' at $500 - 900^\circ\text{C}$, a molecule 'C' is obtained. 'C' can also be prepared by heating a mixture of NH_4Cl and NaNO_2 . 'C' is mixed with excess of

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The compound 'E' is



Answer: D

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135. An allotrope of phosphorous, exhibits a phenomenon of phosphorescence, produces compound 'A' which on reaction with O_2

gives 'B'. The number of oxygen atoms bonds to each central atom in 'A' and 'B' are 'X' and 'Y' respectively. When 'A' is heated to 210°C it decomposes to an oxide 'D' and another allotrope of phosphorus 'C'.

X and Y are respectively

A. 3 and 5

B. 2 and 4

C. 4 and 4

D. 3 and 4

Answer: D

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136. An allotrope of phosphorous, exhibits a phenomenon of phosphorescence, produces compound 'A' which on reaction with O_2 gives 'B'. The number of oxygen atoms bonds to each central atom in 'A' and 'B' are 'X' and 'Y' respectively. When 'A' is heated to 210°C it

decomposes to an oxide 'D' and another allotrope of phosphorus 'C'.

This allotrope of phosphorous reacts with halogens to produce the pentahalides but nitrogen does not give pentahalides. The reason is:

- A. Smaller size, more electronegativity and nonavailability of d-orbitals in nitrogen
- B. Larger size and more electronegativity of nitrogen
- C. Phosphorous is less reactive than nitrogen
- D. More bond energy in P_4 molecule than N_2

Answer: A

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137. An allotrope of phosphorous, exhibits a phenomenon of phosphorescence, produces compound 'A' which on reaction with O_2 gives 'B'. The number of oxygen atoms bonds to each central atom in

'A' and 'B' are 'X' and 'Y' respectively. When 'A' is heated to 210°C it decomposes to an oxide 'D' and another allotrope of phosphorus 'C'.

The 'C' and 'D' are

- A. Black Phosphorous and P_4O_{10}
- B. Red phosphorous and P_4O_8
- C. Red Phosphorous and P_2O_3
- D. Black Phosphorous and PO_2

Answer: B

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138. The elements of VA group directly combines with halogens and form trihalides of the type MX_3 (M - VA group element, X- halogen).

All the trihalides are stable except NCl_3 , NBr_3 and NI_3 .

The unstable nature of these halides is due to

- A. Low polarity of $N - X$ bond and large difference in the size of N and halogen atoms
- B. High polarity of N-H bond and large difference in the size of N and halogen atoms
- C. High bond dissociation energy of N-X bond and low polarity of N-X bond
- D. Increase of electronegativity of halogen atoms for Fluorine to iodine

Answer: A

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139. The elements of VA group directly combines with halogens and form trihalides of the type MX_3 (M - VA group element, X- halogen). All the trihalides are stable except NCl_3 , NBr_3 and NI_3 .

The tetrahedral structure with a particular hybridisation of the central atom of NX_3 ($X = F, Cl, Br, I$)

- A. possesses pyramidal shape with a lone pair of electrons on their central atom with sp^3 hybridisation
- B. possesses tetrahedral shape without lone pair of electrons on their central atom with sp^3 hybridisation
- C. possesses angular shape without lone pair of electrons on their central atom with sp^3 hybridisation
- D. possesses angular shape without lone pair of electrons on their central atom with sp^3d hybridisation.

Answer: A

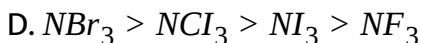
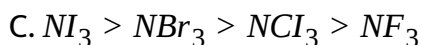
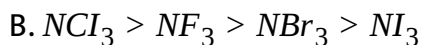
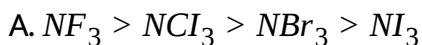


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140. The elements of VA group directly combines with halogens and form trihalides of the type MX_3 (M - VA group element, X - halogen).

All the trihalides are stable except NCl_3 , NBr_3 and NI_3 .

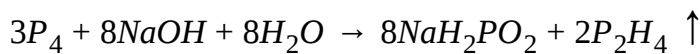
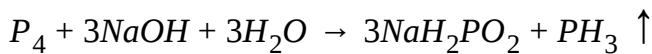
The tendency of act as Lewis bases of these trihalides is in the order of



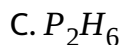
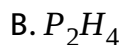
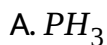
Answer: C

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141. When white phosphorous reacts with $NaOH$, it produces a gaseous mixture by the following parallel reaction.



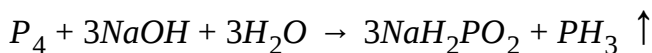
The gas mixture comes out and catches fire immediately due the presence of

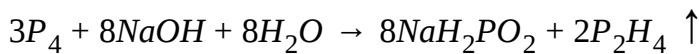


Answer: B

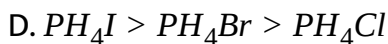
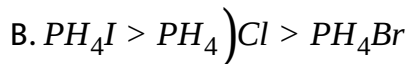
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142. When white phosphorous reacts with $NaOH$, it produces a gaseous mixture by the following parallel reaction.





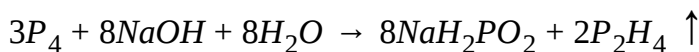
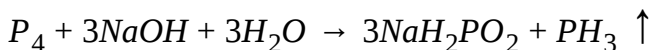
The correct thermal stability order is



Answer: D

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143. When white phosphorous reacts with $NaOH$, it produces a gaseous mixture by the following parallel reaction.



The correct thermal stability order is

- A. The lone pair of P is present at 3d orbital
- B. the lone pair of P raised at almost pure p orbital
- C. the lone pairs of p raised at sp^3 hybrid orbital
- D. the lone pair of p raised at almost pure s orbital

Answer: D

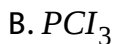
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144. VA group elements form both trihalides and pentahalides of the type MX_3 and MX_5 respectively (M-VA group element, X-halogen).

Both type of halides undergo hydrolysis. Most of these covalent in nature and process covalent bonds formed by overlapping of orbitals. Aqueous solution of these halides conduct electricity.

The halides which releases and alkaline gas on hydrolysis:

A. NCI_3



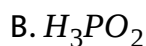
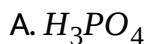
Answer: A

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145. VA group elements form both trihalides and pentahalides of the type MX_3 and MX_5 respectively (M-VA group element, X-halogen).

Both type of halides undergo hydrolysis. Most of these are covalent in nature and process covalent bonds formed by overlapping of orbitals. Aqueous solution of these halides conduct electricity.

The trihalide which undergoes partial hydrolysis is



C. H^+ and Cl^- ions

D. H_3PO_3

Answer: C

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146. VA group elements form both trihalides and pentahalides of the type MX_3 and MX_5 respectively (M-VA group element, X-halogen).

Both type of halides undergo hydrolysis. Most of these covalent in nature and process covalent bonds formed by overlapping of orbitals. Aqueous solution of these halides conduct electricity.

The trihalide which undergoes partial hydrolysis is

A. NI_3

B. PCl_3

C. $AsCl_3$

D. $SbCl_3$

Answer: D

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147. VA group elements form tri oxides and pentoxides of the type M_2O_3 and M_2O_5 respectively (M-VA group element). The trioxides and pentoxides of nitrogen are monomers and that of P,As,Sb are dimers. Nitrogen forms various oxides ranging from NO to N_2O_5 . Oxides of phosphorous have cage like structures.

Number of P-O-P bonds in P_4O_{10} :

- A. 6,1,1
- B. 6,2,18
- C. 6,2,12
- D. 6,2,2

Answer: C

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148. VA group elements form tri oxides and pentoxides of the type M_2O_3 and M_2O_5 respectively (M-VA group element). The trioxides and pentoxides of nitrogen are monomers and that of P,As,Sb are dimers. Nitrogen forms various oxides ranging from NO to N_2O_5 . Oxides of phosphorous have cage like structures.

Number of P-O-P bonds in P_4O_{10} :

A. 6

B. 4

C. 2

D. zero

Answer: D

149. VA group elements form tri oxides and pentoxides of the type M_2O_3 and M_2O_5 respectively (M-VA group element). The trioxides and pentoxides of nitrogen are monomers and that of P,As,Sb are dimers. Nitrogen forms various oxides ranging from NO to N_2O_5 . Oxides of phosphorous have cage like structures.

Number of P-O-P bonds in P_4O_{10} :

- A. 4
- B. 6
- C. 2
- D. 10

Answer: B

150. 

The number of P-O-P bonds in cyclic trimer of N is:

- A. Three
- B. Two
- C. Zero
- D. Four

Answer: A

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151. 

The equivalent weight of X in the reaction $X \xrightarrow{200^\circ \text{C}} Y + Z$ (M= molecular weight of X)

- A. $\frac{M}{2}$

B. $\frac{M}{6}$

C. $\frac{M}{3}$

D. $\frac{2M}{3}$

Answer: D



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152. 

Basicity of X,Y,M are respectively:

A. 2,3,4

B. 4,3,1

C. 3,2,4

D. 1,3,4

Answer: A

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153. The order of the oxidation state of the phosphorus in H_3PO_2 , H_3PO_4 , H_3PO_3 and $H_4P_2O_6$ is

A. zero

B. 2

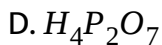
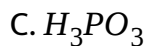
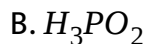
C. 1

D. 3

Answer: C

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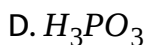
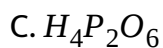
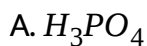
154. The order of the oxidation state of the phosphorus in H_3PO_2 , H_3PO_4 , H_3PO_3 and $H_4P_2O_6$ is



Answer: A

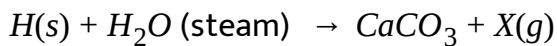
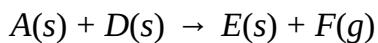
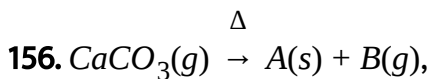
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155. The order of the oxidation state of the phosphorus in H_3PO_2 , H_3PO_4 , H_3PO_3 and $H_4P_2O_6$ is



Answer: B

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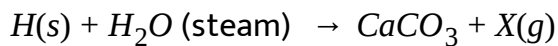
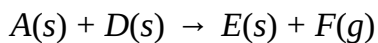
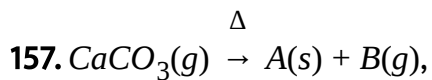


In the above reactions, 'F' is:

- A. Neutral oxide
- B. Acidic oxide
- C. Basic oxide
- D. Amphoteric oxide

Answer: A

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$H + D$ mixture is called

A. susperphate of lime

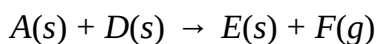
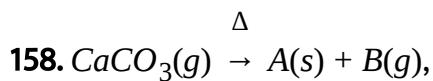
B. thomas slag

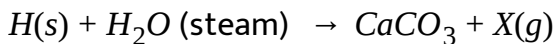
C. nitrolim

D. triple phosphate

Answer: C

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In the above reactions, shape of molecule X is:

- A. pyramidal
- B. tetrahedral
- C. square planar
- D. trigonal bipyramidal

Answer: A



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159. Phosphorous forms a number of oxoacids which differ in their structures and oxidation state of phosphorous. Each of them has at least one $P = O$ or $P \rightarrow O$ unit and one P-OH units. The OH group is ionisable but H atom linked directly to P is nonionisable. structures of all the acids are considered to be derived from phosphorous acid or phosphoric acid.

The number of $P-H$, $P \rightarrow O$ or $P=O$ & $P-O-H$ bonds in orthophosphoric acid are respectively:

A. 0,3,1

B. 1,2,2

C. 2,1,2

D. 0,1,3

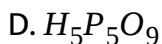
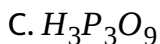
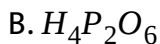
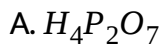
Answer: D

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160. Phosphorus forms a number of oxoacids which differ in their structures and oxidation state of phosphorus. All the acids contain phosphorus atom//atoms linked tetrahedrally to four other atoms or groups. Each of them has at least one $P=O$ or $P \rightarrow O$ unit and one $P-OH$ unit. The OH group is ionisable but H atom linked directly to P is non-ionisable. Structures of all the acids are considered to be

derived either from phosphorus acid or phosphoric acid.

Which of the following is a cyclic oxoacid ?



Answer: C

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161. Phosphorous forms a number of oxoacids which differ in their structures and oxidation state of phosphorous. Each of them has at least one $P = O$ or $P \rightarrow O$ unit and one P-OH units. The OH group is ionisable but H atom linked directly to P is nonionisable. structures of all the acids are considered to be derived from phosphorous acid or phosphoric acid.

The number of $P-H$, $P \rightarrow O$ or $P=O$ & $P-O-H$ bonds in orthophosphoric acid are respectively:

- A. Pyrphosphoric acid
- B. Hypophosphoric acid
- C. $(HOP_3)_2$
- D. Metaphosphorous acid

Answer: B

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162. $P_4 + SO_2Cl_2 \rightarrow X + SO_2$, then $X =$ _____

- A. PCl_3
- B. PCl_5
- C. SO_2

D. SCI_2

Answer: C

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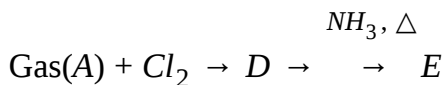
163. $P_4 + SO_2Cl_2 \rightarrow X + SO_2$, then X = _____

- A. planar, trigonal bipyramidal
- B. trigonal bipyramidal, pyramidal
- C. pyramidal, trigonal bipyramidal
- D. trigonal pyramid, planar

Answer: B

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1. $H_2C_2O_4 \xrightarrow{\Delta} \text{gas(A)} + \text{gas(B)} + \text{liquid(C)}$. Gas(A) burns with a blue flame and is oxidised to gas(B).



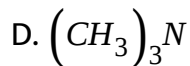
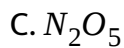
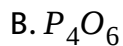
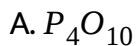
A,B,C and E are

- A. $CO_2, CO, H_2O, HCONH_2$
- B. $CO, CO_2, COCl_2, H_2NCONH_2$
- C. $CO, CO_2, H_2, O, NH_2CONH_2$
- D. $CO, CO_2, H_2O, COCl_2$

Answer: B

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2. Which of the following molecules(s) is /are having $p\pi - d\pi$ back bonding



Answer: A

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3. In which of the following acids, P-P bonds is present?

A. Tetrapolyphosphoric acid

B. Pyrophosphoric acid

C. Hypophosphoric acid

D. Polymetaphosphoric acid

Answer: C

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4. Incorrect statement about Mn_2O_7 is :

A. It self ionises as NO^+ and NO_3^-

B. It is paramagnetic

C. Substance containing NO^+ is said to be acid and that containing NO_3^- is said to be base in N_2O_4 .

D. NO_2 dimerises to N_2O_4 with disappearance in paramagnetism.

Answer: B

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5. Number of acidic oxides among the following is:

(a) N_2O (b) NO (c) N_2O_3 (d) N_2O_4 (e) N_2O_5 (f) P_4O_6

(g) P_4O_{10} (h) SO_3 (i) B_2O_3 (j) CO

A. 4

B. 3

C. 5

D. 6

Answer: B

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6. White $P_4 \xrightarrow{NaOH} H_2OA + B, B \xrightarrow{O_2} C$ Which of the following is correct for the reaction, if 'C' is tribasic oxyacid of phosphorus

A. Compound A is Na_2HPO_3

B. Compound B is PH_3

C. Compound B is H_3PO_4

D. Compound C is H_3PO_3

Answer: B

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7. The product when Sn reacts with conc HNO_3 is:

A. SnO

B. $Sn(OH)_2$

C. H_2SnO_3

D. $Sn(NO_3)_4$

Answer: C

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8. $P_4O_{10} + 4HNO_3 \rightarrow 4HPO_3 + 2X$ Then the correct statement regarding X:

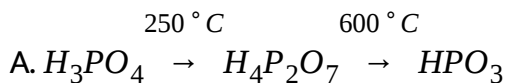
- A. It is a red crystalline solid
- B. It contains N-N linkage
- C. In solid state is ionic $NO_2^+ NO_3^-$
- D. It is least acidic oxide among oxides of nitrogen

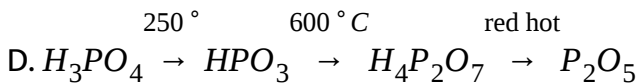
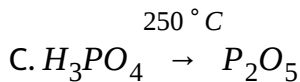
Answer: C



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9. Orthophosphoric acid loses water on heating. The reaction sequence is represented as:





Answer: A

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10. Which of the following statement(s) is/are incorrect?

A. The solid N_2O_5 is ionic and is represented by $\text{NO}_2^+ \text{NO}_3^-$

B. Liquid N_2O_4 self-ionizes as NO^+ and NO_3^-

C. NO_2 is a red-brown gas which is obtained by heating NH_4NO_3

D. In the formation of the dimer N_2O_4 from two molecules of NO_2

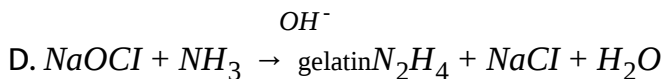
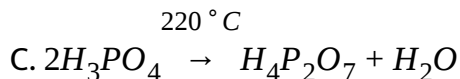
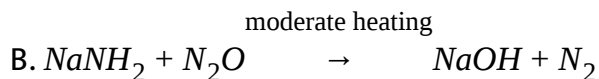
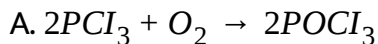
, the odd electron on each of the nitrogen atoms of the NO_2

molecules gets paired to form a weak N-N bond.

Answer: C

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11. In which of the following reactions, the products shown are incorrect?



Answer: B

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12. Au and Pt dissolves in aqua regia forming the soluble compounds X and Y respectively. The oxidation states of Au and Pt in X and Y are:

A. +1, + 2

B. +2, + 4

C. +3, + 2

D. +3, + 4

Answer: D

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13. $Mg_3N_2 \xrightarrow{H_2O} A(\text{gas}) \xrightarrow{CuO} \Delta B + C(g) + H_2O$, $C(g)$ can be obtained by heating:

A. It can also be obtained by reduction of nitric acid

B. It is a mixed anhydride of HNO_2 and HNO_3

C. It is a simple anhydride

D. The oxidation state of Nitrogen is +3

Answer: B

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14. $Mg_3N_2 \xrightarrow{H_2O} A(\text{gas}) \xrightarrow{CuO} \Delta B + C(g) + H_2O$, $C(g)$ can be obtained by heating:

- A. It can also be obtained by heating $Pb(NO_3)_2$
- B. It is a brown coloured gas with paramagnetic nature
- C. On cooling 'D' undergoes dimerisation to form colourless substance with diamagnetic nature
- D. all are correct

Answer: D

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15. ZnO shows yellow colour on heating due to

A. unstable structure of HNO_3 which immediately changes to



B. photochemical decomposition in presence of sunlight

C. interaction of atmospheric gases with HNO_3

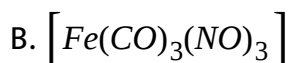
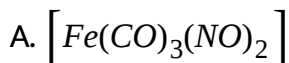
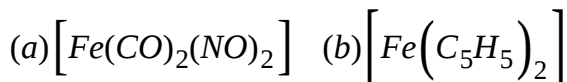
D. conversion of HNO_3 to NO_2^+

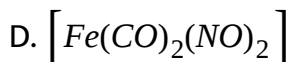
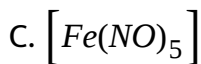
Answer: B



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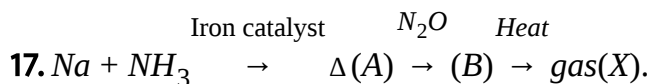
16. Calculate the EAN of central atom in the following complexes





Answer: D

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Which of the following is correct ?

A. B is an amphoteric oxide

B. X is a colourless, diamagnetic gas which combines with Aluminium on heating

C. X can be produced by action of $Zn + NaOH$ on $NaNO_2$

D. X can be produced by action of $ZN + NaOH$ on NH_4NO_3

Answer: C

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18. How does ammonia react with blue solution having Cu^{2+} ions ?

- A. dark blue solution is obtained
- B. light blue precipitate is obtained
- C. no reaction
- D. black precipitate is obtained

Answer: C

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19. Consider the following reaction sequence:

very dilute
Metal (M) $\rightarrow HNO_3$ no reaction ltr. 

Select correct statement:

- A. Gas B is diamagnetic
- B. Solution C contains only NaNO_2 salt
- C. Gas B is paramagnetic
- D. Gas D is N_2

Answer: C

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20. The length of the $\text{N} - \text{Si}$ bond in $(\text{SiH}_3)_3\text{N}$ is shorter than what is normally expected for an $\text{N} - \text{Si}$ single bond. This is due to

- A. $sp^2 - sp^3\sigma$ overlap between N and Si atoms
- B. localised $p\pi - d\pi$ bonding between the N atom and one of the three Si atoms

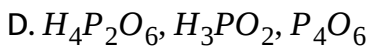
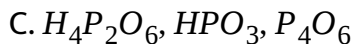
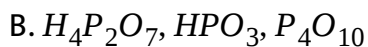
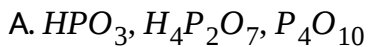
- C. delocalised $p\pi - d\pi$ bonding spread over the N atom and all the three Si atoms
- D. localized $p\pi - p\pi$ bonding between the N atom and one Si atom

Answer: C

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21. 

X,Y and Z are respectively:



Answer: B

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22. Which of the following is not correct?

- A. White and red phosphorus react with chlorine at room temperature
- B. White phosphorus is unstable, while red phosphorous is stable
- C. White phosphorous is lighter than red phosphorus
- D. White phosphorus is highly poisonous, while red phosphorus is not.

Answer: A

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23. The dipoles moment of NF_3 is less than NH_3 because

A. NH_3 forms associated molecules

B. F is more reactive than H

C. The resultant of bond polarity is less

D. The resultant of individual polarities is opposed by the polarity of lone pair

Answer: D



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24. Due to which one of the following "vortex rings" are formed?

A. PH_3

B. P_2H_4

C. N_2O

D. NO_2

Answer: B

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25. Which is true about N_2O_5 ?

- A. It is anhydride of HNO_3
- B. In solid state it exists as $NO_2^+ NO_3^-$
- C. It is structurally similar to P_2O_5
- D. It can be prepared by heating HNO_3 over P_2O_5

Answer: A::B::D

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26. Which of the following statements are true about P_4O_6 and P_4O_{10} ?

- A. Both these oxides have a closed cage like structures
- B. Each oxide requires 6 water molecules for complete hydrolysis to form their respective oxo acids.
- C. both these oxides contain 12 equivalent $P - O$ bonds
- D. P_4O_6 and P_4O_{10} both contains $p\pi - d\pi$ bonds

Answer: A::B::C

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27. Which of the following statements regarding N_2O_4 is/are correct?

- A. It is planar molecule
- B. It is used as non-aq solvent
- C. It involves N-N bond which is shorter than the N-N bond in hydrazine

D. It is dimer of NO_2

Answer: A::B::D

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28. Which of the following statements are correct about the reaction between the copper metal and dilute HNO_3 ?

A. The principal reducing product is NO gas

B. Cu metal is oxidised to Cu^{2+} (aq) ion which is blue in colour

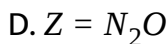
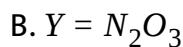
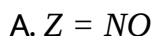
C. NO is paramagnetic and has one unpaired electron in antibonding molecular orbital

D. NO reacts with O_2 to produce NO_2 which is linear in shape

Answer: A::C

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29. Copper metal on treatment with dilute HNO_3 produces a gas X, X when passed through acidic solution of stannous chloride, a nitrogen containing compound Y is obtained. Y on reaction with nitrous acid produces a gas Z. Then



Answer: A::C::D

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30. Which of the following statements is incorrect?

A. Due to hydrogen bonds, H_3PO_4 is a viscous liquid

B. H_3PO_4 cannot react with ammonium molybdate

C. On igniting a mixture of H_3PO_4 , NH_4Cl and magnesium salt,

$MgNH_4PO_4$ (white ppt) is obtained.

D. Orthophosphoric acid on heating with $POCl_3$ gives

polymetaphosphoric acid

Answer: B::C::D

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31. The incorrect statement among the following

A. At high temperature N_2O_3 dissociates into two neutral oxides of nitrogen

B. $H_4P_2O_6$ forms three acidic salts

C. $AgCl$ is soluble in ammonia by forming a complex $[Ag(NH)_2]Cl$

D. Aqua regia is a mixture of 75 % conc HNO_3 and 25 % conc HCl

Answer: A::B::D

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32. which of the following statements are true about metals ?

A. The structure of phosphate ion is tetrahedral

B. On heating to $600^\circ C$, it forms meta phosphoric acid

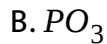
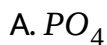
C. It is prepared in the lab by heating red phosphorous with conc
 HNO_3

D. It is a viscous liquid with high boiling point

Answer: A::B::C::D

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33. The 'repeating unit' of glycogen is



Answer: A::B::D

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34. Which of the following statement(s) is/are correct

A. P_4 molecule has six P-P single bonds and four lone pair of electrons

B. Among NF_3 and NCI_3 , the least basic is NF_3

C. Ammonia is dried over P_4O_{10}

D. Black phosphorous is a good conductor of electricity but red phosphorous is not

Answer: A::B::D

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35. Choose the correct statement regarding PCl_5

A. All the P-F bonds are identical in length

B. $3P - F$ bonds have shorter bond length than the outer $2P - F$ bonds

C. $2P - F$ bonds are shorter than the outer $3P - F$ bonds

D. In the formation of PF_5 the d-orbital participated in bond formation is d_{z^2}

Answer: B::D



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36. NH_4Cl on heating with $NaOH$ gives a gas X. the correct statement regarding X

- A. It has three bond pairs and one lone pair
- B. It gives white dense fumes with a glass rod dipped in HCl
- C. It gives brown precipitate with Nessler's reagent
- D. The brown precipitate obtained above is called iodide of millon's base

Answer: A::B::C::D



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37. $X \rightarrow$ mixed anhydride of nitrous acid and nitric acid $Y \rightarrow$ non-aq solvent obtained on cooling X . Pick out the correct statements regarding X and Y :

- A. Y self ionises to NO^+ and NO_3^-
- B. X is an odd electron molecule and paramagnetic
- C. X reacts with alkali forming the corresponding nitrites and nitrates
- D. X is used as a catalyst in the lead chamber process for the manufacture of sulphuric acid

Answer: A::B::D

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38. Which of the following is/are correct statement?

A. NF_3 has trigonal pyramidal structure

B. NF_3 is practically insoluble in water and is only hydrolysed when an electric spark is passed through a mixture with water vapours.

C. Dipole moment of NF_3 is more than that of NH_3

D. N_2O_3 is an acidic oxide.

Answer: A::B::D

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39. Which of the following is true for allotropes of phosphorus?

A. Yellow phosphorus is soluble in CS_2 while red phosphorus is not

B. P-P-P bond angle is 60° in white phosphorus

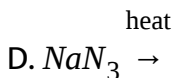
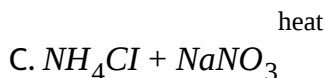
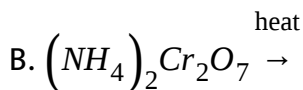
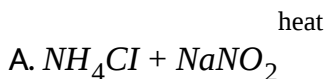
C. On heating in air, white phosphorus changes to red

D. White phosphorus is less stable than red phosphorus at ordinary temperature

Answer: A::B::D

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40. Which of the following reactions is used in the preparation of $N_2(g)$?



Answer: A::B::D

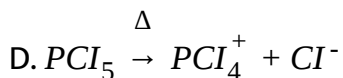
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41. Chemical Bonding

A. Hydrolysis of PCl_5 gives $POCl_3$ and HCl

B. Thermal decomposition of PCl_5 is to PCl_3 & Cl_2

C. Reaction of ethanol with PCl_5 giving C_2H_5Cl and $POCl_3$



Answer: A::B::C

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42. Which one of the following is/are correct statement (s) ?

A. In P_4O_{10} molecule, bridging $P - O$ bond length is lesser than that of in P_4O_6

B. Anionic part of the solid PCl_5 , has sp^3d^2 hybridisation

C. N_2O_3 (symmetrical) contains $N - N$ linkage

D. $NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$ - Thermal stability

Answer: A::B

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43. Which of the following statement(s) is/are correct

A. The products are ortho phosphoric acid and phosphine

B. It is a disproportionation reaction

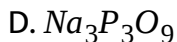
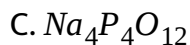
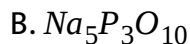
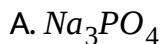
C. The equivalent weight of phosphoric acid is $\frac{15}{7}$ of its molecular weight

D. One of the products formed acts as a reducing agent

Answer: A::B::D

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44. Which one of the following is the chemical formula of Washing soda ?



Answer: A::C::D

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45. Which of the following metal Fe, Zn, Pb, Ag and Pt do not give a metal nitrate on treatment with concentrated HNO_3 ?

A. *Fe*

B. *Pt*

C. *Pb*

D. *Ag*

Answer: A::B

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46. In nitroprusside ion the iron and NO exist as Fe (II) and NO^+ rather than the Fe(III) and NO. these forms can be differentiated by

- A. Estimating the concentration of iron
- B. Measuring the concentration of CN^-
- C. Measuring the solid state magnetic moment
- D. Thermally decomposing the compound

Answer: C

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47. Select the correct statement

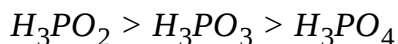
- A. Ostwald's method of preparation of nitric acid is based upon catalytic oxidation of NH_3 by O_2
- B. HNO_2 acts as both oxidising and reductant
- C. NO_2 reacts with ozone to form N_2O_5
- D. Holme's signal can be given by using $CaC_2 + ca_3N_2$

Answer: A::B::C

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48. The true statement of the oxoacids of phosphorus H_3PO_2 , H_3PO_3 and H_3PO_4 is

A. the order of their reducing strength is



B. the hybridisation of phosphorus is sp^3 in all these

C. all have one $P = O$ bond

D. all have two $P - PH$ bonds

Answer: A::B::C

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49. Identify the correct sequencing of hydrides based on the parameters specified in bracket:

A. $NH_3 > PH_3 > AsH_3 > SbH_3$ (bond angle)

B. $SbH_3 > NH_3 > AsH_3 > PH_3$ (boiling point)

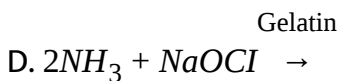
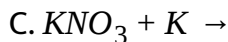
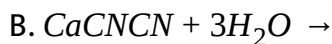
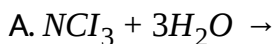
C. $NH_3 > PH_3 > AsH_3 > SbH_3$ (dipole moment)

D. $NH_3 > PH_3 > AsH_3 > SbH_3$ (Lewis basic nature)

Answer: A::B::C::D

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50. In which of the following reaction(s) one or more than one product is acidic in nature?



Answer: A::C

51. Select the correct statement ?

- A. N_2O with sodium metal in liquid ammonia forms sodium azide and nitrogen gas is liberated
- B. Ammonia is oxidised to nitrogen by dilute solution of sodium hypochlorite in presence of glucose
- C. Ammonium dichromate on heating decomposes to give nitrogen and a green coloured compound
- D. $CaNCN$ on hydrolysis produces a white precipitate and a gas which turns filter paper moistened with copper sulphate solution deep blue.

Answer: A::C::D

52. IUPAC name of $\left[Pt(NH_3)_3(Br)(NO_2)Cl\right]Cl$ is

- A. Gas B is H
- B. Solid a is B
- C. Gas C is D
- D. Gas D is E

Answer: A::B::C

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53. $(NH_4)_2Cr_2O_7$ decomposes on heating. Then which statement(s) is/are correct?

- A. Nitrogen undergoes oxidation
- B. Chromium undergoes reduction

C. A neutral oxide is formed as one of the products

D. Green residue is left out

Answer: A::B::C::D

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54. Match the following:



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55. Match the following:



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56. Match the following:



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57. Match the following:



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58. Match the following:



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59. Match the following:



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60. Match the molecules in column I with their characteristics in column II



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61. Match the molecules in column I with their characteristics in column II



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62. Match the following:



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63. Match the following:



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64. Match the following:



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65. Maximum $p\pi - p\pi$ back bonding exists in

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: A

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66. Assertion: In PCl_5 , all $P - Cl$ bonds have same bond lengths.

Reason: The shape of PCl_5 is trigonal bipyramidal

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: D

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67. Assertion: Na_2HPO_3 is an acidic salt

Reason: An acidic salt contains an ionisable proton.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: D

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68. Assertion: PCl_5 in aqueous medium is a better oxidant than NCl_3

Reason: Phosphorous has vacant d-orbitals while nitrogen has not.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: D

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69. Assertion: In hydrazoic acid oxidation state of nitrogen is $-\frac{1}{3}$

Reason: In hydrazoic acid three nitrogen are attached to one

hydrogen atom.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: C



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70. Statement -1 : Hydrolysis of NCl_3 gives NH_4OH and $HOCl$ while PCl_3 on hydrolysis gives H_3PO_3 and HCl .

Statement -2 : The difference is due to the change in polarity of $P^{+\sigma} - Cl^{-\sigma}$ bond in PCl_3 in contrast to $N^{-\sigma} - Cl^{+\sigma}$ bond in NCl_3 .

- A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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71. Real gases show deviation from ideal behaviour at low temperature and high pressure.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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72. Assertion Bond angles of NH_3 , PH_3 , AsH_3 and SbH_3 decrease in order as mentioned

Reasoning The central atom in each possesses a lone pair .

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: B



73. Trisilyamine $(SiH_3)_3 N$ is

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: B

74. Orthophosphoric acid is

- A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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75. Assertion (A) : Stability of NH_3 is greater than PH_3

Reason (R) : M-H bond energy increases down the group in the hydrides of pnicogens.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: C

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76. Which of the following oxide/oxy-anions does not contain $P - O - P$ linkage?

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: B

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77. Assertion: Nitric oxide is paramagnetic in the liquid and solid states.

Reason: Nitric oxide is an odd electron molecule and the gas is paramagnetic.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: B



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78. Conc. HNO_3 can be stored in a container made of

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

Answer: A

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79. Assertion: Red phosphorus is less volatile than white phosphorus.

Reason: Red phosphorus has a discrete tetrahedral structure.

- A. Both A and R are correct and R is the correct explanation of A
- B. Both A and R are correct and R is not the correct explanation of A
- A

C. A is correct R is wrong

D. A is wrong R is correct

Answer: C

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80. Assertion : white phosphorus is more reactive than red phosphorus

Reason: Red phosphorus consists of P_4 tetrahedral units linkage to one another to form linear chains.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not the correct explanation of

A

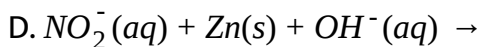
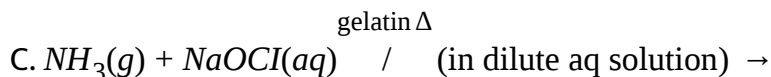
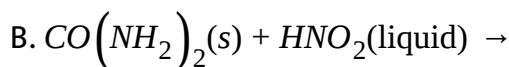
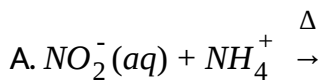
C. A is correct R is wrong

D. A is wrong R is correct

Answer: A

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81. Which of the following compounds does not liberate nitrogen gas on treatment with nitrous acid ?



Answer: B

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82. The true statement among the following are:

A. NF_3 has a strong tendency to act as Lewis base

B. PCl_5 is an ionic compound in solid state

C. Nitrogen can form the trinegative N^{3-} ion

D. While other elements of its group are quite reactive, nitrogen is chemically inert in spite of its high electronegativity.

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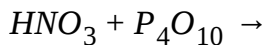
83. The IUPAC name of the element with atomic number $Z = 109$ is

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84. Valency and oxidation number of nitrogen in N_2O_5

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85. Complete the following.



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86. The number of hydroxyl group in pyrophosphoric acid is

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87. Find the number of $p\pi - p\pi$ bonds in N_2O .

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88. VA group elements form tri oxides and pentoxides of the type M_2O_3 and M_2O_5 respectively (M-VA group element). The trioxides and pentoxides of nitrogen are monomers and that of P,As,Sb are

dimers. Nitrogen forms various oxides ranging from NO to N_2O_5 .

Oxides of phosphorous have cage like structures.

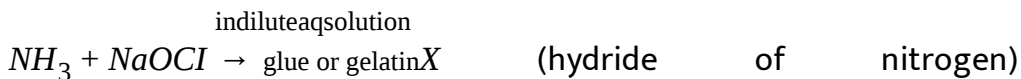
Number of P-O-P bonds in P_4O_{10} :

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89. The correct order of the oxidation states of nitrogen in NO , N_2O , NO_2 and N_2O_3 is :

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90. Let us consider the following reactions:



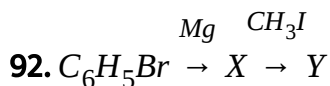
$X + CuSO_4 \rightarrow Y \downarrow + Z \uparrow + A$ what is the oxidation state of nitrogen in Z?

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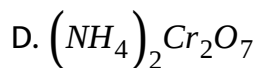
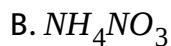
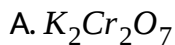
91. Let us consider the following reaction: $N_2O_5 + NaCl \rightarrow X + Y$ (X is a sodium salt)

What is the difference in the oxidation states of nitrogen in the anionic and cationic parts of X and Y?

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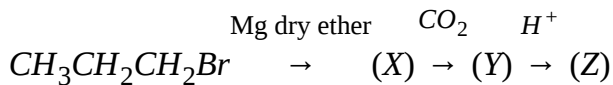
The product Y is



Answer: D

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93. Consider the following sequence of reaction and identify the final product (Z).



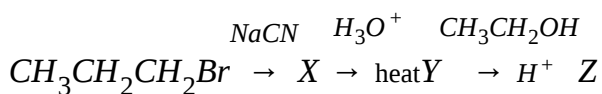
- A. CrO_5
- B. NH_4OH
- C. Cr_2O_3
- D. $Fe(OH)_2$

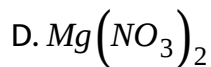
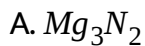
Answer: C



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94. What is compound Z?



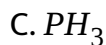
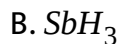


Answer: A

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95. The pronounced change from non-metallic to metallic behaviour and also increase in the basic nature of oxides from nitrogen to bismuth in group 15 is principally due to increasing size of the atom. The ionisation potential of nitrogen is very high on account of its small size. However, ionisation potential decreases regularly on descending the group.

Which one of the following is a strongest base?

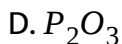
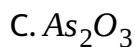
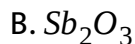
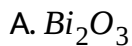


Answer: D

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96. The pronounced change from non-metallic to metallic behaviour and also increase in the basic nature of oxides from nitrogen to bismuth in group 15 is principally due to increasing size of the atom. The ionisation potential of nitrogen is very high on account of its small size. However, ionisation potential decreases regularly on descending the group.

Which one of the following oxides is most acidic?

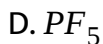
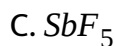
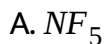


Answer: D

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97. The pronounced change from non-metallic to metallic behaviour and also increase in the basic nature of oxides from nitrogen to bismuth in group 15 is principally due to increasing size of the atom. The ionisation potential of nitrogen is very high on account of its small size. However, ionisation potential decreases regularly on descending the group.

Which one of the following fluorides does not exist?

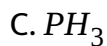
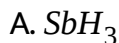


Answer: A

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98. The pronounced change from non-metallic to metallic behaviour and also increase in the basic nature of oxides from nitrogen to bismuth in group 15 is principally due to increasing size of the atom. The ionisation potential of nitrogen is very high on account of its small size. However, ionisation potential decreases regularly on descending the group.

The most unstable hydride is:



Answer: B

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99. An oxyacid of phosphorous has the following properties:
Complete neutralisation of the acid with $NaOH$ solution gives an aq solution of Na^+ ions and oxyacid anions in the ratio 2:1. When a solution of the acid is warmed with silver nitrate solution mtallisilver is deposited.

What is the structure of the acid?

A. 

B. 

C. 

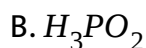
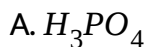
D. 

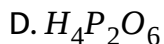
Answer: B

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100. An oxyacid of phosphorous has the following properties: Complete neutralisation of the acid with $NaOH$ solution gives an aq solution of Na^+ ions and oxyacid anions in the ratio 2:1. When a solution of the acid is warmed with silver nitrate solution mtallisilver is deposited.

This oxyacid is converted into ___ on heating ($200^\circ C$):



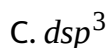


Answer: A

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101. An oxyacid of phosphorous has the following properties:
Complete neutralisation of the acid with $NaOH$ solution gives an aq solution of Na^+ ions and oxyacid anions in the ratio 2:1. When a solution of the acid is warmed with silver nitrate solution metallic silver is deposited.

The hybridisation of phosphorous in this acid is:



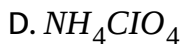
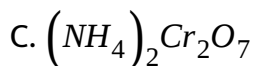
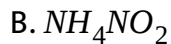
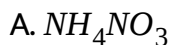
D. sp^3d

Answer: B

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102. A white 'A' on heating decomposes to produce two products 'B' and 'C'. 'B' on reaction with white phosphorous produces 'D', which is a strong dehydrating agent. 'D' on reaction with perchloric acid converts it to its anhydride.

The compound 'A' is:



Answer: A



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103. A white 'A' on heating decomposes to produce two products 'B' and 'C'. 'B' on reaction with white phosphorous produces 'D', which is a strong dehydrating agent. 'D' on reaction with perchloric acid converts it to its anhydride.

The number of moles of H_2O needed to hydrolyse (complete) 1 mole of D is:

A. 10

B. 4

C. 6

D. 2

Answer: C



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104. A white 'A' on heating decomposes to produce two products 'B' and 'C'. 'B' on reaction with white phosphorous produces 'D', which is a strong dehydrating agent. 'D' on reaction with perchloric acid converts it to its anhydride.

The product obtained on hydrolysis (complete) of D is:

A. mixture of H_3PO_3 and H_3PO_4

B. only PH_3

C. only H_3PO_4

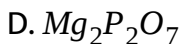
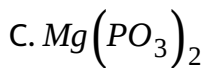
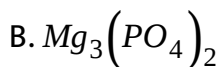
D. mixture of H_3PO_3 and H_3PO_2

Answer: C

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105. 

B is:

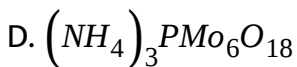
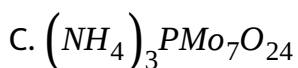
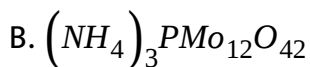
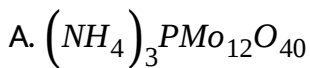


Answer: D

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106. 

C is:

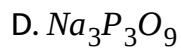
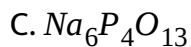
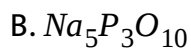


Answer: A

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107. 

D is:



Answer: B

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108. Nitrogen forms the largest number of oxides as it is capable of forming stable multiple bonds with oxygen. They range of N_2O (O.S of nitrogen +1) through NO, N_2O_3, NO_2, N_2O_4 "to" N_2O_5 (O.S of nitrogen +5). Following points are important regarding the study of oxides of nitrogen.

(a) All oxides of nitrogen except N_2O_5 are endothermic as a large amount of energy is required to dissociate the stable molecule of oxygen and nitrogen.

(b) The small electronegativity difference between oxygen and nitrogen make N-O bond easily breakable to give oxygen and hence oxides of nitrogen are said to be better oxidising agents.

(c) Except N_2O_5 , all are gases at ordinary temperature. N_2O_3 is stable only at lower temperature (253K).

(d) Except N_2O and NO which are neutral oxides, all are acidic oxides which dissolve in water forming corresponding oxy acids.

(e) They are also good example for illustrating the concept of

resonance.

The gas which is acidic in nature is :

A. NO

B. N_2O

C. N_2O_3

D. both a and c

Answer: C

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109. Nitrogen forms the largest number of oxides as it is capable of forming stable multiple bonds with oxygen. They range of N_2O (O.S of nitrogen +1) through NO, N_2O_3, NO_2, N_2O_4 "to" N_2O_5 (O.S of nitrogen +5). Following points are important regarding the study of oxides of nitrogen.

(a) All oxides of nitrogen except N_2O_5 are endothermic as a large

amount of energy is required to dissociate the stable molecule of oxygen and nitrogen.

(b) The small electronegativity difference between oxygen and nitrogen make N-O bond easily breakable to give oxygen and hence oxides of nitrogen are said to be better oxidising agents.

(c) Expect N_2O_5 , all are gases at ordinary temperature. N_2O_3 is stable only at lower temperature (253K).

(d) Expect N_2O and NO which are neutral oxides, all are acidic oxides which dissolve in water forming corresponding oxy acids.

(e) They are also good example for illustrating the concept of resonance.

The gas which is acidic in nature is :

A. Dinitrogen trioxide dissolve in potassium hydroxide forming potassium nitrate

B. Aqueous solution of nitrogen dioxide be has both as a reducing agent and as an oxidising agent

C. Nitrous oxides fairly soluble in cold water and turns blue litmus red

D. Nitrogen dioxide in gaseous state is diamagnetic

Answer: B

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110. Nitrogen forms the largest number of oxides as it is capable of forming stable multiple bonds with oxygen. They range of N_2O (O.S of nitrogen +1) through NO, N_2O_3, NO_2, N_2O_4 "to" N_2O_5 (O.S of nitrogen +5). Following points are important regarding the study of oxides of nitrogen.

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(c) Expect N_2O_5 , all are gases at ordinary temperature. N_2O_3 is stable only at lower temperature (253K).

(d) Expect N_2O and NO which are neutral oxides, all are acidic oxides which dissolve in water forming corresponding oxy acids.

(e) They are also good example for illustrating the concept of resonance.

The gas which is acidic in nature is :

A. In N_2O_4 the N - N bond length is longer than the usual N - N is single bond distance

B. NO_2 molecule is angular with N - O distance equal to intermediate distance between a single and a double bond.

C. N_2O is a linear molecule and has a small dipole moment

D. The bond angle of NO_2 is less than 120°

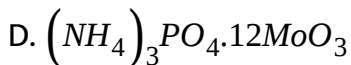
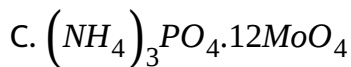
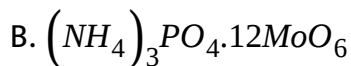
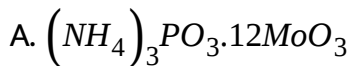
Answer: D

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111. $H_3PO_4 \xrightarrow{\Delta} X \xrightarrow{\Delta} Y$ gives a white precipitate with silver nitrate solution.

When ammonium molybdate and conc

HNO_3 were added to H_3PO_4 , yellow precipitate A is formed. The formula of A is:



Answer: D

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112. $H_3PO_4 \xrightarrow{\Delta} X \xrightarrow{\Delta} Y$ gives a white precipitate with silver nitrate solution.

X is a

- A. di basic acid
- B. tri basic acid
- C. mono basic acid
- D. tetra basic acid

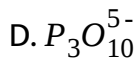
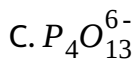
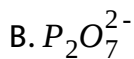
Answer: D

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113. $H_3PO_4 \xrightarrow{\Delta} X \xrightarrow{\Delta} Y$ gives a white precipitate with silver nitrate solution.

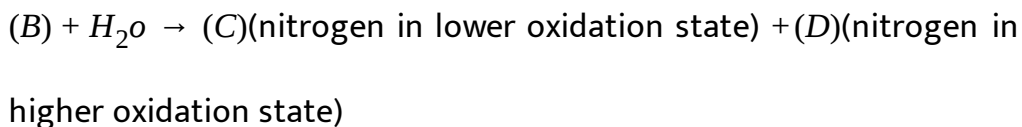
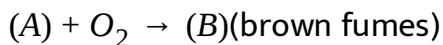
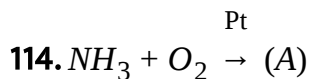
Y can form polyanions. The one that represents the polyanion is:

- A. $P_3O_9^{3-}$

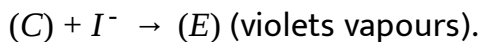


Answer: A

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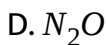
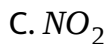
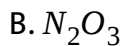


(C) and (D) both are oxoacids of nitrogen.



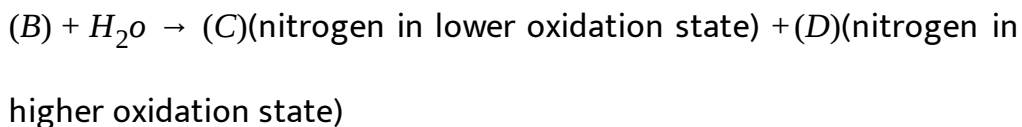
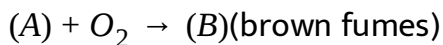
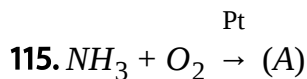
Identify (A) , (B) , (C) , (D) and (E)

A. NO

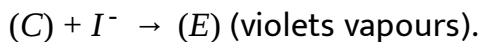


Answer: A

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(C) and (D) both are oxoacids of nitrogen.



Identify (A) , (B) , (C) , (D) and (E)

A. Both B and E are paramagnetic

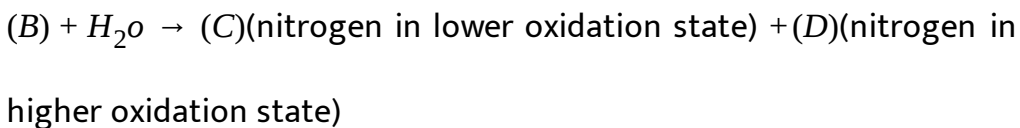
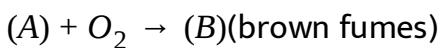
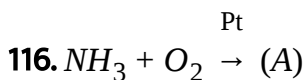
B. E is also a brown coloured vapour

C. B is paramagnetic and E is diamagnetic

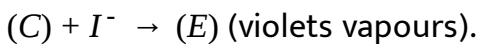
D. Both B and E undergoes disproportionation in aqueous solution

Answer: C

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(C) and (D) both are oxoacids of nitrogen.



Identify (A), (B), (C), (D) and (E)

A. both acts as reducing agents

B. both contains peroxy linkages

C. $C = HNO_2$ and $D = HNO_2$

D. both acts oxidising agents and C also acts as a reducing agent

Answer: D

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117. Action of concentrated nitric acid (HNO_3) on metallic tin produces

A. 8

B. 10

C. 6

D. 4

Answer: B

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118. Which fo the following metal is rendered passive by the action of highly concentrated nitric acid (~80%)?

A. 5

B. 2

C. 6

D. 10

Answer: D

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119. Action of concentrated nitric acid (HNO_3) on metallic tin produces

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120. An inorganic compound 'A' on heating with solution of KOH , gives a gas B and the solution of compound C. Gas B on ignition with excess of air gives a compound D and water. Copper sulphate gives a black precipitate on passing through its solution. White precipitate E is obtained on reaction of C with copper sulphates solution.

Compound D is:

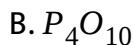


Answer: D

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121. An inorganic compound 'A' on heating with solution of KOH , gives a gas B and the solution of compound C. Gas B on ignition with excess of air gives a compound D and water. Copper sulphate gives a black precipitate on passing through its solution. White precipitate E is obtained on reaction of C with copper sulphates solution.

Compound D is:

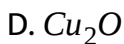
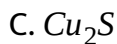
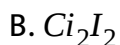
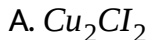


D. does not react

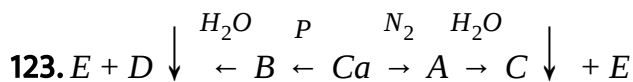
Answer: B

122. An inorganic compound 'A' on heating with solution of KOH , gives a gas B and the solution of compound C. Gas B on ignition with excess of air gives a compound D and water. Copper sulphate gives a black precipitate on passing through its solution. White precipitate E is obtained on reaction of C with copper sulphates solution.

Compound D is:



Answer: B

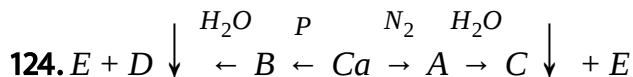


Which of the following characteristic is same for gases C and D?

- A. colour
- B. smell
- C. burning characteristics in air
- D. hybridisation

Answer: A

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When gas C is passed through bleaching powder suspension, another gas F comes out, which is not obtained by

- A. heating NH_4NO_3

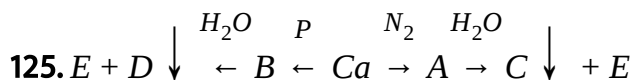
B. heating NH_4NO_2

C. heating $(NH_4)_2Cr_2O_7$

D. heating $Ba(N_3)_2$

Answer: A

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Which of the following characteristic is same for gases C and D?

A. presence of PH_3

B. presence of P_2H_4

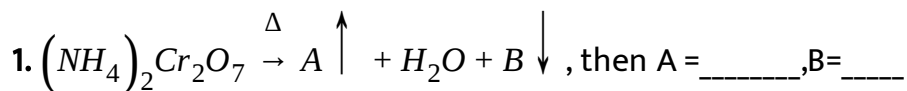
C. presence of O_2

D. presence of H_2

Answer: C

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Complete the following reactions

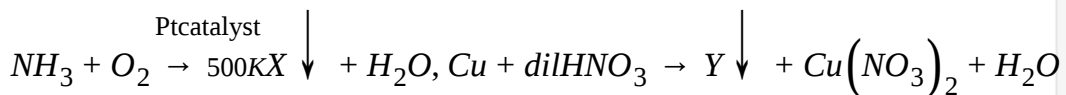


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2. Covalency of nitrogen in N_2O_5 is

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3.



then X = _____, Y = _____

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4. $P_4 + NaOH + H_2O \rightarrow X \downarrow + Y$, then $X = \underline{\hspace{2cm}}$ and the number of $P - H$ bonds in Y is $\underline{\hspace{2cm}}$

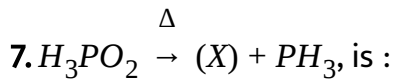
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5. $P_4 + SO_2Cl_2 \rightarrow X + SO_2$, then $X = \underline{\hspace{2cm}}$

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6. The number of $P - O - P$ bonds in cyclotrimetaphosphoric acid, $(HPO_3)_3$ is $\underline{\hspace{2cm}}$

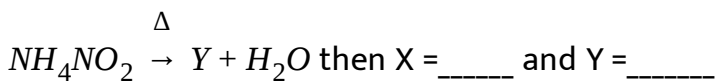
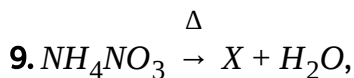
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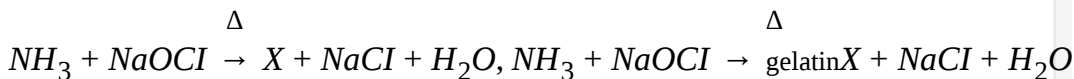
8. N - N bond length is minimum in

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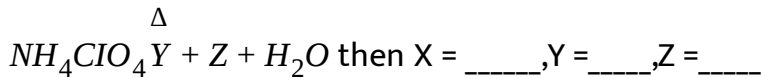
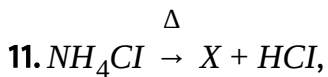
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10.

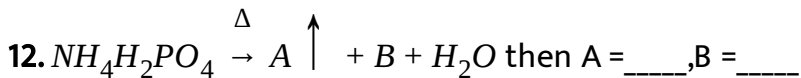


then X = _____ and Y = _____

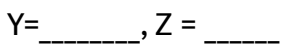
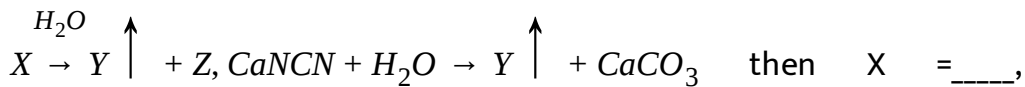
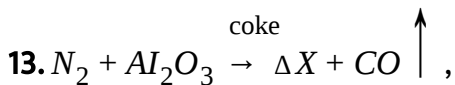
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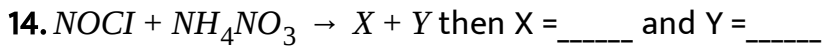


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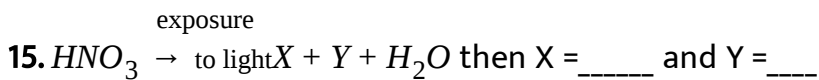


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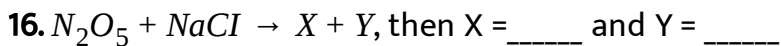
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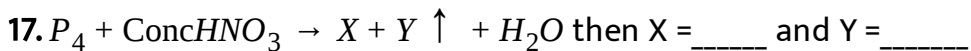
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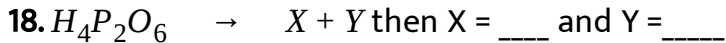


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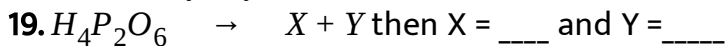
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Hydrolysis



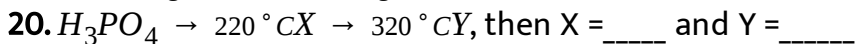
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Hydrolysis



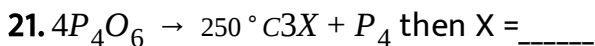
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gentle heat strong heat

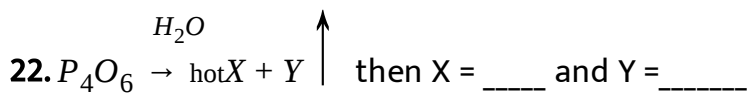


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Δ



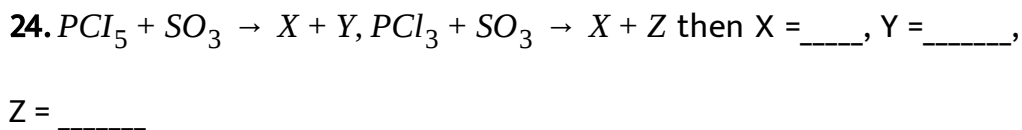
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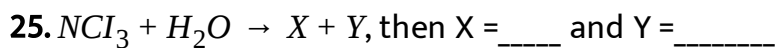
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23. Glacial acetic acid is

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Example

1. Why is red phosphorus less reactive than white phosphorus ?

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2. Explain how chlorine exhibits a maximum covalency of 7.

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3. PH_3 has lower boiling point than NH_3 . Why ?

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4. Bond angle in NH_3 is more than in PH_3 . Explain.



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5. Nitrogen is obtained by the thermal decomposition of :

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6. When compared to CN^- , NO^+ and CO , N_2 is chemically inert.

Explain.

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7. why does NO_2 dimerise?

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8. why does NO_2 dimerise?



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9. NO_2 and N_2O_4 are two forms of nitrogen dioxide. One exists in gaseous state while other in liquid state. The nature of NO_2 and N_2O_4 forms are

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10. N_2O_3 , N_2O_4 and N_2O_5 are anhydride of which oxyacids.

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11. PCl_3 is an electrical conductor in its aqueous solution. Explain

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12. 'P' forms pentahalides and not pentahydrides. Explain

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13. All five bonds of PCl_5 are not equivalent and PCl_5 is less stable.

Explain.

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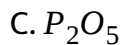
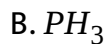
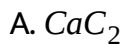
14. How is the reduction ability of H_3PO_2 and H_3PO_3 accounted on the basis of structures of molecules

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15. Aqua-regia can dissolve noble metals. Explain.

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1. Name three gases which are used in warfare as poisonous gases and prepared by chlorine.



Answer: B



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2. White phosphorus on reaction with NaOH gives PH_3 as one of the products. This is a

A. dimerisation reaction

B. disproportionation reaction

C. Condensation reaction

D. Precipitation reaction

Answer: B

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3. Which of the following is not correctly matched?

A. $P_4O_{10} + H_2O$, reactants involved in formation of H_3PO_4

B.

$Ca_3P_2 + H_2O \rightarrow PH_3 + Ca(OH)_2$ reactions involved in Holmes signal

C. $PH_3 - HI \xrightarrow{KOH} PH_4I \rightarrow KI + H_2O + PH_3$, purification of PH_3

D. $PH_3 + HI \rightarrow PH_4I$, show Lewis basic nature of PH_3

Answer: C

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4. Which of the following is the correct statement for PH_3 ?

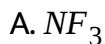
- A. it is a colourless gas having rotten fish smell
- B. it is non poisonous
- C. it is slightly soluble in water
- D. it is a weak Lewis base

Answer: B

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EVALUATE YOURSELF - II

1. Which of the following halides of nitrogen is stable?



Answer: D

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2. Which of the following compound contains ionic as well as covalent bonds?



D. BiBr_5

Answer: A

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3. Which one of the following elements is most metallic?

A. nitrogen

B. arsenic

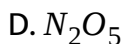
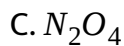
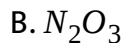
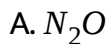
C. antimoney

D. bismuth

Answer: D

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4. The nitrogen oxide does not contain N-N bond are-



Answer: D

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5. Which is true about N_2O_5 ?

A. it is anhydric of HNO_3

B. it is a powerful oxidizing agent

C. solid N_2O_5 is called nitronium nitrate

D. structure of N_2O_5 contains no $[N \rightarrow O]$ bond

Answer: D

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6. Conc. HNO_3 is yellow coloured liquid due to:

A. Dissolution of NO is in conc. HNO_3

B. Dissolution of NO_2 is conc. HNO_3

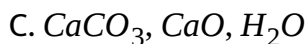
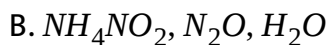
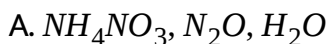
C. Dissolution of N_2O in conc. HNO_3

D. Dissolution of N_2O_3 in conc. HNO_3

Answer: B

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7. An inorganic salt (A) is decomposed at about 523 K to give products (B) and (C). Compound (C) is a liquid at room temperature and is neutral to litmus paper while oxide (B) on burning with white phosphorous gives a dehydrating agent (D). Compounds (A),(B),(C) and (D) will be identified as

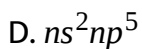
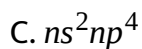
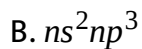
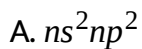


Answer: A

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C.U.Q (GENERAL CHARACTERISTICS)

1. The outer electronic configuration of group VA elements is



Answer: B

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2. VA group elements are known as

A. Halogens

B. Normal elements

C. Chalcogens

D. Pnicogens

Answer: D

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3. The most abundant element in the earth's crust among the following is

A. P

B. As

C. Sb

D. Bi

Answer: A

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4. Which one of the following has the lowest melting point ?

A. N

B. P

C. As

D. Sb

Answer: A



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5. The molecular formula of Phosphorous is

A. P

B. P_4

C. P_2

D. P_5

Answer: B



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6. The elements present in Fluorapatite are

A. *Ca, N&O* Only

B. *Ca&P* only

C. *Ca, N, O, F*

D. *Ca, P, F, O*

Answer: D



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7. Which one of the following has the highest melting point ?

A. P

B. As

C. Sb

D. Bi

Answer: D

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C.U.Q (ALLOTROPIC FORMS)

1. Which is the most thermodynamically stable allotropic form of phosphorus ?

A. Red P

B. Yellow P

C. Black P

D. All are stable

Answer: C

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2. The element(s) of group-16 which exhibit(s) allotropy is/are

A. N

B. As

C. Sb

D. Bi

Answer: D

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3. Nitrogen shows allotropy in ----- state

- A. gaseous
- B. liquid
- C. solid
- D. Liquid and Solid

Answer: C

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4. VA group elements are known as

- A. N
- B. P
- C. Bi

D. Sb

Answer: B

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C.U.Q (OXIDATION STATES)

1. In the compound NCl_3 , negative oxidation state is exhibited by

A. Nitrogen

B. Chlorine

C. Nitrogen & Chlorine

D. Neither nitrogen nor chlorine

Answer: A

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2. What is the highest oxidation state exhibited by group 17 elements

?

A. +1

B. +3

C. -3

D. +6

Answer: D



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3. The enthalpy change (ΔH) for the process,



is 1724 kJ mol^{-1} . If the bond energy of N-H bond in ammonia is 391 kJ

mol^{-1} , what is the bond energy for N-N bond in N_2H_4 ?

- A. 180
- B. 941.4
- C. 350
- D. 120

Answer: B

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4. Anomalous behaviour of nitrogen is due to.

- A. Small size and high electronegativity
- B. Non availability of d - orbitals in valency shell
- C. Ease of multiple bond formation
- D. All are correct

Answer: D



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C.U.Q (HYDRIDES)

1. The trend in the hydrides from Bi to N is

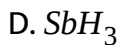
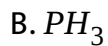
- A. Bond length increases
- B. Bond length decreases
- C. Acidic nature increases
- D. Bond energy decreases

Answer: B



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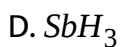
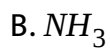
2. Which of the following hydrides has the lowest melting point



Answer: B

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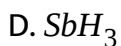
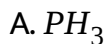
3. The largest bond angle in



Answer: B

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4. Among the following which one is more stable ?

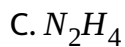


Answer: B

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5. The formula of the Hydride of nitrogen that is acidic in nature is





Answer: B

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6. The element which forms only one hydride is :

A. Nitrogen

B. Phosphorus

C. Arsenic

D. Antimony

Answer: A

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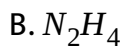
7. Which of the following is correct about 15th group Hydrides (from ammonia to Bismuthine)

- A. Their thermal stability gradually increase
- B. Their ease of preparation gradually increase
- C. The electron pair donating Nature gradually decrease
- D. The bond energies gradually increase

Answer: C

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8. Which of the following is known as freon which is used as a refrigerant ? .



C. HN_3

D. All

Answer: D

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9. The oxidation state of nitrogen is a fractional value in

A. Hydroxyl amine

B. Hydrazoic acid

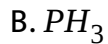
C. Nitrate ion

D. Hydrazine

Answer: B

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10. More stable hydride is-



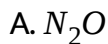
Answer: A

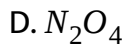
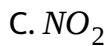


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C.U.Q (OXIDES)

1. Which of the following is paramagnetic ?

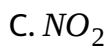
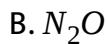




Answer: B

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2. Oxide of nitrogen formed in the atmosphere during the lightening is



D. None

Answer: A

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3. A colourless paramagnetic gas among the following

- A. Nitric Oxide
- B. Nitrous Oxide
- C. Nitrogen dioxide
- D. Dinitrogen trioxide

Answer: A



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4. A blue liquid among the following is

- A. N_2O_3
- B. N_2O
- C. N_2O_4

D. NO_2

Answer: A

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5. Molecule with a three electron bond is :

A. N_2O

B. NO

C. N_2O_3

D. N_2O_5

Answer: B

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6. The laughing gas is

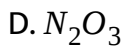
- A. Nitrous oxide
- B. Nitric oxide
- C. Nitrogen oxide
- D. Nitrogen pentoxide

Answer: A

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7. $FeSO_4$ forms brown ring with

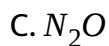
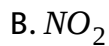
- A. NO_3
- B. NO
- C. NO_2



Answer: B

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8. Ammonium nitrate decomposes on heating into



Answer: C

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9. The number of oxygen atoms bonded to one phosphorus atom in

P_4O_6 is

A. 6

B. 4

C. 3

D. 2

Answer: C



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10. Which of the following is paramagnetic ?

A. NO

B. NO_2

C. ClO_2

D. All

Answer: D

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11. Acidic para magnetic oxide of nitrogen

A. NO

B. N_2O_3

C. NO_2

D. N_2O_5

Answer: C

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12. Regarding H_3PO_5 the wrong statement is

- A. It is called laughing gas
- B. It is called nitrous oxide
- C. It is a linear molecule
- D. It is a more reactive oxide

Answer: D

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13. Which of the following exist as dimer

- A. NO
- B. NO_2
- C. P_2O_3

D. All

Answer: D

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C.U.Q (HALIDES)

1. (A) : Nitrogen cannot form pentahalides

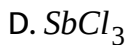
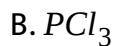
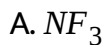
(R) : Nitrogen cannot expand its octet configuration, due to absence of empty d-orbitals.

- A. Nitrogen atom is very small
- B. Nitrogen atom has no vacant orbitals in valency shell
- C. Electronegativity of nitrogen is very high.
- D. Nitrogen molecular contains a very strong triple bond

Answer: B

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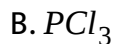
2. Which of the following trihalides is not hydrolysed



Answer: C

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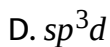
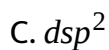
3. Which one of the following exceeds octet rule ?



Answer: C

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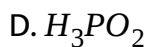
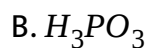
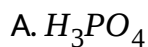
4. The hybrid orbitals used by Phosphorus in the formation of PCl_5 are



Answer: D

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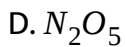
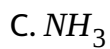
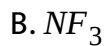
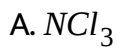
5. PCl_3 on hydrolysis gives



Answer: B

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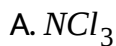
6. Which of the following is an explosive compound ?



Answer: A

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7. Which of the following undergoes hydrolysis ?

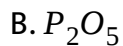
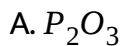


Answer: A

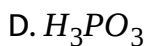


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8. PCl_3 is prepared by the action of Cl_2 on



C. White



Answer: C



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9. Which of the following pentahalides of Bi exists

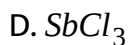
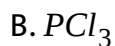




Answer: D

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10. Which chloride is not appreciably hydrolysed by water



Answer: D

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11. The shape and hybridisation of PCl_3 molecule

- A. Tetrahedral and sp^3
- B. Pyramidal and sp^3
- C. Angular and sp^3
- D. Planar trigonal and sp^3

Answer: B

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C.U.Q (OXYACIDS)

1. In hyponitrous acid the number of Hydroxyl groups present are

- A. 1
- B. 2

C. 3

D. 4

Answer: B



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2. The oxidation state of phosphorus is maximum in

A. Orthophosphorus acid

B. Orthophosphoric acid

C. Pyrophosphoric acid

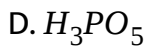
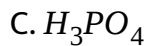
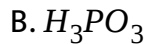
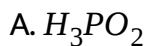
D. Metaphosphoric acid

Answer: A



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3. A tribasic acid with peroxy bond is



Answer: D



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4. The salts of phosphorous acid are called

A. Phosphates

B. Phosphites

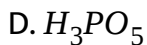
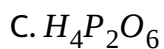
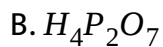
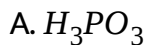
C. Hypophosphites

D. Phosphides

Answer: B

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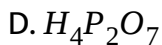
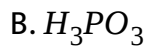
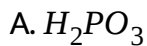
5. Which contains O-O linkage ?



Answer: D

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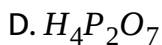
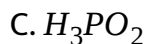
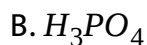
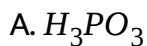
6. The formula of meta phosphoric acid is



Answer: C

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7. Oxidation state of +1 for phosphorus is found in



Answer: C

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8. Number of hydroxyl groups present in hydrosulphuric acid is

A. 1

B. 2

C. 3

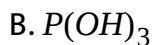
D. 4

Answer: C

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9. Which of the following is an acidic salt –

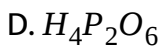
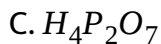
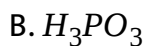
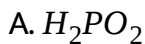
A. $\text{Ca}(\text{OH})_2$



Answer: B

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10. The oxyacid of phosphorous which has more non-ionisable hydrogens



Answer: A

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C.U.Q (PREPARATION AND USES OF NITRIC ACID)

1. Mixture of conc. HNO_3 and conc. H_2SO_4 is known as

- A. Sulphonating mixture
- B. Nitration mixture
- C. Explosion mixture
- D. Fusion mixture

Answer: B

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2. Iron is rendered passive by treatment with

A. aquaregia

B. conc. H_2SO_4

C. conc. HNO_3

D. conc. HCl

Answer: C

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3. Industrial preparation of nitric acid by Ostwald's process involves.

A. reduction of NH_3

B. oxidation of NH_3

C. hydrogenation of NH_3

D. hydrolysis of NH_3

Answer: B

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4. The catalyst used in the Deacon's process for the manufacture of chlorine is

A. *Pt*

B. *Fe*

C. V_2O_5

D. *Ni*

Answer: A

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C.U.Q (AMMONIA)

1. In Haber's process for the manufacture of ammonia, the catalyst used is finely divided _____.

- A. finely divided Nickel
- B. finely divided molybdenum
- C. finely divided iron
- D. finely divided Platinum

Answer: C



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2. The catalytic promoter used in Haber's process is

- A. *Mo*
- B. *Ni*
- C. *Pt*

D. V_2O_5

Answer: A

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3. NH_3 on burning in oxygen gives

A. NO and H_2O

B. NO_2 and H_2O

C. N_2 and H_2O

D. N_2O and H_2

Answer: A

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4. An aqueous solution of ammonia consists of

A. Ammonium ions

B. Hydroxy ions

C. both of them

D. H^+ ions

Answer: C

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5. Nitrolim is

A. $CaC_2 + N_2$

B. $CaCN_2 + \text{Graphite}$

C. $CaNCN$



Answer: B

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6. In the preparation of HNO_3 by Ostwald process ammonia is

A. reduced

B. oxidised

C. reduced and oxidised

D. hydrolysed

Answer: B

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7. NH_4Cl on heating with NaOH liberates

A. $NaCl$

B. NH_3

C. HCl

D. $NaOCl$

Answer: B



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8. Ammonia gas is dried by

A. Quick lime

B. Conc. H_2SO_4

C. P_2O_5

D. CaCl_2

Answer: A

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9. Which of the following substances is used as fertilizer?

A. Ammonium sulphate

B. Urea

C. Calcium super phosphate

D. $\text{Ca}_3(\text{PO}_4)_2$

Answer: D

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10. Which of the following elements can form both ionic and covalent bonds ?

A. Liquid ammonia

B. H_2O

C. Benzene

D. CCl_4

Answer: A



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C.U.Q (ADDITIONAL SYNOPSIS BITS SUPER PHOSPHATE OF LIME)

1. Teeth and bones are made of mainly

A. Calcium silicate

- B. Calcium phosphate
- C. Calcium silicon phosphate
- D. Calcium hydrogen phosphate

Answer: B

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2. Superphosphate of lime is

- A. Calcium containing substance
- B. Soluble in water
- C. Containing gypsum
- D. None of these

Answer: B

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EXERCISE - 1 (C.W) (GENERAL CHARACTERISTICS)

1. A metalloid of nitrogen family is

A. N

B. As

C. P

D. Bi

Answer: B



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2. A metalloid of nitrogen family is

A. P

B. As

C. Sb

D. Bi

Answer: B



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3. Phosphide ion has the electronic structure similar to that of

A. Nitride ion

B. Chloride ion

C. Fluoride ion

D. Sodium ion

Answer: B



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EXERCISE - 1 (C.W) (ALLTROPIC FORMS)

1. Assertion (A) Elementary phosphorus exists in three principal allotropic forms , ie .white (or yellow),red (or violet) and black.

Reason (R) Of the three forms, white phosphorus is the most important and most reactive.

A. White P

B. Red P

C. Black P

D. Scarlet P

Answer: A



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2. Which of the following is oxidised in air?

A. White P

B. CH_4

C. H_2O

D. SO_2

Answer: A



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3. Which of the following exist in mono-atomic state

A. Phosphorus

B. Nitrogen

C. Antimony

D. Bismuth

Answer: D

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4. Which of the following properties of white phosphorus are shared by red phosphorus ?

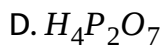
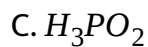
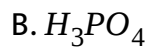
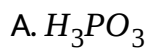
- A. It burns when heated in air
- B. It reacts with hot caustic soda solution to give phosphine
- C. It shown chemiluminescence
- D. It is soluble in carbon disulphide

Answer: A

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EXERCISE - 1 (C.W) (OXIDATION STATES)

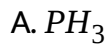
1. Oxidation state of +3 for phosphorous is found in



Answer: A

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2. Non combustible hydride is



C. NH_3

D. AsH_3

Answer: C



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3. Most stable oxidation state of iron is

A. +1

B. +5

C. -3

D. +3

Answer: D



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EXERCISE - 1 (C.W) (DINITROGEN)

1. Fixation of nitrogen means

A. reaction of nitrogen with oxygen

B. conversion of free atmospheric nitrogen into nitrogen compounds

C. the action of denitrifying bacteria on nitrogen compounds

D. decomposition of nitrogenous compounds to yield free nitrogen.

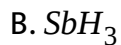
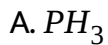
Answer: B



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EXERCISE - 1 (C.W) (HYDRIDES)

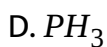
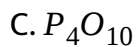
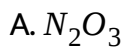
1. Non combustible hydride is



Answer: C

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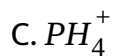
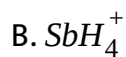
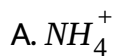
2. The substance that is neutral to litmus



Answer: D

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3. Which of the following is least stable ?



Answer: B

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4. Which statement is false :

- A. NH_3 is a Lewis base
- B. NH_3 molecule is triangular planar
- C. NH_3 does not act as reducing agent
- D. NH_3 (liquid) is used as a solvent

Answer: B

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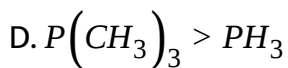
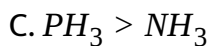
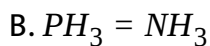
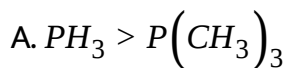
5. Which of the following is used to produce smoke screens?

- A. Zinc sulphide
- B. Calcium phosphide
- C. Zinc phosphate
- D. Sodium carbonate

Answer: B

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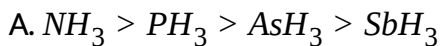
6. Which one of the following statements is correct with respect to basic character?

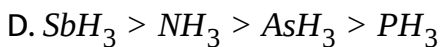
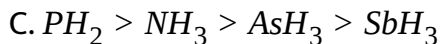
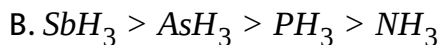


Answer: D

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7. The decreasing order of boiling points is



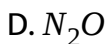
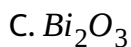
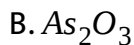
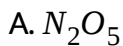


Answer: D

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EXERCISE - 1 (C.W) (OXIDES)

1. Amphoteric oxide among the following is



Answer: B

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2. Which of the following exists as monomer molecules only

- A. Nitrogen (III) Oxide
- B. Phosphorus (V) Oxide
- C. Arsenic (III) Oxide
- D. Antimony (V) Oxide

Answer: A

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3. Nitrogen (i) oxide is produced by

A. Thermal decomposition of Ammonium Nitrate

B. Decomposition of NO_2

C. By The decomposition of $NaNO_2$

D. By the interaction of Hydroxyl amine and Nitrous acid

Answer: A

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4. In P_4O_{10} the number of oxygen atoms bonded to each phosphorus atom is.....

A. 2

B. 3

C. 4

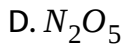
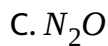
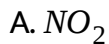
D. 5

Answer: C



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5. Which of the following oxide is brown coloured gas



Answer: A



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6. The gas not having oxidizing as well as bleaching properties is

A. Chlorine

B. Ozone

C. SO_2

D. N_2O

Answer: D

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7. P_4O_{10} is the anhydride of the following

A. H_3PO_2

B. H_3PO_3

C. H_3PO_4

D. H_3PO_5

Answer: C

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EXERCISE - 1 (C.W) (HALIDES)

1. Which of the following trihalides give unique products on hydrolysis



Answer: A

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2. The element which gives explosive halides is

A. Phosphorus

B. Nitrogen

C. Arsenic

D. Bismuth

Answer: B

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3. Which of the following is most stable ?

A. NI_3

B. NF_3

C. NBr_3

D. NCl_3

Answer: B

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4. Among NCl , PF_5 and NF_5 why NF_5 is impossible ?

- A. N has high electronegativity
- B. N has high ionisation energy
- C. N has lowest atomic size
- D. N has no vacant - orbital

Answer: D

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5. Which of the following is not correct?

- A. Hydrolysis of NCl_3 gives NH_3 and $HOCl$
- B. NH_3 is less stable than PH_3
- C. NH_3 is a weak reducing agent compared to PH_3
- D. Nitric oxide in solid state exhibits diamagnetic property

Answer: B

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EXERCISE - 1 (C.W) (OXYACIDS)

1. An element X belongs *I, II, III* or *V* groups. Its oxide reacts with water to produce highly acidic solution the element X belongs to

- A. I group

B. II group

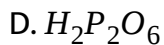
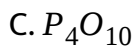
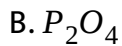
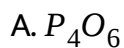
C. III group

D. V group

Answer: D

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2. The anhydride of orthophosphoric acid is



Answer: C

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3. The oxyacid of phosphorous which exists as a dimer in vapour phase is

- A. Hypophosphorous acid
- B. Pyrophosphoric acid
- C. Peroxy phosphoric acid
- D. Metaphosphoric acid

Answer: D

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4. Salt of the following is used as a water softer

- A. $H_2P_2O_6$
- B. $H_4P_2O_7$

C. HPO_3

D. HPO_2

Answer: C



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5. Basicity of orthophosphoric acid is

A. 2

B. 3

C. 4

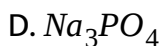
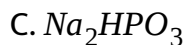
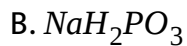
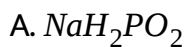
D. 5

Answer: B



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6. Among the following acidic amino acids are



Answer: B

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EXERCISE - 1 (C.W) (PREPARATION AND USES OF NITRIC ACID)

1. Ammonia and air are the starting materials for the manufacture of Nitric acid in

A. Birkland - Eyde process

B. Ostwald's process

C. Haber' process

D. Hasen Clever method

Answer: B

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2. Moles of oxygen that can oxidise one mole of NH_3 to NO

A. 1

B. 1.25

C. 2.5

D. 5

Answer: B

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3. Percentage of nitric acid obtained in Ostwald's process is

A. 61 %

B. 68 %

C. 74 %

D. 82 %

Answer: A

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EXERCISE - 1 (C.W) (AMMONIA)

1. Which does not give ammonia with water

A. Mg_3N_2

B. AlN

C. $CaCN_2$

D. $Ca(CN)_2$

Answer: D

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2. What happens when mixture of NH_3 and air is passed over heated platinum gauze ?

A. NO

B. NO_2

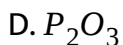
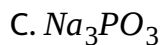
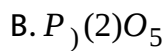
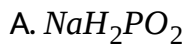
C. $POCl_3$

D. $HOCl$

Answer: A

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3. Aqueous NaOH reacts with white Phosphorous to form Phosphine and

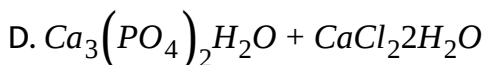
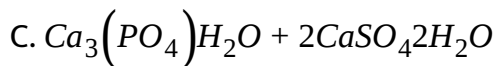
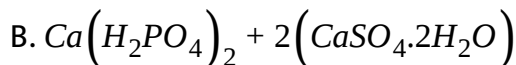
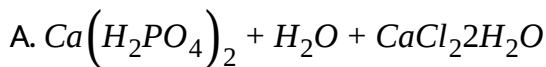


Answer: A

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EXERCISE - 1 (C.W) (ADDITIONAL SYNOPSIS BITS SUPER PHOSPHATE OF LIME)

1. Superphosphate is a mixture of



Answer: B

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2. Superphosphate of lime is obtained by treating

A. Calcium phosphate with HCl

B. Calcium phosphide with HCl

C. Calcium phosphate with H_2SO_4

D. Calcium phosphate with NaOH

Answer: C

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EXERCISE - 1 (H.W) (GENERAL CHARACTERISTICS)

1. Atomicity of white phosphorus is

A. 4

B. 3

C. 2

D. 8

Answer: A

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2. Which of the following is able to form ionic compound

A. Bi

B. As

C. Sb

D. P

Answer: A

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3. The percentage of p-character in the orbitals forming $p - p$ bonds in P_4 is

A. 25

B. 33

C. 50

D. 75

Answer: D



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EXERCISE - 1 (H.W) (ALLOTROPIC FORMS)

1. Which of the following exists in more number of allotropic forms

A. Nitrogen

B. Bismuth

C. Arsenic

D. Phosphorus

Answer: D

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2. Red phosphorous is less soluble and less volatile than white phosphorous because its structure is

- A. polymerised chains
- B. hexagonal rings
- C. tetrahedral
- D. Planar sheets

Answer: A

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EXERCISE - 1 (H.W) (OXIDATION STATES)

1. In $Ba(H_2PO_2)_2$ the oxidation number of phosphorous is

A. +5

B. +1

C. +3

D. +4

Answer: B

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2. The oxidation state of nitrogen in hydrazine is

A. -1

B. -2

C. +1

D. +2

Answer: B



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3. The oxidation state of nitrogen varies from:

A. -1

B. -2

C. 0

D. +2

Answer: C



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EXERCISE - 1 (H.W) (DINITROGEN)

1. Nitrogen forms N_2 but phosphorus forms P_4 due to

A. Triple bond is present between phosphorus atoms

B. $P\pi - P\pi$ bonding is weak.

C. $P\pi - P\pi$ bonding is strong

D. Multiple bond is formed easily

Answer: B

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EXERCISE - 1 (H.W) (HYDRIDES)

1. Which of the following is least stable

A. NH_3

B. N_3H

C. H_2NH_2

D. N_2H_2

Answer: D

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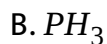
2. The bond angle decreases from NH_3 to BiH_3 due to

- A. The decrease in basic strength
- B. The decrease in bond dissociation energy
- C. The decrease in electronegativity of the central atom
- D. All of these

Answer: C

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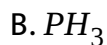
3. Which one of the following can more readily donate the lone pair ?



Answer: A

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4. The most polar compound among the following is :



D. BiH_3

Answer: A

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5. Acidic hydride of nitrogen is

A. NH_3

B. N_2H_4

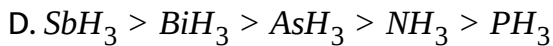
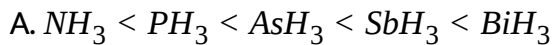
C. N_2H_2

D. N_3H

Answer: D

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6. The correct order of reducing abilities of hydrides of group 15 elements is



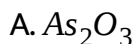
Answer: A

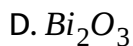
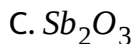
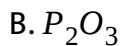


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EXERCISE - 1 (H.W) (OXIDES)

1. Which of the following is most acidic?





Answer: B

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2. Which of the following is a mixed acid anhydrid

A. Nitrogen (III) Oxide

B. Nitrogen (II) Oxide

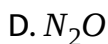
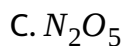
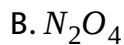
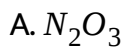
C. Nitrogen (V) Oxide

D. Nitrogen (IV) Oxide

Answer: D

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3. Which of the following oxides of nitrogen is anhydride of nitric acid ?



Answer: C

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4. Which one of the following elements does not form the compound, M_4O_{10} (M = element) ?

A. P

B. Sb

C. As

D. Bi

Answer: D



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5. Nitrous oxide is

A. Soluble in cold water

B. Soluble in hot water without decomposition

C. Acidic in nature

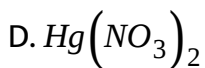
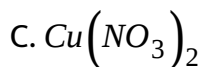
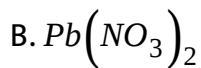
D. Basic in nature

Answer: A



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6. NO_2 can be obtained by heating

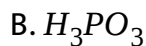
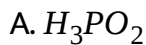
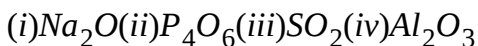


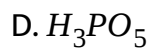
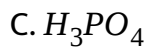
Answer: A



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7. Select the acidic and basic anhydrides from the following :





Answer: B

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EXERCISE - 1 (H.W) (HALIDES)

1. The V A group element that doesn't directly react with chlorine

A. N

B. As

C. Sb

D. Bi

Answer: A

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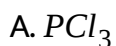
2. Which of the following is NOT an alkaline flux ?



Answer: C

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3. Which of the following molecules does NOT contain a lone pair of electron ?

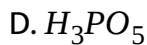
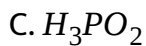
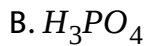
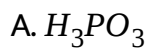




Answer: D

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4. PCl_5 on hydrolysis gives



Answer: B

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EXERCISE - 1 (H.W) (OXYACIDS)

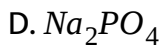
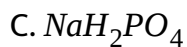
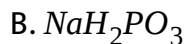
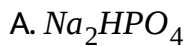
1. H_3PO_2 is the molecular formula of an acid of phosphorus. Its name and basicity respectively are

- A. Metaphosphorous acid and one
- B. Hypophosphorous acid and one
- C. Metaphosphoric acid and two
- D. Hypophosphoric acid and two

Answer: B

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2. Which of the following is a mixel salt ?



Answer: D

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3. Which of the following is tetrabasic?

A. Orthophosphoric acid

B. Orthophosphorous acid

C. Metaphosphoric acid

D. Pyrophosphoric acid

Answer: D



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4. The formula of meta phosphoric acid is

A. 6

B. 5

C. 4

D. 3

Answer: B



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5. The starting material used for the manufactured of HNO_3 by Ostwalds process is

A. Ammonia and N_2O

B. Ammonia

C. Air only

D. Ammonia and nitrogen

Answer: B

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EXERCISE - 1 (H.W) (PREPARATION AND USES OF NITRIC ACID)

1. Which of the following is rendered passive by conc. HNO_3 is

A. *Al*

B. *Au*

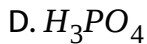
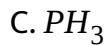
C. *Zn*

D. *Sn*

Answer: A

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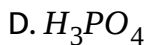
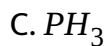
2. Which of the following is used in pyrotechniques



Answer: B

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3. Which of the following is used in pyrotechniques



Answer: D

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4. calcium cyanamide on treatment with steam under pressure gives ammonia and

A. Calcium carbonate

B. Calcium hydroxide

C. Calcium oxide

D. Calcium bicarbonate

Answer: A

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5. Which of the following reaction yield elementary gases like N_2 , H_2 , O_2 as the byproducts ?

- A. I and II only
- B. II, III and IV only
- C. I, II and III only
- D. all of these

Answer: D

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1. The number of covalent bonds made by phosphorus atom never exceeds

A. 3

B. 6

C. 2

D. 12

Answer: B



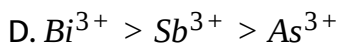
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2. Ionic radii (in Å...) of As^{3+} , Sb^{3+} and Bi^{3+} follow the order

A. $As^{3+} > Sb^{3+} > Bi^{3+}$

B. $Sb^{3+} > Bi^{3+} > As^{3+}$

C. $Bi^{3+} > As^{3+} > Sb^{3+}$



Answer: D

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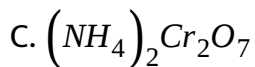
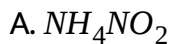
3. The shape and bond angle of white phosphorus molecule is

- A. Linear and 180°
- B. Trigonal planar and 120°
- C. Tetrahedral and $109^\circ 28'$
- D. Tetrahedral and 60°

Answer: D

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1. Nitrogen liberated by the thermal decomposition of only



D. all three

Answer: D

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2. The cyanide ion CN^- and N_2 are isoelectronic, but in contrast to CN^- , N_2 is chemically inert, because of

A. low bond energy

B. absence of bond polarity

C. unsymmetrical electron distribution

D. presence of more number of electrons in bonding orbitals

Answer: B

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EXERCISE - 2 (C.W) (HYDRIDES)

1. Which of the following has maximum complex forming ability with a given metal ion?

A. PH_3

B. BiH_3

C. NH_3

D. SbH_3

Answer: C

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2. Oxidation number of N in NH_3 is

A. $+1/3$

B. 0

C. $-1/3$

D. 1

Answer: C

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3. The bond energies (in $KJ\ mole^{-1}$) of P-H, As-H and N-H respectively

?

A. 247, 318 and 389

B. 247, 389 and 318

C. 318, 389 and 247

D. 318, 247 and 389

Answer: D

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4. The basic strength of the hydrides of group 15 elements :

A. $AsH_3 > SbH_3 > PH_3 > NH_3$

B. $NH_3 > SbH_3 > PH_3 > AsH_3$

C. $NH_3 > PH_3 > AsH_3 > SbH_3$

D. $PH_3 > NH_3 > SbH_3 > AsH_3$

Answer: C

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5. White phosphorous reacts with caustic soda to give phosphine and sodium hypophosphite In this reaction phosphorous undergoes

- A. Oxidation
- B. Reduction
- C. Both
- D. None of these

Answer: C

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EXERCISE - 2 (C.W) (OXIDES)

1. The hybridization of phosphorous atom in P_4O_6 and P_4O_{10} is

A. sp

B. sp^2

C. sp^3

D. sp^3d

Answer: C

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2. The bonds present in P_4O_{10} are

A. Ionic and covalent

B. Ionic and dative

C. Covalent and dative

D. Only covalent bonds

Answer: C

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3. Which of the following oxides of nitrogen is the anhydride of nitrous acid?

A. NO

B. N_2O_3

C. N_2O_4

D. N_2O_5

Answer: B

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4. The number of oxygen atoms bonded to one phosphorus atom in

P_4O_6 is

A. 4

B. 3

C. 6

D. 5

Answer: B



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5. The arrangement of oxygen atoms around each phosphorous in

P_4O_{10}

A. Pyramidal

B. Octahedral

C. Tetrahedral

D. Square planar

Answer: C

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6. When NH_4NO_3 is gently heated, an oxide of Nitrogen is formed.

What is the oxidation state of Nitrogen in this oxide ?

A. +4

B. +2

C. +3

D. +1

Answer: D

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7. The following are aresome statement about oxides of VA group element

I) N_2O molecule is linear

II) NO_2 molecule is angular

III) N_2O_5 molecule is angular

The correct combination is

A. All are correct

B. I & III are correct

C. II & III are correct

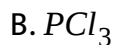
D. I & II are correct

Answer: D



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1. The trihalide which forms oxocations on hydrolysis is



Answer: C

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2. Bismuth forms the only pentahalide with the halogen

A. Bromine

B. Fluorine

C. Chlorine

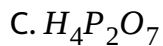
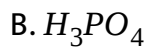
D. Iodine

Answer: B

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EXERCISE - 2 (C.W) (OXYACIDS)

1. Acid having peroxide linkage in its structure is



Answer: D

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2. Two oxides of Nitrogen, NO and NO_2 reacts together at 253 K and form a compound Nitrogen X.X reacts with water to yield another compound of Nitrogen Y. The shape of the anion of Y molecule is

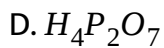
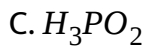
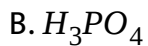
- A. Tetrahedral
- B. Triangular planar
- C. Square planar
- D. Pyramidal

Answer: B

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3. Oxidation state of +1 for phosphorus is found in

- A. H_3PO_3



Answer: C

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4. The number of hydroxyl groups in pyrophosphoric

A. 3

B. 4

C. 5

D. 7

Answer: B

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5. H_3PO_2 is the molecular formula of an acid of phosphorus. Its name and basicity respectively are

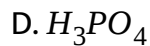
- A. Phosphorous acid and two
- B. Hypophosphorous acid and two
- C. Hypophosphorous acid and one
- D. Hypophosphoric acid and two

Answer: C

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6. The acid that forms primary, secondary and tertiary phosphates is

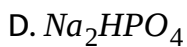
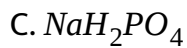
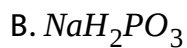
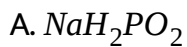
- A. H_3PO_2
- B. H_3PO_3



Answer: D

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7. Which of the following is not an acidic salt ?



Answer: A

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8. The reducing strength of oxyacid of the Phosphorous depends on

- A. The number of H - atoms directly attached to P
- B. The number of H - atoms attached to oxygen atom
- C. The number of O - atoms attached to P - atoms
- D. The number of P - atoms

Answer: A

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9. Regarding H_3PO_5 the wrong statement is

- A. It's basicity is there
- B. Oxidation state P in it is +5
- C. It contains O - O linkage
- D. It can form a dimer

Answer: D

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10. The following are some statements about HNO_2

I) Its undissociated forms are tautomers

II) Its undissociated forms are resonance structures

III) Its anhydride in pure state exists as pale blue solid and that melts to deep blue liquid

The correct combination is

A. All are correct

B. I, III are correct

C. II, III are correct

D. I, II are correct

Answer: B

11. The statements regarding oxyacids of phosphorous are

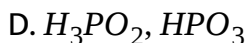
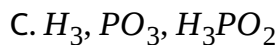
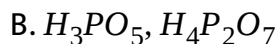
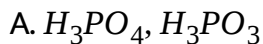
- I) HPO_3 molecule is monobasic acid
- II) $H_4P_2O_6$ molecule has P-P bond
- III) $H_4P_2O_7$ molecule has P-O-P linkage

The correct combination is

- A. All are correct
- B. Only II is correct
- C. II & III are correct
- D. I & II are correct

Answer: A

12. Which pair of oxyacids of phosphorus contain P-H bonds



Answer: C

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EXERCISE - 2 (C.W) (AMMONIA AND NITRIC ACID)

1. A & B are two gases 'A' is identified with the glass rod dipped in NH_3 and 'B' is identified with the glass rod dipped in HCl. Then A, B are

A. HCl, NO_2

B. HCl, NH_3

C. NH_3, HCl

D. NH_3, SO_2

Answer: B

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2. Nessler's reagent is used to detect trace amounts of ammonia. Its formula is

A. $KHgI_4$

B. K_2HgI_2

C. K_2HgI_4

D. $KHgI_3$

Answer: C

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3. Cyanamide process is used to prepare

- A. Cyanide
- B. Isocyanide
- C. Ammonia
- D. Nitric acid

Answer: C

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4. Conc. HNO_3 is treated with iron. The metal is passive because

- A. It is a transition metal
- B. It form protective oxide film
- C. It is reduced
- D. It liberates laughing gas

Answer: B

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5. $4\text{Zn} + 10\text{HNO}_3 \rightarrow 4\text{Zn}(\text{NO}_3)_2 + \text{NH}_4\text{NO}_3 + 3\text{H}_2\text{O}$. In this reaction one mole of HNO_3 is reduced by

- A. 32g Zn
- B. 64g Zn
- C. 128g Zn
- D. 256g Zn

Answer: D

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6. $[CaO \cdot Ca(NO_3)_2]$ is the chemical composition of the substance, commonly used as

- A. Fertiliser
- B. Explosive
- C. Perfume
- D. Medicine

Answer: A

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7. Which of the following is not correct

A. Ammonia is used as refrigerant

B. A mixture of $Ca(H_2PO_4)_2$ and $CaSO_4 \cdot 2H_2O$

C. A mixture of $Ca(CN)_2$ and $CaSO_4 \cdot 2H_2O$ is known as known as superphosphate of lime

D. Hydrolysis of NCl_3 gives NH_3 and $HOCl$

Answer: B

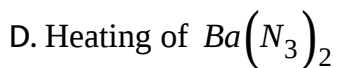
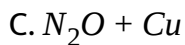
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EXERCISE - 2 (H.W) (GENERAL CHARACTERISTICS)

1. How do we get pure N_2 gas

A. $NH_3 + NaNO_2$

B. $NH_4Cl + NaNO_2$



Answer: D

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2. One mole of calcium phosphide on reaction with excess of water gives

A. 1 mole of phosphine

B. two moles of phosphoric acid

C. two moles of phosphine

D. one mole of phosphorous pentoxide

Answer: C

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3. The p-p bond energy is x' KJ/mole. Then the energy needed for the dissociation of 124g of white phosphorous is

- A. x KJ
- B. $4x$ KJ
- C. $6x$ KJ
- D. $8x$ KJ

Answer: C

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4. The following are some statement about VA group element

- I) All elements exhibits allotropy
- II) Boiling points decrease down the group

III) They contain five electrons in their valency shell The correct combination is

- A. All are correct
- B. Only III is correct
- C. I & II are correct
- D. II & III are correct

Answer: B

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5. With reference to protonic acids, which of the following statements is correct

- A. PH_4 is more basic than NH_3
- B. PH_3 is less basic than NH_3
- C. PH_3 is equally basic as NH_3

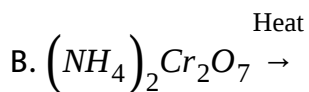
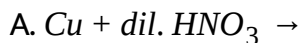
D. PH_3 is amphoteric while NH_3 is basic

Answer: B

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EXERCISE - 2 (H.W) (DINITROGEN)

1. A diatomic gas will be obtained in

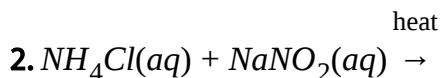


C. Both 1 & 2



Answer: C

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A. (B) is an amphoteric oxide

B. (X) is a colourless, diamagnetic gas which combines with Al on heating

C. (X) can be produced by action of (Zn + NaOH) on $NaNO_2$

D. (X) is coloured, paramagnetic gas which combines with Al on heating

Answer: B

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3. The statements regarding N_2 molecule are

I) The Bond energy is 945.4 KJ/mole

II) It has triple bond

III) It contains 2σ and 1π bond

The correct combination is

- A. Only II is correct
- B. I & III are correct
- C. II and III are correct
- D. All are correct

Answer: B

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EXERCISE - 2 (H.W) (HYDRIDES)

1. Which of the following is not correct ?

- A. Hydrolysis of NCl_3 and $HOCl$
- B. NH_3 is weak reducing agent compared to PH_3

C. NH_3 is weak reducing agent compared to PH_3 .

D.

Answer: B

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2. Silver chloride dissolves in excess of NH_4OH . The cation present in solution is.

A. Ag^+

B. $[Ag(NH_3)_4]^+$

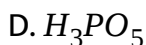
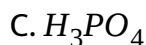
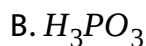
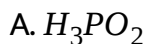
C. $[Ag(NH_3)_2]^+$

D. $[Ag(NH_3)_6]^+$

Answer: C

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3. The oxyacid of phosphorous which has more non-ionisable hydrogens



Answer: A

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4. The following are some statements related to VA group hydrides

I) Reducing property increases from NH_3 to BiH_3

II) Tendency to donate lone pair decreases from NH_3 to BiH_3

III) Ease of replacing H with Cl decreases from NH_3 to BiH_3

IV) Ease of formation of hydrides decreases from NH_3 to BiH_3

The correct statement are

A. I, II, III, IV

B. I, III and IV

C. I, II and IV

D. I and IV

Answer: A

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EXERCISE - 2 (H.W) (OXIDES)

1. The number of Oxygen atoms surroundings each Nitrogen atom in N_2O_5 is

A. 2

B. 3

C. 4

D. 5

Answer: B



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2. Oxide of nitrogen used as one of the constituents in making anesthetics is

A. Nitric Oxide

B. Nitrogen dioxide

C. Nitrous Oxide

D. Dinitrogen Pentoxide

Answer: C

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3. The number of bridge oxygen atoms present in both P_4O_6 and P_4O_{10} are respectively

A. 4, 6

B. 4, 4

C. 6, 4

D. 6, 6

Answer: D

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4. The number of of P-O bonds and lone pair of electrons present in P_4O_6 molecule

A. 12, 16

B. 12, 12

C. 8, 8

D. 12, 4

Answer: A

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List-1

List-2

- A) NO 1) Colourless and paramagnetic
- B) NO_2 2) Greenish yellow gas
5. C) N_2O_3 3) Reddish brown and paramagnetic
- D) N_2O_5 4) Anhydride of Nitric acid
- 5) Anhydride of Nitrous acid

The correct match is

A. A B C D
 2 4 5 1

B. A B C D
 1 3 5 4

A B C D
C. 3 2 1 5

A B C D
D. 1 4 4 3

Answer: B

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List-1

List-2

- A) $HCl_3 + H_2O \rightarrow$ 1) $HOCl$
6. B) $PCl_3 + H_2O \rightarrow$ 2) H_3PO_3
C) $PCl_5 + H_2O \rightarrow$ 3) H_3PO_4
D) $PF_3 + H_2O \rightarrow$ 4) H_3PO_2

The correct match is

A B C D
A. 1 2 3 5

A B C D
B. 2 4 2 5

A B C D
C. 3 2 1 4

A B C D
D. 5 3 2 1

Answer: A

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7. When orthophosphoric acid is heated to 873K, the product formed is

- A. Phosphine, PH_3
- B. Phosphorous trioxide, P_2O_3
- C. Phosphorous acid, H_3PO_3
- D. Metaphosphoric acid, HPO_3

Answer: D

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1. N_2 forms NCl_3 whereas P can form both PCl_3 and PCl_5 . Why ?

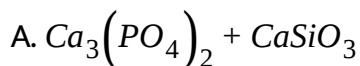
- A. P has d - orbitals which can be used for bonding but N_2 does not have
- B. N atom is larger than P in size
- C. P is more reactive towards Cl than N
- D. None of the above

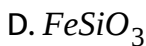
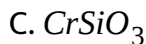
Answer: A

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EXERCISE - 2 (H.W) (OXYACIDS)

1. Thomas slag is





Answer: A

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2. The following are some statements about HNO_2

I) Its undissociated forms are tautomers

II) Its undissociated forms are resonance structures

III) Its anhydride in pure state exists as pale blue solid and that melts to deep blue liquid

The correct combination is

A. All are correct

B. I, iii are correct

C. ii, iii are correct

D. I, ii are correct

Answer: B

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3. In H_3PO_3 molecule

A. P - atom is surrounded by three $-OH$ groups

B. P - atom is tetrahedrally surrounded by two $-OH$ groups, one oxygen atom and one hydrogen atom

C. P - atom is surrounded by four $-OH$ groups

D. P - atom is surrounded by two $-H$ atoms

Answer: B

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4. The following are some statements about oxyacids of VA group elements

I) The salt of nitric contains NO_3^- ion

II) The salt of phosphoric acid contains PO_4^{3-} ion

III) Salts of meta phosphoric acid contains HPO_3^{2-} ion

The correct combination is

A. All are correct

B. I, III are correct

C. II, III are correct

D. I, II are correct

Answer: D



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5. In solid state PCl_5 exists as ionic solid i.e., $[X]^+[Y]^-$, shapes of X^+ and Y^- are respectively

- A. Tetrahedral, Pyramidal
- B. Tetrahedral, Octahedral
- C. Octahedral, Linear
- D. Octahedral, Trigonal bipyramidal

Answer: B



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EXERCISE - 2 (H.W) (AMMONIA AND NITRIC ACID)

1. v22

- A. only 'a' is correct

B. only 'b' is correct

C. only 'c' is correct

D. all the above are correct

Answer: D

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2. The number of P-O-P bonds in cyclic trimetaphosphoric acid is :

A. 3

B. 9

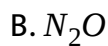
C. 6

D. zero

Answer: D

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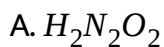
3. A mixture of potassium nitrite and ammonium chloride on heating liberates the gas



Answer: D

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4. Which of the following can not act as both oxidising and reducing agent ?



B. HNO_2

C. HNO_3

D. HNO_4

Answer: B

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5. Concentrated nitric acid oxidises phosphorous and iodine, respectively to

A. H_3PO_3, HI

B. H_3PO_3, HIO_4

C. H_3PO_4, HIO_3

D. H_3PO_4, HIO_4

Answer: C

List-I

List-II

- | | |
|----------------------|--------------------------------|
| A) Phosphorite | 1) KNO_3 |
| B) Bengal salt petre | 2) $Ba(NO_3)_2$ |
| 6. C) Fluoroapatite | 3) $NaNO_3$ |
| D) Chile salt petre | 4) $3Ca_3(PO_4)_2 \cdot CaF_2$ |
| | 5) $Ca_3(PO_4)_2$ |

The correct match is

A.

A	B	C	D
1	2	3	5

B.

A	B	C	D
2	4	3	1

C.

A	B	C	D
4	3	5	2

D.

A	B	C	D
5	1	4	3

Answer: D

List-I

List-II

- A) HNO_3 1) -3,+5 oxidation state
B) NH_4NO_3 2) -1/3 oxidation state
7. C) N_3H 3) +5 oxidation state
D) H_3PO_3 4) +3 oxidation state
 5) + 1/3 oxidation state

The correct match is

A. A B C D
 3 1 2 4

B. A B C D
 5 2 3 4

C. A B C D
 1 2 3 4

D. A B C D
 4 3 2 5

Answer: A



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8. N_2O is an acid anhydride of HNO_3 .

- A. $A \ B \ C \ D$
 1 2 3 4
- B. $A \ B \ C \ D$
 3 2 4 1
- C. $A \ B \ C \ D$
 2 5 3 4
- D. $A \ B \ C \ D$
 4 2 1 5

Answer: D

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- | | List-I | List-II |
|----|-------------------------|-------------|
| | A) Anhydride of HNO_2 | P) N_2O_3 |
| | B) Anhydride of HNO_3 | Q) NO |
| 9. | C) Neutral oxides | R) N_2O_5 |
| | D) Paramagnetic | S) NO_2 |
| | | T) N_2O |

- A. $A \ B \ C \ D$
 $P \ R \ Q \ S$
- B. $A \ B \ C \ D$
 $R \ P \ Q \ S$
- C. $A \ B \ C \ D$
 $Q \ R \ S \ P$

A B C D
D. S Q P R

Answer: A

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10. Which of the following statements is not true ?

- A. Nitrogen differs markedly from the other members of its family
- B. Nitrogen has five valency electrons
- C. Nitrogen show covalency greater than four
- D. Nitrogen shows great stability as a free element

Answer: C

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11. The correct statement is

- A. High reactivity of white phosphorus is due to small bond angle (60°) in P_4 molecule which causes large strain
- B. Low reactivity of red phosphorus is due to polymeric structure
- C. Black phosphorus conducts electricity due to presence of delocalised π electrons
- D. All the above

Answer: D

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12. Which of the following statement is wrong?

- A. The stability of hydride increases from NH_3 to BiH_3 in group 15 of the periodic table
- B. nitrogen cannot form $d\pi - p\pi$ bonds
- C. single $N - N$ bond is weaker than the single $P - P$ bond
- D. N_2O_4 has two resonance structure

Answer: A

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13. $PCl_5 + Cl^- \rightarrow PCl_6^-$. The wrong statement regarding the above the equation is

- A. Hybridisation of P changes from sp^3d to sp^3d^2
- B. Oxidation number of P changes from +5 to +6
- C. Covalency of P changes from 5 to 6

D. Here PCl_5 is a Lewis acid

Answer: B

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14. Which of the following statements is correct?

- A. All the hydrides of VA group elements are pyramidal in shape
- B. The bond angle decreases from NH_3 to BiH_3 down the group because of bond pair - bond pair repulsion
- C. The basic strength decreases from NH_3 to BiH_3 , because of decreases in the availability of lone pair of electrons
- D. All are correct

Answer: D

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15. Pick out the incorrect reaction :

- A. The nitrogen atom of NH_3 gains electrons
- B. NH_3 can give a pair of electrons
- C. A proton in HCl can accept an electron pair from NH_3
- D. The Cl^- ion has a stable configuration of 8 electrons.

Answer: A

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16. The correct statement in respect of structure of hypophosphorous acid is

- A. 2 - OH groups, 2 - H atoms are attached directly to P
- B. One OH group and 2 - H atoms are directly attached to P

C. One OH group and 3 - H atoms are directly attached to P

D. Three OH groups are attached directly to P

Answer: B

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17. Which of the following are correct statements?

A. Solid PCl_5 exists as tetrahedral $[PCl_4]^+$ and octahedral

$[PCl_6]^-$ ions

B. Solid PBr_5 exists as $[PBr]^+ Br^-$

C. Solid N_2O_5 exists as $NO_2^+ NO_3^-$

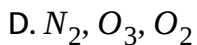
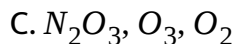
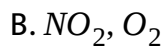
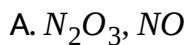
D. All the above

Answer: D

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EXERCISE - 3 (PREVIOUS QUESTIONS)

1. Thermal decomposition of zinc nitrate give:



Answer: B



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2. The total number of σ and π -bonds in pyrophosphoric acid are respectively

A. 8, 2

B. 10, 2

C. 12, 2

D. 8, 4

Answer: C

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3. Chloroethane reacts with Y to form NaCl and Z. One mole of Z reacts with two moles of HI to form water and iodo ethane. Which of the following is Y?

A. CH_3COOH

B. CH_3CHO

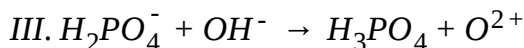
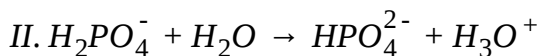
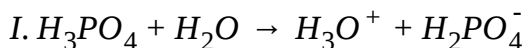
C. $C_2H_5OC_2H_5$

D. C_2H_5ONa

Answer: D

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4. Three reactions involving $H_2PO_4^-$ are given below



In which of the above does $H_2PO_4^-$ act as an acid?

A. (i) only

B. (ii) only

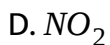
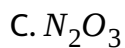
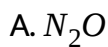
C. (iii) only

D. (i) and (ii) only

Answer: B

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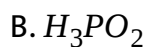
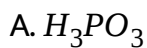
5. Which one of the oxides of nitrogen dimerises into colourless solid/liquid on cooling?

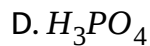


Answer: D

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6. Which one of the acids is a dibasic acid ?

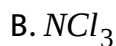
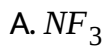




Answer: A

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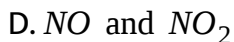
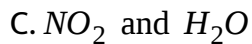
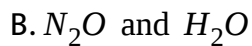
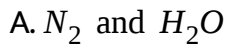
7. Among the trihalides of nitrogen, which is the least basic ?



Answer: A

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8. Which one of the following pairs is obtained on heating ammonium dichromate ?

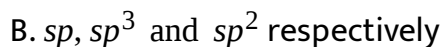
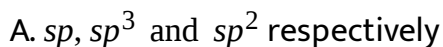


Answer: A



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9. The hybridization of atomic orbitals of nitrogen in NO_2^+ , NO_3^- , and NH_4^+ respectively are



C. sp^2 , sp and sp^3 respectively

D. sp^2 , sp^3 and sp respectively

Answer: B

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10. A metal X on heating in nitrogen gas gives Y , Y on treatment with H_2O gives a colourless gas which when passed through $CuSO_4$ solution gives a blue colour. Y is:

A. $Mg(NO_3)_2$

B. Mg_3N_2

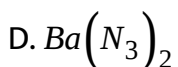
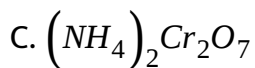
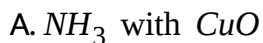
C. NH_3

D. MgO

Answer: B



11. Very pure nitrogen can be obtained by :



Answer: D

12. The reaction of white phosphorus with aqueous $NaOH$ gives phosphine along with another phosphorus containing compound.

The reaction type, the oxidation states of phosphorus in phosphine and the other product are respectively:

A. redox reaction, -3 and -5

B. redox reaction, +3 and +5

C. disproportionation reaction -3 and +1

D. disproportionation reaction -3 and +3

Answer: C

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13. The molecule having smallest bond angle is

A. $AsCl_3$

B. $SbCl_3$

C. PCl_3

D. NCl_3

Answer: B



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14. Which of the following oxides of nitrogen is the anhydride of nitrous acid?

A. NO

B. N_2O_3

C. N_2O_4

D. N_2O_5

Answer: B



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15. The hydrolysis of NCl_3 by water produces

A. NH_2OH and $HOCl$

B. NH_2NH_2 and HCl

C. NH_4OH and $HOCl$

D. NH_2Cl and $HOCl$

Answer: C

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16. For H_3PO_3 and H_3PO_4 the correct choice is :

A. H_3PO_3 is dibasic and reducing

B. H_3PO_3 is dibasic and non - reducing

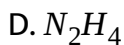
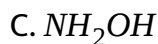
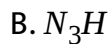
C. H_3PO_4 is tribasic and reducing

D. H_3PO_3 is tribasic and non - reducing

Answer: A

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17. In which of the following compounds, nitrogen exhibits highest oxidation state?

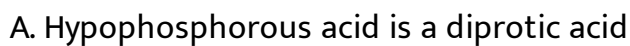


Answer: B



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18. Which of the following statement is not valid for oxoacids of phosphorus?



- B. All oxoacids contain tetrahedral four coordinated phosphorus
- C. All oxoacids contain atleast one $P = O$ unit and one $P - OH$ group
- D. Orthophosphoric acid is used in the manufacture of triple superphosphate

Answer: A

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19. Strong reducing behaviour of H_3PO_2 is due to

- A. High oxidation state of phosphorus
- B. Presence of two $-OH$ groups and one $P - H$ bond
- C. Presence of one $-OH$ group and $P - H$ bonds
- D. High electron gain enthalpy of phosphorus

Answer: C

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20. Nitrogen dioxide and sulphur dioxide have some properties in common, which property is shown by one of these compounds, but not by the other?

- A. is soluble in water
- B. is used as a food - preservative
- C. forms 'acid - rain'
- D. is a reducing agent

Answer: B

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EXERCISE - 4 (NCERT EXEMPLARS/HOTS)

1. Nitrogen can be purified from the impurities of oxides of nitrogen and ammonia by passing through

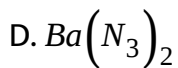
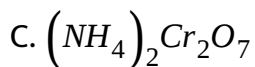
- A. Conc. HCl
- B. Alkaline solution of pyrogallol
- C. A solution of $K_2Cr_2O_7$ acidified with H_2SO_4
- D. A solution of KOH

Answer: C

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2. Very pure nitrogen can be obtained by :

- A. NH_3 with CuO



Answer: B

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3. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to

A. Solvated Sodium

B. Amide Ion

C. Solvated electron

D. Lone pair of electrons on Nitrogen in NH_3 molecule

Answer: C

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4. In Nitrogen family the H-M-H angle in the hydrides MH_3 gradually becomes closer to 90° on going from N to Sb. This due to

- A. The basic strength of the hydrides increases
- B. Due to the increase in the size of central atom M and increase in its electronegativity
- C. The bond energies of $M - H$ increase
- D. The bond pairs of electrons become closer to each other.

Answer: D

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5. Gas obtained by heating a mixture of ammonium chloride and slaked lime is

A. NH_3

B. N_2

C. N_2O

D. NO_2

Answer: A

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6. Ammonia is not a product in the

A. Hydrolysis of nitrolim

B. Hydrolysis of Aluminium nitride

C. Decomposition of Ammonium nitrite

D. Hydrolysis of urea

Answer: C



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7. Phosphine is not obtained by the reaction when

- A. White P is heated with $NaOH$
- B. Red P is heated with $NaOH$
- C. Ca_3P_2 is heated with water
- D. Phosphorus trioxide is boiled with water

Answer: B



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8. The bottle of lique ammonia is cooled before opening the cork because it -

- A. Has high vapour pressure at room temperature

B. It corrosive liquid

C. is an explosive

D. Brings tears in eyes

Answer: A

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9. The dipoles moment of NF_3 is less than NH_3 because

A. NH_3 forms associated molecules

B. F is more reactive than H

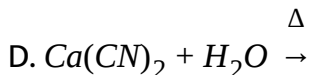
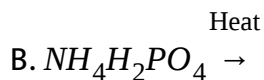
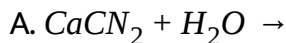
C. The resultant of bond polarity is less

D. The resultant of individual polarities is opposed by the polarity
of lone pair

Answer: D

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10. Ammonia can not be obtained by



Answer: A

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11. The compound $(\text{SiH}_3)_3\text{N}$ is expected to be

A. pyramidal and more basic than $(\text{CH}_3)_3\text{N}$

B. planar and less basic than $(\text{CH}_3)_3\text{N}$

C. pyramidal and less basic than $(CH_3)_3N$

D. planar and more basic than $(CH_3)_3N$

Answer: B

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12. The number of P-O-P bonds present in P_4O_6 and P_4O_{10} are respectively

A. 4 and 5

B. 4 and 6

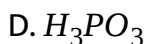
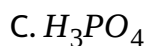
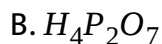
C. 6 and 6

D. 3 and 6

Answer: C

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13. One of the acid listed below is formed $P_2O - (3)$ and the rest are formed from P_2O_5 . The acid formed from phosphorus (III) oxide is



Answer: D

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14. Group 15 of the periodic table consists of the elements N, P, As, Sb and Bi. On passing from N to Bi, the oxides of the elements of general formula M_2O_3 become

A. Strong reducing agents

B. More ionic

C. More basic

D. More volatile

Answer: C

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15. The number of bond in P_4O_{10} is

A. 6

B. 16

C. 20

D. 7

Answer: B

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16. The nitrate which when heated gives off a gas (or) a mixture of gases which cannot relight a glowing splinter is

- A. Sodium nitrate
- B. Ammonium nitrate
- C. Lead nitrate
- D. Potassium nitrate

Answer: B

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17. In nitroprusside ion, the iron and NO exist as $Fe(II)$ and NO^+ rather than Fe^{III} and NO . These forms can be differentiated by

- A. Estimating the concentration of iron

- B. Measuring the concentration of CN^-
- C. Measuring the solid state magnetic moment
- D. Thermally decomposing the compound

Answer: C

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18. The correct order of bond angle of NO_2^+ , NO_2 and NO_2^- is

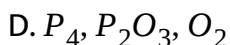
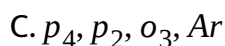
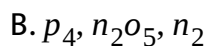
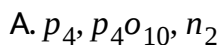
- A. $NO_2^+ < NO_2 < NO_2^-$
- B. $NO_2^+ = NO_2^- < NO_2$
- C. $NO_2^+ > NO_2 > NO_2^-$
- D. $NO_2^+ > NO_2 < NO_2^-$

Answer: C

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19. A tetra-atomic molecule (A) on reaction with nitrogen (I) oxide, produces two substances (B) and (C). (B) is a dehydrating agent while substance (C) is a diatomic gas which shows almost inert behaviour.

The substances (A),(B) and (C) are



Answer: A

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20. Polyphosphates are used as water softening agents because they

A. Form soluble complexes with anionic species

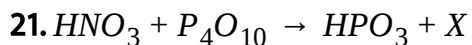
B. Precipitate anionic species

C. Form soluble complexes with cationic species

D. Precipitate cationic species

Answer: C

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in the above reaction the product X is :

A. N_2O_5

B. N_2O_3

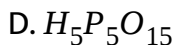
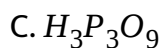
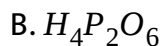
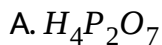
C. NO_2

D. H_2O

Answer: A

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22. Which of the following is a cyclic oxoacid



Answer: C

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23. When rain is accompanied by a thunderstorm, the collected rain water will have a *pH*:

- A. Slightly higher than that when the thunder storm
- B. uninfluenced by occurrence of thunder storm
- C. which depends on the amount of dust in air
- D. slightly lower than that of rain water without thunderstrom

Answer: D

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24. The following are some statements about oxyacids of VA group elements

- i) The salt of Nitric acid contains NO_3^- ion
- ii) The salt of phosphoric acid contains PO_4^{3-} ion
- iii) Salt of meta phosphoric acid contains $H_2PO_3^-$ & HPO_3^{2-} ions

The correct combination is

- A. I and ii are correct

B. ii and iii are correct

C. all are correct

D. only ii is correct

Answer: A

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25. Which of the following metal Fe, Zn, Pb, Ag and Pt do not give a metal nitrate on treatment with concentrated HNO_3 ?

A. *Fe* and *Zn*

B. *Fe* and *Pt*

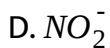
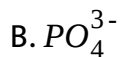
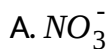
C. *Pb*, *Ag* and *Pt*

D. *Fe*, *Ag* and *Pt*

Answer: B

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26. Among the following ions the $p\pi - d\pi$ overlap is present in .

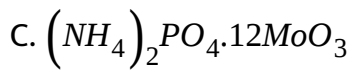
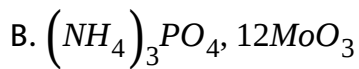
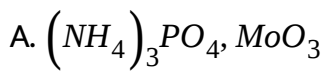


Answer: B

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27. Phosphate + conc. $HNO_3 + (NH_4)_2MoO_4$ so In \rightarrow Yellow precipitate

The composition of yellow precipitate is



D.

Answer: B

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