



CHEMISTRY

PHYSICAL, INORGANIC, AND ORGANIC CHEMISTRY

P BLOCK ELEMENTS

INORGANIC CHEMISTRY(P-Block Elements)

1. When orthoboric acid is heated to red heat the residue is

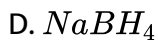
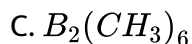
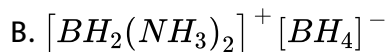
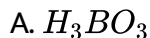
- A. metaboric acid
- B. Boron
- C. Boric anhydride
- D. Borax

Answer: 3



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2. From B_2H_6 , all the following can be prepared except



Answer: 3



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3. S_1 : Argon is used in arc welding of metals or alloys to provide an inert atmosphere.

S_2 : XeF_2 , XeF_4 and XeF_6 are colourless crystalline solids and sublime readily at $298K$.

S_3 : XeF_2 , XeF_4 and XeF_6 are readily hydrolysed.

S_4 : Xenon fluorides react with fluorine ion acceptor to form cationic species and fluoride ion donors to form fluoro anions.

A. *FFFF*

B. *TFTF*

C. *TTTT*

D. *FTFT*

Answer: C



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4. Consider the following statements :

Statement : $1HBr$ is a stronger acid than HI because of hydrogen bonding.

Statement : $2F^-$ ion has higher hydration energy than Cl^-

Statement : $3O_2$ is more powerful oxidising agent than F_2 because it contains three 'O'.

Statement : 4 fluorine does not form polyhalides.

and arrange in the order of true / false.

A. *T T T F*

B. *F T F T*

C. *T F T F*

D. *F F T T*

Answer: B



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5. $H_2SO_4 + NaCl(s) \rightarrow NaHSO_4 + HCl$. Hydrochloric acid is liberated because

A. H_2SO_4 is a reducing agent

B. HCl is a smaller molecule than H_2SO_4

C. HCl is more volatile than H_2SO_4

D. (2) and (3) both

Answer: C

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6. Nitrogen and oxygen exist as diatomic but their congeners are P_4 and S_8 respectively because :

A. phosphorus and sulphur are solids.

B. phosphorus and sulphur catenate due to the existence of d – orbitals and from strainless structures.

C. phosphorus and sulphur polymerise as soon as they are formed

D. catenation tendency of P and S is stronger because of the high $P - P$ and $S - S$ bond energies as compared to $N - N$ and $O - O$ bond energies

Answer: 4

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7. H_3BO_3 is.

- A. monobasic and weak Lewis acid
- B. monobasic and weak Bronsted acid
- C. monobasic and strong Lewis acid
- D. tribasic and weak Bronsted acid

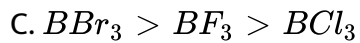
Answer: 1

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8. The Lewis acid character of boron trihalides decreases as:

$BBr_3 > BCl_3 > BF_3$. Explain ?

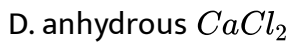
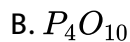
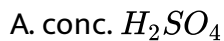
- A. $BCl_3 > BF_3 > BBr_3$
- B. $BBr_3 > BCl_3 > BF_3$



Answer: 2

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9. Ammonia can be dried by :



Answer: 3

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10. XeF_6 on complete hydrolysis gives

- A. Xe
- B. XeO_2
- C. XeO_3
- D. XeO_4

Answer: 3



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11. Which of the following metals gives N_2O gas with dilute HNO_3 ?

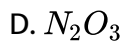
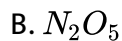
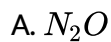
- A. Zn
- B. Cu
- C. Au
- D. Pb

Answer: 1



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12. HNO_3 on dehydration with phosphorus pentoxide yields :

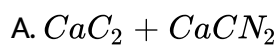


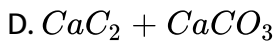
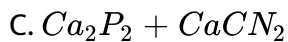
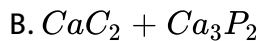
Answer: 2



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13. Holme's signals can be given using :

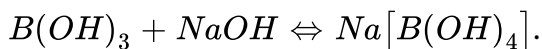




Answer: B

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14. How can the following reaction be made to proceed in forward direction ?



A. *cis* – 1, 2diol

B. *Trans* – 1, 2diol

C. Borax

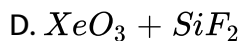
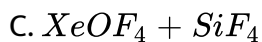
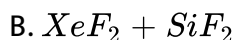
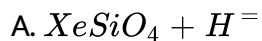
D. Na_2HPO_4

Answer: 1



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15. What are the products formed in the reaction of xenon hexafluoride with silicon dioxide?

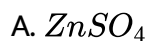


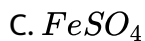
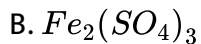
Answer: 3



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16. Which of the following compounds gives a mixture of SO_2 and SO_3 on heating ?

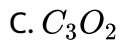




Answer: 4

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17. Which oxide of carbon is obtained when $K_4[Fe(CN)_6]$ is warmed with concentrated sulphuric acid ?



Answer: 1

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18. Which of the following options correctly describes the reagents , products and reaction conditions ?



A.

(p) Catalyst and high pressure	(q) Cool	(r) NO_2	(s) H_2O and O_2
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B.

(p) Catalyst	(q) Cool	(r) N_2O	(s) HNO_3 and O_2
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C.

(p) Catalyst and high pressure	(q) High pressure	(r) NO_2	(s) H_2O and O_2
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D.

(p) High pressure	(q) catalyst	(r) N_2O_3	(s) HNO_3
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Answer: 1



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19. Select the incorrect order .

A. $He > Ar > Kr > Ne > Xe$ – (abundance in air).

B. $He < Ne < Ar < Kr < Xe$ – (boiling point).

C. $XeF_2 > XeF_4 > XeF_6$ – (melting point)

D. $XeF_6 < XeF_4 < XeF_2$ – ($Xe - F$ bond length).

Answer: 1



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20. Which of the following statements is incorrect ?

A. O_3 is used as disinfectant

B. NO_2 is oxidised to N_2O_5 by O_3

C. O_3^- is paramagnetic in nature

D. Dry iodine reacts with ozone and form I_2O_5

Answer: 4



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21. Which of the following statements is incorrect ?

A. At ordinary temperature, the ratio of disproportionation of hypohalites of chlorine, bromine and iodine follows the order



B. Fluorine can not be prepared in aqueous medium by electrolysis, since it decomposes water with liberation of ozonised oxygen.

C. HI is a stronger acid than HBr because of the low dissociation energy of HI .

D. In aqueous solution chlorine is a strong oxidizing agent than fluorine.

Answer: 4



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22. Hydrolysis of one mole of peroxodisulphuric acid produces

- A. two moles of sulphuric acid
- B. two moles of peroxomono – sulphuric acid
- C. one mole of sulphuric acid , one mole of peroxomono – sulphuric acid
- D. one mole of sulphuric acid, one mole of peroxomono – sulphuric acid and one mole of hydrogen peroxides.

Answer: 3

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23. Which of the following is correct statement ?

- A. F_2 has higher dissociation energy than Cl_2
- B. F has higher electron affinity than Cl
- C. HF is stronger acid than HCl
- D. Boiling point increases down the group in halogens.

Answer: 4



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24. The dipole moment of H_2O_2 is more than that of H_2O but H_2O_2 is not a good solvent because :

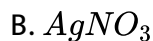
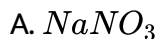
- A. It has a very high dielectric constant so that ionic compounds cannot be dissolved in it
- B. It does not act as an oxidising agent
- C. It acts as a reducing agent.
- D. It dissociates easily and acts as an oxidising agent in chemical reactions.

Answer: 4



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25. Which of the following on heating produces NO_2 ?



Answer: 2



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26. Which is the correct sequence in the following properties. For the

correct order mark (T) and for the incorrect order mark (F):

(a) Acidity order : $SiF_4 < SiCl_4 < SiBr_4 < SiI_4$

(b) Melting point : $N_2 < O_2 < F_2 < Cl_2$

(c) Boiling point : $NH_3 > SbH_3 > AsH_3 > PH_3$

(d) Dipole moment : $CO > NO > N_2O > O_3$

A. $FTFT$

B. $TFTF$

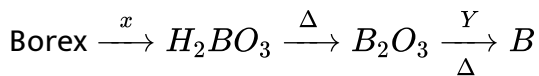
C. $FFTT$

D. *FFTF*

Answer: A

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27. Borax is converted into crystalline boron by the following steps :



X and Y are respectively :

A. *HCl, Mg*

B. *HCl, C*

C. *C, Al*

D. *HCl, Al*

Answer: D

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28. Give the correct order of initials T or F for following statements. Use T if statements is true and F if if false.

(I) Number of $S - S$ bond in $H_2S_nO_6$ are $(n + 1)$

(II) When F_2 reacts with water gives HF , O_2 and O_3

(III) $LiNO_3$ and $BaCl_2$ compounds are used in the fire works

(IV) Be and Mg hydrides are ionic and polymeric

A. *FTTF*

B. *FTTT*

C. *TFTT*

D. *TTFF*

Answer: 1



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29. Which of the following is not true about helium ?

A. It has the lowest boiling point.

- B. It has the highest first ionization energy.
- C. It can diffuse through rubber and plastic material.
- D. It can form clathrate compound.

Answer: D

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30. SbF_5 reacts with XeF_4 to form an adduct. The shapes of cation and anion in the adduct are respectively :

- A. square planar , trigonal bipyramidal
- B. T – shaped , octahedral
- C. square pyramidal, octahedral
- D. square planar, octahedral

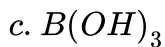
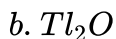
Answer: 2

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31. Match List I with List II and select the correct answer using the codes

given below the lists :

List I



List II

i. Dimer

ii. Trigonal planar

iii. Basic

iv. Monobasic acid

Code :

A. (1) a b c d
i ii iii iv

B. (2) a b c d
ii iii iv i

C. (3) a b c d
iv iii i ii

D. (4) a b c d
iii iv ii iii

Answer: 2

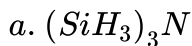


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32. Match List I with List II and select the correct answer using the codes given below the lists :

List I

List II



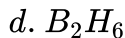
i. 3 centre -2-electron bond



ii. sp^3 – hybridization



iii. $p\pi - p\pi$ bond



iv. $p\pi - p\pi$ bond

Code :

A. $\begin{matrix} a & b & c & d \\ (1) & iv & iii & i & ii \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ (2) & ii & iii & iv & i \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ (3) & i & ii & iii & iv \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ (4) & iv & iii & ii & i \end{matrix}$

Answer: 4



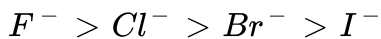
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33. Consider the following statements ,

(I) Amongst HCl , HBr , HI and $HOCl$, HCl is most stable to heat.

(II) Chlorine gas is evolved when potassium chloride reacts with iodine.

(III) The basicity of F^- , Cl^- , Br^- , and I^- follows the order



(IV) Sodium hypochlorite is used as bleaching and sterilising agent of these,

A. (I), (II), and (III) are correct

B. (I), (II), and (IV) are correct

C. (I), (III), and (IV) are correct

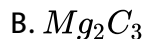
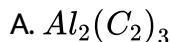
D. All of these

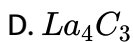
Answer: 3



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34. Which of the following gives acetylene on hydrolysis ?



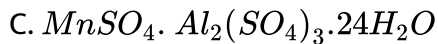
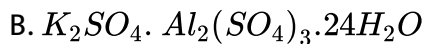
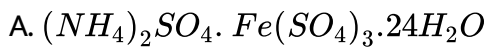


Answer: 1



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35. Which of the following is pseudo alum ?



D. None

Answer: 3



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1. Arrange the following in the increasing order of the properties stated against them.

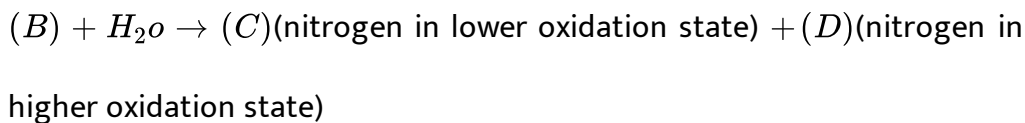
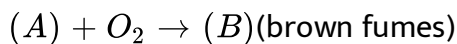
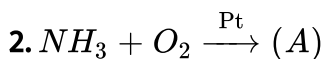
(a) (i) NH_3 , (ii) PH_3 , (iii) AsH_3 , (iv) SbH_3 -boiling point.

(b) (i) Bi^{3+} , (ii) Sb^{3+} , (iii) As^{3+} -stability of +3 oxidation state.

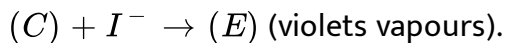
(c) (i) NH_3 , (ii) PH_3 , (iii) AsH_3 , (iv) SbH_3 , (v) BiH_3 -reducing character.



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(C) and (D) both are oxoacids of nitrogen.



Identify (A), (B), (C), (D) and (E)



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3. Why NH_3 gas cannot be dried by passing over P_2O_5 , $CaCl_2$ and H_2SO_4 ?

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4. Explain the high reactivity of white phosphorus as compared to red phosphorus.

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5. What happens ?

(a) When phosphine is heated at $150^\circ C$.

(b) When phosphine is dissolved in water in presence of light.

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6. $P_4 + NaOH$ heated (warm) to Products.

Explain the reducing character of one of the products obtained by

taking the example of copper sulphate.

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7. Identify the group 16(VIA) element that fits each of the following description is:

(a) the most electronegative

(b) semimetal

(c) radioactive

(d) the most abundant element in the earth's crust.

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8. Give the names and formulae of the compounds in which sulphur exhibits an oxidation state of

(A) -2 , (B) $+4$, (C) $+6$

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9. O_3 is a powerful oxidising agent. Write equation to represent oxidation of

(a) I^- to I_2 in acidic solution,

(b) sulphur to sulphuric acid in the presence of moisture,

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10. Give the important applications of O_3

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11. Black (A) + $H_2SO_4 \rightarrow$ (B) gas + (C)

(B) + $(CH_3COO)_2Pb \rightarrow$ (D) black ppt.

(C) + $K_3[Fe(CN)_6] \rightarrow$ (E) blue.

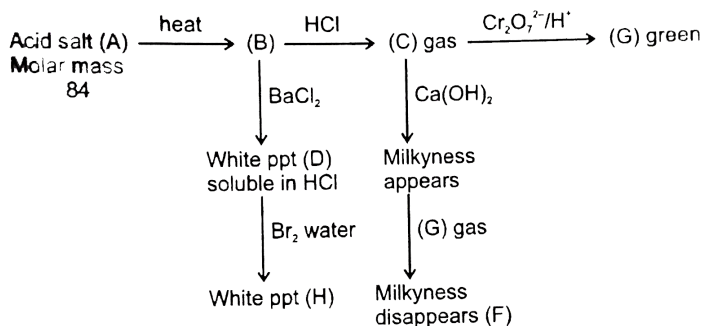
(C) also decolourises acidified $KMnO_4$. Identify (A) to (E)

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12. SO_2 and Cl_2 both are used as bleaching agent. What factors cause bleaching ?

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13. Complete the following reaction



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14. Colourless salt (A) decolourise I_2 solution and gives white precipitate (change to black) with $AgNO_3$ solution. (A) also produces pink colour with $FeCl_3$ solution. Identify (A) and explain reactions.

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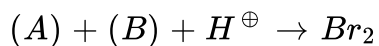
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15. Covalent radius of fluorine is 64 pm but the bond length is not equal to 128 pm and that is 143 pm and bond energy is found to be comparable to I_2 .

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16. Electron affinity of chlorine is more than F. Inspite of this F_2 is the better oxidising agent . Why ?

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(A) gives yellow precipitate with $AgNO_3$. (A) and (B) are

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21. Which of the following is a mixed anhydride

(A) P_4O_{10} , (B) SO_3 , (C) Cl_2O_6 , (D) SO_2



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22. Give appropriate reasons for each of the following :

(a) Addition of Cl_2 to KI solution gives a brown colour but excess of Cl_2 turns it colourless

(b) Perchloric acid is a stronger acid than sulphuric acid.

(c) HI can not be prepared by heating NaI with concentrated H_2SO_4



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23. The correct order of pseudohalide , polyhalide and interhalogen are :

(A) BrI_2^- , OCN^- , IF_5 , (B) IF_5 , BrI_2^- , OCN^- , (C)

OCN^- , IF_5 , BrI_2^- , (D) OCN^- , BrI_2^- , IF_5



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24. Name the noble gas which

(A) is most abundant in atmosphere, (B) has least boiling point.



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25. What is the utility of the clathrate compounds?



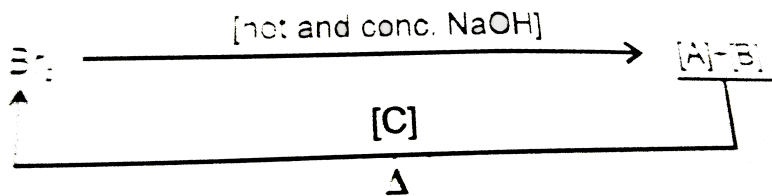
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26. Does the hydrolysis of XeF_4 at $-80^\circ C$ lead to a redox reaction?



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27. Identify [A], [B] and [C] and give the complete chemical reactions involved.



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28. Comment on the following.

(a) Electrolysis of ICN in pyridine solution.

(b) Iodine dissolves in oleum

(c) Electrical conductivity of molten iodine

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29. Why anhydrous HF liquid is not electrolysed alone to get F_2 ?

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30. Which of the following products is/are obtained in the following reaction



A. $KBrO_4$

B. KF

C. HOF

D. Br_2

Answer: A,B

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Exercise 1 part 1 subjective ques

1. Nitrogen exists as diatomic molecule and phosphorus as P_4 . Why ?

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2. Why is BiH_3 the strongest reducing agent amongst all the hydrides of group 15 elements?

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3. Anhydrous $CaCl_2$, P_4O_{10} or concentrated H_2SO_4 can not be used as drying agent for ammonia. Why?

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4. Explain why NH_3 is basic while BiH_3 is only feebly basic?

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

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6. NO_2 can not be dried by an alkali, why ?

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7. Concentrated HNO_3 turns yellow is sun light. Explain ?

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8. Nitric acid acts as an oxidising agent while nitrous acid can act both as an oxidising as well as reducing agent ?

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9. What products are formed when H_3PO_2 is heated at 415K and at 435K respectively.

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10. What happens when phosphoric acid is heated ?

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11. Why does H_3PO_3 act as a reducing agent but H_3PO_4 does not ?

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12. What happens when white phosphorus is boiled with a strong solution of $NaOH$ in moist atmosphere ?

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13. What happens when :

(i) PCl_5 , is heated (ii) H_3PO_3 is heated

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14. Why does PCl_3 fumes in air ?

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15. Write the chemical reactions of P_4O_6 with cold and hot water.

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16. Mg_3N_2 on reaction with water gives off NH_3 , but $MgCl_2$ on reaction with water does not give HCl at room temperature.

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17. Write balanced equation for the following :

Phosphorus is treated with concentrated nitric acid.

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18. Manufacture of phosphoric acid from phosphorus.

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19. Write the allotropic forms of oxygen.

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20. Explain why the liquid oxygen sticks to the magnet pole but liquid nitrogen does not ?

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21. Which allotropic form of sulphur is thermodynamically stable at room temperature ?

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22. On moving down the group forms H_2O to H_2Te acidic strength increases, why ?

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23. What happens when one mole of per oxodisulphuric acid reacts with one mole of water (partial hydrolysis) and excess of water (complete hydrolysis) ?

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24. Out of following forms of sulphur S_8 , S_6 and S_2 which one is paramagnetic in nature and why ?

 [View Text Solution](#)

25. Why concentrated H_2SO_4 can not be used for drying H_2 ?

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26. Consider the following molecules :



Arrange these molecules in increasing order of bond angles

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27. Why sulphurous acid and sulphites are reducing in nature.

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28. Describe the action of heat on $NaHSO_3$

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29. For drying H_2S gas concentrated H_2SO_4 can not be used why ?



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30. In the contact process for industrial manufacture of sulphuric acid, some amount of sulphuric acid is used a starting material. Explain briefly.

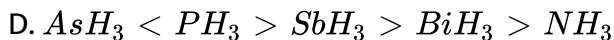
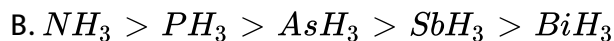
What is the catalyst used in the oxidation of SO_2 ?



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Exercise 1 part 2 objective que

1. The correct order of thermal stability of hydrides of group 15 is



Answer: B



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2. The hydrides of group 15 elements act as :

- A. lewis acids
- B. lewis bases
- C. both
- D. none

Answer: B



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3. The basic strength of the hydrides of group 15 elements :

- A. decreases on moving down the group
- B. increases on moving down the group
- C. first decreases upto AsH_3 and then increases

D. first increases upto AsH_3 and then decreases

Answer: A

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4. Which of the following acids is monobasic?

A. Hypophosphorous acid (H_3PO_2)

B. Orthophosphoric acid (H_3PO_4)

C. Pyrophosphoric acid ($H_4P_2O_7$)

D. Hypophosphoric acid ($H_4P_2O_6$)

Answer: A

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5. Red and white phosphorus will differ but not in:

A. smell

B. solubility in $CHCl_3$

C. exhibiting phosphorescence

D. reaction with concentrated HNO_3

Answer: D

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6. Compound used in safety matches is :

A. P_4S_3

B. P_4

C. P_2O_5

D. PCl_3

Answer: A

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7. The high reactivity and low volatility of white phosphorous is due to:

- A. tetrahedrally arranged P_4 units
- B. bond angle of 60° increases steric (strain) factor
- C. weak van der Waals forces of attraction
- D. both (B) and (C)

Answer: B



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8. Which of the following oxides is amphoteric in nature?

- A. N_2O_3
- B. P_4O_6
- C. Sb_4O_6

D. Bi_2O_3

Answer: C



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9. Which of the following is least reactive?

A. White phosphorus

B. Yellow phosphorus

C. Red phosphorus

D. Black phosphorus

Answer: D



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10.is obtained when ammonium dichromate is heated.

A. nitrogen

B. oxygen

C. ammonia

D. none

Answer: A



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11. In the Ostwald's process, nitric acid is prepared by the catalytic oxidation of :

A. N_2

B. NH_3

C. N_2O_5

D. NO_2

Answer: B

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12. $NH_4Cl(s)$ 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_4OH and HCl
- B. formation of NH_3 and HCl
- C. greater diffusion of NH_3 than HCl
- D. greater diffusion of HCl than NH_3

Answer: C

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13. Which of the following combines with Fe^{2+} ions to form brown complex ?

- A. N_2O

B. NO

C. N_2O_3

D. NO_2

Answer: B



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14. NO_2 can be prepared by heating :

A. NH_4NO_3

B. $NaNO_3$

C. $Pb(NO_3)_2$

D. KNO_3

Answer: C



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15. The wrong statement about N_2O is :

- A. it is nitrous oxide
- B. it is least reactive oxide of nitrogen
- C. it is not a linear molecule
- D. it is known as laughing gas

Answer: C

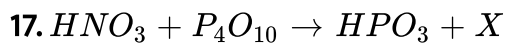
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16. Following are neutral oxides except :

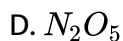
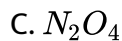
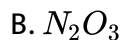
- A. NO
- B. N_2O
- C. CO
- D. NO_2

Answer: D

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in the above reaction the product X is :

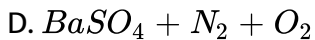
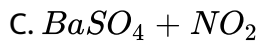
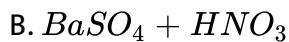
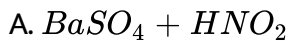


Answer: D

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18. Cold solution of barium nitrite on mixing with sulphuric acid produces

:



Answer: A

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19. Nitric acid usually turns yellow on standing. This is due to

A. absorption of yellow wavelength

B. slow decomposition of HNO_3 into NO_2

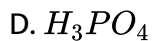
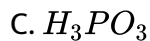
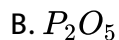
C. its oxidation by atmospheric air

D. absorption of moisture by it

Answer: B

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20. Concentrated nitric acid oxidises phosphorus (P) into:



Answer: D



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21. Which of the following metals does not dissolve in concentrated HNO_3 ?



D. Hg

Answer: C



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22. The compound which has molecular nature in gas phase but ionic in solid state is :

A. PCl_5

B. $POCl_3$

C. P_4O_{10}

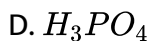
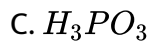
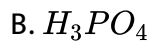
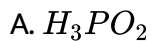
D. PCl_3

Answer: A



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23. When P_4O_{10} is dissolved in water, the acid formed finally is :

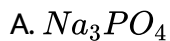


Answer: B



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24. The substance used as a fast drying agent in the laboratory is:



C. charcoal

D. anhydrous calcium chloride

Answer: B

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25. Metaphosphoric acid exists in polymeric form and may have :

- A. a linear structure
- B. a cyclic structure
- C. both linear as well as cyclic structure
- D. none

Answer: C

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26. On heating ammonium dichromate, the gas evolved is :

- A. oxygen

B. ammonia

C. nitrous oxide

D. nitrogen

Answer: D

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27. One mole of calcium phosphide on reaction with excess water gives

A. one moles of phosphine

B. two moles of phosphoric acid

C. two moles of phosphine

D. one mole of phosphorus pentoxide

Answer: C

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28. Which statement is not correct for nitrogen?

- A. it is obtained by heating $(NH_4)_2Cr_2O_7$
- B. It does not readily react with O_2
- C. It is a typical non-metal
- D. d -orbitals are available for bonding

Answer: D



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29. Nitrogen is obtained by the thermal decomposition of :

- A. NH_4Cl
- B. NH_4NO_3
- C. $AgNO_3$
- D. none of these

Answer: D

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30. Nitrogen gas is prepared :

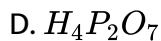
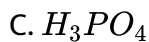
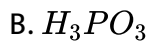
- A. by heating ammonium nitrate
- B. by reacting excess chlorine with liquor ammonia
- C. by passing HNO_3 vapours on red hot copper.
- D. by heating lead nitrate

Answer: C

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31. Which of the following compound is tribasic acid?

- A. H_3PO_2

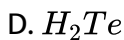
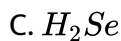
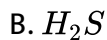
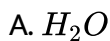


Answer: C



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32. Which of the following hydrides of the oxygen family shows the lowest boiling point?



Answer: B



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33. Which of the following statement is false ?

- A. Superoxides give hydrogen peroxide and oxygen with water
- B. CrO_3 is an acidic oxide.
- C. SnO_2 is an amphoteric oxide
- D. KO_2 is peroxide which with H_2O forms hydrogen peroxides only.

Answer: D



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34. The compound which on strong heating gives oxygen is :

- A. $AgNO_3$
- B. BaO_2
- C. $Pb(NO_3)_2$
- D. $CaCO_3$

Answer: A::B::C



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35. Ozone layer is being depleted. This is due to :

- A. *NO* emission from supersonic jets
- B. chlorofluorocarbon used as aerosols
- C. both (A) and (B)
- D. none of the above

Answer: C



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36. A considerable part of the harmful ultraviolet radiation of the sun does not reach the surface of earth. This is because in the upper atmosphere, there is a layer of

A. O_3

B. CO_2

C. SO_2

D. NO

Answer: A



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37. Estimation of ozone can be made quantitatively by :

A. decomposition into O_2 and absorption of O_2 into pyragallol

B. volumetric method using KI and titration of the liberated iodine
using hypo solution

C. oxidative ozonolysis method

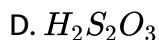
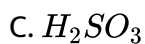
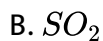
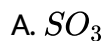
D. all methods given above

Answer: B



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38. Sulphur on oxidation with hot sulphuric acid gives :

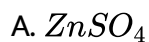


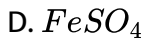
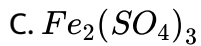
Answer: B



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39. Which of the following compounds gives a mixture of SO_2 and SO_3 on heating ?

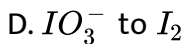
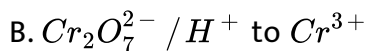
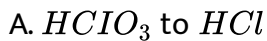




Answer: D

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40. SO_2 can reduce :



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

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41. H_2S is far more volatile than water because :

- A. sulphur atom is more electronegative than oxygen atom.
- B. oxygen being more electronegative than sulphur forms hydrogen bond.
- C. H_2O has bond angle of nearly 105°
- D. hydrogen atom is loosely bonded with sulphur.

Answer: B

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42. When H_2S is passed through acidified $K_2Cr_2O_7$ solution, the solution turns :

- A. yellow
- B. blue
- C. green

D. white

Answer: C

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43. H_2SO_4 has very high corrosive action on skin because

A. it reacts with $CaCO_3$

B. it acts as an reducing agent

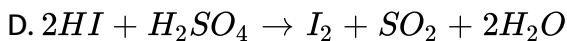
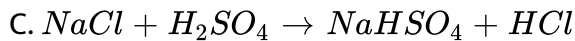
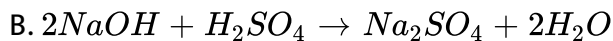
C. it acts as a dehydrating agent

D. it acts as a dehydrating agent and absorption of water is highly exothermic

Answer: D

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44. Which of the following reactions depict the oxidising behaviour of H_2SO_4 ?

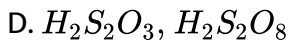
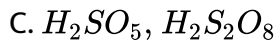
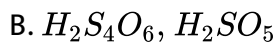
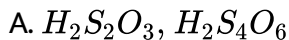


Answer: D



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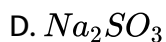
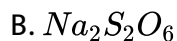
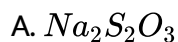
45. Out of $H_2S_2O_3$, $H_2S_4O_6$, H_2SO_5 and $H_2S_2O_8$ peroxy acids are:



Answer: C

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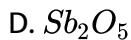
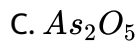
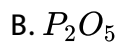
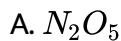
46. The term 'thio' is used in the names of all of the following compounds except :



Answer: D

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47. Which of the following oxides is the most acidic?



Answer: A



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48. Hydrolysis of one mole of peroxy disulphuric acid produces

A. two moles of sulphuric acid

B. two moles of peroxy monosulphuric acid.

C. one mole of sulphuric acid and one mole of peroxy monosulphuric acid

D. one mole of sulphuric acid, one mole of hydrogen peroxide.

Answer: C



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49. The oxidation number of S in S_8 , S_2F_2 , and H_2S , respectively, are

- A. 0, + 1 and - 2
- B. +2, + 1 and - 2
- C. 0, + 1 and + 2
- D. - 2, + 1 and - 2

Answer: A



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Exercise 1 part 3 ASSERTION/REASONING

1. Statement-1 : Ammonium nitrate on heating gives N_2O .

Statement-2 : The contaminant is NO which is removed by passing through ferrous sulphate solution

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-2
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: B

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2. Statement-1 : H_3PO_3 is a dibasic acid and shows reducing character.
- Statement-2 : H_3PO_3 contains two OH – groups and one hydrogen atom directly attached to P atom.
- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-2

- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-3
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: A

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3. Statement-1 : Liquid NH_3 is used for refrigeration.

Statement-2 : Enthalpy of vapourisation of ammonia is very large.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1
- C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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4. Statement-1 : Nitrates are not wide spread in the earth's crust.

Statement-2 : Nitrate are all very soluble in water.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-4

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-5

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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5. Statement-1 : Among nitrogen halides NX_3 , the dipole moment is higher for NI_3 and lowest for NF_3 .

Statement-2 : Nitrogen halides NX_3 , have trigonal pyramidal structure.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-5

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-6

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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6. Statement-1 : Bismuth does not form a pentoxides.

Statement-2 : The stability of the highest oxidation states decreases on

descending the group due to inert pair effect.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-6
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-7
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: A



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7. Statement-1 : NaH_2PO_2 is an acid salt.

Statement-2 : It contains no ionisable protons.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-7

- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-8
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: D

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8. Statement-1 : Both H_3PO_3 and H_3PO_4 have the same number of hydrogen atoms but H_3PO_4 is a tribasic acid and H_3PO_3 is a dibasic acid.

Statement-2 : 1 mol of H_3PO_3 is neutralised by 2 mol of $NaOH$ while 1 mol of H_3PO_4 is neutralised by 3 mol of $NaOH$

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-8

- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-9
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: B

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9. Statement I HNO_3 is a stronger acid than HNO_2 .

Statement II In HNO_3 , there are two nitrogen to oxygen bonds whereas in HNO_2 there is only one.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-9
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-10
- C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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10. Statement-1 : Electrovalency of oxygen is two (O^{2-})

Statement-2 : Dinegative anion of oxygen (O^{2-}) is quite common but dinegative anion of sulphur (S^{2-}) is less common.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-10

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-11

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B



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11. Statement-1 : At room temperature oxygen exists as a diatomic gas, where as sulphur exists as solid.

Statement-2 : The catenated $-O - O - O -$ chains are less stable as compared to $O = O$ molecule.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-11
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-12
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: B



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12. Statement-1 : Anhydrous BaO_2 is not used for preparing H_2O_2 .

Statement-2 : H_2O_2 is prepared on large scale by air oxidation of 2-Ethyl anthraquinol.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-12

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-13

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B



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13. Statement-1 : Mobility of mercury (Hg) decreases and its starts sticking to glass when it brought in contract with ozone.

Statement-2 : Ozone oxidises mercury to Hg_2O which dissolves in mercury.

Statement-2 : ozone oxidises mercury to Hg_2O which dissolves in mercury.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-13

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-14

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A



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14. Statement-1 : Sulphuric acid is less viscous than water due to intermolecular hydrogen bonding.

Statement-2 : Concentrated sulphuric acid is used as dehydrating agent.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-14
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-15
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: D

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15. Statement-1 : In caro's acid the oxidation state of sulphur is +5

Statement-2: In caro's acid, there is one peroxolinkage. ($-O-O-$)

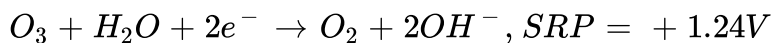
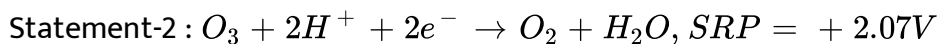
- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-15

- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-16
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: D

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16. Statement-1 : Ozone is a stronger oxidising agent in acidic medium.



- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-16
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-17
- C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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17. Assertion: A pink coloured solution of potassium permanganate turns green on passing O_3 through it

Reason K_2MnO_4 is oxidised by O_3 to $KMnO_4$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-17

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-18

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

18. Statement-1 : H_2O_2 is stored in wax-lined glass.

Statement-2 : Presence of traces of alkali metal ions in the glass catalyse the decomposition of H_2O_2 .

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-18
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-19
- C. Statement-1 is True, Statement-2 is False.
- D. Statement-1 is False, Statement-2 is True.

Answer: A

19. Statement-1 : Sulphur exhibits paramagnetic behaviour in vapour state.

Statement-2 : In vapour state sulphur partly exists as S_2 molecule which has two unpaired electrons in antibonding π^* orbitals.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-19

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-20

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A



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1. What happens when:

(a) NH_4Cl & $NaNO_3$ is heated strongly. , (b) $(NH_4)_2CO_3$ is heated. , (c) NH_4NO_2 is heated.

(d) Mg_3N_2 reacts with water. , (e) Mg is burnt in air and the product is treated with water.

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2. How will you obtain :

(A) Ammonia from quick lime (in three only)

(B) H_3PO_4 from phosphorite (in two steps only)

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3. An orange solid (A) on heating gave a green residue (B), colourless gas (C) and water vapour. The dry gas (C) on passing over heated magnesium gave a white solid (D). (D) on reaction with water have a

gas (*E*) which formed dense white fumes with HCl . Identify (*A*) to (*E*) and give the reactions.

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4. What happens when ?

(i) Ammonia reacts with $KMnO_4$ (neutral medium)

(ii) A mixture of NO and NO_2 is passed in Na_2CO_3 solution.

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5. What happens when ?

(i) Aqueous solution of $NaNO_3$ is heated with zinc dust and caustic soda.

(ii) CaO in water reacts with white phosphorus.

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6. Write down a reaction showing action of $N_2O_4(l)$ as non-aqueous solvent.

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7. Give the equations for preparation of :

(A) Nitrolim.

(B) Phosphine by P_4 and $I_2(aq)$

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8. A waxy crystalline solid (A) with a garlic odour is obtained by burning white P in a stream of air and nitrogen. (A) reacts vigorously with hot water forming a gas (B) and an acid (C). Gas (B) has unpleasant odour of rotten fish and is neutral towards litmus. When passed through $AgNO_3$ solution, gas (B) produces a black precipitate (D). What are (A) to (D) ?
Give chemical equations of the reactions.

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9. Identify (*A*) to (*E*).

(a) An inorganic iodide (*A*) on heating with a solution of *KOH* gives a gas (*B*) and the solution of a compound (*C*).

(b) The gas (*B*) on ignition air gives a compound (*D*) and water.

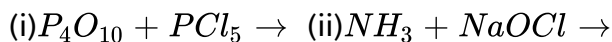
(c) Copper sulphate is reduced to the metal on passing (*B*) through the solution.

(d) A precipitate of the compound (*E*) is formed on reaction of (*C*) with copper sulphate solution.



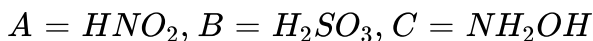
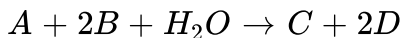
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10. Complete and balance the following :



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11. In the following equation :

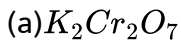


Identify D . Draw the structure of A , B , C and D .



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12. What happens when :



(b) Silent electric discharge is passed through pure and dry O_2

(c) Ozone reacts with dry iodine

(d) 2-Ethyl anthraquinol undergoes air oxidation

(e) H_2S and SO_2 react in presence of moisture

(f) Burning magnesium is kept in the atmosphere of SO_2

(g) Acidified iodates react with SO_2

(h) Conc. H_2SO_4 is made to react with phosphorus pentoxide

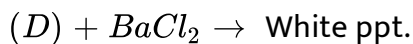
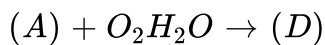
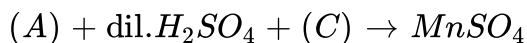
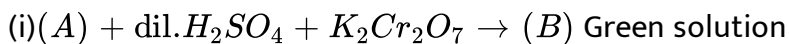


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13. What do you understand by talling of mercury ?

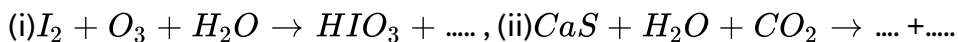
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14. From the reactions given below. Identify (A), (B), (C) and (D) and write their formulae.



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15. Complete the following equations



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16. What happens when

(i)Hydrogen sulphide is bubbled through an aqueous solution of sulphur dioxide.

(ii)Hydrogen sulphide is passed through acidified ferric chloride.



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17. Draw the structures of following acid.

(a)Marshall's acid , (b)Dithonic acid , (c)Caro's acid , (d)Thiosulphuric acid



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Exercise 2 part 2 OBJECTIVE

1. Which of the following is arranged in the increasing order of enthalpy of vaporization?

A. NH_3 , PH_3 , AsH_3

B. AsH_3 , PH_3 , NH_3

C. NH_3 , AsH_3 , PH_3

D. PH_3 , AsH_3 , NH_3

Answer: D

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2. The element which forms oxides in all oxidation states +1 to +5 is.

A. N

B. P

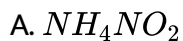
C. As

D. Sb

Answer: A

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3. Which of the following compounds does give N_2 on heating ?



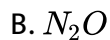
D. Both (A) and (C)

Answer: D



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4. A mixture of alumina and coke is heated in a current of nitrogen to about $1800^\circ C$ and the product obtained treated with water. A gas is evolved. The gas is :



D. NO

Answer: C



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5. Nitrolim is obtained by passing nitrogen over:

A. heated mixture of Al_2O_3 and carbon

B. carborundum

C. calcuim carbide

D. heated aluminium

Answer: C



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6. NH_3 can't be obtained by :

A. heating of NH_4NO_3 or NH_4NO_2

B. heating of NH_4Cl or $(NH_4)_2CO_3$

C. heating of NH_4NO_3 with $NaOH$

D. reaction of AlN or Mg_3N_2 or $CaCN_2$ with H_2O

Answer: A

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7. When ammonia is oxidised by oxygen in the presence of platinum at $800^\circ C$, the gas obtained is :

A. N_2O

B. NO

C. NO_2

D. N_2O_5

Answer: B

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8. Substances burn more readily in N_2O than in air because N_2O :

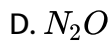
- A. is reactive at high temperature
- B. dissociates to give more oxygen than in air.
- C. the activation energy is increased on increasing temperature
- D. acts as a catalyst

Answer: B

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9. The mixed anhydride of nitrous and nitric acid is.

- A. NO
- B. NO_2
- C. N_2O_5

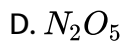
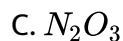
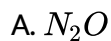


Answer: B



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10. Which of the following combines with Fe^{2+} ions to form brown complex ?



Answer: B



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11. Select the correct statement.

- A. Ostwald's method of preparation of HNO_3 is based upon catalytic oxidation of NH_3 by atmospheric oxygen.
- B. HNO_2 acts as both oxidising and reducing agents.
- C. NO_2 reacts with O_3 to form N_2O_5
- D. All of these

Answer: D



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12. A gas is obtained on heating ammonium nitrate. The gas:

- A. causes laughter
- B. brings tears to the eyes
- C. is acidic in nature

D. is basic in nature

Answer: A



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13. The gas obtained on heating lead nitrate to 400°C :

A. N_2O

B. NO

C. NO_2

D. N_2O_5

Answer: C



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14. A gaseous substance dissolve in water giving a pale blue solution which decolourises $KMnO_4$ and oxidises KI to I_2 in acidic medium :

- A. N_2O_5
- B. NH_3
- C. N_2O_3
- D. HNO_3

Answer: C



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

- A. sublimation
- B. distillation
- C. heating
- D. heating with an alkali solution

Answer: D

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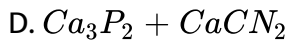
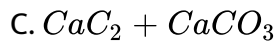
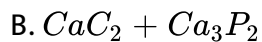
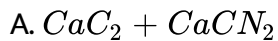
16. Red phosphorus may be prepared from white phosphorus by :

- A. adding red colour to white phosphorus
- B. heating white phosphorus to red heat
- C. heating white phosphorus at $250^{\circ}C$ or at low temperature in the presence of sun light.
- D. dissolving white phosphorus in $NaOH$

Answer: C

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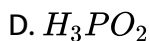
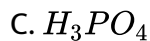
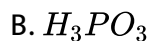
17. Holme's signals produce burning gases which serve as a signal to the approaching ships contains.



Answer: B

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18. Phosphorus trichloride, PCl_3 undergoes, hydrolysis at room temperature to produce an oxoacid. It has the formula :



Answer: B

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19. Ortho phosphoric acid on heating above $300^{\circ}C$ gives :

- A. hypophosphorus acid
- B. hypophosphoric acid
- C. metaphosphoric acid
- D. phosphorous acid

Answer: C

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20. 1 mol of H_3PO_2 , H_3PO_3 and H_3PO_4 will neutralise x mol $NaOH$, y mol of $Ca(OH)_2$ and z mol of $Al(OH)_3$ respectively (assuming all as strong electrolytes). x, y, z are in the ratio of:

- A. 3 : 1.5 : 1

B. 1:2:3

C. 3:2:1

D. 1:1:1

Answer: D

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21. The true statement for the acids of phosphorus. H_3PO_2 , H_3PO_3 and H_3PO_4 is:

A. H_3PO_3 on heating does not disproportionate

B. all of them are reducing in nature

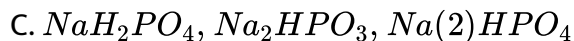
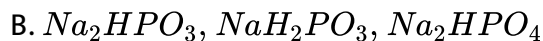
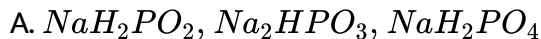
C. all of them are tribasic acids

D. H_3PO_2 is obtained by alkaline hydrolysis of P_4 (white)

Answer: D

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



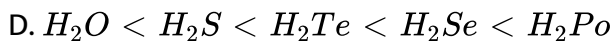
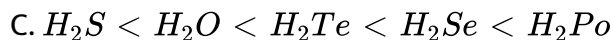
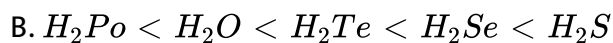
D. All of these

Answer: C



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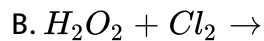
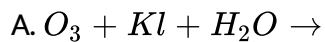
23. The thermal stability of the hydrides of oxygen family is in order :



Answer: A

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24. Which of the following reactions does not produce oxygen ?



D. None

Answer: D

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25. The gases respectively absorbed by alkaline pyrogallon and oil of cinnamon is.

A. O_2, O_3

B. SO_2, O_3

C. O_3, CH_4

D. N_2O, O_3

Answer: A

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26. Alkaline KI is oxidised by ozone to :

A. potassium iodate

B. potassium periodate

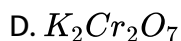
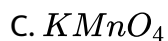
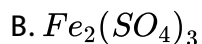
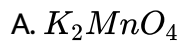
C. both (A) and (B)

D. None of these

Answer: C

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27. Which of the following is oxidised by O_3 ?



Answer: A



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28. Identify the incorrect statement with respect to ozone.

A. Ozone is formed in the upper atmosphere by a photochemical reaction involving dioxygen.

B. Ozone is more reactive than oxygen

C. Ozone is diamagnetic where as dioxygen is paramagnetic

D. Ozone protects the earth's inhabitants by absorbing γ radiations.

Answer: D

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29. The aqueous solution of hydrogen peroxide:

A. converts blue litmus pink

B. converts blue litmus white

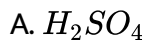
C. converts red litmus blue

D. None of these

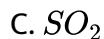
Answer: B

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30. When H_2S is passed through nitric acid and acidified $KMnO_4$ solution the product formed is



B. colloidal sulphur



D. plastic sulphur

Answer: B



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31. Consider the following compounds :

(i) sulphur dioxide

(ii) hydrogen peroxide

(iii) ozone

Among these compounds, those which can act as bleaching agents would include :

A. 1 and 3

B. 2 and 3

C. 1 and 3

D. 1, 2 and 3

Answer: D



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32. When an article is bleached by SO_2 it loses its colour. The colour can be restored by :

A. exposure to air

B. heating

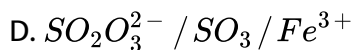
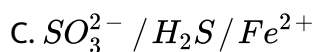
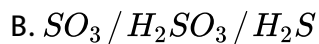
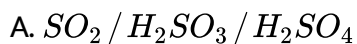
C. diluton

D. none of these

Answer: A

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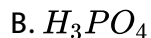
33. Which of the following can convert acidified $Cr_2O_7^{2-}$ to green ?



Answer: C

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34. In the reaction, $H_2SO_4 + P_2O_5 \xrightarrow{\Delta} (X) + SO_3$, the product (X) is :



D. $N_4P_2O_7$

Answer: C

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35. Bleaching action of SO_2 is due to :

A. its reducing nature

B. its oxidising nature

C. its acidic nature

D. its both oxidising as well as reducing nature

Answer: A

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36. A gas that cannot be collected over water is.

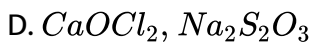
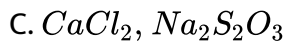
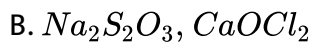
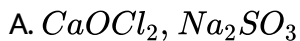


Answer: C



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37. Bleaching of a fabric cloth is done using A and excess of chlorine is removed using B. A and B are :



Answer: D

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38. Aqueous hypo solution on reaction with aqueous $AgNO_3$ gives :

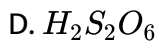
- A. yellow precipitate changing to black
- B. white precipitate changing to black
- C. orange precipitate to blue
- D. no precipitate

Answer: B

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39. Which of the following gives H_2O_2 on hydrolysis ?

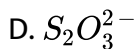
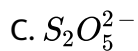
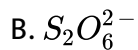
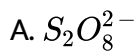
- A. $H_2S_2O_3$
- B. H_2SO_5
- C. $H_2S_2O_7$



Answer: B

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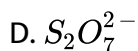
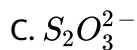
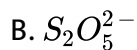
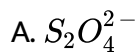
40. Which of the following does not have S-S linkage but have O-O linkage ?



Answer: A

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41. There is no $S - S$ bond in



Answer: D



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42. Sodium thiosulphate is prepared by

A. reducing Na_2SO_3 solution with H_2S

B. Boil gNa_2SO_3 in alkaline medium.

C. Neutralising $H_2S_2O_3$ solution with $NaOH$

D. Boiling Na_2SO_3 with S in an acidic medium

Answer: B

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43. Ammonia , on reaction with hypochlorite anion, can form

A. NO

B. NH_4Cl

C. N_2H_4

D. HNO_2

Answer: C

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44. As, Sb and Bi show little or no tendency to form negative ions of the type M^{3-} . This is because

- A. these elements are less electronegative
- B. their atoms have larger size
- C. they are unable to hold the added elements due to inert pair effect
- D. they do not possess half filled np subshells

Answer: AB



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45. Which of the following statements is (are) correct ?

- A. The hydrides of group 15 elements act as oxidising agents
- B. The hydrides of group 15 elements act as reducing agents
- C. The oxidising power increases in going from NH_3 "to" BiH_3
- D. The reducing power increases in going from NH_3 "to" BiH_3

Answer: BD



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

A. $SbH_3 > NH_3 > AsH_3 > PH_3$ ("boiling point")

B. $H_3PO_4 > H_3PO_3 > H_3PO_2$ ("reducing character")

C. $N_2O < NO < N_2O_3 < N_2O_5$ ("oxidation state on nitrogen atom")

D. $NH_3 > PH_3 > AsH_3 > SbH_3 \geq BiH_3$ ("basicity")

Answer: B



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47. Which of the following statements is (are) correct ?

A. Antimony on reaction with conc. HNO_3 gives antimonic acid.

B. Manganese on reaction with cold and dilute HNO_3 gives NO_2 gas.

C. HNO_2 disproportionate to give HNO_3 and NO

D. HNO_3 on reaction with P_4O_{10} gives N_2O_5

Answer: ACD

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48. Which of the following is//are true for oxygen.

A. $KMnO_4(s)$ on strong heating gives oxygen gas

B. Oxygen mixed with helium is used for artificial respiration.

C. It has two unpaired electrons in bonding π molecular orbitals.

D. Brins process is used as industrial method for the preparation of oxygen gas.

Answer: ABD

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49. What is true for hydrogen peroxide and ozone ?

- A. H_2O_2 acts as a stronger reducing agent in alkaline medium than in acidic medium
- B. H_2O_2 and O_3 both are oxidizing agents as well as bleaching agent
- C. H_2O_2 forms a hydrate, $H_2O_2 \cdot H_2O$
- D. Ozone is used in the manufacture of potassium permanganate from pyrolusite.

Answer: ABCD



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50. Sulphuric acid acts as

- A. hygroscopic agent
- B. sulphonating agent

C. reducing agent

D. oxidising agent

Answer: ABD

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51. Which of these statement is true for sodium thiosulphate ?

A. it acts as an antichlor

B. it is used as an reducing agent in iodometric titration.

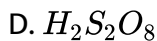
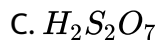
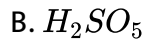
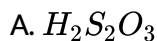
C. it reacts with hydrochloric acid to form SO_2 and sulphur

D. it is used in photography as hypo to dissolves excess of AgBr as soluble complex.

Answer: ABCD

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52. Which among the following is//are peroxo acid (s) ?



Answer: B



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PART -III : Match the column

1.

(Column - I, Column - II), $\left(PCI_5 \xrightarrow[\text{Air}]{\text{moist}} \right)$, (p)Hydrolysis

$\left(P_4 + NaOH(\text{conc.}) + H_2O \xrightarrow{\text{Warm}} \right)$, (q)At least one of the products

$\left(P_4O_6 + H_2O \xrightarrow{\Delta} \right)$, (s)At least one of the products has

ppi – dpibonding) :}

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2.

(Column – I, Column – II), $\left((NH_4)_2S_2O_8 + H_2O \xrightarrow{\text{Distillation}} \right)$,

$\left(NaBO_2H_2O + H_2O_2 \xrightarrow{OH^-} \right)$, (q) One of the product has peroxide linkage

rarr

, (s) In one of the products the central atom has sp^3 hybridisation.

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ALP PART IV : Comprehension

1. 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. NO_2

D. both (A) and (C)



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2. 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 $NO, N_2O_3, NO_2, N_2O_4 \rightarrow N_2O_5$ (O.S of nitrogen +5).

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(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.

Which of the following statements is correct for the oxides of nitrogen?

- A. Dinitrogen trioxide dissolves in potassium hydroxide forming potassium nitrate.
- B. Aqueous solution of nitrogen dioxide behaves both as a reducing agent and as an oxidising agent.
- C. Nitrogen oxide is fairly soluble in cold water and turns blue litmus red.
- D. Nitrogen dioxide is not an acidic oxide.

Answer: A

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3. An inorganic iodide (A) on heating with a solution of KOH gives a gas (B) and a solution of a compound. The gas (B) on ignition in air gives a compound (C) and water. Copper sulphate is finally reduced to the metal on passing (B) through its solution.

Select the correct statement from the following for the gas (B).

- A. Its solution in water does not decompose in pressure of light.
- B. It can be prepared by the alkaline hydrolysis of white phosphorus.
- C. It is non- inflammable owing to the presence of P_2H_4 .
- D. It can act as oxidising agent.

Answer: C

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4. An inorganic iodide (A) on heating with a solution of KOH gives a gas (B) and a solution of a compound. The gas (B) on ignition in air gives a compound (C) and water. Copper sulphate is finally reduced to the methal on passing (B) through its solution.

The compound (C) :

- A. has sp^3 hybridisation of central atom(s)
- B. has sixteen sigma bonds.
- C. is used as a dehydrating agent.

D. all of these.

Answer: In the form of elemental nitrogen it

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5. An inorganic iodide (A) on heating with a solution of KOH gives a gas (B) and a solution of a compound. The gas (B) on ignition in air gives a compound (C) and water. Copper sulphate is finally reduced to the metal on passing (B) through its solution.

What is true about gas (B) and compound (C) ?

- A. The oxidation number of central atom of gas (B) is $+IV$
- B. The gas (B) produces a black precipitate of metallic silver with silver nitrate solution.
- C. Compound (C) dissolves in water forming an acid which with sodium hydroxide forms three series of salts.
- D. (B) and (C) both



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6. Oxygen differs from the other elements of the group. Compounds of oxygen with metals are more ionic in nature and hydrogen bonding is more important for oxygen compounds. Oxygen is never more than divalent because when it has formed two covalent bonds, there are no low energy orbitals which can be used for forming further bonds. However, the elements S, Se, Te and Po have empty d-orbitals which may be used for bonding, and they can form four or six bonds by unpairing electrons. The higher oxidation states become less stable on descending the group.

The bond between S and O, or Se and O, are much shorter than might be expected for a single bond owing to $p\pi - d\pi$ interaction between the p-orbital of oxygen and d-orbital of S or Se.

Which of the following statements is incorrect ?

A. Oxo-anions of sulphur have little tendency to polymerise compared with the phosphates and silicates.

- B. In pyrosulphurous acid ($H_2S_2O_5$) the oxidation states of both the sulphur atoms are not same, they are $+V$ and $+III$
- C. Concentrated HNO_3 oxidises both sulphur and selenium to $H_2SO_4 (+VI)$ and $H_2SeO_4 (+VI)$ respectively.
- D. Most metal oxides are ionic and basic in nature while non-metallic oxides are usually covalent and acidic in nature.



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7. Oxygen differs from the other elements of the group. Compounds of oxygen with metals are more ionic in nature and hydrogen bonding is more important for oxygen compounds. Oxygen is never more than divalent because when it has formed two covalent bonds, there are no low energy orbitals which can be used for forming further bonds. However, the elements S, Se, Te and Po have empty d-orbitals which may be used for bonding, and they can form four or six bonds by unpairing electrons. The

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The bond between S and O, or Se and O, are much shorter than might be expected for a single bond owing to $\rho\pi - d\pi$ interaction between the p-orbital of oxygen and d-orbital of S or Se.

Which one of the following orders represents the correct order for the properties indicated against them?

A. $H_2O < H_2S < H_2Se < H_2Te$ – "acidic character"

B. $H_2O < H_2S < H_2Se < H_2Te$ – "thermal stability"

C. $H_2S > H_2Se < H_2Te < H_2O$ – "reducing character"

D. $H_2S > H_2Se < H_2O < H_2Te$ – "boiling point "



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8. The property of hydrides of p-block elements mostly depends on :

(i) electronegativity difference between central atom and hydrogen.

(ii) size of central atom

(iii) number of valence electrons in central atom

Some undergo hydrolysis in which central is less electronegative, react with OH^- to give hydrogen. while acidic property of hydride in a period depends on electronegativity of central atoms. i.e. more electronegative is the atom, more acidic is hydride. In a group, acidic property is proportional to size of central atom. Some electron deficient hydride behaves as Lewis acid while only one hydride of an element in p-block behaves as Lewis base with central atom's electronegativity is close to hydrogen has no reaction with water.

Which one is the weakest acid among the following ?

- A. HF
- B. HCl
- C. HBr
- D. HI



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9. The property of hydrides of p-block elements mostly depends on :

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(iii) number of valence electrons in central atom

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Which hydride has no reaction with water ?





10. The property of hydrides of p-block elements mostly depends on :

- (i) electronegativity difference between central atom and hydrogen.
- (ii) size of central atom
- (iii) number of valence electrons in central atom

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Which one is strongest base ?



C. Hse^-

D. HTe^-

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ALP EX #3 OBJECTIVE

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

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2. (a) What amount of CaO in grams is required to neutralise 852g of P_4O_{10} .

(b) Write the structure of P_4O_{10}

(b) Write the structure of P_4O_{10} .

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3. Among the following, the number of compounds that can react with PCl_5 to give $POCl_3$ is $O_2, CO_2, SO_2, H_2O, H_2SO_4, P_4O_{10}$.

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1. The number of hydrogen atom(s) attached to phosphorus atom in hypophosphorus acid is :

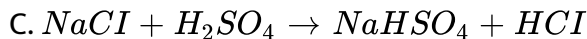
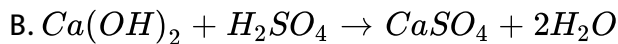
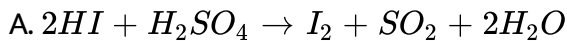
- A. zero
- B. two
- C. one
- D. three

Answer: 2



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1. Which of the following chemical reactions depicts the oxidizing behaviour of H_2SO_4 ?



Answer: 1

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2. Repeated use of which one of the following fertilizers would increase the acidity of the soil?

A. Superphosphate of lime

B. Ammonium sulphate

C. Potassium nitrate

D. Urea

Answer: 2

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3. Which of the following statements is wrong ?

- A. The stability of hydrides increase from NH_3 to BiH_3 in group 15 of the periodic table.
- B. Nitrogen cannot form $d\pi - p\pi$ bond.
- C. Single N-N bond is weaker than the single P-P bond.
- D. N_2O_4 has resonance structure.

Answer: (1, 4)

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4. Which of the following statements regarding sulphur is incorrect?

- A. S_2 molecule is paramagnetic.
- B. The vapour at $200^\circ C$ consists mostly of S_8 rings.

C. At 600°C the gas mainly consists of S_2 molecules.

D. The oxidation state of sulphur is never less than +4 in its compounds.

Answer: 4

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5. Which of the following is the wrong statement ?

A. ONCl and ONO^- are not isoelectronic.

B. O_3 molecule is bent.

C. Ozone is violet-black in solid state

D. Ozone is diamagnetic gas.

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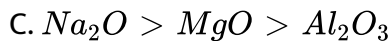
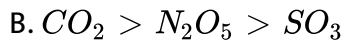
1. Give chemical reaction in support of the statement that all the bonds in PCl molecule are not equivalent.



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ALP PART 1 OBJECTIVE

1. The correct order of acidic strength is



Answer: A



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2. Ammonia can be dried by :

A. *conc. H₂SO₄*

B. *P₄O₁₀*

C. *CaCO*

D. *anhydrous CaCl₂*

Answer: C



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3. Polyphosphates are used for 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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4. For H_2PO_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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5. $(NH_4)_2Cr_2O_7$ 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 H_2O

D. treating Na (compound) with H_2O_2

Answer: A

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6. A pale blue liquid is obtained by equimolar mixture of two gases at $-30^\circ C$.

A. N_2O

B. N_2O_3

C. N_2O_4

D. N_2O_5

Answer: B

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7. Thermodynamically most stable allotrope of phosphorus is :

- A. Red
- B. White
- C. Black
- D. Yellow

Answer: B

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8. There are some deposits of nitrated and phosphates in the earth's crust. Nitrates are more soluble in water. Nitrates are difficult to reduce under laboratory conditions but microbes do it easily. Ammonia forms a large number of complexes with transition metal ions. Hybridisation easily explains the ease of sigma donation capability of NH_3 and PH_3 .

Phosphine is a flammable gas and is prepared from white phosphorous.

Which of the following statement is correct ?

- A. phosphates have no biological significance in humans .
- B. between nitrates and phosphates, phosphates are less a abundant in earth's cursy.
- C. between nitrates and phosphates, niteates are less abundant in earth's crust.
- D. oxidation of nitrates is possible in soil.

Answer: C



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9. There are some deposits of nitrated and phosphates in the earth's crust. Nitrates are more soluble in water. Nitrates are difficult to reduce under laboratory conditions but microbes do it easily. Ammonia forms a large number of complexes with transition metal ions. Hybridisation

easily explains the ease of sigma donation capability of NH_3 and PH_3 .

Phosphine is a flammable gas and is prepared from white phosphorous.

Which of the following statement is correct ?

- A. between NH_3 and PH_3 , NH_3 is a better electron donor because the lone pair of electrons occupies spherical s orbital and is less dirctional.
- B. between NH_3 and PH_3 , PH_3 is a better electron donor because the lone pair of electrons occupies sp^3 orbital and is more directional.
- C. between NH_3 and PH_3 , PH_3 is a better electron donor because the lone pair of electrons occupies sp^3 orbital and is more directional.
- D. between NH_3 and PH_3 , NH_3 is a better electron donor because the lone pair of electrons occupies spherical s orbital and is less dirctional.

Answer: C



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10. There are some deposits of nitrates and phosphates in the earth's crust. Nitrates are more soluble in water. Nitrates are difficult to reduce under laboratory conditions but microbes do it easily. Ammonia forms a large number of complexes with transition metal ions. Hybridisation easily explains the ease of sigma donation capability of NH_3 and PH_3 . Phosphine is a flammable gas and is prepared from white phosphorous. White phosphorous on reaction with $NaOH$ gives PH_3 as one of the products. This is a.

- A. dimerization reaction
- B. disproportionation reaction
- C. condensation reaction
- D. precipitation reaction

Answer: B

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11. The reaction of P_4 with X leads selectively to P_4O_6 . The X is :

- A. Dry O_2
- B. A mixture of O_2 and N_2
- C. Moist O_2
- D. O_2 in the presence of aqueous NaOH

Answer: B

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

Column I

Column II

- A. $\text{Cu} + \text{dil. HNO}_3$ p. NO
B. $\text{Cu} + \text{cons. HNO}_3$ q. NO_2
C. $\text{Zn} + \text{dil. HNO}_3$ r. N_2O
D. $\text{Zn} + \text{cons HNO}_3$ s. $\text{Cu}(\text{NO}_3)_2$
 t. $\text{Zn}(\text{NO}_3)_2$

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13. Extra pure N_2 can be obtained by heating

A. NH_3 with CuO

B. NH_4NO_3

C. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$

D. $\text{Ba}(\text{N}_3)_2$

Answer: D

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14. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen ?

- A. HNO_3, NO, NH_4, Cl, N_2
- B. HNO_3, NO, N_2, NH_4, Cl
- C. HNO_3, NH_4, Cl, NO, N_2
- D. NO, HNO_3, NH_4, Cl, N_2

Answer: B



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15. Amongst H_2O, H_2S, H_2Se and H_2Te the one with highest boiling point is :

- A. H_2O because of H-bonding .
- B. H_2Te because of higher molecular weight.
- C. H_2S because of H-bonding.

D. H_2Se because of lower molecular weight.

Answer: A

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16. The number of S-S bonds, in sulphur trioxide trimer (S_3O_9) is :

A. three

B. two

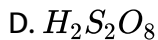
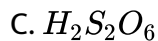
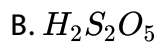
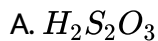
C. one

D. zero

Answer: D

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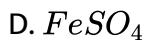
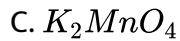
17. Which of the following oxoacids of sulphur has -O-O- linkage ?



Answer: D

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18. Which of the following will not be oxidised by O_3 ?



Answer: B

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19. Which gas is evolved when PbO_2 is treated with conc HNO_3 ?

A. NO_2

B. O_2

C. N_2

D. N_2O

Answer: B



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20. Aqueous solution of $Na_2S_2O_3$ on reaction with Cl_2 , gives

A. $Na_2S_4O_6$

B. $NaHSO_4$

C. $NaCl$

D. NaOH

Answer: B

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21. Assign a reason for each of the following :

(i) SCl_6 is not known but SF_6 is known.

(ii) Sulphur hexafluoride is used as a gaseous electrical insulator.

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22. Bismuth is a strong oxidizing agent in the pentavalent state. Or pentavalent bismuth is a strong oxidizing agent.

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23. H_3PO_3 is diprotic (or dibasic). Why ?

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24. How will you account for the following ?

Bi_2O_3 is not acidic in any of its reactions ?

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25. Give reasons for the following observations :

Why SF_4 undergoes hydrolysis but not SF_6 ?

Or SF_6 is inert towards hydrolysis.

SF_6 is much less reactive than SF_4 .

Or (i) SF_4 is easily hydrolysed whereas SF_6 is not easily hydrolysed.

(ii) Sulphur exhibits greater tendency for catenation than selenium.

(iii) Sulphur has a higher tendency for catenation than oxygen.

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26. Why do nitro compounds have high boiling points in comparison with other compounds of same molecular mass ?

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27. Write the structure of the following species :

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28. Assign a reason for each of the following statements :

- (i) Ammonia is a stronger base than phosphine.
- (ii) Sulphur in vapour state exhibits a paramagnetic behaviour :

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29. The electron gain enthalpy with negative sign for oxygen (-141 kJ mol^{-1}) is less than of sulphur (-200 kJ mol^{-1})

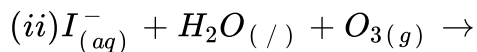
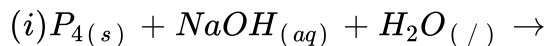
Or The value of electron gain enthalpy with negative sign for sulphur is higher than that of oxygen.

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30. $Bi(V)$ and $Sb(V)$ which may be a stronger oxidizing agent and why ?

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31. Complete the following chemical reaction equations :



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32. Account for the following :

(i) NH_3 is a stronger base than PH_3

(ii) Sulphur has a greater tendency for catenation than oxygen.

(iii) Bond dissociation energy of F_2 is less than that of Cl_2 .

(OR)

Explain the following situations :

(i) In the structure of HNO_3 molecule, the $N - O$ bond (121 pm) is shorter than the $N - OH$ bond (140 pm).

(ii) SF_4 is easily hydrolysed whereas SF_6 is not easily hydrolysed.

(iii) XeF_2 has a straight linear structure and not a bent angular structure.

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

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34. (a) Why does NO_2 dimerise ?

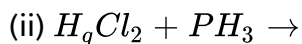
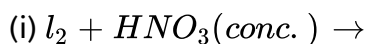
(b) In what way can it be proved that PH_3 is basic in nature ?

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35. Draw the structures of white phosphours and red phosphours. Which one of these two types of phosphours is more reactive and why ?

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36. Complete the following chemical reaction equations :



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37. State reasons for each of the following :

(i) "The" $N - O$ "bond in" NO_2^- "is shorter then the" $N - O$ "bond in" NO_3^- .

(ii) SF_6 is kinetically an inert substance.

OR

State reasons for each of the following :

- (i) "All the" $P - Cl$ "bonds in" PCl_5 "molecule are not equivalent".
- (ii) Sulphur has greater tendency for catenation than oxygen.

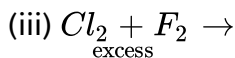


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38. (a) Explain the following :

- (i) NF_3 is an exothermic compound whereas NCl_3 is not
- (ii) F_2 is most reactive of all the four common halogens.

(b) Complete the following chemical equations :



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39. How would you account for the following :

- (i) H_2S is acidic than H_2O .
- (ii) The N-O bond in NO_2^- is shorter than the $N - O$ bond in NO_3^- .

(iii) Both O_2 and F_2 stabilize high oxidation states but the ability of oxygen to stabilize the higher oxidation state exceeds that of fluorine.

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40. Why BiH_3 is strongest reducing agent amongst group 15 hydrides ?

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41. Explain the following facts giving appropriate reason in each case :

(i) NF_3 is an exothermic compound whereas NCl_3 is not.

(ii) All the bonds in SF_4 are not equivalent.

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42. (A) complete the following chemical equations :

(i) $Cu + HNO_3$ (dilute) to (ii) $XeF_4 + O_2F_2$ to

(B) Explain the following observations:

- (i) Phosphorus has greater tendency for catenation than nitrogen.
- (ii) Oxygen is a gas but sulphur a solid.
- (iii) The halogens are coloured. Why ?



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43. What happens when

- (i) PCl_5 is heated ?
- (ii) H_3PO_3 is heated ?

Write the reactions involved .



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44. Nitrogen shows different oxidation states in the range:

- A. 0 to 5
- B. - 3 to + 5
- C. - 5 to + 3

D. -5 to $+3$

Answer: B



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45. Dinitrogen gas is evolved when sodium nitrite is heated :

- A. alone
- B. with ammonium chloride
- C. with ammonium hydroxide
- D. with potassium nitrate

Answer: B



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46. Dinitrogen cannot be liberated by :

- A. decomposition of ammonium dichromate.
- B. reaction of ammonia with heated cupric
- C. reaction of ammonia with bleaching powder.
- D. heating ammonium carbonate.

Answer: D

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47. Dinitrogen can be purified from the impurities of NO and NH_3 by passing through :

- A. concentrated HCl
- B. alkaline solution of phrogallol.
- C. an acidified solution of potassium dichromate.
- D. an aqueous solution of KOH .

Answer: C

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48. Ammonia and red hot CuO react to produce :

- A. Cu_2O, N_2, H_2
- B. Cu, H_2O, N_2
- C. $Cu(OH)_2, N_2$
- D. $[Cu(NH_3)_4](OH)_2$

Answer: B

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49. Which compounds are produced when ammonia reacts with excess of bromine ?

- A. N_2, NH_4Br
- B. N_2 and HBr

C. NBr_3 , HBr

D. NH_4Br Only

Answer: C

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50. 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

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51. 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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52. Which is not produced when Nl_3NH_3 is rubbed against the hard surface ?

A. I_2

B. N_2



Answer: C

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53. Which will not give precipitate with NH_4OH Solution ?



Answer: C

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54. Which of the following cannot result in the formation of NO ?

A. $N_2 + O_2$ (Electric arc)

B. $NH_3 + O_2$, (*Pt / Rhcatalyst / 1200K*)

C. $NaNO_3 / HCl$

D. None of these

Answer: C



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55. A lighting flash through air may result in the formation of :

A. nitrogen pentaoxide

B. ammonia

C. nitric acid

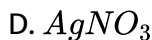
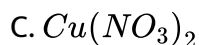
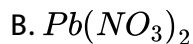
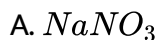
D. nitric oxide

Answer: D



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56. Which of the following does not give NO_2 by heating at $500^\circ C$?



Answer: A



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57. When a vapour, at atmosphere pressure was gradually heated from $25^\circ C$ its colour was found to deepen at first and then to fade as the temperature was raised above $160^\circ C$. At $600^\circ C$, the vapour was almost

colourless, but its colour deepened when the pressure was raised at this temperature. The vapour was:

- A. the bromine.
- B. a mixture of nitrogen dioxide and dinitrogen tetraoxide.
- C. pure nitrogen dioxide .
- D. pure dinitrogen tetraoxide.

Answer: B



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58. Nitrogen (i) oxide is produced by

- A. thermal decomposition of ammonium nitrate
- B. disproportionation of N_2O_4
- C. thermal decomposition of ammonium nitrate
- D. interaction of hydroxyl amine with nitrous acid.

Answer: A

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59. Which of the following statements about N_2O is false ?

- A. A neutral oxide which does not form hyponitrous acid with water
- B. An oily liquid
- C. Used as propellant for whipped ice-cream.
- D. Used as an anaesthetic.

Answer: B

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60. The aqueous solution/ liquid that absorbs nitric oxide to a considerable extent is :

- A. lead nitrate
- B. nitric acid
- C. ferrous sulphate
- D. sodium hydroxide

Answer: C

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61. One of the oxidants used with liquid propellant is :

- A. ammonia perchlorate
- B. nitrocellulose
- C. sulphuric acid
- D. nitrogen tetroxide (N_2O_4)

Answer: D

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62. Which of the following statements is true for HNO_2 ?

- A. It can be prepared by acidifying an aqueous solution of nitrite.
- B. It is unstable weak acid which is known only in aqueous solution.
- C. N_2O_3 is an anhydride of HNO_2 .
- D. All of these

Answer: D



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63. What is true about N_2O_4 ?

- A. It is mixture N_2O_3 and N_2O_5 .
- B. It is absorbed by water to form nitric acid.
- C. it is raddish brown gas.

D. It reacts with water to give mixture of two oxoacids of nitrogen.

Answer: D

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64. Nitrogen dioxide

A. dissolve in water forming HNO_3

B. does not dissolve in water.

C. dissolves in water to form HNO_2 and gives off O_2 .

D. dissolves in water to form a mixture of nitrous and nitric acid.

Answer: D

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65. Which oxide does not act as a reducing agent?

A. NO

B. N_2O_4

C. N_2O

D. N_2O_5

Answer: D



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66. Action of concentrated nitric not act as a reducing agent ?

A. stannous nitrite

B. stannous nitrate

C. stannic nitrate

D. hydrated stannic oxide

Answer: D



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67. In modern process, white phosphorus is manufactured by :

- A. heating a mixture of phosphorus mineral with sand and coke in an electric furnace
- B. heating calcium phosphates with lime
- C. heating bone ash with coke
- D. heating phosphate mineral with sand.

Answer: A



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68. 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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69. The true statement of the acids of phosphorus H_3PO_2 , H_3PO_3 and H_3PO_4 is :

A. the order of their reducing strength is H_3PO_2 , H_3PO_3 , H_3PO_4 .

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

C. all have one $P = O$

D. All of these

Answer: D

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70. White phosphorus when boiled with strong solution of caustic soda produces :

- A. sodium phosphide
- B. sodium phosphate
- C. sodium hypophosphite
- D. red phosphorus

Answer: C



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71. Oxygen can be obtained from bleaching powder by:

- A. adding dilute acid
- B. adding alkalies
- C. heating with lime
- D. heating with a cobalt salt.

Answer: D



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72. Which compound does not give oxygen on heating?

A. HgO

B. KMnO_4

C. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$

D. KClO_3

Answer: C



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73. Acidified potassium permanganate is dropped over sodium peroxide taken in a round bottom flask at room temperature, vigorous reaction takes place to produce:

- A. hydrogen peroxide
- B. mixture of hydrogen and oxygen
- C. a colourless gas hydrogen
- D. a colourless gas dioxygen.

Answer: D

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74. Which pair of species are referred to as suboxides respectively?

- A. CO , NO
- B. SO_2 , CaO
- C. N_2O , CO
- D. N_2O , C_3O_2

Answer: D

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75. Which of the following statements is not true about ozone ?

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76. Ozone is prepared by passing silent electric discharge through oxygen. In this reaction

- A. energy is given out
- B. energy is absorbed
- C. oxygen is dissociated into atom
- D. oxygen is loaded with energy.

Answer: B

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77. Which of the following is responsible starch-iodide paper blue when it is brought in contact with O_3 ?

- A. Liberation of iodine
- B. Liberation of oxygen
- C. Formation of alkali
- D. Reaction of ozone with litmus paper.

Answer: A



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78. Which one of the following property is not correct for ozone?

- A. It oxidises lead sulphide
- B. It oxidises potassium iodide
- C. It oxidises mercury
- D. It cannot act as bleaching agent in dry state.

Answer: D

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79. Ozone give carbonyl compounds with :

A. alkyl chlorides

B. alkanes

C. alkenes followed by decomposition with Zn/H_2O .

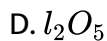
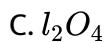
D. alkenes followed by decomposition with Zn/H_2O .

Answer: C

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80. Moist iodine reacts with ozone to form.

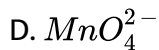
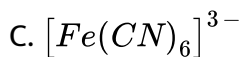
A. HI



Answer: B

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81. Which ion cannot be oxidized by ozone?



Answer: C

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82. Which of the following solutions does not change its colour on passing ozone through it ?

- A. starch iodide solution
- B. alcoholic solution of benzidien
- C. acidic solution of potassium dichromate
- D. acidified solution of $FeSO_4$

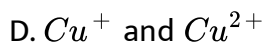
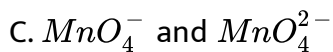
Answer: C



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83. A green coloured solution of a salt changes its colour to light pink on passing ozone through it. Which of the following species represent pink and green colour respectively.

- A. Mn^{2+} and MnO_2
- B. MnO_4^{2-} and MnO_4^-



Answer: C

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84. Mercury loses its meniscus on passing ozone through it. The meniscus can be regained:

A. by passing O_2 gas.

B. by shaking it with water.

C. by passing O_2 gas.

D. by shaking it with liquor ammonia.

Answer: B

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85. All the following decomposes easily on heating to give oxygen except :

- A. barium peroxide
- B. potassium dichromate
- C. sodium nitrate
- D. None of these

Answer: D



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86. What is the product formed when ozone reacts with mercury?

- A. HgO
- B. Hg_2O_2
- C. Hg_2O
- D. HgO_2

Answer: C

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87. Which one of the following properties is correct for ozone ?

- A. It is used for killing water -born germs
- B. It reacts with dry iodine to form I_4O_9
- C. It oxidises mercury to mercury suboxide
- D. All of these

Answer: D

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88. By which of the following SO_2 is formed ?

- A. Reaction of dilute H_2SO_4 with O_2

B. Heating $Fe_2(SO_4)_3$

C. Reaction of concentrated H_2SO_4 with Cu .

D. None

Answer: C

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89. SO_2 reacts with chlorine in sunlight to form :

A. sulphuryl chloride

B. sulphonyl chloride

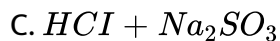
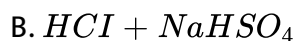
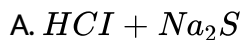
C. sulphur acid

D. sulphuric acid.

Answer: A

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90. The products of the chemical reaction between $Na_2S_2O_3$, Cl and H_2O are :



Answer: B



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91. When sulphur is boiled with Na_2SO_4 solution, the compound formed is :

A. sodium sulphide

B. sodium sulphate

C. sodium persulphate

D. sodium thiosulphate

Answer: D

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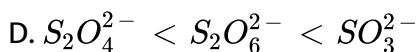
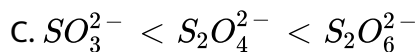
92. $Na_2S_2O_3$ is prepared by :

- A. reaching $H_2S_2O_3$ with $NaOH$.
- B. reacting Na_2SO_4 with S is alkaline medium.
- C. heating $NaOH$ and S
- D. reducing Na_2SO_4 with S in acidic medium.

Answer: C

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93. The oxidation states of sulphur in the anions SO_3^{2-} , $S_2O_4^{2-}$, and $S_2O_6^{2-}$ follow the order



Answer: B

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94. Ammonium dichromate on heating liberates a gas. The same gas will be obtained by :

A. heating $NaNO_2$ and NH_4Cl .

B. treating H_2O_2 "with" $NaNO_2$.

C. "passing ammonia gas over red hot" CuO .

D. treating of hydroxyl with $KMnO_4$ in neutral medium.

Answer: A,C,D

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95. Nitrogen (i) oxide is produced by

A. thermal decomposition of ammonium nitrate.

B. disproportionation of N_2O_4 .

C. thermal decomposition of ammonium nitrate.

D. interaction of hydroxyl ammine and nitrous acid.

Answer: A,D

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96. Select the incorrect statement(s).

- A. Alkaline H_2O_2 reduces ClO_2 to ClO_2^-
- B. Ammonia reacts with excess of iodine to form an explosive, NI_3 .
- NH_3
- C. The manufacture of HNO_3 is based upon catalytic oxidation of NH_3 by atmospheric oxygen.
- D. N_2O_3 with concentrated $HClO_4$ forms nitrosyl salt.

Answer: A,B,C,D

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97. Which of the following is//are incorrect statement(s) for phosphine ?

- A. It is less basic than NH_3 .
- B. It is less poisonous than NH_3 .
- C. The solution of PH_3 in water does not decompose.
- D. Phosphine on heating at $150^\circ C$ "burns forming" H_3PO_4 .

Answer: B,C

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98. What is//are not true about phosphine (PH_3)?

A. It turns red litmus blue.

B. It reacts with $HCl(aq)$.to give PH_4Cl .

C. Phosponium compounds are obtained when anhydrous phosphine reacts with anhydrous halogen acids.

D. It is prepared by hydrolysis of metal phosphides with acids.

Answer: A,B

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99. Hyderolysis (complete) of peroxodisulphuric acid yields hydrogen peroxide and sulphuric acid.



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ALP PART 1 OBJECTIVE Assertion/ Reasoning

1. Statement -1 : Hydrogen 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. Statement -1 is true , Statement-2 is true, Statement-2 is a correct explanation for Statement -1.
- B. Statement -1 is true, Statement- 2 is false.
- C. Statement -1 is False, Statement- 2 is True.
- D. Statement -1 and Statement- 2 both are False.

Answer: A



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2. 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. Statement -1 is true, Statement- 2 is false.

B. Statement -1 is true , Statement-2 is true, Statement-2 is a NOT a correct explanation for Statement -1.

C. Statement -1 and Statement- 2 both are False.

D. Statement -1 is False, Statement- 2 is True.

Answer: B



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3. Statement -1 : NO_2 and ClO_2 both being odd electron molecules dimerise.

Statement -2 : On dimerisation, NO_2 is converted to stable N_2O_4 molecule with even number of electrons.

A. Statement -1 and Statement- 2 both are False.

B. Statement -1 is true, Statement- 2 is false.

C. Statement -1 is true , Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

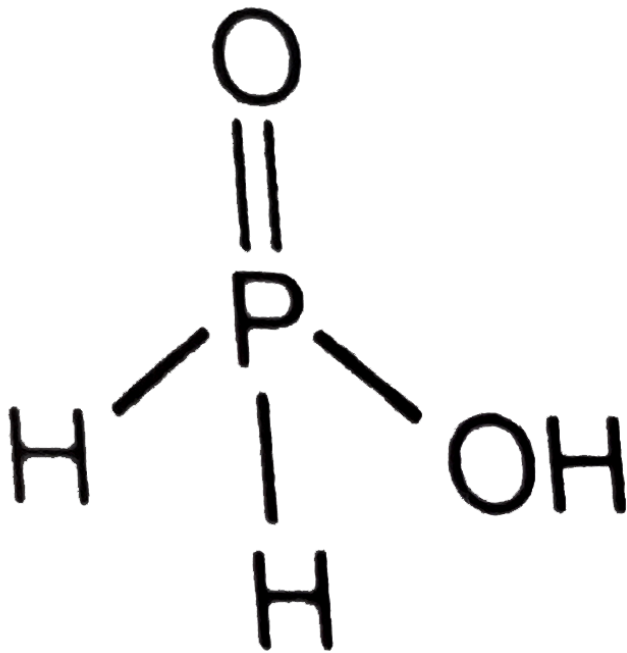
D. Statement -1 is False, Statement- 2 is True.

Answer: D



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4. Statement -1 : H_3PO_2 is a weak monobasic acid and is also strong reducing in nature.



Statement -2 :

- A. Statement -1 is true , Statement-2 is true, Statement-2 is a correct explanation for Statement -1.
- B. Statement -1 is true , Statement-2 is true, Statement-2 is a NOT a correct explanation for Statement -1.
- C. Statement -1 is true, Statement- 2 is false.
- D. Statement -1 and Statement- 2 both are False.

Answer: A



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5. Statement -1 : Ozone is a powerful oxidising agent in comparison to O_2 .

Statement -1 : O_3 molecules is diamagnetic but O_3^- is paramagnetic.

A. Statement -1 is true , Statement-2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement -1 is true , Statement-2 is true, Statement-2 is a NOT a correct explanation for Statement -1.

C. Statement -1 is False, Statement- 2 is True.

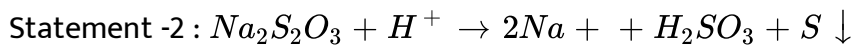
D. Statement -1 and Statement- 2 both are False.

Answer: B



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6. Statement -1 : Sodium thiosulphate is not prepared by boiling Na_2SO_3 with S in acidic medium.



- A. Statement -1 is true , Statement-2 is true, Statement-2 is a correct explanation for Statement -1.
- B. Statement -1 and Statement- 2 both are False.
- C. Statement -1 is true, Statement- 2 is false.
- D. Statement -1 is true, Statement- 2 is false.

Answer: A



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ALP PART 1 Comprehension # 1 OBJECTIVE

1. Fifth group elements form hydrides to type AH_3 . The hydrides have a lone pair of electrons. The hydrides are reducing in nature and the reducing power is related to the stability of A-H bonds. The hydrides are covalent and low boiling. Their boiling points depends on their ability to

from hydrogen bond and their molecular size which decide the intermolecular forces in the hydrides .

The H-M-H bond angle of V group hydrides decrease from 107° to 90° for NH_3 to SbH_3 , this is due to:

- A. increase in strength of bases with molecular weight
- B. use of pure p-orbital M-H bonding in hydrides of higher molecular weight
- C. bond energies of M-H bonds increase
- D. bond pairs of electrons go closer to central atom

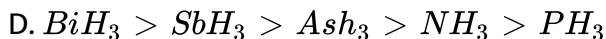
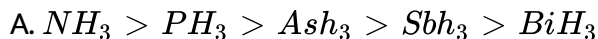
Answer: B

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2. Fifth group elements form hydrides to type AH_3 . The hydrides have a lone pair of electrons. The hydrides are reducing in nature and the reducing power is related to the stability of A-H bonds. The hydrides are covalent and low boiling. Their boiling points depends on their ability to

from hydrogen bond and their molecular size which decide the intermolecular forces in the hydrides .

Reducing power of V-group hydrides are in order :



Answer: B

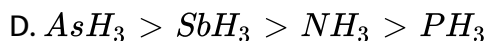
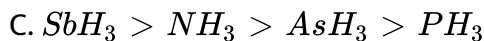
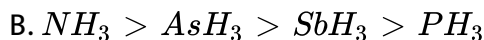
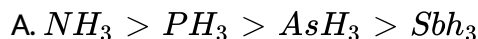


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3. Fifth group elements form hydrides to type AH_3 . The hydrides have a lone pair of electrons. The hydrides are reducing in nature and the reducing power is related to the stability of A-H bonds. The hydrides are covalent and low boiling. Their boiling points depends on their ability to form hydrogen bond and their molecular size which decide the

intermolecular forces in the hydrides .

The boiling points of the hydrides of V-group elements are in the order :



Answer: C



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4. An orange solid (A) on heating gives a green residue (B), a colourless gas (C) and water vapours. The dry gas (C) on passing over heated Mg gave a white solid (D). (D) on reaction with water gave a gas (E) which formed black precipitate with mercurous nitrate solution.

which of the following is true ofr the gas (E)?

A. It gives a deep blue colouration with $CuSO_4$ solution.

- B. It is oxidised to a colourless gas (neutral oxide) at 1200 K in presence of a catalyst Pt/Rh in air.
- C. It gives the same gas (C) with potassium permanganate solution.
- D. All of these.

Answer: D

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5. An orange solid (A) on heating gives a green residue (B), a colourless gas (C) and water vapours. The dry gas (C) on passing over heated Mg gave a white solid (D). (D) on reaction with water gave a gas (E) which formed black precipitate with mercurous nitrate solution.

The green residue (B) is :

- A. amphoteric in nature.
- B. used as green pigment.
- C. used in fire crackers to impart the red colour.

D. (A) and (B) both.

Answer: D

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6. Ozone is an unstable, dark blue diamagnetic gas. It absorbs strongly the UV radiation, thus protecting the people on the earth from the harmful UV radiation from the sun. The use of chlorofluorocarbon (CFC) in aerosols and refrigerators, and their subsequent escape into the atmosphere, is blamed for making holes in the ozone layer over the Antarctic, and Arctic.

Ozone acts as a strong oxidising agent in acidic and alkaline medium. For this property ozone is used as a germicide and disinfectant for sterilising water and improving the atmosphere of crowded places.

Identify the incorrect statement with respect to ozone.

A. Ozone is formed in the upper atmosphere by a photochemical reaction involving dioxygen.

B. Ozone protects the earth's inhabitants by absorbing UV radiations.

C. Ozone can also be made by heating O_2 over $2500^\circ C$. And quenching.

D. Chloride gas is preferred over zone for the purification of drinking water and for water treatment in swimming pools.

Answer: D

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7. Ozone is an unstable, dark blue diamagnetic gas. It absorbs strongly the UV radiation, thus protecting the people on the earth from the harmful UV radiation from the sun. The use of chlorofluorocarbon (CFC) in aerosols and refrigerators, and their subsequent escape into the atmosphere, is blamed for making holes in the ozone layer over the Antarctic, and Arctic.

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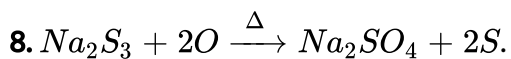
water and improving the atmosphere of crowded places.

which of the following statements is correct ?

- A. The dark blue colour of ozone is due to intense absorption of green light.
- B. oxides of nitrogen and the halogen can not damage the O_3 later.
- C. Ozone oxidises dry iodine to I_2O_9
- D. Ozone forms orange coloured KO_3 with potassium hydroxide.

Answer: D

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1. An orange solid (A) on heating gives a green residue (B), a colourless gas (C) and water vapours. The dry gas (C) on passing over heated Mg gave a white solid (D). (D) on reaction with water gave a gas (E) which formed black precipitate with mercurous nitrate solution.

Select the incorrect statement.

- A. The central atom(s) of the anion of solid (A) has sp^3 hybridisation.
- B. The orange solid (A) is diamagnetic in nature.
- C. The anion of orange solid (A) is oxidising in nature.
- D. None

Answer: D

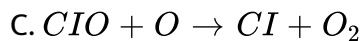
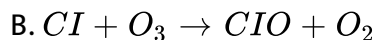
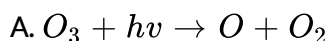


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1. Ozone is an unstable, dark blue diamagnetic gas. It absorbs strongly the UV radiation, thus protecting the people on the earth from the harmful UV radiation from the sun. The use of chlorofluorocarbon (CFC) in aerosols and refrigerators, and their subsequent escape into the atmosphere, is blamed for making holes in the ozone layer over the Antarctic, and Arctic.

Ozone acts as a strong oxidising agent in acidic and alkaline medium. For this property ozone is used as a germicide and disinfectant for sterilising water and improving the atmosphere of crowded places.

CFC damages ozone layer by reactions :



D. All of these.

Answer: D

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ALP PART II SUBJECTIVE

1. Nitrogen cannot be stored as liquid in sealed containers but ammonia can be, why

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ALP PART 1 Comprehension # 1 SUBJECTIVE

1. (a) Why does NO_2 dimerise ?

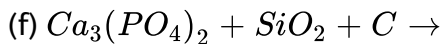
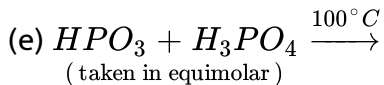
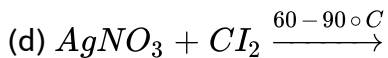
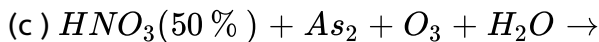
(b) In what way can it be proved that PH_3 is basic in nature ?

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2. Complete and balance the following chemical equations

(a) $H_2SO_3 + NH_3 + HNO_3(\text{conc.}) \rightarrow$

(b) $Ag_2N_2O_2 + HCl \xrightarrow{\text{ether}}$



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3. Give reason for the following :

(a) Formation of NH_3 from its elements at constant pressure is accompanied by a decrease in volume.

(b) Nitric oxide turns in air.

(c) Copper dissolves in HNO_3 but not in HCl.

(d) $Pb(NO_3)_2$ on heating produces a pale yellow gas which on strong heating produces brown gas.



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4. What happens when :

(i) Red phosphorus is treated with I_2 and water.

(ii) Give balance equation : Cu reacts with HNO_3 to produce NO and NO_2 in the ration 2: 1.

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

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6. Write the names of substances which have higher oxidation potential than ozone.

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7. Why sulphur is able to show oxidation state of +4 and +6 with fluoroine and oxygen ?

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8. Oxygen exists as a gas, while sulphur exists as a solid Why ?

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9. How is the presence of SO_2 detected?

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10. Which aerosols deplete ozone ?

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11. Oxygen almost variably and oxidation state of -2 but the other members of family exhibit negative as well as positive oxidation states of $+2$, $+4$ and $+6$. Explain.

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12. An aqueous solution of a gas (X) gives the following reactions :

(i) It decolourizes an acidified $K_2Cr_2O_7$.

(ii) On boiling with H_2O_2 , cooling it and then adding an aqueous solution of $BaCl_2$, a precipitate insoluble in dilute HCl is obtained.

(iii) On passing H_2S gas in the solution, white turbidity is obtained.

Identify (X) and give equations for steps (i), (ii) and (iii).

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13. On heating rhombic sulphur it melts but viscosity of liquid increases upto $200^\circ C$ and beyond that it decreases why?

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Column I

(Oxy acids of phosphorus)

Column II

(Characteristic bonds)

14. (A) $H_4P_2O_7$ (p) $P - P$ bond(s)
- (B) $H_4P_2O_5$ (q) $P - - P$ bond(s)
- (C) $H_4P_2O_6$ (r) $P - H$ bond(s)
- (D) $(HPO_3)_n$ (cyclic) (s) Three of four P-OH bonds

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15.

Column I

- (A) $PbO_2 + HNO_3 \rightarrow$
- (B) $Cr_2O_7^{2-} + H^+ + H_2O_2 \rightarrow$
- (C) $H_2O_2 + ClO_2 + OH^- \rightarrow$
- (D) $XeF_2 + NaOH \rightarrow$

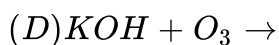
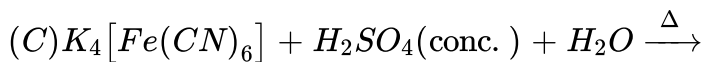
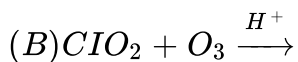
Column II

- (p) One of the products has bond order of
- (q) One of the products has peroxide link
- (r) One of the products is a hydride and i
- (s) One of the products has bent shape w

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16.

Column I



Column II

(p) One of the products

(q) One of the products

(r) The oxidation state

(s) One of the products

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17. P_4 reduces copper sulphate solution to metallic copper.

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18. Red phosphorus catches fire at room temp.

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19. Hydroxylamine undergoes disproportionation reaction rapidly in alkaline solution.

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20. N_2O does not form hypertrite with alkali.

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21. In alkaline solution, with Devarda's alloy (Cu//Al//Zn) nitrites are reduced to ammonia.

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22. N_2O is an acid anhydride of HNO_3 .

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23. SO_3 does not turn starch iodate paper blue.

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24. Reduction of bisulphite solution and SO_2 with zin dust yields sulphate.

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ALP PART OBJECTIVE

1. Mercuric oxide and curpic oxide both gives off oxygen on moderate heating.

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2. S_2Cl_2 hydrolysis slowly to give HCl, SO_2 and S.



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3. Ozone acts as a bleaching agent only in presence of moisture.

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4. Nitrogen is a mixture of carbon and

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5. ____phosphorus is reactive because of its highly strained tetrahedral structure.

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6. Among PCl_3 , CH_3^+ , NH_2^- and NF_3 is least reactive towards water.

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7. Red phosphorus is reactive than white phosphorus as red phosphorus is polymeric and consists of the of P_4 units.

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8. Thermal decomposition of ammonium dichromate produces gas and steam.

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9. NO_2 is the mixed anhydride of and acids.

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10. The lead chamber process involves oxidation of SO_2 by atomic oxygen under the influence of ___ as catalyst.

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11. An oxide liberates chlorine with HCl and oxygen with conc. H_2SO_4 .

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12. Bleaching action of SO_2 is due to and is

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B.L.E

1. What is the basicity of H_3PO_4 ?

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2. Solid phosphorus pentachloride behaves as an ionic compound. Explain

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3. Phosphorus shows greater tendency for catenation than nitrogen. Why ?

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4. Give the chemical reaction to support that +5 oxidation state of *Bi* is less stable than +3 state.

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5. *Bi(V)* and *Sb(V)* which may be a stronger oxidizing agent and why ?

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6. *Bi₂O₃* is treated stronger oxidizing agent, write a balanced equation for the reaction.



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7. Sulphur disappears when boiled with an aqueous solution of sodium sulphite. Why ?



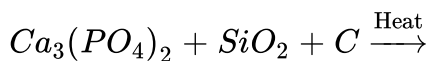
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8. Write one chemical reaction to show that conc. H_2SO_4 can act as an oxidising agent.



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9. Write the chemical equation for the following :



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10. Write balanced equation when NH_3 is dissolved in water.

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11. What is the oxidation number of phosphorus in H_3PO_2 molecule ?

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12. Why is N_2 less reactive at room temperature ?

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13. List the important sources of sulphur.

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14. Why does O_3 act as a powerful oxidizing agent?



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15. How is ozone estimated?



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16. The HNH angle value is higher than HPH , $HAsH$ and $HSbH$ angles. Why?



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17. Nitrogen exists as diatomic molecule and phosphorus as P_4 . Why?



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18. Among the hydrides of group 16, water shows unusual physical properties. Why?

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19. Draw the structures of (i) $PCl_5(s)$, (ii) SO_3^{2-}

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20. On being slowly passed through water, PH_3 forms bubbles but NH_3 dissolves. Why is it so ?

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21. Mention the conditions required to maximise the yield of ammonia.

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22. Bond angle in PH_4^+ is higher than that in PH_3 . Why ?

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23. Why is H_2O a liquid and H_2S a gas?

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24. The stability of +5 oxidation state decreases down the group 15 of the periodic table. Explain this observation giving appropriate reasons.

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25. (a) What happens when white phosphorus is heated with concentrated $NaOH$ solution in an inert atmosphere of CO_2 ?

(b) Draw the structure of white phosphorus and red phosphorus. Which one of these two types of phosphorus, is more reactive and why?

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26. What are the oxidation states of phosphorus in the following:

(i) H_3PO_3 , (ii) PCl_3 , (iii) Ca_3P_2

(iv) Na_3PO_4 , (v) POF_3



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27. (a) Give reasons for the following : Nitric oxide becomes brown when released in air.

(b) Ammonia acts as a ligand. Why ?

(c) Assign a reason for the following: SCl_6 is not known but SF_6 is known.



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28. Why is ICl more reactive than I_2 ?



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29. Why is helium used in diving apparatus ?

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30. With which neutral molecule is ClO^- isoelectronic ? Is this molecule Lewis acid or base ?

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31. Why has it been difficult to study the chemistry of radon ?

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32. How are XeO_3 and $XeOF_4$ prepared ?

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33. List the uses of neon and argon gases.

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34. Explain why fluorine forms only one oxoacid, HOF.

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35. Explain why inspite of nearly the same electronegativity, nitrogen forms hydrogen bonding while chlorine does not.

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36. Write two uses of ClO_2 .

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37. Why are halogens coloured?

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38. How can you prepare Cl_2 from HCl and HCl from Cl_2 ? Write reactions only.

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39. How are xenon fluorides XeF_2 , XeF_4 and XeF_6 obtained?

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40. Which one of the following does not exist ?

(i) $XeOF_4$ (ii) NeF_2 (iii) XeF_2 (iv) XeF_6 .

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41. Why do noble gases have comparatively large atomic sizes?

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42. Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidising power of F_2 and Cl_2

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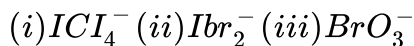
43. Write the reaction of F_2 and Cl_2 with water.

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44. Name two poisonous gases which can be prepared from chlorine gas.

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45. Give the formula and describe the structure of a noble gas species which is isostructural with :



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46. Arrange the following in the order of property indicated for each set :

(i) F_2 , Cl_2 , Br_2 , I_2 - increasing bond dissociation enthalpy.

HF, HCl, HBr, HI- increasing acid strength.

NH_3 , PH_3 , AsH_3 , SbH_3 , BiH_3 - increasing base strength.

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47. Assign appropriate reasons for each of the following statements.

(i) More metal fluorides are ionic in nature than metal chlorides.

(ii) Hydrogen fluoride is a weaker acid than hydrogen chloride in aqueous solution.

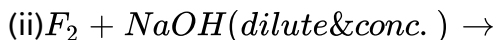
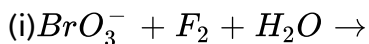
(iii) In aqueous solution HI is a stronger acid than HCl ?

(iv) Addition of Cl_2 to KI solution gives it a brown colour but excess of Cl_2 turns it colourless.

(v) Perchloric acid is a stronger acid than sulphuric acid.

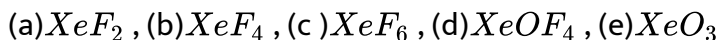
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48. Complete and balance the following chemical equations.



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49. Write the hybridization and also draw their molecular structures ?



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1. Why are halogens strong oxidising agents ?

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2. Although chlorine and oxygen have nearly same electronegativity yet only oxygen form hydrogen bond explain it ?

A. It is less

B.

C.

D.

Answer: Oxygen has smaller size than size, it cannot act as central atom in higher oxidation state.

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3. Explain why fluorine forms only one oxoacid , HOF ?

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4. Name the fluoro carbon used in refrigerators.

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5. Name the compound which is used to obtain fluorine gas on electrolysis. At which electrode does F_2 appears?

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6. Euchlorine is:

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7. When a blue litmus is dipped into a solution of hypochlorous acid, it turns red and then gets decolourised. Explain.

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8. What is the maximum percentage of available chlorine in a sample of bleaching powder?

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9. (a) Name two interhalogens of AB_3 type.

(b) Write the hydrolysis product of ICl_3 ?

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10. State what happens when halogens react with a cold dilute solution of NaOH?

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11. HI can not be prepared by heating NaI with concentrated H_2SO_4 . Give the method which is preferred for the preparation of HI.

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12. What idea lead to the discovery of Xenon fluorides?

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13. Noble gases are mostly inert. Assign reasons.

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14. Why do noble gases have comparatively large atomic sizes?

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Exercise 1 part-2

1. The halogens are :

- A. transition elements
- B. inner-transition elements
- C. noble elements
- D. representative elements

Answer: D

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2. Astatine is the element below iodine in the group *VIIA* of the periodic table. Which of the following statements is not true for astatine?

- A. It is less electronegative than iodine

- B. It will exhibit only - 1 oxidation state.
- C. Intermolecular forces between the astatine molecules will be larger than that between iodine molecules.
- D. None of these.

Answer: B

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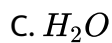
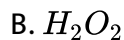
3. Which statement is correct about halogen ?

- A. They are all diatomic and form univalent ions
- B. Halogen have the smallest atomic radii in their respective periods
- C. They are all diatomic and form diatomic ions
- D. They are all reducing agents

Answer: AB

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4. H_2O is oxidised to O_2 by :

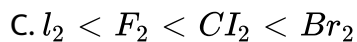
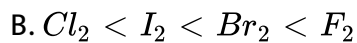
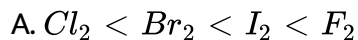


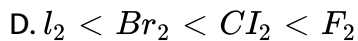
Answer: D



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5. Oxidising action increases in the following order :





Answer: D



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6. Which of the following hydrogen halide is most volatile.

A. HCl

B. HF

C. HI

D. HBr

Answer: A



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7. Which can do glass etching ?

A. HIO_4

B. HF

C. HNO_3

D. SIF_4

Answer: B

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8. Which of the following pairs do not correctly matched ?

A. A halogen which is liquid at room temperature - Bromine

B. The most electronegative element-Fluorine

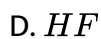
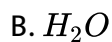
C. The most reactive halogen-Fluorine

D. The strongest oxidising agent- Iodine

Answer: D

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9. Hydrogen bonding does not play role in the boiling point of :



Answer: D



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10. Which of the following posses the highest bond energy ?



D. I_2

Answer: B



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11. Elements of the one of the following groups will form anions most readily ?

A. oxygen group

B. nitrogen group

C. halogens

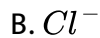
D. alkali metals

Answer: C



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12. The strongest reducing agent is :



Answer: D



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13. The most powerful oxidising agent is :

A. fluorine

B. chlorine

C. bromine

D. iodine

Answer: A

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14. Which one of the hydracid does not form any precipiate with $AgNO_3$?

- A. HF
- B. HCl
- C. HBr
- D. HI

Answer: A

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15. Which of the following is the strongest acid ?

A. HBr

B. HF

C. H_2S

D. PH_3

Answer: A



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16. Which of the following has highest bond strength :

A. HI

B. HCl

C. HF

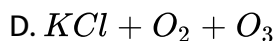
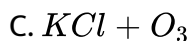
D. HBr

Answer: C



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17. On heating $KClO_3$ we get :

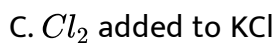
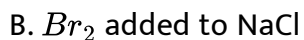


Answer: B



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18. Which of the following will not displace the halogen from the solution of the halide?



D. Cl_2 added to NaF

Answer: BCD



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19. ClO_2 is the anhydride of :

A. HOCl

B. $HClO_2$

C. $HClO_3$

D. $HClO_2$ and $HClO_3$

Answer: D



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20. ClO_3 is the mixed anhydride of :

A. HClO_2 and HClO_3

B. HClO_3 and HClO_4

C. HClO_2 and HClO_4

D. HClO_2 and HClO_3

Answer: B



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21. Concentrated H_2SO_4 cannot be used to prepare HBr from NaBr , because it ,

A. reduces HBr

B. oxidises HBr

C. disproportionates HBr

D. reacts slowly with NaBr

Answer: B

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22. The following acid have arrange in the order of decreasing strength.

Identify the correct order. $ClOH(I)BrOH(II)IOH(III)$

A. $I > II > III$

B. $II > I > III$

C. $III > II > I$

D. $I > III > II$

Answer: A

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23. Which one of the following are pseudohalide ions ?

A. CNO^-

B. $RCOO^-$



Answer: B

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24. The formation of $O_2^+ [PtF_6]^-$ is the basis for the formation of xenon fluorides. This is because:

A. O_2 and Xe have comparable sizes.

B. both O_2 and Xe are gases.

C. O_2 and Xe have comparable ionisation energies.

D. O_2 and Xe have comparable electronegativities.

Answer: C

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25. Which of the following gaseous molecules is monoatomic ?

- A. chlorine
- B. helium
- C. oxygen
- D. nitrogen

Answer: B



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26. Which one of the following noble gases is not found in atmosphere ?

- A. Rn
- B. Kr
- C. Ne
- D. Ar

Answer: A

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27. The inert gas abundantly found in atmosphere is:

A. Ar

B. Kr

C. He

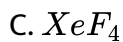
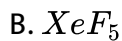
D. Xe

Answer: A

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28. The none-existent species is

A. XeF_6



Answer: B

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29. Maximum number of compound are known in the case of :

A. neon

B. xenon

C. krypton

D. argon

Answer: B

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30. Which inert gas has abnormal behaviour on liquefaction ?

A. Xe

B. He

C. Ar

D. Kr

Answer: B



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31. Helium is added to oxygen used by deep sea divers because :

A. It is less soluble in blood than nitrogen under high pressure

B. It is lighter than oxygen

C. It is readily miscible with oxygen

D. It is less poisonous than nitrogen

Answer: A

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32. Hydrolysis of XeF_4 and $CaNCN$ gives respectively :

- A. XeO_3 and $CaCO_3$
- B. XeO_2 and $CaCN_2$
- C. $XeOF_3$ and $CaCN_2$
- D. $XeOF_2$ and $CaCO_3$

Answer: A

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1. Statement-1 : Chlorine and sulphur dioxide both are bleaching agents.

Statement-2 : The bleaching action of chlorine and sulphur dioxide is performed through the process of oxidation.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: C



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2. Statement-1 : Fluorine is a stronger oxidising agent than chlorine because

Statement-2 : It has (i) low enthalpy of dissociation of F-F bond and (ii) high hydration energy.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-2
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

Answer: A



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3. Statement-1 : Most of the reactions of fluorine are exothermic.

Statement-2: Fluorine atom is smaller in size and forms strong bonds with other elements and has low dissociation energy of the F-F bond.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-3

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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4. Statement-1 : Halogens are more reactive than interhalogens.

Statement-2 : Bond in the interhalogenes (X-Y) is weaker than X-X bond in the halogens.

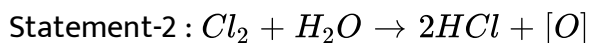
A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-4
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

Answer: D

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5. Statement-1 :Chlorine bleaches vegetable or organic substances in the presence of moisture.



- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-5
- C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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6. Statement-1 : IO_3^- oxidises I^- to I_2 in acidic medium.

Statement-2 : HIO_3 is formed by oxidation of I_2 with concentrated HNO_3 .

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B



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7. Statement-1 : Hydrolysis of XeF_6 represents a redox reaction.

Statement-2 : The products of hydrolysis are $XeOF_4$ and XeO_3 where the oxidation states of all elements remain the same as it was in the reacting state.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

Answer: D



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8. Statement-1 : Helium and beryllium both are chemically inert.

Statement-2 : Helium and beryllium have similar outer electronic configuration of the type ns^2

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: D



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9. Statement-1 : Xenon forms fluorides.

Statement-2 : 5 d-orbitals are available in xenon for valence shell

expansion.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

Answer: B

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10. Statement-1 : Noble gases have very low boiling points.

Statement-2 : Noble gases being monoatomic have weak dispersion interatomic forces.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-10

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A



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Exercise 2 part-1

1. Explain the following with proper reason :

(i) Fluorine cannot be prepared from fluorides by chemical oxidation.

(ii) Anhydrous HCl is a bad conductor of electricity while aqueous HCl is a good conductor.

- (iii) Halogens are strong oxidising agents.
- (iv) Bleaching of flowers by chlorine is permanent while after bleaching with SO_2 , the colour returns.
- (v) Iodine dissolves more in KI solution than in water.
- (vi) KHF_2 is well known whereas $KHCl_2$ or $KHBr_2$ does not exist.
- (vii) Ferric iodide is very unstable but ferric chloride is stable.
- (viii) Fluorine does not form F_3^- (polyhalide) ion.
- (ix) HF is not stored in glass bottles but kept in wax lined bottles.
- (x) HF has a greater electronegativity difference and more ionic character than HCl, HBr and HI but it is the weakest acid.



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2. What happens when ? (Give balanced equations)

- (i) Sodium iodate is treated with sodium bisulphite solution.
- (ii) Chlorine is passed through hot and concentrated NaOH solution.
- (iii) Chlorine is passed into dilute and cold potassium hydroxide solution.
- (iv) Chlorine gas is bubbled through a solution of ferrous bromide.
- (v) Iodine reacts with concentrated HNO_3 .

(vi) Chlorine is passed over slaked lime.

(vii) Potassium iodide is heated with MnO_2 and concentrated H_2SO_4 .

(viii) Chlorine reacts with Na_2SO_3 solution.

(ix) Iodine is added to acidified stannous chloride solution.



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3. Predict the products when the following reactions are carried out:

(A) Red lead reacts with concentrated HCl.

(B) Ammonia reacts with excess iodine.

(C) Bleaching powder reacts with lead nitrate in alkaline medium.

(D) Chlorine is passed through heated freshly precipitated HgO .

(E) In acidic medium when SO_2 is passed through $NaClO_3$.



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4. Arrange the following :

(i) Increasing order of thermal stability $HOCl$, $HClO_2$, $HClO_3$, $HClO_4$.

(ii) Increasing acid strength $HClO$, $HClO_2$, $HClO_3$, $HClO_4$

(iii) Increasing reducing nature F^- , Cl^- , Br^- , I^-

(iv) Increasing oxidation number of iodine I_2 , HI , HIO_4 , ICl .

(v) Increasing acid strength $HOCl$, $HOBr$, HOI .

(vi) Increasing oxidising power F_2 , Cl_2 , Br_2 , I_2

(vii) Increasing acid strength HF , HCl , HBr , HI .

(viii) Increasing electronegativity F , Cl , Br , I .



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5. An inorganic compound (X) gives a brick red flame on performing flame test. This compound gives the following tests also.

(a) Smells of chlorine when placed in moist air.

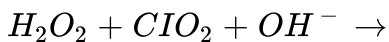
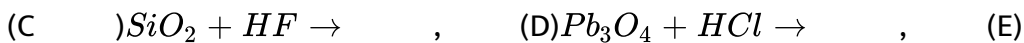
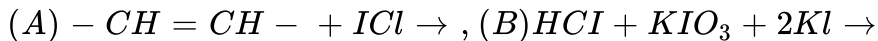
(b) If KI and CH_3COOH are added to the suspension in water, a brown colour is obtained.

Identify (X) and write equations for reactions at steps (a) and (b).



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6. Complete and balance the following reactions :



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7. Answer the following with relevant reason.

(i) Xenon has closed shell configuration but is known to give compounds with fluorine.

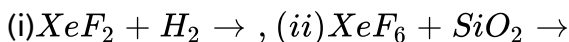
(ii) The boiling points of noble gases increase with increase in atomic number.

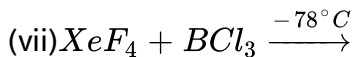
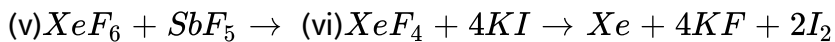
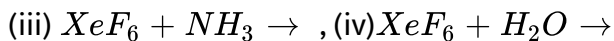
(iii) Why helium and neon do not form clathrate compounds with quinol ?



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8. Complete the following reactions :





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9. How does XeO_3 reacts with aqueous alkali ?

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10. Write the oxidation product when XeO_3 oxidises I^- in acidic medium.

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11. XeF_6 is not stored in glass or quartz vessels. Why ?

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12. Write down the hydrolysis of XeF_6 in strongly alkaline medium.

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13. Arrange the XeF_2 , XeF_4 , XeF_6 in decreasing order of Xe-F bond length, give reason also.

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Exercise 2 part-2

1. Which of the following is weakest oxidising agent ?



Answer: D



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2. Fluorine reacts with water to give :

A. oxygen and hydrogen fluoride

B. HOF and O_3

C. hydrogen fluoride and HOF

D. No reaction

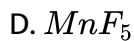
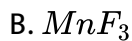
Answer: A



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3. F_2 is formed by reacting K_2MnF_6 with

A. SbF_5



Answer: A

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4. Which of the following is not oxidised by MnO_2 ?



Answer: A

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5. Chlorine acts as a bleaching agent only in the presence of

- A. dry air
- B. moisture
- C. sunlight
- D. pure oxygen

Answer: B

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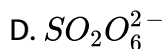
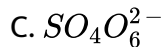
6. Chlorine gas is dried over :

- A. CaO
- B. NaOH
- C. H_2SO_4
- D. $NH_3(l)$

Answer: C

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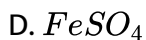
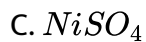
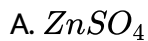
7. When thiosulphate ion is oxidised by iodine. which one of the following ion is produced ?



Answer: C

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8. Iodine is liberated from KI solution when treated with :



Answer: B

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9. Concentrated HNO_3 reacts with I_2 to give :



Answer: C

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10. Bleaching powder is obtained by the interaction of Cl_2 and

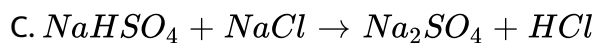
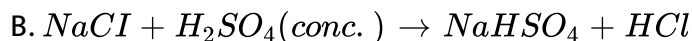
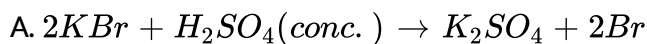
- A. dilute solution of $Ca(OH)_2$
- B. concentrated solution of $Ca(OH)_2$
- C. dry calcium oxide
- D. dry slaked lime

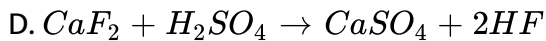
Answer: D



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11. Which amongst the following reactions cannot be used for the respective preparation?





Answer: A

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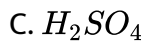
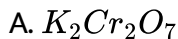
12. In the preparation of HBr or HI , NaX ($X = Br, I$) is treated with H_3PO_4 and not by concentrated H_2SO_4 since,

- A. H_2SO_4 makes the reaction reversible
- B. H_2SO_4 oxidises HX to X_2 (Br_2, I_2)
- C. Na_2SO_4 is water soluble and Na_3PO_4 is water insoluble
- D. Na_3PO_4 is water insoluble and Na_2SO_4 is water soluble

Answer: B

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13. HBr and HI can reduce sulphuric acid, HCl can reduced $KMnO_4$ and HF can reduce.....



D. none

Answer: D



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14. Select correct statement :

A. Cl_2O and ClO_2 are used as bleaching agents and as germicides.

B. I_2O_5 is used in the quantitative estimation of CO.

C. Cl_2O explodes in presence of ammonia forming NH_4Cl and liberating N_2 gas.

D. all are correct.

Answer: D

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15. Select incorrect statement :

A. ClO_2 and Cl_2O are used as bleaching agents for paper pulp and textiles.

B. OCl^- (hypochalites) salts are used as detergent.

C. OCl^- disproportionates in alkaline medium.

D. BrO_3^- is oxidised to Br_2 by Br^- in acidic medium.

Answer: B

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16. The strongest acid amongst the following is :

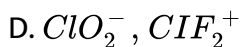
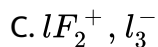
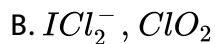
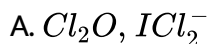


Answer: A



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17. The isoelectronic pair is

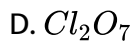
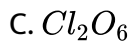
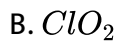
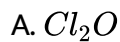


Answer: D



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18. Which one is the anhydride of HClO_4 ?



Answer: D



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19. The reaction $3\text{ClO}^- (\text{aq}) \rightarrow \text{ClO}_3^- (\text{aq}) + 2\text{Cl}^- (\text{aq})$ an example of :

A. oxidation reaction

B. reduction oxidation

C. disproportionation

D. decomposition reaction

Answer: C

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20. Which of the following product is formed when sulphur dioxide gas is passed through sodium chlorate in strongly acidic solution?

A. $NaClO_4$

B. ClO_2

C. Na_2SO_3

D. SO_3

Answer: B

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21. Consider following properties of the noble gases.

I. They readily form compounds which are colourless.

II: They generally do not form ionic compounds.

III: Xenon has variable oxidation states in its compounds

IV : the smaller He and Ne do not form clathrate compounds.

Select correct properties.

A. I,II,III

B. III,III,IV

C. I,III,IV

D. All

Answer: B



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22. Which one of the following configurations represents a noble gas?

A. $1s^2 2s^2 p^6, 3s^2$

B. $1s^2 2s^2 p^6, 3s^1$

C. $1s^2 2s^2 p^6$

D. $1s^2 2s^2 p^6, 3s^2 p^6, 4s^2$

Answer: C



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23. In Kroll and *Icl* process of the production of titanium, the inert gas used is:

A. Ne

B. Ar

C. Kr

D. Xe

Answer: B

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24. Among the following molecules, (i) XeO_3 (ii) $XeOF_4$ (iii) XeF_6 those having same number of lone pairs on Xe are:

- A. (i) and (ii) only
- B. (i) and (iii) only
- C. (ii) and (iii) only
- D. (i),(ii) and (iii)

Answer: D

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25. XeF_6 on complete hydrolysis gives

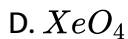
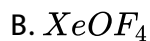
- A. Xe
- B. XeO_2



Answer: C

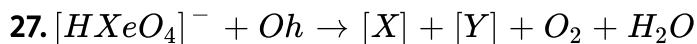
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26. The product of the reaction between one mole of XeO_3 and two mole of XeF_6 is :

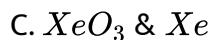
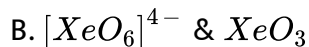
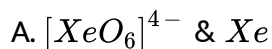


Answer: B

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The products $[X]$ and $[Y]$ in unbalanced reaction are:



Answer: A



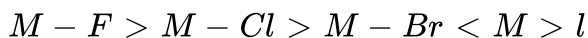
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28. Which is / are true statement(s) ?



B. HI is strongest acid of HF, HCl, HBr and HI

C. The ionic character of M-X bond decreases in the order



D. Among F, Cl, Br and I, F has the highest enthalpy of hydration.

Answer: BC



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29. Electrolysis of aqueous solution of Brine (NaCl) gives

A. Cl_2

B. H_2

C. $NaOH$

D. None

Answer: ABC



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30. which one of the following salts will evolve halogen on treatment with conc. H_2SO_4 ?

A. NaCl

B. KI

C. NaBr

D. none of these

Answer: BC



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31. Iodine reacts with hypo to give

A. NaI

B. Na_2SO_3

C. $Na_2S_4O_6$

D. Na_2SO_4

Answer: AC



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32. Cl_2 reacts with hot aqueous NaOH to give

A. NaCl

B. $NaClO_3$

C. $NaClO_2$

D. $NaClO_4$

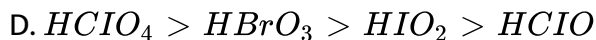
Answer: AB



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33. Select the correct order of acidity :

A. $HI > HBr > HCl > HF$



Answer: ABCD

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34. Which of the following product(s) is/are obtained when Cl_2O_6 reacts with KOH ?



Answer: CD

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35. Which of the following product is are obtained when Cl_2O reacts with NH_3 ?

A. NO_2

B. N_2

C. NCl_3

D. NH_4Cl

Answer: BD



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36. Select the incorrect order .

A. $He > Ar > Kr > Ne > Xe$ -(abundance in air).

B. $He < Ne < Ar < Kr < Xe$ -(boiling point).

C. $XeF_6 > XeF_4 > XeF_2$ -(melting point)

D. $XeF_6 < XeF_4 < XeF_2$ – (Xe-F bond length)

Answer: AC

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37. Which of the following inert gas(es) form(s) clathrate compound(s) with quinol ?

- A. Helium
- B. Xenon
- C. Krypton
- D. Neon

Answer: BC

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38. Which among the following statements is/are correct ?

- A. XeF_4 and SbF_5 combine to form salt.
- B. He and Ne do not form clathrate
- C. He diffuses through rubber and polyvinyl chloride
- D. He has lowest boiling point in its group.

Answer: ABCD



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39. Thermal decomposition product(s) of XeF_6 is/are :

- A. Xe
- B. XeF_2
- C. XeF_4
- D. F_2

Answer: BCD

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40. Which of the following statements(s) is/are true for XeF_6 ?

- A. Its partial hydrolysis gives $XeOF_4$
- B. Its reaction with silica gives $XeOF_4$
- C. It is prepared by the reaction of XeF_4 and O_2F_2
- D. Its reaction with XeO_3 gives $XeOF_4$.

Answer: ABCD

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41. Which of the following is/are properties of helium ?

- A. It is chemically inert.

- B. It has very high thermal conductivity
- C. It has extremely low boiling point
- D. It has very low viscosity

Answer: ABCD

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42. Select of correct statement(s) regarding the fluorides of xenon.

- A. All three fluorides are decomposed by water, XeF_2 slowly and XeF_4 and XeF_6 rapidly.
- B. All three fluorides are powerful oxidising agents
- C. XeF_4 and XeF_6 can act as fluorides ion acceptors as well as fluoride ion donors.
- D. All three fluorides are volatile, readily subliming at room temperature ($298K$).

Answer: ABCD



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Exercise 2 part-3

1. A red liquid (A) when treated with sodium carbonate gives a mixture of two salts (B) and (C) in the solution in which (C) contains oxygen. The mixture then on acidification with sulphuric acid and distillation produces the red liquid (A) again.

Select the correct statement (or the liquid (A)).

- A. It acts as an oxidising agent
- B. It is sparingly soluble in water
- C. It converts the yellow-dye stuff fluorescein (I) into red colour compound
- D. All of these

Answer: D

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2. A red liquid (A) when treated with sodium carbonate gives a mixture of two salts (B) and (C) in the solution in which (C) contains oxygen. The mixture then on acidification with sulphuric acid and distillation produces the red liquid (A) again.

Which of the following statement is false for salt (B)?

- A. Its solution in water gives pale yellow precipitate with silver nitrate solution.
- B. Its solution in water gives white precipitate with lead nitrate solution
- C. Its acidified solution (with conc. H_2SO_4) liberates a coloured gas which produces orange red spots on starch paper
- D. None

Answer: D

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3. A red liquid (A) when treated with sodium carbonate gives a mixture of two salts (B) and (C) in the solution in which (C) contains oxygen. The mixture then on acidification with sulphuric acid and distillation produces the red liquid (A) again.

Which of the following statement is correct?

- A. Liquid (A) undergoes disproportionation reaction in aqueous solution of sodium carbonate
- B. The anion of compound (C) has sp^3 hybridisation and is trigonal pyramidal in shape
- C. (A) and (B) both
- D. none of these

Answer: C



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4. White crystalline solid (A) reacts with H_2 to form a highly associated liquid (B) and a monoatomic, colourless gas (C). The liquid (B) is used for etching glass. Compound (A) undergoes hydrolysis slowly to form (C), (B) and a diatomic gas (D) whose IE is almost similar to that of (C). (B) forms an addition compound with KF to form (E) which is electrolysed in the molten state to form a most reactive gas (F) which combines with (C) in 2:1 ratio of produce (A).

According to Molecular Orbital Theory, which of the following is correct about the molecule (D) ?

- A. Its bond order is 2.0
- B. it has two unpaired electrons in π -bonding M.O.
- C. both the above are correct
- D. none of these is correct

Answer: A

5. White crystalline solid (A) reacts with H_2 to form a highly associated liquid (B) and a monoatomic, colourless gas (C). The liquid (B) is used for etching glass. Compound (A) undergoes hydrolysis slowly to form (C), (B) and a diatomic gas (D) whose IE is almost similar to that of (C). (B) forms an addition compound with KF to form (E) which is electrolysed in the molten state to form a most reactive gas (F) which combines with (C) in 2:1 ratio of produce (A).

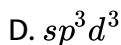
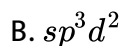
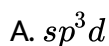
Which of the following is correct for the white crystalline solid (A) ?

- A. It oxidises F^- to F_2
- B. It on hydrolysis with alkali under goes disproportionation.
- C. It is obtained by the reaction of (C) with O_2F_2 at $118^\circ C$.
- D. None of these

Answer: C

6. White crystalline solid (A) reacts with H_2 to form a highly associated liquid (B) and a monoatomic, colourless gas (C). The liquid (B) is used for etching glass. Compound (A) undergoes hydrolysis slowly to form (C), (B) and a diatomic gas (D) whose IE is almost similar to that of (C). (B) forms an addition compound with KF to form (E) which is electrolysed in the molten state to form a most reactive gas (F) which combines with (C) in 2:1 ratio of produce (A).

The compound 'A' reacts with sulphur to form a compound in which hybridisation state of sulphur atom is :



Answer: B



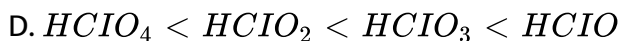
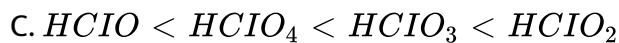
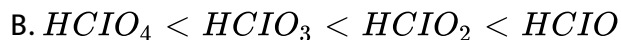
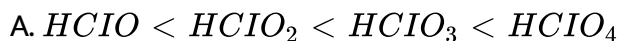
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Exercise 3 part-1

1. Give an example of oxidation of halide by another halogen. Explain the feasibility of the reaction.

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2. The set with correct order of acidity is :



Answer: A

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3. The reaction $3ClO^{-}(aq) \rightarrow ClO_3^{-}(aq) + 2Cl^{-}(aq)$ an example of :

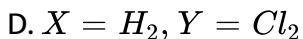
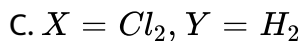
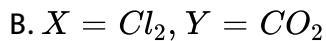
- A. oxidation reaction
- B. reduction reaction
- C. disproportionation reaction
- D. decomposition reaction

Answer: C

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4. A greenish yellow gas 'X' is passed through water to form a saturated solution. The aqueous solution on treatment with silver nitrate solution gives a white precipitate. The saturated aqueous solution also dissolves magnesium ribbon with the evolution of a colourless gas 'Y'. Identify gases 'X' and 'Y'.

A. $X = CO_2, Y = Cl_2$



Answer: C



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5. The noble gases have closed-shell electronic configuration and are monoatomic gases under normal conditions. The low boiling points of the lighter noble gases are due to weak dispersion forces between the atoms and the absence of other Interatomic Interactions.

The direct reaction of xenon with fluorine leads to a series of compounds with oxidation numbers +2,+4 and +6. XeF_4 reacts violently with water to give XeO_3 The compound of xenon exhibit rich stereochemistry and their geometries can be deduced considering the total number of electron pairs in the valence shell.

Argon is used In arc welding because of its:

- A. low reactivity with metal
- B. ability to lower the melting point of metal
- C. flammability
- D. high calorific value

Answer: A

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6. The noble gases have closed-shell electronic configuration and are monoatomic gases under normal conditions. The low boiling points of the lighter noble gases are due to weak dispersion forces between the atoms and the absence of other Interatomic Interactions.

The direct reaction of xenon with fluorine leads to a series of compounds with oxidation numbers +2,+4 and +6. XeF_4 reacts violently with water to give XeO_3 The compound of xenon exhibit rich stereochemistry and their geometries can be deduced considering the total number of

electron pairs in the valence shell.

Argon is used in arc welding because of its:

- A. linear
- B. planar
- C. pyramidal
- D. T-shaped

Answer: C

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7. The noble gases have closed-shell electronic configuration and are monoatomic gases under normal conditions. The low boiling points of the lighter noble gases are due to weak dispersion forces between the atoms and the absence of other interatomic interactions.

The direct reaction of xenon with fluorine leads to a series of compounds with oxidation numbers +2, +4 and +6. XeF_4 reacts violently with water to give XeO_3 . The compound of xenon exhibits rich stereochemistry and

their geometries can be deduced considering the total number of electron pairs in the valence shell.

XeF_4 and XeF_6 are expected to be:

- A. oxidizing
- B. reducing
- C. unreactive
- D. strongly basic

Answer: A



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8. The reactions of Cl_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two different oxoacids of chlorine, P and Q, respectively. The Cl_2 gas reacts with SO_2 gas, in presence of charcoal, to give a product R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus. P and Q, respectively, are the sodium salts of

A. hypochlorous and chloric acids

B. hypochlorous and chlorous acids

C. chloric and perchloric acids

D. chloric and hypochlorous acids

Answer: A

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9. The reactions of Cl_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two different oxoacids of chlorine, P and Q, respectively. The Cl_2 gas reacts with SO_2 gas, in presence of charcoal, to give a product R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus.

R, S and T, respectively, are

A. SO_2Cl_2 , PCl_5 and H_3PO_4

B. SO_2Cl_2 , PCl_3 and H_3PO_3

C. $SOCl_2$, PCl_3 and H_3PO_2

D. $SOCl_2$, PCl_5 and H_3PO_4

Answer: A



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Exercise 3 part-2

1. In case of nitrogen, NCl_3 is possible but not NCl_5 while in case of phosphorous, PCl_5 are possible. It is due to

A. availability of vacant d - orbital in P but not in N .

B. LOWER electronegative of P then N.

C. lower tendency of H bond formation in P than N.

D. occurrence of P in solid while N in gaseous state at room temperature .

Answer: 1



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2. Concentrated hydrochloric acid when kept in open air sometimes produces a cloud of white fumes. The explanation for it is that :

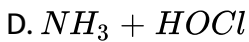
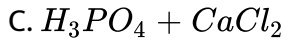
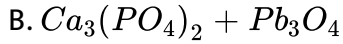
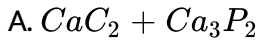
- A. strong affinity of HCl gas for moisture in air results in forming of droplets of liquid solution which appears like a cloudy smoke.
- B. strong affinity for water, con.HCl pulls moisture of air towards self.The moisture forms droplets of water and hence the cloud.
- C. conc. HCl emits strongly smelling HCl gas all the time
- D. oxygen in air reacts with emitted HCl gas to form a cloud of chlorine gas

Answer: 4



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3. The substance used in holmes singnals of the ship is a mixture of :

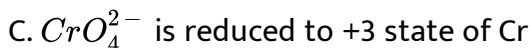
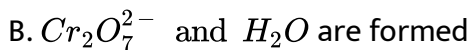
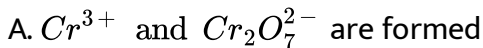


Answer: 1



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4. What happen when a solution of potassium chromate is treated with an excess of dil. Nitic acid?



Answer: 2

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5. Which one of the following statements regarding helium is incorrect?

- A. It is used to produce and sustain powerful superconducting magnets
- B. It is used as a cryogenic agent for carrying out experiments at low temperatures
- C. It is used to fill gas balloons instead of hydrogen because it is lighter and non-inflammable
- D. It is used in gas-cooled nuclear reactors

Answer: 3

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6. Which among the following factors is the most important in making fluorine the strongest oxidizing halogen ?

- A. Hydration enthalpy
- B. Ionization enthalpy
- C. Electron affinity
- D. Bond dissociation energy

Answer: 4



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7. The correct order of thermal stability of hydrogen halides (H-X) is :

- A. $HI > HBr > HCl > HF$
- B. $HF > HCl > HBr > HI$
- C. $HCl < HF < HBr < HI$
- D. $HI > HCl < HF < HBr$

Answer: 2

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8. Which of the following statements is true ?

- A. H_3PO_3 is a stronger acid than H_2SO_3
- B. In aqueous medium HF is a stronger acid than HCl
- C. $HClO_4$ is a weaker acid than $HClO_3$
- D. HNO_3 is a stronger acid than HNO_2

Answer: 4

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9. What products are expected from the desproprtionation reactin of hypochorous acid ?

A. $HClO_3$ and Cl_2O

B. $HClO_2$ and $HClO_4$

C. HCl and Cl_2O

D. HCl and $HClO_3$

Answer: 4

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10. Identify the incorrect statement among the following :

A. Cl_2 reacts with excess of NH_3 to give N_2 and HCl

B. Br_2 reacts with hot and strong NaOH solution to give NaBr,

$NaBrO_4$, and H_2O

C. Ozone reacts with SO_2 to given SO_3

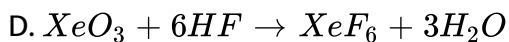
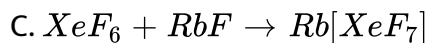
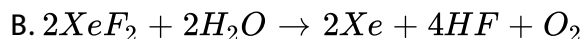
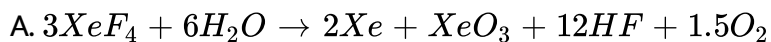
D. Silicon reacts with $NaOH_{(aq)}$ in the presence of air to give

Na_2SiO_3 and H_2O

Answer: 2

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11. Which one of the following reaction of xenon compounds is not Feasible?



Answer: 4

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1. Why interhalogens are more reactive than halogens ?

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2. ClF_3 exists but Cl_3 does not. Why ?

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3. Give reasons : (i) Xenon does not form fluorides such as XeF_3 and XeF_5 . (ii) Out of noble gases, only xenon is known to form established chemical compounds.

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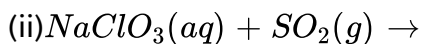
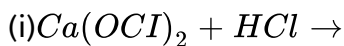
4. Bleaching of flowers by chlorine is permanent, while that by sulphur dioxide is temporary. Explain.

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5. What prompted Bartlett to the discovery of noble gases compounds ?

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6. Complete the following reactions equations :



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7. Noble gases are mostly inert. Assign reasons.

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8. Bond dissociation enthalpy of F-F bond is less than that of Cl-Cl bond.

Explain.

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9. What happens when Cl_2 is passed through a hot concentrated solution of a base like $Ba(OH)_2$?



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10. How would you account for the following ?

(i) The lower oxidation state becomes more stable with increasing atomic number in Group 13.

(ii) Hydrogen fluoride is much less volatile than hydrogen chloride.

(iii) Interhalogen compounds are strong oxidising agents.



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11. Write chemical equations for the following processes :

(i) Chlorine reacts with a hot concentrated solution of sodium hydroxide

(ii) Orthophosphorous acid is heated

(iii) PtF_6 and xenon are mixed together

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12. The negative value of electron gain enthalpy is less for fluorine than for chlorine. Why?

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13. Draw the structural formulae of molecules of following compounds :

(i) BrF_3 and (ii) XeF_4

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14. F_2 is a stronger oxidising agent than Cl_2

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15. The majority of noble gas compounds are those of xenon. Explain.

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16. No chemical compound of helium is known.

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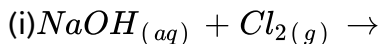
17. XeF_2 has linear structure and not a bent structure, Given reason .

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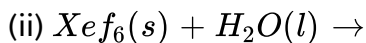
18. Why fluorine never acts as the central atom in polyatomic interhalogen compounds?

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19. (a) (i) Complete the following chemical equations :



(Hot and conc.)



(b) How would you account for the following ?

(i) The value of electron gain enthalpy with negative sign for sulphur is higher than that for oxygen.

(ii) NF_3 is an exothermic compound but NCl_3 is endothermic compound.

(iii) ClF_3 molecule has a T-shaped structure and not a trigonal planar one.

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20. Why fluorine does not exhibit any positive oxidation state?

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21. Explain the following :

(a) The electron gain enthalpy with negative sign for fluorine is less than for chlorine, still fluorine is a stronger oxidising agent than chlorine.

(b) XeF_2 is linear molecule without a bend.

(c) NCl_3 is an endothermic compound while NF_3 is an exothermic one.

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22. Draw the structure of XeF_2 molecule.

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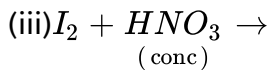
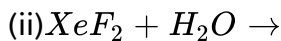
23. (a) Account for the following :

(i) The acidic strength decreases in the order $HCl > H_2S > PH_3$

(ii) Tendency to form pentahalides decreases down the group in group 15 of the periodic table.

(b) Complete the following chemical equations. :

(i) $P_4 + SO_2Cl_2 \rightarrow$



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24. (a) what happens when

(i) Chlorine gas is passed through a hot concentrated solution of NaOH?

(ii) sulphur dioxide gas is passed through an aqueous solution of Fe (III)

salt?

(b) Answer the following :

(i) what is the basicity of H_3PO_3 and why?.

(ii) why does fluorine not play the role of a central atom in interhalogen

compounds ?

(iii) Why do noble gases have very low boiling points ?



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25. Explain the following giving an appropriate reason in each case.

(i) O_2 and F_2 both stabilize higher oxidation states of metals but O_2 exceeds F_2 in doing so.

(ii) Structure of Xenon fluorides cannot be explained by Valence Bond approach.

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26. (a) Complete the following chemical equations :

(i) $NaOH + Cl_2 \rightarrow$ (hot and cone.)

(ii) $XeF_4 + O_2F_2 \rightarrow$

(b) Draw the structure of the following molecules :

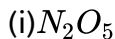
(i) H_3PO_2

(ii) $H_2SO_2O_7$

(ii) $XeOF_4$

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27. (a) Draw the molecule structure of the following compounds :



(b) Despite lower value of its electron gain enthalpy with negative sign, fluorine (F_2) is a stronger oxidising agent than Cl_2 .



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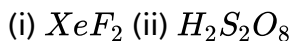
28. (a) Account for the following :

(i) Helium is used in diving apparatus.

(ii) Fluorine does not exhibit positive oxidation state.

(iii) Oxygen shows catenation behaviour less than sulphur.

(b) Draw the structures of the following molecules.



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1. The manufacture of fluorine is done by

- A. heating anhydrous HF and MnO_2
- B. electrolysis of aqueous HF
- C. electrolysis of anhydrous HF mixed with KHF_2
- D. heating a mixture of KF, MnO_2 and conc. H_2SO_4

Answer: C



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2. Which halogen oxidises water to liberate oxygen exothermally ?

- A. fluorine
- B. chlorine
- C. bromine
- D. iodine

Answer: A



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3. Fluorine is obtained by the interaction of K_2MnF_6 with Lewis acid SbF_5 because of the :

- A. Acidolysis of MnF_4
- B. Decomposition of MnF_4
- C. Ionization of MnF_4
- D. Decomposition of SbF_6

Answer: B



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4. Which of the following statements is true ?

- A. Cl_2 can not dried over H_2SO_4
- B. Available chlorine is obtained from caustic soda by treating with HCl
- C. Conc. HCl +conc. HNO_3 is Marshall's acid
- D. All neutral interhalogen molecules are diamagnetic in nature.

Answer: D

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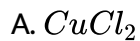
5. An easy way of obtaining Cl_2 gas in the laboratory is :

- A. by heating NaCl and concentrated H_2SO_4
- B. by heating NaCl and concentrated MnO_2
- C. by mixing HCl and $KMnO_4$
- D. by passing F_2 through NaCl solution.

Answer: C

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6. The catalyst used in Decons process is :



Answer: A



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7. When chlorine reacts with turpentine oil, the product formed is

A. carbon

B. carbon and HCl

C. turpentine chloride

D. none of these

Answer: B



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8. Which electrolyte is used in Dennis method for the preparation of fluorine ?

A. KHF_2 in anhydrous HF

B. molten cryolite

C. pure dry molten KHF_2

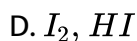
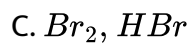
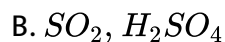
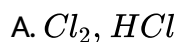
D. none of these

Answer: A



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9. A dark violet solid X reacts with NH_3 to form a mild explosive which decomposes to give a violet coloured gas .X also reacts with H_2 to give an acid Y. Y can also be prepared by heating its salt with H_3PO_4 . X and Y are :

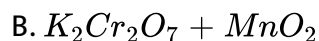


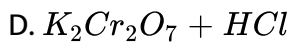
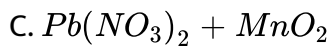
Answer: D



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10. Chlorine is liberated, when we heat

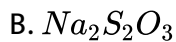
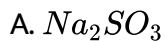




Answer: D

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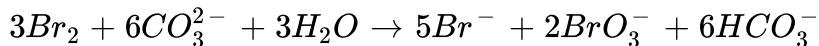
11. Which of the following does not decolouries iodine ?



Answer: C

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12. In the reaction



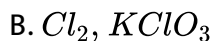
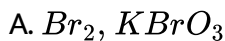
- A. bromine is oxidised and carbonate is reduced
- B. bromine is both oxidised and reduced
- C. bromine is reduced and water is oxidised
- D. bromine is neither oxidised nor reduced

Answer: B



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13. A greenish yellow gas reacts with an alkali metal hydroxide to form a halate which can be used in fireworks and safety matches. The gas and the halate are



C. I_2 , $NaIO_3$

D. none

Answer: B

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14. The reaction of $KMnO_4$ and HCl results in:

A. Oxidation of Mn in $KMnO_4$ and production of Cl_2

B. Reduction of Mn in $KMnO_4$ and production of H_2

C. Oxidation of Mn in $KMnO_4$ and production of H_2

D. Reduction of Mn in $KMnO_4$ and production of Cl_2

Answer: D

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15. Which one of the following halogen liberates oxygen, when passed through hot concentrated KOH solution ?

A. I_2

B. Cl_2

C. Br_2

D. F_2

Answer: D



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16. H_2SO_4 cannot be used for obtaining HBr from KBr because :

A. HBr oxidises H_2SO_4

B. HBr reduces H_2SO_4

C. HBr undergoes disproportionation.

D. KBr reacts very slowly.

Answer: B

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17. Which of the following gases can be dried by conc. H_2SO_4 ?

- A. HCl
- B. HBr
- C. HI
- D. H_2S

Answer: A

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18. ClO_2 reacts with water and alkali to give:

- A. sodium chlorate

- B. sodium chlorite
- C. sodium chlorate and sodium chlorite
- D. none of the above

Answer: C

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19. Which of the following is not the characteristic of interhalogen compounds?

- A. They are more reactive than halogens.
- B. They are quite unstable but none of them is explosive
- C. They are covalent in nature
- D. They have low boiling point and are highly volatile.

Answer: D

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20. When chlorine is bubbled through aqueous solution of potassium iodide, iodine gas is liberated because

- A. chlorine is more electropositive
- B. chlorine has higher electron affinity
- C. chlorine is more powerful oxidising agent than iodine.
- D. none of the above

Answer: C



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21. In the clathrates of xenon with water , the nature of bonding between xenon and water molecule is _____.

- A. covalent
- B. hydrogen bonding

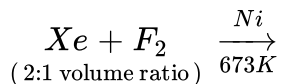
C. co-ordinate

D. dipole-induced dipole interaction

Answer: D

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22. Which compound is prepared by the following reaction ?



A. XeF_4

B. XeF_2

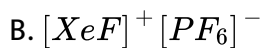
C. XeF_6

D. None of these

Answer: B

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23. XeF_2 reacts with PF_5 to give :



Answer: B



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24. Among noble gases (from He to Xe) only xenon reacts with fluorine to form stable fluorides because xenon :

A. has the largest size

B. has the lowest ionization enthalpy

C. has the highest heat of vaporization

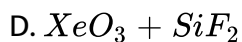
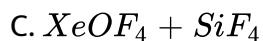
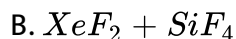
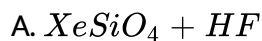
D. is the most readily available noble gas

Answer: B



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25. What are the products formed in the reaction of xenon hexafluoride with silicon dioxide?



Answer: C



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26. Which of the following pair will give chlorine gas most quickly, upon reaction ?

A. HCl and $KMnO_4$

B. $NaCl$ and H_3PO_4

C. $NaCl$ and MnO_2

D. $CaCl_2$ and Br_2

Answer: A

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27. Iodine is liberated from sodium iodate by reacting with :

A. dilute H_2SO_4

B. $KMnO_4$

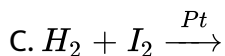
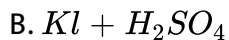
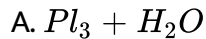
C. $NaHSO_4$

D. concentrated H_2SO_4 & NaI

Answer: CD

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28. HI can be prepared by all the following methods except :



Answer: B



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29. Select correct statement(s)

A. ClO_2 and Cl_2O are used as bleaching agents for paper pulp and textiles

B. OCl^- disproportionates in alkaline medium

C. BrO_3^- liberates Br_2 with iodine in acidic medium

D. $HClO_2$ liberates iodine from KI

Answer: ABCD

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30. What products are expected from the disproportionation reaction of hypochlorous acid ?

A. $HClO_3$

B. $HClO_2$

C. HCl

D. $HClO_4$

Answer: AC

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31. Select the correct order(s).

A. $\text{HOCl} > \text{HOBr} > \text{HOI}$ -Acid strength

B. $\text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2 \leq \text{HClO}$ -oxidising power

C. $\text{ClO}_4^- < \text{BrO}_4^- < \text{IO}_4^-$ -oxidising power

D. $\text{IO}^- > \text{BrO}^- > \text{ClO}^-$ -ease of disproportionation.

Answer: ABD



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32. A solution of KI_3 in water contains :

A. K^{3+} ions

B. I^- ions

C. K^+ ions

D. I_3^- ions

Answer: CD

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33. Which of the following statement(s) is/are incorrect for noble gases ?

- A. Argon is used in higher temperature metallurgical process because of their inert nature.
- B. Krypton and xenon form clathrate compounds with quinol having chemical formula not exact but approximately 3 quinol molecules : 1 gas molecule.
- C. All the noble gases are monoatomic.
- D. Noble gases are completely soluble in water.

Answer: D

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34. Statement-1 : Hypochlorous acid (HClO) acts as a powerful oxidising and bleaching agent

Statement-2 : Sodium hypochlorite in solution undergoes disproportionation reaction.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B

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35. Statement-1 : All interhalogens are paramagnetic

Statement-2 : AB type of interhalogen undergoes hydrolysis giving a

halide ion derived from the smaller halogen and a hypohalite ion derived from the larger halogen.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

Answer: D



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36. Statement-1 : $HClO_4$ is a more stronger acid than $HClO_3$

Statement-2 : Oxidation state of Cl in $HClO_4$ is +7 and in $HClO_3$ is +5

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B

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37. Statement-1 : Fluorine is obtained by the interaction of K_2MnF_6 with lewis acid SbF_5

Statement-2 : Stronger lewis acid SbF_5 displaces weaker acid MnF_4 from K_2MnF_6 and MnF_4 being unstable decomposes to give MnF_3 and F_2

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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38. Statement-1 : Fluorine with sodium hydroxide solution does not undergo disproportionation reaction.

Statement-2 : Fluorine has the highest SRP value, therefore, it is completely reduced only.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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39. Statement-1 : Xenon hexafluoride is kept in silica-lined vessel.

Statement-2 : Xenon hexafluoride is not kept in silica-lined vessel.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: D

40. Statement-1 : Argon is used in the laboratory for handling substances that are air-sensitive.

Statement-2 : Argon is inert towards chemical reactivity due to the completely filled valence shell electronic configuration, high ionization enthalpy and more positive electron gain enthalpy.

- A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.
- B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

Answer: A

41. All the noble gases are colourless and tasteless monoatomic gases. In general, noble gases are least reactive and their inertness to chemical reactivity is attributed to the following reasons. Reactive and their inertness to chemical reactivity is attributed to the following reasons.

(i) Except helium, all have completely filled ns^2np^6 electronic configuration in their valence shells.

(ii) All have high ionisation enthalpy and more positive electron gain enthalpy.

However, a number of xenon compounds mainly with most electronegative elements like fluorine and oxygen have been synthesized under different conditions and fluorides of xenon have been used as an oxidising agent and a fluorinating agent in many of the chemical reactions

Noble gases have very low melting and boiling points because.

- A. they have high ionisation enthalpy
- B. they have more positive electron gain enthalpy
- C. the type of interatomic interaction is weak metallic bonds.

D. the type of interaction is weak dispersion forces.

Answer: D

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42. All the noble gases are colourless and tasteless monoatomic gases. In general, noble gases are least reactive and their inertness to chemical reactivity is attributed to the following reasons. Reactive and their inertness to chemical reactivity is attributed to the following reasons.

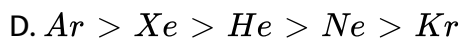
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However, a number of xenon compounds mainly with most electronegative elements like fluorine and oxygen have been synthesized under different conditions and fluorides of xenon have been used as an oxidising agent and a fluorinating agent in many of the chemical

reactions

The correct order of the abundance of various noble gases in air is :



Answer: B



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43. All the noble gases are colourless and tasteless monoatomic gases. In general, noble gases are least reactive and their inertness to chemical reactivity is attributed to the following reasons. Reactive and their inertness to chemical reactivity is attributed to the following reasons.

(i) Except helium, all have completely filled ns^2np^6 electronic configuration in their valence shells.

(ii) All have high ionisation enthalpy and more positive electron gain

enthalpy.

However, a number of xenon compounds mainly with most electronegative elements like fluorine and oxygen have been synthesized under different conditions and fluorides of xenon have been used as an oxidising agent and a fluorinating agent in many of the chemical reactions

Select the correct statement.

- A. Neon does not form clathrate compound with para-quinol
- B. Noble gases are sparingly soluble in water
- C. Helium is a non-inflammable and light gas, therefore, it is used in filling balloons for meteorological observations.
- D. All of these

Answer: D



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44. All the noble gases are colourless and tasteless monoatomic gases. In general, noble gases are least reactive and their inertness to chemical reactivity is attributed to the following reasons. Reactive and their inertness to chemical reactivity is attributed to the following reasons.

(i) Except helium, all have completely filled ns^2np^6 electronic configuration in their valence shells.

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However, a number of xenon compounds mainly with most electronegative elements like fluorine and oxygen have been synthesized under different conditions and fluorides of xenon have been used as an oxidising agent and a fluorinating agent in many of the chemical reactions

Identify the correct statement with respect to XeF_2

A. It is a colourless crystalline compound which sublimes at 298 K

B. BrO_3^- being good oxidising agent cannot be oxidised by XeF_2 to



C. It undergoes hydrolysis more rapidly with alkali in comparison to water.

D. XeF_2 can be prepared by heating Xenon with O_2F_2 at $118^\circ C$

Answer: B

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PART -II

1. Write the two important minerals of fluorine.

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2. Name four oxyacids of chlorine. Give their molecular formulae.

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3. Name the oxide of chlorine which has odd number of electrons and paramagnetic in nature.

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4. What is the colour of vapours obtained when an iodide is heated with conc. H_2SO_4 ?

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5. Freshly distilled colourless HI (aqueous solution) gradually turns brown with time.

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6. A certain compound (X) shows the following reactions.

(i) When KI is added to an aqueous suspension of (X) containing dilute HCl, iodine is liberated.

(ii) When the paste of (X) in water is heated with acetone, a product of anesthetic use is obtained.

(iii) When CO_2 is passed through an aqueous suspension of (X) the turbidity transforms to a precipitate.

Identify (X) and write down chemical equations for the step (i),(ii) & (iii)

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7. Write is quantum mechanical liquid i.e. helium (II) ? Give its two important characteristics.

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8. Write down the formula of the noble gas species which are isostructural with (a) ICl_4^- , (b) IBr_2^- , (c) BrO_3^-

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9. Distillation of HBr and $HBrO_3$ yields bromine gas.

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10. Pl_3 on hydrolysis yields H_3PO_3 and HI

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11. $IO_3^- + 6OH^- + Cl_2 \rightarrow IO_6^{5-}$ (periodate) + $3H_2O + 2Cl^-$

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12. HBr is a stronger acid than HI because of hydrogen bonding.

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13. Bleaching powder does not show oxidising properties.



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14. Noble gases are paramagnetic in nature.



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15. Neon lights are visible even in fog and moist.



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16. The high activity of fluorine is due to its Dissociation energy



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17. The atomicity of all halogens is



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18. Among halogen acids (hydrogen halides) Is the strongest reducing agent

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19. $K_2Cr_2O_7 + HCl \rightarrow KCl + CrCl_3 + \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$

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20. Iodine reacts with hot concentrated NaOH solution. The products are NaI and _____

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21. $H_2SO_4 + HI \rightarrow \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$

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23. Cesium fluoride reacts with XeF_6 to form _____

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24. XeO_3 in strong alkaline medium _____

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