CHEMISTRY

BOOKS - KALYANI CHEMISTRY (ENGLISH)

P-BLOCK ELEMENTS

Intext Questions

1. Among the hydrides of group 15, which is (i) most basic (ii) most stable (iii) most volatile (iv) strogest reducing agent ?

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2. Which oxide of nitrogen is neutral ?

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3. Which hydride of nitrogen is not basic ?

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4. Which oxide of nitrogen is called laughing gas ?

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5. Why a mixture of NH_4Cl and $NaNO_2$ is heated instead of NH_4NO_2 for the preparation of nitrogen gas

?

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6. Why concentrated HNO_3 acquires a yellow colour on standing in sunlight ?

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7. Give reasons for the following :

(i) Nitric oxide become brown on exposure to air

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8. Give reasons for the following

(i) Ammonia is used for cleaning window panes.

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9. Give reasons for the following :

NO_2 is considered a mixed anhydride.

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10. Name the most abundant element of group 16.

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11. Which element of group 16 shows magnetic behaviour?

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12. Which element of group 16 has maximum tendency for catenation ?

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13. Which element of group 16 exists as a diatomic gas?

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14. Which element of group 16 forms maximum number of oxoacids?

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15. Among the hydrides of the members of oxygen family, which has (1) Lowest boiling point (ü) Highest reducing character (ii) Highest thermal stability (iv) Weakest acidic character?

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16. What will be the effect of increasing temperature of sea water on aquatic life?

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17. Can aquatic animals live in distilled water?

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18. Give one example each of (i) an acidic oxide (ii) a basic oxide (iii) an amphoteric oxide.

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19. Which isotope of oxygen is used as a tracer in the study of reaction mechanism ?

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20. What is sulfuric anhydride?

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21. Why is

H_2SO_4 not a drying agent for H_2S ?

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22. For dilution of H_2SO_4, why water should not be added to concentrated H_2SO_4 ?

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23. Why the wooden shelf under the reagent bottle containing concentrated H_2SO_4 blackens after some time?

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24. Why sugar turns black when added to conc. H_2SO_4 ?

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25. Which oxide of sulfur can act as an oxidising as well as a reducing agent ?

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26. Which allotrope of sulfur exists in the form of zig-zag chains of sulfur atoms?

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27. The element that does not show positive oxidation state is

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28. Which of the halogens has highest value of bond dissociation energy?

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29. Which among the halogens is the strongest oxidising agent?

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30. Which halogen has highest value of electron gain enthalpy?

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31. Which halogen has the tendency to form cations?

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32. Which among the HF, HCI, HBr and HI is the strongest acid ?

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33. Which halogen does not form the polyhalide ions?

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34. Which among the hydrides of group 17 elements is: (i) most volatile (ii) most stable (iii) strongest reducing agent?

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35. Which is the most abundant noble gas ?

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36. Name a noble gas which is radioactive

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37. Which noble gas is found in natural gas ?

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38. What is the shape of XeF_4 ?

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39. Who prepared the first noble gas compound?

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40. Which noble gas is found in Sun's atmosphere?

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41. Which noble gas gets-liquified with maximum difficulty?

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42. What is the formula of the first noble gas compound prepared by N.Bartlett?

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43. Which noble gas is not present in the atmosphere?

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44. Which element does not have any p-electron but it forms a part of the p-block of the periodic table?

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45. Which elements are generally used in the formation of compounds of xenon ?

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Exercise Part I Objective Questions Fill In The Blanks

1. The tendency to form chains of identical atoms is known as .....

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2. The basic character of hydrides of nitrogen family..... on moving down the group.

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3. Most basic hydride of group 15 elements is .....

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4. H_3PO_3 is a..... Basic acid.

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5. When ..... Is heatd with ..... Phosphine is obtained.

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6. What is the basicity of H_3PO_4?

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7. Phosphorus pentoxide reacts with nitric acid to form.

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8. The electronic configuration of group VIA or group 16 elements is.....

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9. In gruop VIA or group 16, Polonium is metallic while all other elements are .....

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10. The various oxidation states of sulfur are ..... While those of oxygen .....

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11. The molecular formula of oxygen at ordinary temperature is ..... And that of sulfur is .....

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12. Out of the elements in VIA (16) group ..... Exhibits the property of hyderogen bonding .

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13. Oxidation state of oxygen is + 1 in ..... And +2 in ,.....

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14. The hydride of sulfur is..... Volatile than that of oxygen .

Watch Video Solution

15. The various fluorides formed with sulfur are ....., and with tellurium are .....,and .....

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16. Hydrogen fluoride is a.....acid.

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17. Chlorine element has +7 oxidation state in.....and + 1 in.....

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18. Among the oxyacids of halogens, the one with high percentage of oxygen is.....

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19. The higher value of bond energy for chlorine molecule than that of fluorine is due to possibility of.....

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20. Sulfur forms.....with fluorine.

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21. The oxidation state of bromine in BrO_2 and $HBrO_3$ are ..... and ..... respectively.

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22. Which halogen has highest value of electron gain enthalpy?

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23. Compounds formed by the union of two different halogens are called.....

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24. Out of the halogen acids, HX, the one with the highest degree of ionization is.....

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25. (a) Draw the structures of the following :

(i) XeF_4

(ii) $H_2S_2O_7$

(iii) SO_3^{2-}

(b) Explain the following observations :

(i) Phosphorous has a greater tendency for catenation than nitrogen.

(ii) The negative value of electron gain enthalpy is less for fluorine than that for chlorine.

(iii) Hydrogen fluoride has a much higher boiling point than hydrogen chloride.

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26. Halogens have high electron gain enthalpies because the addition of an electron gives them the.....configuration

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27. The first noble gas compound was prepared by .....

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28. $XeOF_4$ has .... geometry

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29. Noble gas used in the treatment of cancer is .....

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30. Clathrates are formed by noble gases other than ..... and.....

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Exercise Part I Objective Questions The Correct Alternative From The Choices Given

1. What causes nitrogen to be chemically inert ?

1) Multiple bond formation

2) Absence of bond polarity

3) Short internuclear distance

4) High bond energy

A. Multiple bond formation

B. Absence of bond polarity

C. Short internuclear distance

D. High bond energy

Answer: A

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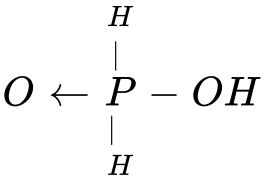
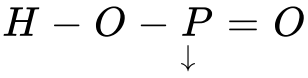
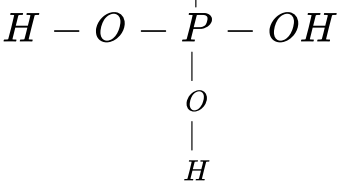
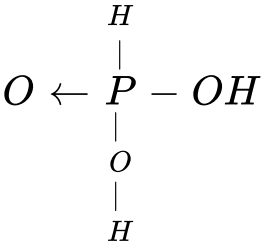
2. The structure of ortho-phosphoric acid is:

A. 

B. 

C. 

D. 

Answer: C

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3. An allotrope of phosphorus which is poisonous in character is :

1) red P

2) black P

3) yellow P

4) white P

A. red P

B. black P

C. yello P

D. violet P

Answer: C

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4. Phosphorus pentoxide is :

A. oxidising agent

B. reducing agent

C. bleaching agent

D. dehydrating agent

Answer: A

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5. Yellow phosphorus in the molecular state exists as :

A. P_4

B. P_5

C. P_9

D. P_{10}

Answer: A

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6. Set of elements known as chalcogens is :

1) O, S, Se,

2) Cl, Br, I

3) N, P, S

4) C, Si, Ge

A. O, S, Se,

B. Cl, Br, I

C. N, P, S

D. C, Si, Ge

Answer: A

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7. The electronic configuration of chalcogens is :

1) ns^2np^2

2) ns^2np^3

3) ns^2np^4

4) ns^2np^5

A. ns^2np^2

B. ns^2np^3

C. ns^2np^4

D. ns^2np^5

Answer: C

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8. Choose the most appropriate answer from the following options :

Identify the metallic oxide which is amphoteric in nature :

Calcium oxide

Barium oxide

Zinc oxide

Copper(II)oxide

A. $Na2O$

B. SO_2

C. B_2O_3

D. ZnO

Answer: D

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9. Increasing order of boiling points is:

1) $H_2O > H_2S > H_2Se > H_2Te$

2) $H_2O > H_2Te > H_2Se > H_2S$

3) $H_2O > H_2Se > H_2Te > H_2S$

4) $H_2O > H_2S > H_2Te > H_2Se$

A. $H_2O > H_2S > H_2Se > H_2Te$

B. $H_2O > H_2Te > H_2Se > H_2S$

C. $H_2O > H_2Se > H_2Te > H_2S$

D. $H_2O > H_2S > H_2Te > H_2Se$

Answer: B

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10. The compound which gives off oxygen on moderate heating is

A. cupric oxide

B. mercuric oxide

C. zinc oxide

D. aluminium oxide

Answer: B

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11. O_2 molecule is

A. paramagnetic

B. diamagnetic

C. ferromagnetic

D. none of these

Answer: A

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12. The element having maximum catenation property is

A. Se

B. S

C. Te

D. O

Answer: B

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13. Oxygen exhibits positive oxidation state in

A. CO

B. F_2O

C. NO

D. N_2O

Answer: B

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14. On addition of conc. H_2SO_4 to a chloride salt, colourless fumes are evolved but in case of iodide salt,

violet fumes come out. This is because

A. H_2SO_4 reduces HI to I_2

B. HI is of violet colour

C. HI gets oxidised to I_2

D. HI changes to HIO_3

Answer: C

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

excess of aqueous solution of ammonia to this solution gives

A. deep blue precipitate of $Cu(OH)_2$

B. deep blue solution of $\left[Cu(NH_3)_4\right]^{2+}$

C. deep blue solution of $Cu(NO_3)_2$

D. deep blue solution of $Cu(OH)_2.\ Cu(NO_3)_2$

Answer: B

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16. In a cyclotrimetaphosphoric acid molecule, how many P-Osingle and double bonds are present ?

A. 3 double bonds, 9 single bonds

B. 6 double bonds, 6 single bonds

C. 3 double bonds , 12 single bonds

D. Zero double bonds, 12 single bonds

Answer: A

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

A. Carbon

B. Nitrogen

C. Phosphorus

D. Boron

Answer: C

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

A. CO_3^{2-}, NO_3^-

B. ClO_3^-, CO_3^{2-}

C. SO_3^{2-}, NO_3^-

D. ClO_3^-, SO_3^{2-}

Answer: A

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19. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?

A. HF

B. HCI

C. HBO

D. HI

Answer: A

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20. Bond dissociation enthalpy of E-H (E = element) bonds is given below. Which of the compounds will act as strongest reducing agent?

Compound	NH_3	PH_3	AsH_3	SbH_3
Δ_{diss} $(E—H)$/kJ mol^{-1}	389	322	297	255

A. NH_3

B. PH_3

C. AsH_3

D. SbH_3

Answer: D

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

A. It is highly poisonous and has smell like rotten fish.

B. It's solution in water decomposes in the presence of light.

C. It is more basic than NH_3.

D. It is less basic thatn NH_3

Answer: C

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

A. H_3PO_2

B. H_3BO_3

C. H_3PO_4

D. H_3PO_3

Answer: C

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23. Strong reducing behaviour of H_3PO_2 is due to

A. Low oxidation state of phosphorus

B. Presence of two - OH groups and one P-H bond

C. Presence of one - OH group and two P-H bonds

D. High electron gain enthalpy of phosphorus.

Answer: C

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24. On heating, lead nitrate forms oxides of nitrogen and lead. The oxides formed are _____.

A. N_2O, PbO

B. NO_2, PbO

C. NO, PbO

D. NO, PbO_2

Answer: B

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

A. Nitrogen

B. Bismuth

C. Antimony

D. Arsenic

Answer: A

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26. Which of the following statements is wrong?

A. Single N-N bond is stronger than the single. P-P bond.

B. PH_3 can act as a ligand in the formation of coordination compound with transition elements.

C. NO_2 is paramagnetic in nature

D. Covalency of nitrogen in N_2O_5 is four.

Answer: A

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27. Maximum covalency of nitrogen is ____

A. 3

B. 5

C. 4

D. 6

Answer: C

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

A. $\left[Fe(H_2O)_5(NO)\right]^{2+}$

B. $FeSO_4.NO_2$

C. $\left[Fe(H_2O)_4(NO)_2\right]^{2+}$

D. $FeSO_4.HNO_3$

Answer: A

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29. Elements of group - 15 compounds in +5 oxidation state. However, bismuth forms only one well characterised

compound in +5 oxidation state. The compound is

A. Bi_2O_5

B. BiF_5

C. $BiCl_5$

D. Bi_2S_5

Answer: B

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

A. N_2 in both cases

B. N_2 with ammonium dichromate and NO with barium azide

C. N_2O with ammonium dichromate and Nwith barium azide

D. N_2O with ammonium dichromate and NO_2 with barium azide

Answer: A

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31. In the preparation of HNO_3, we get NO gas by catalytic oxidation of ammonia . The moles of No

produced by the oxidation of two moles of NH_3 will be ..... .

A. 2

B. 3

C. 4

D. 6

Answer: A

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32. The oxidation state of central atom in the anion of compound NaH_2PO_2 will be .....

A. $+3$

B. $+5$

C. $+1$

D. -3

Answer: C

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33. Which of the following is not tetrahedral in shape?

A. NH_4^+

B. $SiCl_4$

C. SF_4

D. SO_4^{2-}

Answer: C

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34. Which of the following are peroxoacids of sulphur ?

A. H_2SO_5 and $H_2S_2O_8$

B. H_2SO_5 and $H_2S_2O_7$

C. $H_2S_2O_7$ and $H_2S_2O_8$

D. $H_2S_2O_6$ and $H_2S_2O_7$

Answer: A

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35. Hot cone. H_2SO_4 acts as moderately strong oxidising agent. It oxidises both metals and non-metals. Which of the following elements is oxidised by cone. H_2SO_4 into two gaseous products?

A. Cu

B. S

C. C

D. Zn

Answer: C

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36. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with NH_3 an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from

A. $-3 \text{ to } +3$

B. $-3 \text{ to } 0$

C. $-3 \text{ to } +5$

D. $0 \text{ to } -3$

Answer: A

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37. In the preparation of compounds of Xe, Bartlett had taken $O_2^+ PtF_6^-$ as a base compound. This is because

A. both O_2 and Xe have same size

B. both O_2 and Xe have same electron gain enthalpy.

C. both O_2 and Xe have almost same ionization enthalpy.

D. both Xe and O_2 are gases.

Answer: C

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38. In solid state, PCI_5, is a

A. covalent solid

B. octahedral structure

C. ionic solid with $[PCl_6]^+$ octahedral and $[PCl_4]^-$ tetrahedra

D. ionic solid with $[PCl_4]^+$ tetrahedra and $[PCl_6]^-$ octahedra

Answer: D

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39. Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidising power.

Ion	ClO_4^-	IO_4^-	BrO_4^-
Reduction potential $E°/V$	$E°$ =1.19 V	$E°$ = 1.65 V	$E°$ = 1.74 V

A. $ClO_4^- > IO_4^- > BrO_4^-$

B. $IO_4^- > BrO_4^- > ClO_4^-$

C. $BrO_4^- > IO_4^- > ClO_4^-$

D. $BrO_4^- > ClO_4^- > IO_4^-$

Answer: C

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40. Which of the following is isoelectronic pair ?

A. ICI_2, ClO_2

B. BrO_2^-, BrF_2^+

C. ClO_2, BrF

D. CN^-, O_3

Answer: B

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Exercise Part I Do Not Change The Whole Sentence

1. Nitrogen is an active non-metal.

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2. Nitrogen forms pentahalides.

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3. Boiling point of phosphine is higher than that of ammonia.

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4. Phosphorus occus in free state.

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5. Hydrogen sulfide is a monobasic acid in solution.

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6. The number of valence electrons for each member of halogen family is equal to six.

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7. Members of the oxygen family are called halogens.

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8. The ionization enthalpy of selenium is less than that of tellurium. The given statement is true or false?

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9. Oxygen is the most electronegative element in the periodic table.

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10. The oxidation state of fluorine can also be + 2. The given statement is true or false?

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11. Hydride of sulfur is more stable than that of oxygen. The given statement is correct or not?

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12. The bond energy of fluorine is more than that of chlorine.

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13. At room temperature, all the elements of group 17 exist in the gaseous state.

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14. Among halogens, fluorine is least reactive.

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15. Fluorine can be prepared by heating NaF and MnO_2 with conc. sulfuric acid.

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16. Electron gain enthalpies of noble gases are negative.

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17. No compounds of Kr and Xe are known.

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18. Hydrogen fluoride is a better reducing agent than hydrogen bromide.

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19. $XeOF_4$ has .... geometry

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20. The first noble gas compound was prepared by Ramsay.

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Exercise Part I Match The Following

1. Match the following

(*i*) Hydrogen fluoride	(*a*) Liquid O_2
(*ii*) Whytlaw-Gray method	(*b*) O_2 and O_3
(*iii*) Preparation of H_2S	(*c*) F_2
(*iv*) Rocket fuel	(*d*) Hydrogen bonding
(*v*) Allotropes	(*e*) Kipp's apparatus
(*vi*) Basic oxide	(*f*) SO_2
(*vii*) Acidic oxide	(*g*) ZnO
(*viii*) Amphoteric oxide	(*h*) Na_2O
(*ix*) Peroxodisulfuric acid	(*i*) $H_2S_2O_7$
(*x*) Peroxomonosulfuric acid	(*j*) $H_2S_2O_8$
(*xi*) Pyrosulfuric acid	(*k*) H_2SO_5
(*xii*) Distorted octahedral	(*l*) Ne
(*xiii*) Tetrahedral	(*m*) XeO_3
(*xiv*) Trigonal pyramidal	(*n*) XeF_6
(*xv*) Used in beacon lights	(*o*) XeO_4

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Exercise Part Ii Descriptive Questions Very Short Answer Questions

1. Write the names and symbols of the group 15(VA) elements.

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2. Write the electronic configuration of group 15 elements

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3. The maximum number of covalent bonds formed by nitrogen is 4.

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4. Why the elements of the second row (first short period)? exhibit a number of differences in properties from othero members of their respective families ?

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5. Which of the following is/are not known?

(i) PCl_3, $AsCl_3$, $SbCl_3$, NCl_5, PCl_5, $BiCl_5$

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6. Write chemical equation for thermal decomposition of ammonium dichromate.

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7. Account for the fact that ammonia is a good complexing agent.

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8. Why is phosphoric acid syrupy?

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9. Name two oxoacids of nitrogen and write the oxidation state of nitrogen in each case.

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10. What is the difference between the nature of pi-bonds present in H_3PO_3 and HNO_3 molecules?

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11. Name three allotropes of phosphorus. Which out of these is most reactive?

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12. Why is white phosphorus stored under water?

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13. How is pyrophosphoric acid related to orthophosphoric acid?

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14. Give reasons for the following :

(i) Nitric oxide become brown on exposure to air

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15. Give reasons for the following :

NO_2 is considered a mixed anhydride.

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16. What is the basicity of phosphorus acid ?

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17. Name the series of salts that are formed by orthophosphoric acid with sodium hydroxide.

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18. What is the state of hybridization of nitrogen in NO_3^- ion ?

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19. NO_2 readily forms a dimer. Explain.

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20. What is laughing gas ? How is it prepared?

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

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

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23. Mention one use of hydrazine.

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24. Basicity of H_3PO_2, H_3PO_3 and H_3PO_4 is not the same. Explain

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25. What are chalcogens ? Why are group 16 elements called chalcogens ?

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26. What is the outer shell electronic configuration of chalcogens?

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27. Name the allotropes of oxygen.

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28. Which element of group 16 has maximum tendency for catenation ?

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29. Ionisation enthalpy of nitrogen is more than oxygen because of

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30. What is hypo?

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31. Sodium thiosulfate is a salt of which acid ?

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32. Give one method of preparation of sodium thiosulfate.

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33. Which form of sulphur shows paramagnetic behaviour ?

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34. What are allotropes of sulfur?

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35. What do you understand by (a) inert pair effect (b) allotropy and (c) catenation?

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36. What is oleum ? What is the oxidation state of sulfur in it?

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37. What property of conc. H_2SO_4 is made use of in each of the following cases ? Give an equation for the reaction

in each case :

in the production of HCl gas when it reacts with a chloride.

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38. Give reason why?

Conc. H_2SO_4 is not a drying agent for H_2S?

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39. What happens when ozone reacts with KI solution?

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40. Why a black suspension of lead (II) sulfide in water turns white when ozone is passed through it?

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41. What happens when ozone and hydrogen peroxide are allowed to react with each other?

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42. What is tailing of mercury ?

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43. What is ozonolysis ?

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44. Why is O-O bond length in ozone (128 pm) more than in O_2 (122 pm)?

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45. Why ozone is used in improving the atmosphere of crowded places such as cinema halls, tube railway, etc.?

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46. Write balanced chemical equations for the preparation of SO_2 from a sulfite and sulfide ores.

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47. Why quicklime is not used for drying SO_2?

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48. What is produced when SO_2 is dissolved in water?

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49. Name one substance which can be used as a catalyst in the formation of SO_3, from SO_2 Also give the relavent chemical equation.

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50. Write one chemical equation to show that SO_2 acts as a reducing agent.

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51. What happens when SO_2 reacts with Cl_2 :

(i) in presence of sunlight.

(ii) in presence of moisture ?

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52. SO_2 acts as a bleaching agent. How?

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53. Dry SO_2 does not bleach dry flowers because

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54. Why does SO_2 exhibit bleaching action only in presence of water?

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55. What happens when H_2S reacts with SO_2 ?

Watch Video Solution

56. What happens when SO_2 is passed through caustic soda solution ?

Watch Video Solution

57. What is the bond angle in SO_2 ?

Watch Video Solution

58. State the name of anhydride of H_2SO_4.

Watch Video Solution

59. Why sulfuric acid is described as king of chemicals ?

Watch Video Solution

60. Why sulfuric acid is also known as oil of vitriol?

Watch Video Solution

61. Why the process of manufacture of H_2SO_4 is named contact process ?

Watch Video Solution

62. In the the manufacture of sulphuric acid by the Contact process ,give the equations for the conversion of sulphur trioxide to sulphuric acid .

Watch Video Solution

63. Why vanadium pentoxide is considered as a better catalyst than platinised asbestos ?

Watch Video Solution

64. Why heating of catalyst is discontinued the moment the oxidation of sulphur dioxide takes place ?

Watch Video Solution

65. Explain the following giving suitable reasons: In the manufacture of H_2SO_4 by contact process:

For the production of concentrated sulphuric acid, SO_3 is not directly dissolved in water.

Watch Video Solution

66. Sulfuric acid having concentration greater than 98.5% H_2SO_4 cannot be obtained by distillation of an aqueous solution of H_2SO_4. Why?

Watch Video Solution

67. Why conc. H_2SO_4 is stored in air tight bottles ?

Watch Video Solution

68. What happens when ferrous sulfide is treated with dil. H_2SO_4 ?

Watch Video Solution

69. What is the action of conc. H_2SO_4 on sulfur?

Watch Video Solution

70. Which gas is produced when common salt reacts with conc. H_2SO_4 ?

Watch Video Solution

71. What is the importance of ozone for plant and animal life on earth?

Watch Video Solution

72. Why there is not more than 1.1 parts of ozone per million parts of air in the lower part of atmosphere?

Watch Video Solution

73. What is an ozoniser ?

Watch Video Solution

74. Name the conditions for obtaining better yield of O_3 from O_2.

Watch Video Solution

75. How is pure ozone obtained from ozonised oxygen?

Watch Video Solution

76. Why group 17 elements are called halogens?

Watch Video Solution

77. Which one of the halogens is radioactive ?

Watch Video Solution

78. Why do halogens exist as diatomic molecules ?

Watch Video Solution

79. Arrange the given halogens in increasing order of boiling points.

Watch Video Solution

80. Why is F_2 most reactive among halogens ?

Watch Video Solution

81. Why is covalent bonding of halogens always sigma bonding?

Watch Video Solution

82. Why is I_2 more soluble in KI than in water?

Watch Video Solution

83. Among the halogen hydrides, which has maximum per cent of ionic character ?

Watch Video Solution

84. Arrange the haloacids in the increasing order of acid strength.

Watch Video Solution

85. Why HI cannot be obtained by heating KI with conc. H_2SO_4 ?

Watch Video Solution

86. Which of the hydracids of halogens reacts with glass?

Watch Video Solution

87. Iodine forms I_3^- but F_2 does not form F_3^- ions. Why?

Watch Video Solution

88. CIF_3 exists but FCl_3 does not exist. Why?

Watch Video Solution

89. What is freon ?

Watch Video Solution

90. In interhalogen compounds of the type AB_5 and AB_7

B is invaribly fluorine. Why?

Watch Video Solution

91. Name the oxides of chlorine used to bleach paper pulp.

Watch Video Solution

92. Why a dilute aqueous solution of hydrochloric acid cannot be concentrated by evaporation beyond 22.2%?

Watch Video Solution

93. Why do noble gases exist as monoatomic ?

Watch Video Solution

94. Which noble gas is radioactive?

Watch Video Solution

95. Xe readily forms compounds but Kr does not form compounds easily. Why?

Watch Video Solution

96. Why helium and neon not form any compounds?

Watch Video Solution

97. How does xenon atom form compounds with fluorine even though the xenon atom has a closed shell configuration ?

Watch Video Solution

98. Why do noble gases form compounds with fluorine and oxygen only.

Watch Video Solution

99. What are clathrate compounds of noble gases?

Watch Video Solution

100. Which one of the following does not exist ?

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

Watch Video Solution

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

Watch Video Solution

102. Which is the most abundant noble gas ?

Watch Video Solution

103. Why do members of the noble gas family have low boiling points ?

Watch Video Solution

104. Why is OF_6 compound not known?

Watch Video Solution

105. Why is NF_6 compound not known?

Watch Video Solution

106. Why are fluorine and oxygen compounds called oxygen fluorides?

Watch Video Solution

107. Nitrogen does not form pentahalides. Give reason.

Watch Video Solution

108. Noble gases are mostly chemically inert. Give reason.

Watch Video Solution

109. Complete and balance the chemical equation:

$BrO_3^- + F_2 + OH^- \rightarrow$

Watch Video Solution

110. Draw the structure of xenon oxyfluoride which is isoelectronic with IF_5.

Watch Video Solution

111. Fluorine provides the largest variety of interhalogen compounds among halogens, why?

Watch Video Solution

112. Draw and name the molecular shape of SF_6.

Watch Video Solution

113. Out of H_2O which one has higher bond angle and why?

Watch Video Solution

114. Name one ion whose central atom has sp^3d^3 type of hybrid orbitals.

Watch Video Solution

115. What type of hybridization is associated with N in NH_3 ?

What is the expected bond angle in NH_3 ?

Watch Video Solution

116. The bond energy of fluorine is more than that of chlorine.

Watch Video Solution

117. Account for the following:

Tendency to show -2 oxidation state diminishes from sulfur to polonium in group 16.

Watch Video Solution

Watch Video Solution

118. Which is the strongest oxidising agent among ClO_4^-, BrO_4^- and IO_3^-

Watch Video Solution

119. Why is H_2S more acidic than H_2O ?

Watch Video Solution

120. Which type of hybridisation explains the trigonal bipyramidal shape of SF_4?

Watch Video Solution

121. Draw the structure of BrO_4^-

Watch Video Solution

122. Whys is F_2 a stronger oxidising agent than Cl_2 ?

Watch Video Solution

123. Write the chemical equation for the reactions which occur when sodium iodate $(NalO_3)$ is reduced with sodium hydrogen sulfite.

Watch Video Solution

124. Draw the structure of XeF_4 molecule.

Watch Video Solution

125. Complete the following chemical equation :

$XeF_4 + H_2O \rightarrow$

Watch Video Solution

126. Write one chemical equation to show that chlorine gas can be obtained from bleaching powder.

Watch Video Solution

127. Write one chemical equation to show that SO_2 acts as a reducing agent.

Watch Video Solution

128. Write one chemical equation that conc. H_2SO_4 is a strong oxidising agent.

Watch Video Solution

129. Give a chemical equation or name of the reaction to show that sodium chlorate(NaClO_3)` is a strong oxidant.

Watch Video Solution

130. Find the oxidation number of sulfur in peroxomono-sulfuric acid.

Watch Video Solution

131. Write the formula of the noble gas species that is isostructural with (i) ICl_4^- (i) BrO_3^-

Watch Video Solution

132. Draw the structure of peroxodisulfuric acid.

Watch Video Solution

133. Which is more stable PCl_5 or PCl_3 ?

Watch Video Solution

134. Write the structural formula of $PCl_5(s)$.

Watch Video Solution

135. What type of hybridization is involved in PCI_5 ?

Watch Video Solution

136. Why is sulfurous acid a reducing agent ?

Watch Video Solution

137. Why do hydrides of oxygen and sulfur differ in physical state?

Watch Video Solution

138. Which halogen has highest value of electron gain enthalpy?

Watch Video Solution

139. Write the chemical equation for the following:

$Ca_3(PO_4)_2 + SiO_2 + C \xrightarrow{\text{heat}}$

Watch Video Solution

140. Why is nitrous acid oxidant as well as reductant ?

Watch Video Solution

141. Which is least basic ? $SbH_3 PH_3$, NH_3, AsH_3

Watch Video Solution

142. Draw the structure of XeF_2

Watch Video Solution

143. Among the noble gases only xenon is well known to form chemical compounds.

Watch Video Solution

144. Assign reason for the following: In solid state, PCI_5 , behaves as an ionic species.

Watch Video Solution

145. Are all the five bonds in PCl_5 molecule equivalent? Justify your answer

Watch Video Solution

146. Complete the following reactions :

(i) $P_4 + SOCl_2 \rightarrow$

Watch Video Solution

147. Complete the following reactions :

(ii) $CH_3COOH + PCl_5 \rightarrow$

Watch Video Solution

148. What happens when (write balanced chemical equations):

Ammonia is dissolved in water.

Watch Video Solution

149. In which one of the two structures, NO_2^+ and NO_2^- the bond angle has a higher value ?

Watch Video Solution

150. Why is the bond angle in PH_3 molecule lesser than that in NH_3 molecule?

Watch Video Solution

151. Answer the following :

(i) Which neutral molecule would be isoelectronic with ClO^- ?

(ii) Of Bi (V) and Sb (V) which may be a stronger oxidising agent and why?

Watch Video Solution

152. Why is Bi(V) a stronger oxidant than Sb(V) ?

Watch Video Solution

153. Why is red phosporus less reactive than white phosphorus?

Watch Video Solution

154. In the ring test for identification of nitrate ion, what is the formula of the compound responsible for the brown ring formed at the interface of two liquids ?

Watch Video Solution

155. Write the balanced equation for complete hydrolysis of XeF_6.

Watch Video Solution

156. In what way can it be proved that PH_3 is basic in nature?

Watch Video Solution

157. Draw the structure of O_3 molecule.

Watch Video Solution

158. Explain the following observations :

(i) Fluorine does not exhibit any positive oxidation state.

(ii) The majority of known noble gas compounds are those of Xenon.

(iii) Phosphorus is much more reactive than nitrogen.

Watch Video Solution

159. Nitrogen is relatively inert as compared to phosphorus. Why ?

Watch Video Solution

160. Comment on the nature of two S–O bonds formed in SO_2 molecule. Are the two S–O bonds in this molecule equal ?

Watch Video Solution

Exercise Part Ii Descriptive Questions Short Answer Questions

1. Write the electronic configuration of group 15 elements

Watch Video Solution

2. Why does the reactivity of nitrogen differ from phosphorus?

Watch Video Solution

3. Explain the following observations :

(i) Nitrogen is much less reactive than phosphorus.

(ii) Despite having greater polarity, hydrogen fluoride boils at a lower temperature than water.

Watch Video Solution

4. (a) Draw the molecular structure of following compounds :

(i) XeF_6

(ii) $H_2S_2O_8$

(b) Explain the following observations :

(i) The molecules NH_3 and NF_3 have dipole moments which are of opposite direction.

(ii) All the bonds in PCl_5 molecule are not equivalent.

(iii) Sulphur in vapour state exhibits paramagnetism.

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5. 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.

Watch Video Solution

6. Account for the following

$BiCl_3$ is less covalent than PCl_3.

Watch Video Solution

7. Account for the following

`Nitrogen shows weaker tendency for catenation than

phosphorus.

Watch Video Solution

8. 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.

Watch Video Solution

9. Answer the following :

(i) Which neutral molecule would be isoelectronic with

ClO^-?

(ii) Of Bi (V) and Sb (V) which may be a stronger oxidising agent and why?

Watch Video Solution

10. 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.

Watch Video Solution

11. Draw the strucutres of the following

H_3PO_2

Watch Video Solution

12. Draw the structures of the following molecules :

$(i) XeOF_4$,(ii) H_3PO_3

Watch Video Solution

13. Draw the strucutres of the following

H_3PO_4

Watch Video Solution

14. Complete the following chemical equations :

$P_4(s) + NaOH(aq) + H_2O \rightarrow (ii) Ca_3P_2(s) + H_2O(l) \rightarrow$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

17. How is ammonia manufactured industrially?

Watch Video Solution

18. Write main differences between the properties of white phosphorus and red phosphorus.

Watch Video Solution

19. What is the basicity of H_3PO_3 and why ?

Complete the following equations :

(i) $Cu + HNO(dil.) \rightarrow$

(ii) $I_2 + HNO_3(conc.) \rightarrow$

Watch Video Solution

20. Name the elements belonging to oxygen family and write down their electronic configurations.

Watch Video Solution

21. Members of the oxygen family are called halogens.

Watch Video Solution

22. What is catenation ? Explain why oxygen is diatomic, while sulfur is octa-atomic, S_g.

Watch Video Solution

Watch Video Solution

23. Account for the following:

The valency of oxygen is generally 2, whereas sulfur shows valency of 2, 4 and 6.

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24. Account for the following:

Tendency to show -2 oxidation state diminishes from sulfur to polonium in group 16.

Watch Video Solution

25. Explain the following:

(a) Oxygen molecule has formula O_2 while sulfur has S_g.

(b) CIF_3 exists whereas FCl_3 does not.

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26. Compare the structural shapes of the following species:

$(i) SF_4$

$(ii) SF_6$

Watch Video Solution

27. (a) Draw the molecular structures of the following compounds :

(i) N_2O_5 (ii) $XeOF_4$

(b) Explain the following observations :

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

(ii) ICI is more reactive than I_2.

(iii) Despite lower value of its electron gain enthalpy with negative sign, fluorine (F_2) is a stronger oxidizing agent than Cl_2.

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28. How would you account for the following :

(i) The electron gain enthalpy with negative sign is less for oxygen than that for sulphur.

(ii) Phosphorus shows greater tandency for catenation than nitrogen.

(iii) Fluorine never acts as the central atom in polyatomic interhalogen compounds.

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29. (a) Give reasons for the following:

(i) Sulphurin vapour state shows paramagnetic behaviour.

(ii) N-N bond is weaker than P-P bond.

(iii) Ozone is thermodynamically less stable than oxygen.

(b) Write the name of gas released when Cu is added to:

(i) dilute HNO_3 and,

(ii) conc. HNO_3

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30. (a) Account for the following observations :

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

(ii) Chlorine water is a powerful bleaching agent.

(iii) Bi (V) is a stronger oxidising agent than Sb(V)

(b) What happens when :

(i) White phosphorus is heated with concentrated NaOH solution in an inert atmosphere of CO_2.

(ii) XeF_6 undergoes partial hydrolysis.

(Give the chemical equations involved).

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31. Explain the following situations :

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

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32. Why oxygen differs from the rest of the members of its family?

Watch Video Solution

33. Give the structures of the following compounds :

(i) Peroxomonosulfurica acid

(ii) Dithionic acid

(iii) SeO_3 tetramer

(iv) Sulfur trioxide trimer (S_3O_9)

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34. Give reasons for the following :

Fluorine shows an oxidation state of -1 only.

Watch Video Solution

35. Give reasons for the following :

Fluorine has lower electron gain enthalpy than chlorine.

Watch Video Solution

36. Give reasons for the following :

HF has abnormally high melting and boiling points.

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37. Why the melting and boiling points of halogens increase in going from top to bottom of the group.

Watch Video Solution

38. How is chlorine produced industrially?

Watch Video Solution

39. Why are halogens coloured?

Watch Video Solution

40. Why F_2 is the strongest oxidising agent, although it has lower electron gain enthalpy than Cl_2 ?

Watch Video Solution

41. Why are halogens strong oxidising agents?

Watch Video Solution

42. Why does fluorine not form polyfluorides?

Watch Video Solution

43. What are hallucinogens? Give their two examples. Mention their clinical cure, if any.

Watch Video Solution

44. Why does fluorine exhibit abnormal behaviour ?

Watch Video Solution

45. Why special methods are employed for the preparation of HBr and HI ?

Watch Video Solution

46. Explain the trends in property in halogen family as given under:

(i) Ionization enthalpy

(ii) Oxidation state

(iii) Electron affinity or electron gain enthalpy.

Watch Video Solution

47. How will you account that when chlorine is pased through a fluoride solution, no reaction takes place.

Watch Video Solution

48. Fluorine is more electronegative than iodine atom, yet HF has lower acidic strength than HI.

Watch Video Solution

49. State the trends observed in case of each of the following:

(i) Oxidising power of the elements of the halogen family.

(ii) Acidic character of the hydrides of the elements of group 16.

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50. Give reasons for the following:

(i) Binary compounds of oxygen and fluorine are called fluorides.

(ii) Fluorine forms only one oxoacid HOF.

(iii) Noble gases have very low melting and boiling points.

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51. What happens when :

(i) Cl_2 is passed through hot NaOH.

(ii) Cl_2 is passed through an aqueous solution of NaF.

Watch Video Solution

52. Noble gases are relatively inert elements. Give reasons.

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53. Why ease to liquefy noble gases increases with increase in atomic number?

Watch Video Solution

54. Give reasons which prompted Bartlett to react xenon with fluorine to form first noble gas compound.

Watch Video Solution

55. How are XeO_3 and $XeOF_4$ prepared?

Watch Video Solution

56. Explain the following :

Only higher members of group 18 of the periodic table are expected to form compounds.

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57. Explain the following :

Hydrogen fluoride is much less volatile than hydrogen chloride.

Watch Video Solution

58. Explain the following :

Interhalogen compounds are strong oxidising agents.

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59. Explain the hybridization in XeF_2. Also draw its molecular structure.

Watch Video Solution

60. Explain the hybridization in XeF_4. Also draw its molecular structure.

Watch Video Solution

61. Explain the hybridization in XeF_{6-} . Also draw its molecular structure.

Watch Video Solution

62. Explain the hybridization in $XeOF_{2-}$. Also draw its molecular structure.

Watch Video Solution

Watch Video Solution

63. Give the shapes of CIF_3, BrF_5 and IF_7 using VSEPR theory.

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64. Write the hybridization and also draw their molecular structures :

(i) XeO_3

(ii) $XeOF_4$

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65. Give equations for the preparation of XeO_2F_2, $XeOF_4$ and XeO_2F_2.

Watch Video Solution

66. Give the molecular shapes of XeF_2, XeF_4, XeF_6 and XeO_3.

Watch Video Solution

67. How are xenon fluorides prepared ? Discuss their behaviour towards water.

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Exercise Part Ii Descriptive Questions Long Answer Questions

1. Discuss the general characteristics of Group 15 elements with reference to their electronic configuration, oxidation state, atomic size, ionisation enthalpy and electronegativity.

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2. Discuss the trends in chemical reactivity of group 15 elements.

Watch Video Solution

3. Discuss the general properties of nitrogen family under the following heads :

A. Atomic radius

B. Oxidation states

C. Formation of hydrides

D. Metallic and non-metallic character.

Answer:

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4. What type of hydrides are formed by group 15 elements. Discuss their characteristics under the following heads.

(i) Thermal stability

(ii) Basic character

(iii) Reducing character

(iv) Bond angles

(v) Boiling points.

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5. What type of halides are formed by group 15 elements? Discuss their structures and important characteristics.

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6. Give a brief account of oxides and oxoacids of phosphorus.

Watch Video Solution

7. Why is nitrogen anomalous in its behaviour as compared to other members of its group ?

Watch Video Solution

8. Name important oxides and oxyacids of nitrogen and phosphorus and write their formulae.

Watch Video Solution

9. Write the valence shell electronic configuration of group 16 elements and discuss their important

characteristics.

Watch Video Solution

10. Compare the elements of group 15 which those of group 16 in relation to the following properties

A. Atomic radii

B. Oxidation states

C. Ionization enthalpy

D. Electron gain enthalpy

Answer:

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11. What are allotropes of sulfur?

Watch Video Solution

12. Give reasons for the following observations:

(i) SF6 is not easily hydrolysed though thermodynamically it should be.

(ii) Sulfur in vapour state exhibits paramagnetism.

(iii) OF_6 is not known whereas, SF_6 is known.

(iv) HCIO is a stronger acid than HIO.

(v) HCIO is a weaker acid than $HCIO_2$

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13. How is O_2 obtained in the laboratory?

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14. Why is O_2 inert at room temperature ?

Watch Video Solution

15. Name the elements of group 17. Describe the trend in the properties of halogens such as:

(a) Bond energy

(b) Ionization enthalpy

(c) Oxidising power

(d) Reactivity and

(e) Reducing power of halogen halides.

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16. Discuss gradation in physical and chemical properties among halogens.

Watch Video Solution

17. How does chlorine occur in nature ? Give names and formulae of its important minerals.

Watch Video Solution

18. How is Cl_2obtained in the laboratory ? Describe its important properties and uses.

Watch Video Solution

19. Arrange the following in the increasing order of acid strength :

1) HF, HCl, HBr, HI

2) H_2O, H_2S, H_2Se, H_2Te

3) $HOCl, HOClO, HOClO_2, HOClO_3$

A. HF, HCl, HBr, HI

B. H_2O, H_2S, H_2Se, H_2Te

C. $HOCl, HOClO, HOClO_2, HOClO_3$

D.

Answer:

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

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21. Arrange the following in order of decreasing ionic character

M-F,M-Cl,M-Br,M-I.

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Watch Video Solution

22. What are interhalogen compounds ? How are they classified? Give the structure of IF_7.

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23. Using VSEPR theory, predict the probable structures of SO_3^{2-}, IF_6^-, ClO_4^-, Icl_4^- and Ibr_2^-

Watch Video Solution

24. Describe the molecular shapes of the following

A. SF_4

B. BrF_5

C. IF_3

D. BrF_3

Answer:

Watch Video Solution

25. Write the formula of the noble gas species that is isostructural with (i) ICl_4^- (i) BrO_3^-

A. ICI_4^-

B. IBr_2^-

C. BrO_3^-

D.

Answer:

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26. With what neutral molecule is ClO^- isoelectronic? Is that molecule a Lewis base ?

Watch Video Solution

27. Describe the position of noble gases in the periodic table .

Watch Video Solution

28. Describe the position of noble gases in the periodic table .

Watch Video Solution

29. Discuss the trend in the following properties of noble gases:

(i) Melting and boiling point.

(ii) Ionization enthalpy.

(iii) Electron affinity. (Electron gain enthalpy)

Watch Video Solution

30. Using the VSEPR theory, discuss the molecular shapes of

XeF_2. XeF_4, XeF_6, XeO_3 and XeO_4.

Watch Video Solution

31. Draw the structures of the following:

(i) $N_2O_5(ii)XeOF_4$

Watch Video Solution

32. (a) Draw the structure of the following :

(i) N_2O_5

(ii) $XeOF_4$

(b) Explain the following observations :

(i) The electron gain enthalpy of sulphur atom has a greater negative value than that of oxygen atom.

(ii) Nitrogen does not form pentahalides.

(iii) In an aqueous solution, HI is a stronger acid than HCl.

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33. Draw the structures of the following:

$(i) XeF_4$

$(ii) H_2S_2O_7$

Watch Video Solution

34. Explain the following observations:

(i) Phosphorus has a greater tendency for catenation than nitrogen

(ii) The negative value of electron gain enthalpy is less for fluorine than for chlorine.

(iii) Hydrogen fluoride has a much higher boiling point than hydrogen chloride

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35. Complete the following chemical equations :

(i) $P_4 + SOCl(2) \rightarrow$

(ii) $F_2(\text{Excess}) + Cl_2 \xrightarrow{300^\circ C}$

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36. Complete the following chemical equations :

$XeF_2 + H_2O \rightarrow$

Watch Video Solution

37. Complete the following chemical equations :

$I_2 + \underset{(\text{conc.})}{HNO_3} \rightarrow$

Watch Video Solution

38. Complete the following chemical equation :

$XeF_4 + H_2O \rightarrow$

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39. Complete the following chemical reaction equations :

(i) $\underset{(\text{cold and dilute})}{NaOH} + Cl_2 \rightarrow$

(ii) $\underset{(\text{excess})}{XeF_6} + H_2O \rightarrow$

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40. Complete the following chemical equations :

$XeF_6(s) + H_2O(l) \rightarrow$

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41. (a) (i) Complete the following chemical equations :

(i)$NaOH_{(aq)} + Cl_{2(g)} \rightarrow$

(Hot and conc.)

(ii) $Xef_6(s) + H_2O(l) \rightarrow$

(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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42. How dould you account for the following :

CIF_3 molecule has a T-shaped structure and not a trigonal planar one.

Watch Video Solution

43. How dould you account for the following :

The stability of +5 oxidation state decreases down the group 15 of the periodic table.

Watch Video Solution

44. How dould you account for the following :

Solid phosphorus pentachloride behaves as an ionic

compound.

Watch Video Solution

45. Why are halogens strong oxidising agents?

Watch Video Solution

46. Account for the following :

The acidic strength decreases in the order $HCl > H_2S > PH_3$

(ii) Tendency to form pentahalides decreases down the group 15 of the periodic table.

(iii) Noble gases have large positive values of electron gain enthalpy.

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

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48. Account for the following :

Write balanced equation for the reaction taking place when NaCl is heated with sulfuric acid in presence of MnO_2.

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49. Account for the following :

(i) Oxygen does not show an oxidation state of + 4 and + 6 like sulfur .

(ii) NO_2 readily forms a dimer.

(iii) Fluorine always exhibits and oxidation state of -1 only in its compunds

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50. Draw the structure of XeF_4 molecule.

Watch Video Solution

51. Account for the following : .

Complete and balance the chemical equation :

$I_2 + H_2O + Cl_2 \rightarrow$

Watch Video Solution

52. (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:

(i) $C + H_2SO_4(\text{conc}) \rightarrow$

(ii) $P_A + NaOH + H_2O \rightarrow$

(iii) $\underset{(\text{excess})}{Cl_2 + F_2 \rightarrow}$

Watch Video Solution

53. Explain the following:

Complete the following chemical equations :

(i) $C + H_2SO_4(conc.) \rightarrow (ii)P_4 + NaOH + H_2O \rightarrow$

$(iii)Cl_2 + \underset{(\text{excess})}{F_2} \rightarrow$

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54. (a) Given reasons for the following :

(i) Bond enthalpy of F_2 is lower than that of Cl_2.

(ii) PH_3 has lower boiling point than NH_3.

(b) Draw the structures of the following molecules :

(i) BrF_3 (ii) $(HPO_3)_3$

(iii) XeF_4

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55. Complete the following chemical equations :

(i) $HgCl_2 + PH_3 \rightarrow (ii) SO_3 + H_2SO_4 \rightarrow$

(iii) $XeF_4 + H_2O \rightarrow$

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56. (a) what happens when

(i) Chlorine gas is passed though a hot concentrated solution of NaOH?

(ii) sulphure dioxide gas is passed through an aqueses 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 pay the role of a central atom in interhalogen compounds ?

(iii) Why do noble gases have very low boiling points ?

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57. What happens when :

(i) What is basicity of H_3PO_3 and why ?

(ii) Why does fluorine not play the role of central atomo in inter halogen compunds ?

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58. Why do members of the noble gas family have low boiling points ?

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59. (a) Given reasons for the following :

(i) Bond enthalpy of F_2 is lower than that of Cl_2.

(ii) PH_3 has lower boiling point than NH_3.

(b) Draw the structures of the following molecules :

(i) BrF_3 (ii) $(HPO_3)_3$

(iii) XeF_4

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60. (a) Given reasons for the following :

(i) Bond enthalpy of F_2 is lower than that of Cl_2.

(ii) PH_3 has lower boiling point than NH_3.

(b) Draw the structures of the following molecules :

(i) BrF_3 (ii) $(HPO_3)_3$

(iii) XeF_4

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61. Account for the following :

(i) Helium is used in diving apparatus.

(ii) Fluorine does not exhibit positive oxidation state.

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62. Draw the structures of the following :

(i)XeO_3

(ii)H_2SO_4

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63. Draw the structure of the following :

(i) H_2SO_4

(ii) XeF_2

Watch Video Solution

64. Write main differences between the properties of white phosphorus and red phosphorus.

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65. Account for the following :

(i) PCl_5 is more covalent than PCl_3.

(ii) Iron on reaction with HCl forms $FeCl_2$ and not $FeCl_3$.

(iii) The two O-O bond lengths in the ozone molecule are equal.

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Isc Examination Questions Part I Objective Questions Fill In The Blanks

1. Red phosphorus is used in the manufacture of ..... and .....

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2. In the laboratory, bromine can be obtained by heating a mixture of KBr and ..... with conc.....

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3. Oxygen molecule is ..... due to the presence of ..... unpaired electrons.

Watch Video Solution

4. Why are halogens strong oxidising agents?

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5. Nitrogen atom in ammonia undergoes _____ hybridization and the geometry of the molecule is_____ .

Watch Video Solution

6. Aqua regia is a mixture of _____ and _____ in the ratio of 3:1.

Watch Video Solution

Isc Examination Questions Part I Objective Questions The Correct Alternative From The Choices Given

1. When hydrogen sulfide reacts with sulfur dioxide to give sulfur and water,

A. Both H_2S and SO_2 are oxidised

B. Both H_2S and SO_2 are reduced

C. H_2S is oxidised and SO_2 is reduced

D. H_2S is reduced and SO_2 is oxidised

Answer: C

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2. Phosphorus pentachloride reacts with sulfur dioxide to form

A. Chlorosulfonic acid

B. Phosphoric acid

C. Thionyl chloride

D. Sulfuryl chloride

Answer: C

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3. of the following compounds, the one which is a Lewis acid is :* *

A. PCl_3

B. $AlCl_3$

C. NCl_3

D. $AsCl_3$

Answer: B

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4. Among the following halogens, the one which does not form an oxyacid is :

A. Fluorine

B. Chlorine

C. Bromine

D. Iodine

Answer: A

Watch Video Solution

5. The geometry of XeF_6 molecule and the hybridization of Xe atom in the molecule is :

A. Distorted octahedral and sp^3d^3

B. Square planar and sp^3d^2

C. Pyramidal and sp^3

D. Octahedral and sp^3d^3

Answer: A

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6. When SO_2 gas is passed through acidified $K_2Cr_2O_7$ solution, the colour of the solution changes to

A. Red

B. Black

C. Orange

D. Green

Answer: D

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Isc Examination Questions Part Ii Descriptive Questions

1. Write balanced equations for the following reactions :

(i) Iodine with hot conc. sodium hydroxide.

(ii) Iodine with sodium thiosulfate solution.

(iii) Fluorine passes through a concentrated solution of sodium hydroxide.

(iv) Bromine passed through a dilute solution of sodium hydroxide.

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2. Write balanced equation for the reaction of bromine with sodium sulfite.

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3. (i) Why could fluorine not be prepared for a long time from HF and metal fluorides either by electrolysis or by any chemical reaction ?

(ii) Describe the modern method for the preparation of fluorine by giving:

(a) Materials used in the construction of the cell.

(b) Electrolyte used.

(c) Electrode reactions.

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4. Write a balanced equation for the following reacton: Bromine water and sodium sulfite.

Watch Video Solution

5. Give balanced equations for each of the following reactions:

(i) Fluorine and dilute sodium hydroxide.

(ii) Chlorine and hot concentrated caustic soda.

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6. Account for the following

SF_6 exists but OF_6 does not, though both oxygen and

sulfur belong to the same group in the periodic table.

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7. Account for the following

To which class of compounds does IF_7 belong ? What is the structure of the molecule ?

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8. Give balanced chemical equations for the following:

Chlorine gas is passed through cold, dilute NaOH.

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9. Give reactions and the conditions required for preparation of the following compounds :

(i) XeF_6

(ii) $XeOF_4$

Watch Video Solution

10. What is the hybridization of chlorine atom in CIF_3 molecule ?

(ii) Draw the structure of the molecule and state its geometry.

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11. Name the inert gases used for :

(i) Filing sodium vapour lamps.

(ii) Obtaining ligth of different colours in neon signs.

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12. For the molecule XeF_2 :

Draw the structure of the molecule indicating the lone pairs.

Watch Video Solution

13. Explain why interhalogen compounds are more reactive than their constituent elements.

Watch Video Solution

14. Write balanced chemical equations for the following reactions :

(i) Ozone and lead sulfide

(ii) Chlorine is passed through hot concentrated NaOH solution

(iii) Sulfuric acid is treated with phosphorus.

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15. Give reasons for the following:

Florine gives only one oxide but chlorine gives a series of oxides.

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16. For the molecule of IF_7 :

(i) Draw the structure of the molecule

(ii) State the hybridization of the central atom.

(iii) State the geomtry of the molecule.

Watch Video Solution

17. Give balanced chemical equations for the following reactions :

(i) Fluorine is passed through cold, dilute NaOH solution.

(ii) Hydrogen peroxide is treated with acidified $KMnO_4$

solution.

(iii) Sulfuric acid is treated with hydrogen sulfide.

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18. Draw the structure of XeF_4 molecule.

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19. Sulfur dioxide acts as an oxidising agent as well as a reducing agent. Give one reaction each to show its oxidising nature and its reducing nature.

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20. Give balanced equation for the following reaction : Phosphorus reacts with conc. H_2SO_4.

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Multiple Choice Question

1. The geometry of XeF_6 molecule the hybridization of Xe atom in the molecule is:

A. Distorted octahedral and sp^3d^3

B. Square planar and sp^3d^2

C. Pyramidal and sp^3

D. Octahedral and sp^3d^3

Answer: A

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2. The minimum bond angle in hydrides of group 16 elements is in:

A. H_2O

B. H_2Te

C. H_2Se

D. H_2S

Answer: B

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3. The tendency of group 16 elements to form catenated compounds is greatest in case of:

A. Oxygen

B. Sulphur

C. Selenium

D. Tellurium

Answer: B

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4. Which of the following has lowest reducing character?

A. H_2O

B. H_2S

C. H_2Te

D. H_2Se

Answer: A

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5. Which of the following mainly exhibits (-2) oxidation state?

A. S

B. Se

C. O

D. Te

Answer: B

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6. Oxygen molecule is:

A. Paramagnetic.

B. Diamagnetic

C. Ferromagnetic

D. Ferrimagnetic

Answer: A

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7. The halogen with highest electron affinity:

A. F

B. Cl

C. Br

D. I

Answer: B

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8. The halide ion easiest to oxidise is:

A. F^-

B. Cl^-

C. Br^-

D. I^-

Answer: D

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9. Aqua regia is a mixture of :

A. Conc. HNO_3 and conc. H_2SO_4

B. Conc. HCl and conc. H_2SO_4 in the ratio of 3:1

C. Conc. HCl and conc. HNO_3 in the ratio of 3:1

D. None of these

Answer: C

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10. Tailing of mercury is due to the formation of:

A. Hg_2O

B. HgO

C. $Hg(OH)_2$

D. $HgCl_2$

Answer: A

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11. The name of the compound described below is :

A compound of N, H and O which on heating gives laughing gas.

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12. The high viscosity and high boiling point of HF is due to:

A. Low dissociation energy of F_2 molecule

B. Associated nature due to hydrogen bonding

C. Ionic character of HF

D. High electronegativity of fluorine

Answer: B

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13. The name of the compound described below is:

A compound of N, H and O which on heating gives nitrogen gas.

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14. In XeF_2, Xenon involves the hybridisation:

A. sp

B. sp^2

C. sp^3d

D. sp^3

Answer: C

View Text Solution

15. Which one of the following displaces bromine form an aqueous solution of bromine?

A. Cl_2

B. Cl^-

C. I_2

D. I_3^-

Answer: A

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16. When SO_2 gas is passed through acidified $K_2Cr_2O_7$ solution, the colour of the solution changes to

A. Red

B. Black

C. Orange

D. Green

Answer: D

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17. The name of the compound described below is:

A compound of Ca, P and O which is found in bones.

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18. Orthophosphorous acid reacts with I_2 in aqueous medium to form:

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19. What is the valence shell electronic configuration of p-block elements?

A. ns^2

B. ns^2np^{1-5}

C. ns^2np^{1-6}

D. None of these

Answer: C

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20. Group 16 elements have lower value of first ionisation enthalpy as compared to group 15 elements because

A. Half-filled p-orbitals in group 15 elements are more stable.

B. Group 16 elements have smaller size than group 15 elements.

C. Group 16 elements contain double bond while group 15 elements have triple bond.

D. Group 16 elements have more number of electrons in p-orbitals.

Answer: A

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21. Orthophosphorous acid reacts with Br_2 in aqueous medium to form:

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22. Orthophophoric acid on reaction with sodium hydroxide forms compound A along with H_2O. Compound A is:

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23. Which of the following is the balanced equation describing the combustion of elemental sulphur?

A. $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$

B. $H_2S + 2O_2 \rightarrow SO_3 + H_2O$

C. $2SO_3 \rightarrow 2S + 3O_2$

D. $S + O_2 \rightarrow SO_2$

Answer: D

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24. The geometry of XeF_6 molecule and the hybridization of Xe atom in the molecule is:

A. Distorted octahedral and sp^3d^3

B. Square planar and sp^3d^2

C. Pyramidal and sp^3

D. Octahedral and sp^3d^3

Answer: A

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25. Which of the following is not an interhalogen compound?

A. ICl_4^-

B. ClF_5

C. IPO_4

D. ClF_3

Answer: C

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26. Which of the following xenon fluoride of xenon cannot be formed?

A. XeF_2

B. XeF_6

C. XeF_4

D. XeF_3

Answer: D

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27. The most powerful oxidizing agent is:

A. Fluorine

B. Chlorine

C. Bromine

D. Iodine

Answer: A

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28. For IF_7 molecule:

The structure of the given molecule is:

A. Octahedral

B. Tetrahedral

C. Trigonal bipyramidal

D. Pentagonal bipyramidal

Answer: D

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29. For IF_7 molecule:

The type of hybridization of the given molecule is:

A. sp^3 hybridisation

B. sp^3d^3 hybridisation

C. sp^3d^2 hybridisation

D. sp^3d hybridisation

Answer: B

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30. With reference to XeF_6 molecule, answer the following question.

What is the hybridisation of Xe atom in the given molecule?

A. sp^3d^3

B. sp^3d^2

C. sp^3

D. sp^3d

Answer: A

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31. With reference to XeF_6 molecule, answer the following question.

What is the geometry of this molecule?

A. Distorted octahedral

B. Square planer

C. Pyramidal

D. Tetrahedral

Answer: B

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32. Ozone is prepared from oxygen, which method is used in the above preparation?

A. Oxidation at high temperature

B. Oxidation using catalyst

C. Silent electric discharge

D. Reduction at high temperature

Answer: C

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Fill In The Blanks

1. At $-78.9^{\circ}C$ ..... solidifies into snow like solid. With ammonia ..... gives white dense fumes.

A. SO_2, HCl

B. CO_2, KCl

C. CO, NaCl

D. O_2, KBr

Answer: A

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2. Aqua regia is a mixture of ..... and ..... in the ratio of 3: 1 ..... the Swedish chemist, was the first to prepare

oxygen.

A. Conc. $C_6H_8O_7$, Conc. HNO_3, Ada Lovelace

B. Conc. HCl, Conc. HNO_3, Joseph Priestley

C. Conc. HCl, Conc. H_2SO_4, Ada Lovelace

D. Conc. HCl, Conc. H_2CO_3, Nikola Tesla

Answer: B

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3. Oxygen family is also called as ..... . Oxygenated water is ..... .

A. Chalcogen, Hydrogen peroxide

B. Halogen, Hydrogen oxide

C. both a and b

D. none

Answer: A

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4. In the preparation of ozone ..... electric ..... produces ..... heat and prevents the local ..... in temperature.

A. Layer, discharge, immense, decrease

B. Molecule, current, immense, rise

C. Silent, discharge, less, rise

D. Dioxide, Current, more, decrease

Answer: C

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5. Sulphuric acid is a ..... molecule having hexavalent ..... atom. It has a ..... structure. On boiling sulphur in NaOH solution ..... are produced.

A. Ionic, Sulphur, Octahedral, NaS_2 and $NaSO_3$

B. Covalent, Oxygen, Square planar, Na_2S and Na_2SO_3

C. Ionic, Oxygen, Linear, NaS and Na_2SO_3

D. Covalent, Sulphur, tetrahedral, Na_2S and $Na_2S_2O_3$

Answer: D

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6. In contact process for the manufacture of H_2SO_4, the SO_3 is absorbed in ..... The two series of salts that sulphuric acid can produce are ..... and ..... .

A. Water, sulphate and hydrogen sulphate

B. Conc. H_2SO_4, sulphate, bisulphates

C. Dil. H_2SO_4, nitrate and sulphate

D. SO_2 gas, sulphate, bisulphates

Answer: B

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7. H_2SO_4 reacts with H_2S to form..... , H_2O and .....The oil of vitriol is ..... .

A. S, SO_2, H_2SO_4

B. O_2, S_3, HNO_3

C. H_2O_2, SO_2, CH_3COOH

D. H_2S, O_2, H_2CO_3

Answer: A

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8. Halogens are strong ..... agents because of their high ..... The most electronegative element among halogens is ..... .

A. Reducing, electropositive nature, fluorine

B. Oxidizing, ionisation energy, oxygen

C. Oxidizing, electronegativity, fluorine

D. Reducing, electron affinity, chlorine

Answer: C

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9. Chlorine on reaction with cold and dilute sodium hydroxide forms compound A along with NaCl and H_2O. Compound A is:

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10. Chlorine on reaction with hot and concentrated sodium hydroxide forms compound A along with NaCl and H_2O. Compound A is:

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11. Which among the following processes does not form ammonia as one of the product?

A. Hydrolysis of Ca_3N_2

B. Hydrolysis of Li_3N

C. Hydrolysis of Mg_3N_2

D. Hydrolysis of $B_3N_3H_6$

Answer:

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12. AX_3 type of inter halogen compounds show ..... type of hybridisation. The shape of AX_7 type of inter halogen is .....

A. sp^3d, Octahedral

B. sp^3d^3, Trigonal planar

C. sp^3d^2, square pyramidal

D. sp^3d, pentagonal bipyramidal

Answer: D

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Match The Following

1. Match the columns:

Column I	Column II
1. Frasch process	(p) Sulphur
2. Noble gas	(q) For respiration by deep divers
3. O_2	(r) NaCl
4. Common salt	(s) N. Bartlett
5. ICl_2	(t) Inter halogen
6. He	(u) Paramagnetic

A. 1-(u), 2-(q), 3-(p), 4-(t), 5-(r), 6-(s)

B. 1-(s), 2-(p), 3-(u), 4-(t), 5-(r), 6-(q)

C. 1-(q), 2-(s), 3-(r), 4-(u), 5-(t), 6-(p)

D. 1-(p), 2-(s), 3-(u), 4-(r), 5-(t), 6-(q)

Answer: D

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2. Match the columns:

Column I	Column II
1. CFC	(p) HCl, HNO_3
2. Ozone	(q) Acid rain
3. Ozonide	(r) Depletion
4. $Na_2SO_4.10H_2O$	(s) Ethylene
5. Aqua regia	(t) Glauber's Salt
6. SO_2	(u) Chloro fluoro carbon

A. 1-(u), 2-(r), 3-(s), 4-(t), 5-(p), 6-(q)

B. 1-(r), 2-(u), 3-(s), 4-(p), 5-(t), 6-(q)

C. 1-(q), 2-(s), 3-(r), 4-(u), 5-(t), 6-(p)

D. 1-(p), 2-(s), 3-(u), 4-(r), 5-(t), 6-(q)

Answer: A

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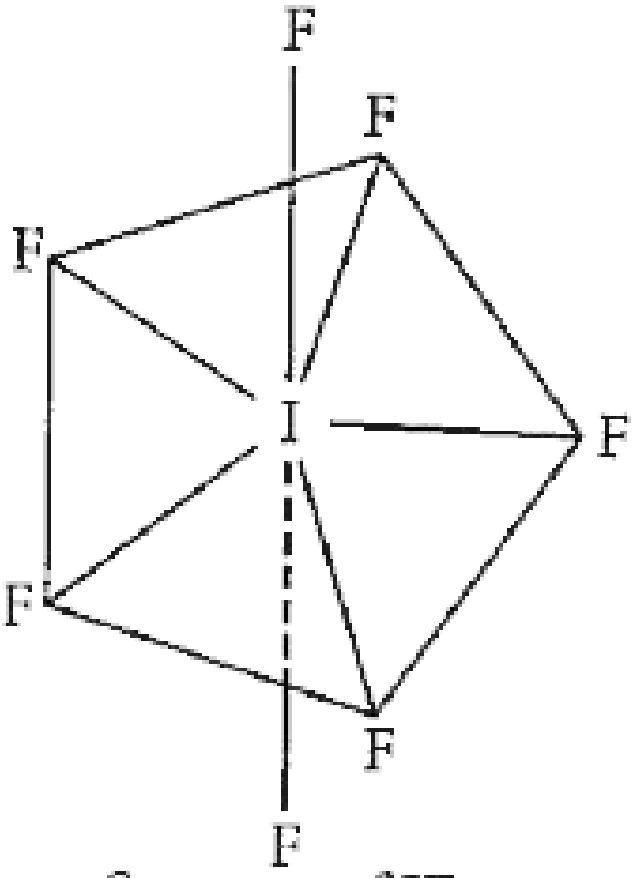
Structure Based Questions

1. The diagram below shows the structure of IF_7 molecule. State the following:



Structure of IF_7

(i) To which class of compounds does IF_7 belong?

(ii) What is the structure of the molecule ?

A. Halides, Square planar structure

B. Coordination compounds, structure tetrahedral

C. Interhalogen compounds, pentagonal bipyramidal structure

D. Halogen compounds, linear structure

Answer: C

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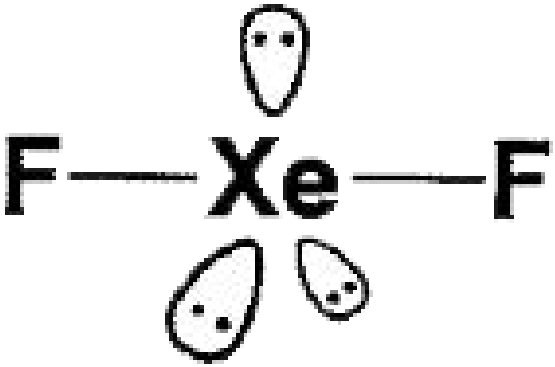
2. The figure below shows the structure of XeF_2 molecule. State the following:



(i) Hybridisation of the central atom.

(ii) Geometry of the molecule

A. sp^3d hybridisation, linear

B. sp^3d^2, pentagonal bipyramidal

C. sp^2, tetrahedral

D. Sp, linear

Answer: A

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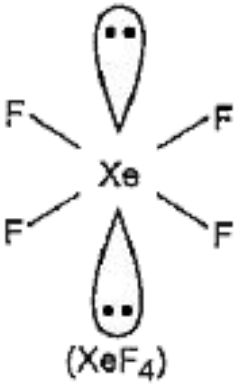
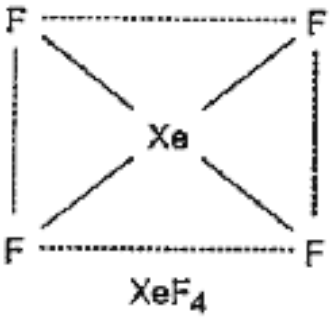
3. The figure below shows the structure of XeF_4 molecule. State the following:





(i) Hybridisation of the central atom.

(ii) Geometry of the molecule

A. sp^3d hybridisation, linear

B. sp^3d^2, pentagonal bipyramidal

C. sp^2, tetrahedral

D. d^2sp^3, square planar

Answer: D

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Assertion Reason Based Questions

1. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: Valency of noble gas is 0.

Reason: Noble gases possess complete octet.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: A

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2. Which among the given processes liberate N_2 gas?

A. Heating NH_4NO_3

B. Heating NH_4N0_2

C. Heating $(NH_4)_2Cr_2O_7$

D. Both B and C

Answer:

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3. Which among the following nitrates evolve NO_2 gas on heating?

A. $Zn(NO_3)_2$

B. Mg(NO_3)_2`

C. $LiNO_3$

D. All of the above

Answer:

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4. Which among the following sulphates evolve SO_3 gas on heating?

A. $FeSO_4$

B. $CuSO_4$

C. $ZnSO_4$

D. All of the above

Answer:

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5. Orthophosphoric acid is treated with ammonium molybdate in presence of HNO_3 to form yellow precipitate of A. Molecular formula of compound A is

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6. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: F_2 has low reactivity.

Reason: F-F bond has high $\Delta_{\text{bond}}H$

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: D

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7. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: Ozone layer in the upper region of atmosphere protects earth from UV radiations of sun.

Reason: Ozone is a powerful oxidising agent as compared to oxygen.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: B

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8. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: S shows paramagnetic nature, when present in vapour state.

Reason: S exists as S_2 in vapour state.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: A

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9. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: F_2 is a strong oxidising agent.

Reason: Electron gain enthalpy of fluorine is less negative.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: B

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10. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: PbI_4 is not a stable compound.

Reason: Iodide stabilizes lower oxidation state.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: C

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11. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: Solubility of noble gases in water decreases with increasing size of the noble gas.

Reason: Solubility of noble gases in water is due to dipole-induced dipole interaction.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true, but reason is not the correct explanation of assertion.

C. If assertion is true, but reason is false.

D. Both assertion and reason are false.

Answer: D

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Source Based Questions

1. Read the passage given below and answer the following question:

The atmosphere is the principal nitrogen reservoir, with over 99% of the total in the form of N_2. Nitrogen in terrestrial system occurs mainly as a constituent in soil organic matter, with litter and soil inorganic nitrogen accounting for the majority (97%). Biomass accounts for just fewer than 3% of this, 95% occurs in plant tissue. Dinitrogen, in dissolved form (N_2, aq), is the most abundant nitrogen form in the world's oceans. Nitrogen also occurs in both inorganic forms (e.g., nitrate, nitrite, ammonia, hydrazine, nitrous oxide, and nitrogen dioxide) and organic forms (e.g., amino acids, amines, and amides). Amino acids are minor but important constituents of dissolved organic content.

The valence shell electronic configuration of group 15 elements is ns^2np^3. Electronic configuration of Bismuth is:

A. $[He]2s^2 2p^5$

B. $[Xe]f^{14}5d^{10}6s^2 6p^3$

C. $[Kr]4d^{10}5s^2 5p^5$

D. $[Ar]3d^{10}4s^2 4p^3$

Answer: B

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2. Read the passage given below and answer the following question:

The atmosphere is the principal nitrogen reservoir, with over 99% of the total in the form of N_2. Nitrogen in terrestrial system occurs mainly as a constituent in soil organic matter, with litter and soil inorganic nitrogen accounting for the majority (97%). Biomass accounts for just fewer than 3% of this, 95% occurs in plant tissue. Dinitrogen, in dissolved form (N_2, aq), is the most abundant nitrogen form in the world's oceans. Nitrogen also occurs in both inorganic forms (e.g., nitrate, nitrite, ammonia, hydrazine, nitrous oxide, and nitrogen dioxide) and organic forms (e.g., amino acids, amines, and amides). Amino acids are minor but important constituents of dissolved organic content.

Ionisation enthalpy decreases down the group 15 because:

A. atomic size increases gradually

B. atomic size decreases gradually

C. atomic size does not change going down the group

D. atomic size decreases slightly

Answer: A

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3. Read the passage given below and answer the following question:

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organic matter, with litter and soil inorganic nitrogen accounting for the majority (97%). Biomass accounts for just fewer than 3% of this, 95% occurs in plant tissue. Dinitrogen, in dissolved form (N_2, aq), is the most abundant nitrogen form in the world's oceans. Nitrogen also occurs in both inorganic forms (e.g., nitrate, nitrite, ammonia, hydrazine, nitrous oxide, and nitrogen dioxide) and organic forms (e.g., amino acids, amines, and amides). Amino acids are minor but important constituents of dissolved organic content.

Which one of the following elements have a unique property to form $p\pi - p\pi$ multiple bonds with itself?

A. Bi

B. As

C. P

D. N

Answer: D

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4. Read the passage given below and answer the following question:

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Which one of the following best describes the types of oxides formed by nitrogen family elements?

A. EO_3 and EO_5

B. E_2O_3 and E_2O_5`

C. E_3O and E_2O

D. EO_5 and E_2O_5

Answer: B

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5. Read the passage given below and answer the following question:

The atmosphere is the principal nitrogen reservoir, with over 99% of the total in the form of N_2. Nitrogen in terrestrial system occurs mainly as a constituent in soil organic matter, with litter and soil inorganic nitrogen accounting for the majority (97%). Biomass accounts for just fewer than 3% of this, 95% occurs in plant tissue. Dinitrogen, in dissolved form (N_2, aq), is the most abundant nitrogen form in the world's oceans. Nitrogen also occurs in both inorganic forms (e.g., nitrate, nitrite,

ammonia, hydrazine, nitrous oxide, and nitrogen dioxide) and organic forms (e.g., amino acids, amines, and amides). Amino acids are minor but important constituents of dissolved organic content.

A thermal decomposition method that yields very pure nitrogen uses the following as reactant(s)

A. barium azide

B. sodium nitride

C. ammonium chloride

D. magnesium nitride

Answer: A

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6. Read the passage given below and answer the following question:

Phosphorus signifies an essential element in molecular biology, yet given the limited solubility of phosphates on early Earth, alternative sources like meteoritic phosphides have been proposed to incorporate phosphorus into biomolecules under prebiotic terrestrial conditions. Here, we report on a previously overlooked source of prebiotic phosphorus from interstellar phosphine (PH_3) that produces key phosphorus oxoacids-phosphoric acid (H_3PO_4), phosphonic acid (H_3PO_3), and pyrophosphoric acid ($H_4P_2O_7$)- in interstellar analog ices exposed to ionizing radiation at temperatures as low as 5 K.

Which one of the following is not an oxoacid of phosphorus

A. polymetaphosphoric acid

B. hypophosphorus acid

C. metapyro phosphoric acid

D. orthophosphoric acid

Answer: C

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7. Read the passage given below and answer the following question:

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have been proposed to incorporate phosphorus into biomolecules under prebiotic terrestrial conditions. Here, we report on a previously overlooked source of prebiotic phosphorus from interstellar phosphine (PH_3) that produces key phosphorus oxoacids-phosphoric acid (H_3PO_4), phosphonic acid (H_3PO_3), and pyrophosphoric acid ($H_4P_2O_7$)- in interstellar analog ices exposed to ionizing radiation at temperatures as low as 5 K.

What is the three-dimensional structure of PCl_3.

A. tetrahedral

B. trigonal bipyramidal

C. planar bipyramidal

D. square planar

Answer: B

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8. Read the passage given below and answer the following question:

Phosphorus signifies an essential element in molecular biology, yet given the limited solubility of phosphates on early Earth, alternative sources like meteoritic phosphides have been proposed to incorporate phosphorus into biomolecules under prebiotic terrestrial conditions. Here, we report on a previously overlooked source of prebiotic phosphorus from interstellar phosphine (PH_3) that produces key phosphorus oxoacids-phosphoric acid (H_3PO_4), phosphonic acid (H_3PO_3), and pyrophosphoric

acid ($H_4P_2O_7$)- in interstellar analog ices exposed to ionizing radiation at temperatures as low as 5 K.

Hypophosphorus acid is a good:

A. oxidising agent

B. drying agent

C. reducing agent

D. fumigating agent

Answer: C

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9. Read the passage given below and answer the following question:

Phosphorus signifies an essential element in molecular biology, yet given the limited solubility of phosphates on early Earth, alternative sources like meteoritic phosphides have been proposed to incorporate phosphorus into biomolecules under prebiotic terrestrial conditions. Here, we report on a previously overlooked source of prebiotic phosphorus from interstellar phosphine (PH_3) that produces key phosphorus oxoacids-phosphoric acid (H_3PO_4), phosphonic acid (H_3PO_3), and pyrophosphoric acid ($H_4P_2O_7$)- in interstellar analog ices exposed to ionizing radiation at temperatures as low as 5 K.

Passing dry chlorine over heated white phosphorus yields:

A. phosphorus chloride

B. phosphorus oxide

C. phosphorus tetrachloride

D. phosphorus trichloride

Answer: D

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10. Read the passage given below and answer the following question:

Phosphorus signifies an essential element in molecular biology, yet given the limited solubility of phosphates on early Earth, alternative sources like meteoritic phosphides have been proposed to incorporate phosphorus into biomolecules under prebiotic terrestrial conditions. Here, we report on a previously overlooked source of prebiotic

phosphorus from interstellar phosphine (PH_3) that produces key phosphorus oxoacids-phosphoric acid (H_3PO_4), phosphonic acid (H_3PO_3), and pyrophosphoric acid ($H_4P_2O_7$)- in interstellar analog ices exposed to ionizing radiation at temperatures as low as 5 K.

Phosphine reacts with hydrobromic acid to give:

A. phosphonium hydroxide

B. phosphonium bromide

C. phosphonic acid

D. phosphorus

Answer: B

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