

## 7.THE P-BLOCK ELEMENTS

### Single Correct Answer Type

1. Which of the following arrangements does not truly represent the property indicated against it?
  - a)  $\text{Br}_2 < \text{Cl}_2 < \text{F}_2$  : Oxidising power
  - b)  $\text{Br} < \text{Cl} < \text{F}$  : Electronegativity
  - c)  $\text{Br} < \text{F} < \text{Cl}$  : Electron affinity
  - d)  $\text{Br}_2 < \text{Cl}_2 < \text{F}_2$ : Bond energy
2. Consider the following reactions in which atoms have been labelled with isotopes (indicated by \*)
  - (I)  $\text{S}^*\text{SO}_3^{2-} + 2\text{H}^+ \rightarrow \text{H}_2\text{SO}_4 + \text{S}$
  - (II)  $\text{Na}_2\text{HgI}_2\text{I}_2^* + 2\text{AgNO}_3 \rightarrow 2\text{AgI} + \text{HgI}_2 + 2\text{NaNO}_3$
 In which case isotopes are equivalent in the products?
  - a) I
  - b) II
  - c) Both I and II
  - d) None of these
3. What does Green Chemistry in terms of environment mean?
  - a) Green house effect
  - b) Reactions related to depletion of ozone layer
  - c) Photosynthetic reactions in plants
  - d) Reduction in the use and production of hazardous chemicals
4. The number of S – S bonds in sulphur trioxide trimer, ( $\text{S}_3\text{O}_9$ ) is
  - a) Three
  - b) Two
  - c) One
  - d) Zero
5. Extra pure  $\text{N}_2$  can be obtained by heating
  - a)  $\text{NH}_3$  with  $\text{CuO}$
  - b)  $\text{NH}_4\text{NO}_3$
  - c)  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$
  - d)  $\text{Ba}(\text{N}_3)_2$
6. Which of the following is not a chalcogen?
  - a) Se
  - b) O
  - c) S
  - d) Na
7. Select the correct statements
  - a) Helium has the lowest melting point and boiling point
  - b) Helium can diffuse through rubber, PVC and even glass
  - c) Ar, Kr and Xe form clathrate
  - d) All the above are correct statements
8. Select the correct statement(s)
  - a)  $\text{Cl}_2\text{O}$  and  $\text{ClO}_2$  are used as bleaching agents and as germicides
  - b)  $\text{I}_2\text{O}_5$  is used in the quantitative estimation of CO
  - c) Bond angle  $\text{XOX}$  varies in the order  $\text{FOF} < \text{ClOCl} < \text{BrOBr}$
  - d) All of the above are correct statements
9. Chlorine dioxide
  - a) Is paramagnetic in nature
  - b) Has odd-electron bond
  - c) Is stable
  - d) Has all the above properties true
10. Of the following acids
  - I. Hypophosphorous acid
  - II. Oxalic acid
  - III. Glycine
  - a) I, II are monobasic, III dibasic and amphoteric
  - b) II monobasic, I dibasic acid, III amphoteric
  - c) I monobasic, II dibasic, III amphoteric
  - d) I, II dibasic, III amphoteric
11. In case of oxygen family (Group 16)
  - a) The tendency for catenation decreases markedly as we go down the group
  - b) Maximum coordination of oxygen is four due to lack of *d*-orbital but that of other elements is six due to presence of *d*-orbital
  - c) The tendency to form multiple bonds with C, N and O decreases as going down the group from S to Te

- d) All of the above are correct statements
12. Dissociation of HI into  $H_2$  and  $I_2$  is
- Kinetically controlled
  - Thermodynamically controlled
  - Kinetically as well as thermodynamically controlled
  - Neither kinetically nor thermodynamically controlled
13. Which is most basic fluoride?
- $XeF_6$
  - $XeF_2$
  - $XeF_4$
  - None is basic, all are acids
14. Which one of the following is not a true "per acid"?
- $HClO_4$
  - $H_2SO_5$
  - $H_2S_2O_8$
  - $H_3PO_5$
15. Maximum coordination number of oxygen in liquid water is
- Two
  - Three
  - Four
  - Five
16.  $ClO_2$  is the anhydride of
- $HOCl$
  - $HClO_2$
  - $HClO_3$
  - $HClO_2$  and  $HClO_3$
17. Which of the following atoms has the highest ionization energy?
- F
  - Cl
  - Br
  - I
18.  $Na_2CO_3$  reacts with  $SO_2$  in alkaline medium to produce
- $Na_2SO_4$
  - $Na_2SO_3$
  - $NaHSO_4$
  - $NaHSO_3$
19.  $HClO_4$ ,  $HNO_3$  and  $HCl$  are all very strong acids in aqueous solution. In glacial acetic acid medium, their acid strength is such that
- $HClO_4 > HNO_3 > HCl$
  - $HNO_3 > HClO_4 > HCl$
  - $HCl > HClO_4 > HNO_3$
  - $HCl > HClO_4 \sim HNO_3$
20. Thermal stability of hydrates of group 18 elements
- Increases down the group
  - Decreases down the group
  - Remains unchanged
  - First increases up to Ar and then decreases
21. "Chlorine-type" laundry bleaches are in reality aqueous solution of
- $HOCl$
  - $HClO_3$
  - $NaClO_3$
  - $NaOCl$
22. Basic character of fluorides increases in the order
- $XeF_6 < XeF_4 < XeF_2$
  - $XeF_2 < XeF_4 < XeF_6$
  - $XeF_2 = XeF_4 < XeF_6$
  - $XeF_2 > XeF_4 < XeF_6$
23. S – S bond is present in
- $\alpha-(SO_3)_n$
  - $\gamma-(S_3O_9)$
  - $H_2S_2O_3$
  - $H_2S_2O_8$
24. An experiment involving absorption of oxygen and its quantitative estimation would involve use of
- Caustic soda
  - Pyrogallol
  - Conc sulphuric acid
  - Turpentine oil
25. Which is/are true statement(s)?
- Basic nature of  $X^-$  is in order  $F^- > Cl^- > Br^- > I^-$
  - HI is strongest acid of HF, HCl, HBr and HI
  - The ionic character of  $M - X$  bond decreases in the order  $M - F > M - Cl > M - Br > M - I$
  - All the above are correct statements
26. Ozone layer is being depleted. This is due to
- No emission from supersonic jets
  - Chlorofluorocarbon used as aerosols
  - Both (a) and (b)
  - None of the above
27. The thermal stability of hydrides of oxygen family is in order
- $H_2Po < H_2Te < H_2Se < H_2S < H_2O$
  - $H_2Po < H_2O < H_2Te < H_2Se < H_2S$
  - $H_2S < H_2O < H_2Te < H_2Se < H_2Po$
  - $H_2O < H_2S < H_2Te < H_2Se < H_2Po$
28. Consider the following compounds  
 I.  $Na_2S_2O_3$     II.  $Na_2S_4O_6$     III.  $CaOCl_2$   
 Among these compounds identify those that have different oxidation states for same type of atoms
- I and III
  - I and III
  - I and II
  - I, II and III
29. The term 'thio' is used in the names of all of the following compounds except
- $Na_2S_2O_3$
  - $NaCS_3$
  - $NaSCN$
  - $Na_2SO_3$

30. Most abundant noble gas in air is  
 a) He                                      b) Ne                                      c) Rn                                      d) Ar
31. A rare gas that was detected in the sun before its discovery on earth is  
 a) He                                      b) Ne                                      c) Ar                                      d) Kr
32. Aqueous hypo solution on reaction with aqueous  $\text{AgNO}_3$  gives  
 a) Yellow ppt changing to black                                      b) White ppt changing to black  
 c) Orange ppt changing to blue                                      d) No ppt
33. Which of the following gas mixture is used by the divers inside the sea?  
 a)  $\text{O}_2 + \text{He}$                                       b)  $\text{O}_2 + \text{Xe}$                                       c)  $\text{O}_2 + \text{Ar}$                                       d)  $\text{O}_2 + \text{N}_2$
34. Which of the following is not oxidised by  $\text{O}_3$ ?  
 a) KI                                      b)  $\text{FeSO}_4$                                       c)  $\text{KMnO}_4$                                       d)  $\text{K}_2\text{MnO}_4$
35. Sulphur dioxide levels in the atmosphere can be reduced by using  
 a) Catalytic converters in industry                                      b) Static electricity to attract it in factory chimneys  
 c) More efficient car-engines                                      d) Low-sulphur fuels
36.  $\text{SO}_2$  behaves as a reducing agent when  
 a) Passed over hot  $\text{CuO}$                                       b) Mixed with moist  $\text{H}_2\text{S}$   
 c) Passed through acidified  $\text{KMnO}_4$  solution                                      d) Passed through  $\text{FeSO}_4$  solution
37.  $\text{FeS} + \text{HCl} \rightarrow \text{A} + \text{B}(\text{g})$   
 Gas B is passed into aqueous solution of C to form A. Select the correct statements based on the above facts  
 a) Colour of C changes from yellow to very light green  
 b) Gas B turns lead acetate paper black  
 c) A form deep blue colour with  $\text{K}_3[\text{Fe}(\text{CN})_6]$   
 d) All the above facts are true
38. Dipole moment and ionization constant are maximum in case of  
 a) HF, HF                                      b) HF, HI                                      c) HI, HF                                      d) HI, HI
39. The compound of sulphur used as a solvent in rubber industry is  
 a)  $\text{SO}_2(\text{OH})\text{Cl}$                                       b)  $\text{SO}_2$                                       c)  $\text{SO}_3$                                       d)  $\text{S}_2\text{Cl}_2$
40. The high oxidizing power of fluorine is due to  
 a) High electron affinity  
 b) High heat of dissociation and low heat of hydration  
 c) Low heat of dissociation and high heat of hydration  
 d) High heat of dissociation and high heat of hydration
41. Which is most thermodynamically stable allotropic form of phosphorus?  
 a) Red                                      b) White                                      c) Black                                      d) Yellow
42. Which one of the following is square planar?  
 a)  $\text{XeF}_4$                                       b)  $\text{XeO}_4$                                       c)  $\text{XeO}_3\text{F}$                                       d)  $\text{XeO}_3\text{F}_2$
43.  $\text{Na}_2\text{S}_2\text{O}_3$  is used in photography for fixing the negative. It removes the  $\text{AgBr}$  by  
 a) Complex formation  $\text{Na}_3[\text{Ag}(\text{S}_2\text{O}_3)_2]$                                       b) Oxidation of  $\text{AgBr}$  to  $\text{Br}_2$   
 c) Reduction of  $\text{AgBr}$  to  $\text{Ag}$                                       d) Formation of double salt
44. Which of the following have highest melting points?  
 a) *p*- block elements                                      b) *s*- block elements                                      c) *d*- block elements                                      d) None of these
45. Match Column I with Column II and select the correct answer using the codes given below the column

| Column I |                | Column II |                      |
|----------|----------------|-----------|----------------------|
| A        | $\text{XeF}_4$ | 1         | Distorted octahedral |
| B        | $\text{XeF}_6$ | 2         | Tetrahedral          |
| C        | $\text{XeO}_3$ | 3         | Square planar        |
| D        | $\text{XeO}_4$ | 4         | Pyramidal            |

Codes

A B C D

- a) 1 2 3 4                                    b) 3 1 4 2  
 c) 1 3 2 4                                    d) 2 4 1 3
46. Which is the strongest oxidizing agent out of the following?  
 a) I<sub>2</sub>                                        b) Cl<sub>2</sub>                                        c) Br<sub>2</sub>                                        d) F<sub>2</sub>
47. SO<sub>2</sub> can reduce  
 a) HClO<sub>3</sub> to HCl                                b) Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup>/H<sup>+</sup> to Cr<sup>3+</sup>                                c) MnO<sub>4</sub><sup>-</sup>/H<sup>+</sup> to Mn<sup>2+</sup>                                d) All of those
48. Cold solution of barium nitrite on mixing with sulphuric acid produces  
 a) BaSO<sub>4</sub> + HNO<sub>2</sub>                                b) BaSO<sub>4</sub> + HNO<sub>3</sub>                                c) BaSO<sub>4</sub> + NO<sub>2</sub>                                d) BaSO<sub>4</sub> + N<sub>2</sub> + O<sub>2</sub>
49. ClO<sub>3</sub> is the mixed anhydride of  
 a) HClO<sub>2</sub> and HClO<sub>3</sub>                                b) HClO<sub>3</sub> and HClO<sub>4</sub>                                c) HClO<sub>2</sub> and HClO<sub>4</sub>                                d) HClO<sub>2</sub> and HClO<sub>3</sub>
50. Oxalic acid on heating with conc. H<sub>2</sub>SO<sub>4</sub> produce  
 a) H<sub>2</sub>O and CO<sub>2</sub>                                b) CO, CO<sub>2</sub> and H<sub>2</sub>O                                c) CO<sub>2</sub> and H<sub>2</sub>S                                d) CO and CO<sub>2</sub>
51. Which of the following gas mixture is used by the divers inside the sea?  
 a) O<sub>2</sub> + He                                        b) O<sub>2</sub> + Xe                                        c) O<sub>2</sub> + Ar                                        d) O<sub>2</sub> + N<sub>2</sub>
52. Ozone reacts with all the following reagents except one of the following  
 a) K<sub>2</sub>MnO<sub>4</sub>                                        b) Moist iodine                                        c) Potassium ferrocyanide                                d) Mercury
53. CH<sub>3</sub>CH<sub>2</sub>OH on reaction with bleaching powder forms  
 a) CHCl<sub>3</sub>                                        b) CCl<sub>3</sub>CHO                                        c) CH<sub>2</sub>ClCHO                                        d) CCl<sub>4</sub>
54. End-product of the hydrolysis of XeF<sub>6</sub> is  
 a) XeF<sub>4</sub>O                                        b) XeF<sub>2</sub>O<sub>2</sub>                                        c) XeO<sub>3</sub>                                        d) XeO<sub>3</sub><sup>-</sup>
55. Out of H<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, H<sub>2</sub>S<sub>4</sub>O<sub>6</sub>, H<sub>2</sub>SO<sub>5</sub> and H<sub>2</sub>S<sub>2</sub>O<sub>8</sub> peroxy acids are  
 a) H<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, H<sub>2</sub>S<sub>4</sub>O<sub>6</sub>                                b) H<sub>2</sub>S<sub>4</sub>O<sub>6</sub>, H<sub>2</sub>SO<sub>5</sub>                                c) H<sub>2</sub>SO<sub>5</sub>, H<sub>2</sub>S<sub>2</sub>O<sub>8</sub>                                d) H<sub>2</sub>S<sub>2</sub>O<sub>3</sub> and H<sub>2</sub>S<sub>2</sub>O<sub>8</sub>
56. The active constituent of bleaching powder is  
 a) Ca(OCl)<sub>2</sub>                                        b) Ca(OCl)Cl                                        c) Ca(ClO<sub>2</sub>)<sub>2</sub>                                        d) Ca(ClO<sub>2</sub>)Cl
57. Liver of sulphur is a mixture of  
 a) Potassium pentasulphide (A) and potassium thiousulphate (B)  
 b) Potassium carbonate (C) and (B) above  
 c) Potassium disulphide (D) and (B) above  
 d) (B) and (D) above
58. Oil of vitriol is  
 a) HNO<sub>3</sub>                                        b) HCl                                        c) H<sub>2</sub>SO<sub>4</sub>                                        d) H<sub>3</sub>PO<sub>4</sub>
59. For advertisement the coloured discharged tubes contain  
 a) He                                        b) Ne                                        c) Ar                                        d) Kr
60. Cl<sub>2</sub> gas is passed into aqueous solution of KBr and KI and CHCl<sub>3</sub> added. It is observed that there is  
 a) Violet colour in CHCl<sub>3</sub> layer                                b) Yellow colour in CHCl<sub>3</sub> layer  
 c) Yellow colour in aqueous layer                                d) Violet colour in CHCl<sub>3</sub> layer
61. The bond angle in OF<sub>2</sub> out of OF<sub>2</sub>, Cl<sub>2</sub>O, Br<sub>2</sub>O is minimum. It is because in case of OF<sub>2</sub>  
 a) Electrons are nearer to fluorine due to high electronegativity of F compared to Cl to Br  
 b) Lone pair-lone pair repulsion decreases bond angle  
 c) Both (a) and (b) are correct  
 d) None of the above is correct
62. Which is the incorrect statement?  
 a) All halogens form oxyacids  
 b) All halogens show -1, +1, +3, +5, +7 oxidation states  
 c) Hydrofluoric acid forms KHF<sub>2</sub> and K<sub>2</sub>F<sub>2</sub> and attacks glass  
 d) Oxidising power is in order F<sub>2</sub> > Cl<sub>2</sub> > Br<sub>2</sub> > I<sub>2</sub>
63. Estimation of ozone can be made quantitatively by  
 a) Decomposition into O<sub>2</sub> and absorption of O<sub>2</sub> into pyrogallol  
 b) Volumetric method using KI and titration of the liberated iodine using hypo solution

- c) Oxidative ozonolysis method  
d) All methods given above
64. Consider the following compounds  
I. Sulphur dioxide                      III. Ozone  
II. Hydrogen peroxide
- Among these compounds, those which can act as bleaching agents would include  
a) I and III                      b) II and III                      c) I and II                      d) I, II and III
65. Least stable oxide of chlorine is  
a)  $\text{Cl}_2\text{O}_4$                       b)  $\text{ClO}_2$                       c)  $\text{Cl}_2\text{O}_7$                       d)  $\text{Cl}_2\text{O}_6$
66. Acid strength of  $\text{HX}$  ( $X = \text{F, Cl, Br, I}$ ) is dependent on  
a) The electronegativity differences of H and X  
b) The tendency of the hydrated molecule to form  $\text{H}^+$   
c) Both (a) and (b)  
d) None of the above
67. All of the following have a tetrahedral shape except  
a)  $\text{SO}_4^{2-}$                       b)  $\text{XeF}_4$                       c)  $\text{ClO}_4^-$                       d)  $\text{XeO}_4$
68. Which have distorted geometry based on VSEPR model?  
a)  $\text{XeF}_2, \text{XeF}_4, \text{XeO}_3$                       b)  $\text{XeOF}_2, \text{XeO}_3, \text{XeF}_2$                       c)  $\text{NH}_3, \text{SO}_2, \text{H}_2\text{O}$                       d) All of these
69. Xenon fluorides acts as fluoride acceptor with  
a)  $\text{RbF}$                       b)  $\text{CsF}$                       c) Both (a) and (b)                      d) None of these
70. When molten sulphur is suddenly cooled by pouring into water, it takes the form of  
a) Milk of sulphur                      b) Colloidal sulphur                      c) Flower of sulphur                      d) Plastic sulphur
71. An important product in the ozone depletion by chlorofluorocarbons is  
a)  $\text{Cl}_2$                       b)  $\text{OCl}$                       c)  $\text{F}_2$                       d)  $\text{O}_2\text{F}_2$
72. Hydrates of helium and neon have not been prepared because of  
a) Low polarisability                      b) Small size                      c) Low boiling point                      d) All of these
73. A bottle completely filled with conc.  $\text{H}_2\text{SO}_4$  is left unstoppered for several days and we observe spontaneous overflow of acid. It is due to  
a) Change in temperature                      b) Hygroscopic nature of  $\text{H}_2\text{SO}_4$   
c) Absorption of air by  $\text{H}_2\text{SO}_4$                       d) Dehydration of  $\text{H}_2\text{SO}_4$
74. Which of the following bonds has the least energy?  
a)  $\text{Se} - \text{Se}$                       b)  $\text{Te} - \text{Te}$                       c)  $\text{S} - \text{S}$                       d)  $\text{O} - \text{O}$
75. Helium accumulates in the earth's crust through  
a)  $\alpha$ -decay of radioactive element                      b) Thermonuclear reactions  
c)  $\beta$ -decay of radioactive element                      d)  $\gamma$ -decay of radioactive element
76. Which reaction is not feasible?  
a)  $2\text{KI} + \text{Br}_2 \rightarrow 2\text{KBr} + \text{I}_2$                       b)  $2\text{KBr} + \text{I}_2 \rightarrow 2\text{KI} + \text{Br}_2$   
c)  $2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2$                       d)  $2\text{H}_2\text{O} + 2\text{F}_2 \rightarrow 4\text{HF} + \text{O}_2$
77. The tetrahedral arrangement of perchlorate ion is due to  
a) Presence of a lone pair of electrons                      b) Trigonal bipyramidal shape of the ion  
c)  $sp^3$  hybridisation                      d)  $sp^2$  hybridisation
78. The inert gas abundantly found in atmosphere is  
a) Kr                      b) He                      c) Ar                      d) Xe
79. The reaction of  $\text{P}_4$  with  $X$  leads selectively to  $\text{P}_4\text{O}_6$  the  $X$  is  
a) dry  $\text{O}_2$                       b) A mixture of  $\text{O}_2$  and  $\text{N}_2$   
c) Moist  $\text{O}_2$                       d)  $\text{O}_2$  in the presence of aqueous  $\text{NaOH}$
80. A considerable part of the harmful UV rays of the sun does not reach the surface of the earth. This is because high above the earth's atmosphere, there is a layer of  
a)  $\text{O}_3$                       b)  $\text{CO}_2$                       c)  $\text{SO}_2$                       d)  $\text{NO}$
81. Oxidative ozonolysis of 2-butene in the presence of Zn or dimethyl sulphide forms

- a)  $\text{CH}_3\text{CHO}$                       b)  $\text{CH}_3\text{COOH}$                       c)  $\text{CO}_2$                       d)  $(\text{CH}_3)_2\text{CO}$
82. The best reducing agent of the following is  
a)  $\text{H}_2\text{S}$                       b)  $\text{Cl}^-$                       c)  $\text{SO}_4^{2-}$                       d)  $\text{O}_3$
83.  $\text{Cl}_2\text{O}$ ,  $\text{Br}_2\text{O}$ ,  $\text{I}_2\text{O}$  have positive value of  $\Delta G$  (free energy) indicating that  
a) These oxides are stable  
b) These oxides are unstable and changes to  $X_2$  and  $\text{O}_2$   
c) These disproportionate into  $X^-$  and  $\text{XO}^-$   
d) These oxides can form interhalogen compounds
84. Inert atmosphere for welding of metals is obtained by  
a) Ar, He                      b)  $\text{N}_2$ , He                      c)  $\text{O}_2$ ,  $\text{N}_2$                       d) Ar,  $\text{N}_2$
85. Yellow oils of sulphur is/are  
a)  $\text{H}_2\text{S}$                       b)  $\text{H}_2\text{S}_2$ ,  $\text{H}_2\text{S}_3$                       c)  $\text{H}_2\text{SO}_4$                       d)  $\text{CS}_2$ ,  $\text{NH}_2\text{CSNH}_2$
86. 10 g of bleaching powder on reaction with KI required 100 mL of 1 N hypo. Thus, % of pure bleaching powder is  
a) 100%                      b) 80%                      c) 63.5%                      d) 35.5%
87. Oxidation of hydrogen halide,  $\text{HX}$  affords a method for the industrial and laboratory preparation of the halogen,  $X_2$ , in the free state in respect of all of the following except  
a) Fluorine                      b) Chlorine                      c) Bromine                      d) Iodine
88. Which of the following gas is insoluble in water?  
a)  $\text{SO}_2$                       b)  $\text{H}_2$                       c)  $\text{NH}_3$                       d)  $\text{CO}_2$
89. The process of obtaining sulphur by the borehole method is called  
a) The Frasch process                      b) The Lablanc process  
c) The Calcaroni process                      d) The Mannheim process
90. Which of the following product is formed by the reaction of sulphur dioxide with chlorine in presence of sunlight?  
a)  $\text{SO}_2\text{Cl}$                       b)  $\text{SO}_2\text{Cl}_2$                       c)  $\text{SOCl}_2$                       d)  $\text{SO}_3\text{Cl}$
91. Which one of the following compounds is not a protonic acid  
a)  $\text{SO}(\text{OH})_2$                       b)  $\text{SO}_2(\text{OH})_2$                       c)  $\text{B}(\text{OH})_3$                       d)  $\text{Po}(\text{OH})_3$
92. Shape of  $\text{O}_2\text{F}_2$  is similar to that of  
a)  $\text{C}_2\text{F}_2$                       b)  $\text{H}_2\text{O}_2$                       c)  $\text{H}_2\text{F}_2$                       d)  $\text{C}_2\text{H}_2$
93. Which of the following has—O—O—linkage?  
a)  $\text{H}_2\text{S}_2\text{O}_6$                       b)  $\text{H}_2\text{S}_2\text{O}_8$                       c)  $\text{H}_2\text{S}_2\text{O}_3$                       d)  $\text{H}_2\text{S}_4\text{O}_6$
94. Select the incorrect statement  
a)  $\text{ClO}_2$  and  $\text{Cl}_2\text{O}$  are used as bleaching agents for paper pulp and textiles  
b)  $\text{OCl}^-$  (hypohalites) salts are used as detergent  
c)  $\text{OCl}^-$  disproportionates in alkaline medium  
d)  $\text{BrO}_3^-$  is oxidized to  $\text{Br}_2$  by  $\text{Br}^-$  in acidic medium
95.  $\text{XeF}_6$  is conducting in the presence of  
a)  $\text{BF}_3$                       b)  $\text{RbF}$                       c)  $\text{HF}$                       d) All of these
96. Select the incorrect statement(s)  
a)  $\text{Cl}_2\text{O}_6$  is diamagnetic in solid state                      b)  $\text{ClO}_3$  is paramagnetic and exists in liquid state  
c)  $\text{Cl}_2\text{O}_6$  is anhydride of  $\text{HClO}_3$                       d)  $\text{ClO}_3$  forms dimer due to unpaired electron
97. In very recent Sunami in Japan, food materials were banned as they were contaminated with radioactivity. Which of the following was found to have radioactive beyond prescribed limit?  
a) F                      b) Cl                      c) I                      d) At
98. For  $\text{H}_3\text{PO}_3$  and  $\text{H}_3\text{PO}_4$  the correct choice is  
a)  $\text{H}_3\text{PO}_3$  is dibasic and reducing                      b)  $\text{H}_3\text{PO}_3$  is dibasic and non-reducing  
c)  $\text{H}_3\text{PO}_3$  is tribasic and reducing                      d)  $\text{H}_3\text{PO}_3$  is tribasic and non reducing
99. Which does not have (S – S) bond?  
a)  $\text{H}_2\text{S}_2\text{O}_3$                       b)  $\text{H}_2\text{S}_2\text{O}_5$                       c)  $\text{H}_2\text{S}_2\text{O}_4$                       d)  $\text{S}_3\text{O}_9$

100. The absorption of UV radiation by  $O_3$
- Protects the inhabitants of our planet from injurious radiation
  - Maintains an equilibrium between the concentrations of  $O_2$  and  $O_3$
  - Makes both the function effective
  - Makes no function effective
101. Acid strength of oxoacids of chlorine is in order
- $HOCl < HClO_2 < HClO_3 < HClO_4$
  - $HClO_4 < HClO_3 < HClO_2 < HOCl$
  - $HClO_3 < HClO_4 < HClO_2 < HOCl$
  - $HClO_2 < HClO_3 < HOCl < HClO_4$
102. Which one of the following is the weakest base as per the Bronsted concept?
- $[ClO_4]^-$
  - $[ClO_3]^-$
  - $[ClO_2]^-$
  - $[ClO]^-$
103.  $H_2S$  precipitates aqueous  $ZnCl_2$  solution in
- Acidic medium
  - Neutral medium
  - Both (a) and (b)
  - None of these
104. Among the following the number of compounds that can react with  $PCl_5$  to give  $POCl_3$  is  $O_2$ ,  $CO_2$ ,  $SO_2$ ,  $H_2O$ ,  $H_2SO_4$ ,  $P_4O_{10}$
- 1
  - 2
  - 3
  - 4
105. Consider the following boron halides
- |              |             |
|--------------|-------------|
| I. $BF_3$    | II. $BCl_3$ |
| III. $BBr_3$ | IV. $BI_3$  |
- The Lewis acid characters of these halides are such that
- $I < II < III < IV$
  - $I < III < II < IV$
  - $IV < III < II < I$
  - $IV < II < III < I$
106. The  $[XeF]^+$  ions are attached to anion  $[AsF_6]^-$
- With a linear F-bridge
  - With an angular F-bridge
  - With H-bond
  - With tetrahedral F-bridge
107. Which of the following can convert acidified  $Cr_2O_7^{2-}$  to green?
- $SO_2/H_2SO_3/H_2SO_4$
  - $SO_3/H_2SO_3/H_2S$
  - $SO_3^{2-}/H_2S/Fe^{2+}$
  - $S_2O_3^{2-}/SO_3/Fe^{3+}$
108. Which of the following will displace the halogen from the solution of the halide?
- $Br_2$  added to  $NaI$
  - $Br_2$  added to  $NaCl$
  - $Cl_2$  added to  $KCl$
  - $Cl_2$  added to  $NaF$
109.  $CaOCl_2 + H_2O + CO_2 \rightarrow CaCO_3 + CaCl_2 + HOCl$
- This reaction is simply
- Oxidation
  - Reduction
  - Redox
  - Hydrolysis in presence of  $CO_2$
110. When water is allowed to freeze in the presence of Ar, Kr or Xe under pressure then
- Atoms of noble gas (G) trapped in the crystal lattice of ice giving clathrates corresponding to the composition  $8G \cdot 26H_2O$
  - These are called noble gas hydrates
  - Both (a) and (b) are correct
  - None of the above is correct
111. There is  $p\pi-d\pi$  multiple bonding in
- $CS_2$
  - $CO_2$
  - $NO_2$
  - NO
112. Among  $CH_4$ ,  $NH_3$  and  $H_2O$ , acidity of  $H_2O$  is maximum because
- Oxygen contains two lone pairs of electrons
  - Bond angle in  $H_2O$  is less than  $109^\circ 28'$  due to VSEPR
  - Oxygen is more electronegative than C or N
  - $H_2O$  is an associated liquid
113. A group 16 element exists in the monoatomic state in metallic lattice. It also exists in two crystalline forms. The metal is
- Sulphur
  - Polonium
  - Selenium
  - Tellurium
114. Consider the following species
- |                 |              |                |
|-----------------|--------------|----------------|
| I. $[O_2]^{2-}$ | II. $[CO]^+$ | III. $[O_2]^+$ |
|-----------------|--------------|----------------|
- Among these species sigma bond alone is present in

- a) I, II, and III                      b) II alone                      c) II and III                      d) I alone
115. When  $\text{Cl}_2$  is passed through cold dil.  $\text{NaOH}$ , the products are  
a)  $\text{NaCl}$ ,  $\text{NaOCl}$  and  $\text{H}_2\text{O}$     b)  $\text{NaCl}$ ,  $\text{NaClO}_2$  and  $\text{H}_2\text{O}$     c)  $\text{NaCl}$ ,  $\text{NaClO}_3$  and  $\text{H}_2\text{O}$     d)  $\text{NaCl}$ ,  $\text{NaClO}_4$  and  $\text{H}_2\text{O}$
116. Consider the following properties of the noble gases  
I. They readily form compounds which are colourless  
II. They generally do not form ionic compounds  
III. They have variable oxidation states in their compounds  
IV. Generally do not form covalent compounds  
Select the correct properties  
a) I, II, III                      b) II, III                      c) I, III                      d) I
117. Which of the following compounds possesses Lewis acid character?  
I.  $\text{BF}_3$                       II.  $\text{SiF}_4$                       III.  $\text{PF}_5$   
Select the correct answer using the codes given below  
**Codes**  
a) I alone                      b) I, II and III                      c) II and III                      d) I and III
118. The interhalogen compound not obtained is  
a)  $\text{ICl}$                       b)  $\text{IF}_5$                       c)  $\text{BrF}_5$                       d)  $\text{BrCl}_7$
119. Hypervalent ion is/are  
a)  $\text{SO}_3^{2-}$                       b)  $\text{PO}_4^{3-}$                       c)  $\text{SO}_4^{2-}$                       d)  $\text{ClO}_4^-$
120. Consider the following transformations  
I.  $\text{XeF}_6 + \text{NaF} \rightarrow \text{Na}^+[\text{XeF}_7]^-$   
II.  $2\text{PCl}_5(\text{s}) \rightarrow [\text{PCl}_4]^+[\text{PCl}_6]^-$   
III.  $[\text{Al}(\text{H}_2\text{O})_6]^{3+} + \text{H}_2\text{O} \rightarrow [\text{Al}(\text{H}_2\text{O})_5\text{OH}]^{2+} + \text{H}_3\text{O}^+$   
Possible transformations are  
a) I, II, III                      b) I, III                      c) I, II                      d) II, III
121. Bleaching of a fabric cloth is done using *A* and excess of chlorine is removed using *B* is  
a)  $\text{CaOCl}_2$ ,  $\text{Na}_2\text{SO}_3$                       b)  $\text{Na}_2\text{S}_2\text{O}_3$ ,  $\text{CaOCl}_2$                       c)  $\text{CaCl}_2$ ,  $\text{Na}_2\text{S}_2\text{O}_3$                       d)  $\text{CaOCl}_2$ ,  $\text{Na}_2\text{S}_2\text{O}_3$
122. Second most abundant element in the universe (after hydrogen) is  
a) Al                      b) Fe                      c) He                      d) Ne
123. In the following  
a)  $\text{CsI}_3$  will ionize to give  $\text{Cs}^+$  and  $\text{I}_3^-$                       b)  $\text{RbICl}_2$  will give  $\text{RbCl}$  and  $\text{ICl}$   
c)  $\text{KBrICl}$  will give  $\text{KCl}$  and  $\text{IBr}$                       d) All of the above are correct
124. Which is/are true statements?  
a) Sulphur trioxide exists as cyclic trimer in solid state,  $\text{S}_3\text{O}_9$   
b) Selenium trioxide solid is a cyclic tetramer,  $\text{Se}_4\text{O}_{12}$   
c)  $\text{TeO}_3$  is a solid with a network structure in which  $\text{TeO}_6$  octahedra share all vertices  
d) All of the above are correct
125.  $\text{S}_2\text{O}_3^{2-}$  has  
a) S – S linkage  
b) S – O linkage  
c) Both (a) and (b)  
d) None of these
126. Which of the underlined atoms in oxyacids have  $sp^3$  hybridised atoms?  
a)  $\text{H}\underline{\text{C}}\text{ClO}_4$ ,  $\text{H}_2\underline{\text{S}}\text{O}_4$ ,  $\text{H}\underline{\text{N}}\text{O}_2$     b)  $\text{H}_2\underline{\text{S}}\text{O}_4$ ,  $\text{H}_3\underline{\text{P}}\text{O}_4$ ,  $\text{H}\underline{\text{N}}\text{O}_3$     c)  $\text{H}\underline{\text{C}}\text{ClO}_4$ ,  $\text{H}_2\underline{\text{S}}\text{O}_4$ ,  $\text{H}_2\underline{\text{S}}\text{O}_5$     d)  $\text{H}\underline{\text{C}}\text{ClO}_4$ ,  $\text{H}\underline{\text{N}}\text{O}_3$ ,  $\text{H}\underline{\text{C}}\text{ClO}_3$
127. Select the correct statement(s) regarding behavior of HF as non- aqueous solvent  
a)  $\text{HCl}$  behaves as an acid and HF as a base  
b)  $\text{HClO}_4$  behaves as a base and HF as an acid  
c)  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  behave as base and HF as an acid  
d) All of the above are correct statements
128. Which one is the strongest bond?



- a) Br – F                      b) F – F                      c) Cl – F                      d) Br – Cl
129. Bleaching powder is disinfectant for purification of water when water born germs are killed. But disinfectant activity is destroyed. It is due to its disproportion into  
a)  $\text{CaCl}_2$  and  $\text{Cl}_2$                       b)  $\text{CaCl}_2$  and  $\text{Ca}(\text{ClO}_3)_2$                       c)  $\text{CaO}$  and  $\text{Cl}_2$                       d)  $\text{CaO}$ ,  $\text{Cl}_2$  and  $\text{CaCl}_2$
130. The colour of the red glass in traffic signals is due to  
a)  $\text{Sb}_2\text{S}_3$                       b)  $\text{HgI}_2$                       c)  $\text{CdS}$                       d)  $\text{CdSe}$
131. Molecule(s) possessing two-centre two electron bonds and three centre-four electron bonds would include  
a)  $\text{B}_2\text{H}_6$  and  $\text{SiF}_4$                       b)  $\text{XeF}_6$  and  $\text{BF}_6$                       c)  $\text{B}_2\text{H}_6$  and  $\text{XeF}_6$                       d)  $\text{B}_2\text{H}_6$  alone
132. Which of the following is used in vulcanization of rubber?  
a)  $\text{SF}_6$                       b)  $\text{CF}_4$                       c)  $\text{Cl}_2\text{F}_2$                       d)  $\text{C}_2\text{F}_2$
133. Alkali ozonides are  
a) Paramagnetic in nature  
b) Hydrolytically unstable and decompose to superoxides  
c) Decreasing in stability as size of alkali metal decreases  
d) Having all the above statements as correct
134.  $\text{XeF}_2$  forms .....with  $\text{AsF}_5$   
a)  $\text{XeF}^+$  cation and  $\text{AsF}_4^+$                       b)  $\text{XeF}_2^-$  anion and  $\text{AsF}_4^+$   
c)  $\text{AsF}_4^+$  cation and  $\text{AsF}_6^-$                       d)  $\text{XeF}^+$  cation and  $\text{AsF}_6^-$  anion
135. In the presence of  $\text{H}_2\text{O}$ ,  $\text{SO}_2$  acts as  
a) An oxidizing agent                      b) A reducing agent                      c) A hydrolyzing agent                      d) A redox reagent
136. Which one will liberate  $\text{Br}_2$  from  $\text{KBr}$ ?  
a)  $\text{I}_2$                       b)  $\text{SO}_2$                       c)  $\text{HI}$                       d)  $\text{Cl}_2$
137. Iodine test is shown by  
a) Glucose                      b) Starch                      c) Glycogen                      d) Polypeptide
138. In the preparation of  $\text{HBr}$  or  $\text{HI}$ ,  $\text{NaX}$  ( $X = \text{Br}, \text{I}$ ) is treated with  $\text{H}_3\text{PO}_4$  and not by conc.  $\text{H}_2\text{SO}_4$  and since  
a)  $\text{H}_2\text{SO}_4$  makes the reaction reversible                      b)  $\text{H}_2\text{SO}_4$  oxidises  $\text{HX}$  to  $\text{X}_2$  ( $\text{Br}, \text{I}$ )  
c)  $\text{Na}_3\text{PO}_4$  is water soluble                      d)  $\text{Na}_2\text{SO}_4$  is water soluble
139. Which of the following species have undistorted octahedral structures?  
I.  $\text{SF}_6$                       II.  $\text{PF}_6^-$                       III.  $\text{SiF}_6^{2-}$                       IV.  $\text{SeF}_6$   
Select the correct answer using the codes given below  
a) II, III and IV                      b) I, III and IV                      c) I, II and III                      d) I, II and IV
140. The gas not absorbed by coconut charcoal is  
a) He                      b) Ne                      c) Ar                      d) Kr
141. Electron affinity is positive, when  
a) O changes into  $\text{O}^-$                       b)  $\text{O}^-$  changes into  $\text{O}^{2-}$   
c) O changes into  $\text{O}^+$                       d) Electron affinity is always negative
142. Which of the following can be used as dehydrating agents?  
a) Conc.  $\text{H}_2\text{SO}_4$                       b)  $\text{POCl}_3$                       c)  $\text{P}_2\text{O}_5$                       d) All of these
143. Which of the following statements are correct for all three halogens ( $X$ ), Cl, Br and I?  
a) They all need to gain one electron to acquire stable configuration  
b) They all form strong acid of the type  $\text{HX}$   
c) Both (a) and (b) are correct  
d) None of the above is correct
144. Which is thermochromic?  
a)  $\text{S}_4\text{N}_4$                       b)  $\text{B}_3\text{N}_3\text{H}_6$                       c)  $\text{S}_8$                       d) None of these
145. Which of the following has peroxy linkage?  
a)  $\text{H}_2\text{S}_2\text{O}_3$                       b)  $\text{H}_2\text{SO}_5$                       c)  $\text{H}_2\text{S}_2\text{O}_7$                       d)  $\text{H}_2\text{S}_4\text{O}_6$
146. Neon lamps are used in botanical gardens and in green houses as they  
a) Provides oxygen                      b) Provide better light

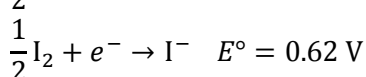
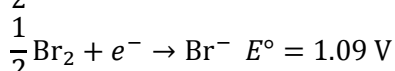
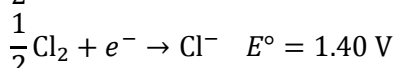
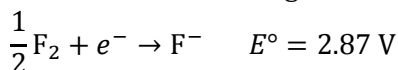
- c) Stimulate growth of plants  
d) None of the above
147. Aqueous solutions of hydrogen sulphide and sulphur dioxide when mixed together yield  
a) Sulphur trioxide and water  
b) Sulphur and sulphuric acid  
c) Sulphur and water  
d) Hydrogen peroxide and sulphur
148. The correct order of O – O bond length in  $O_2$ ,  $H_2O_2$ , and  $O_3$  is  
a)  $H_2O_2 > O_3 > O_2$   
b)  $O_2 > H_2O_2 > O_3$   
c)  $O_3 > H_2O_2 > O_2$   
d)  $O_2 > O_3 > H_2O_2$
149. When an article is bleached by  $SO_2$  it loses its colour. The colour can be restored by  
a) Exposure to air  
b) Heating  
c) Dilution  
d) None of these
150. Acid strength of oxoacids of halogen is in order  
a)  $HOCl > HOBr > HOI$   
b)  $HOI > HOBr > HOCl > HOF$   
c)  $HOI > HOCl > HOBr > HOF$   
d)  $HOCl > HOBr > HOI > HOF$
151. Inter-halogen compounds can be  
a)  $ICl_3$   
b)  $BrF_5$   
c)  $IF_7$   
d) All of these
152. Select the correct statement(s)  
a)  $O_3$  molecule is resonance stabilized  
b) There is 3-centre, 4-electron  $\pi$ -bond system in  $O_3$   
c) Ozone layer is being depleted by fluorocarbons  
d) All the above are correct statements
153. Which has peroxy linkage?  
a) Perchloric acid  
b) Hypochlorous acid  
c) Para perchloric acid  
d) None of these
154. The compound which has no reaction with  $KMnO_4$  is  
a) Perdisulphuric acid  
b) Sulphurous acid  
c) Hydrogen sulphide  
d) Hydrogen peroxide
155. Which is the best fluorinating agent?  
a)  $XeF_2$   
b)  $XeF_4$   
c)  $XeF_6$   
d)  $XeO_2F_2$
156. Which one of the following oxoacids of chlorine is the least oxidizing in nature?  
a)  $HClO$   
b)  $HClO_2$   
c)  $HClO_3$   
d)  $HClO_4$
157. Which of the following is not known?  
a)  $XeF_6$   
b)  $XeF_4$   
c)  $KrF_6$   
d)  $Cs_2XeF_6$
158. Bleaching powder contains  
a)  $CaO$  and  $Cl_2$  molecules  
b)  $Ca^{2+}$  and  $OCl_2^{2-}$  ions  
c)  $Ca^{2+}$ ,  $Cl^-$  and  $OCl^-$  ions  
d)  $Ca^{2+}$ ,  $O^{2-}$  ions and  $Cl_2$  molecule
159. Which one of the following acid possesses oxidising, reducing and complex forming properties?  
a)  $HNO_3$   
b)  $HCl$   
c)  $H_2SO_4$   
d)  $HNO_2$
160. Xenon fluorides acts as fluoride donor with  
a)  $AsF_3$   
b)  $BF_3$   
c)  $HF$   
d) All of these
161. In  $SO_3^{2-}$   
a)  $d\pi-p\pi$  bond between S and O is delocalised  
b) Bonds between S and O are equivalent  
c) There is  $sp^3$  hybridised sulphur atom  
d) All of the facts given above are true
162. Tincture of iodine is  
a)  $CHI_3$  in alcohol  
b)  $I_2$  in alcohol  
c)  $I_2$  in  $KI$   
d)  $CHI_3$  in  $KI$
163. The formula for calcium chlorite is  
a)  $Ca(ClO_4)_2$   
b)  $Ca(ClO_3)_2$   
c)  $CaClO_2$   
d)  $Ca(ClO_2)_2$
164. The mixture of concentrated  $HCl$  and  $HNO_3$  made in 3:1 ratio contains  
a)  $ClO_2$   
b)  $NOCl$   
c)  $NCl_3$   
d)  $N_2O_4$
165. The greater reactivity of  $F_2$  is due to  
a) Lower electron affinity of F  
b) Lower bond energy of F – F bond  
c) Higher electronegativity of F  
d) Gaseous state of  $F_2$
166. Which has maximum  $pK_a$  value?  
a)  $H_2O$   
b)  $H_2S$   
c)  $H_2Se$   
d)  $H_2Te$
167. To a piece of charcoal sulphuric acid is added. Then

- a) There is no reaction  
c) SO<sub>2</sub> and CO<sub>2</sub> evolved

- b) Water gas is formed  
d) CO and SO<sub>2</sub> are evolved

### Multiple Correct Answers Type

168. Base on the  $E^\circ$  values gives



- a) Oxidizing power of F<sub>2</sub> is maximum  
c) Oxidizing power is in order F<sub>2</sub> > Cl<sub>2</sub> > Br<sub>2</sub> > I<sub>2</sub>  
169. Which of the following statements is/are correct?  
a) He<sub>II</sub> has much lower entropy  
b) Transition of He<sub>I</sub> to He<sub>II</sub> takes place, across the line  $\lambda - \lambda' = 2.2\text{K}$   
c) It has very high viscosity  
d) He<sub>II</sub> is unique liquid that exhibits superconductivity

170. Helium is used

- a) As a refrigerant (in liquid form) in low-temperature physics  
b) As a substituent for nitrogen in the breathing gas for deep-sea divers  
c) In radiation therapy  
d) In fluorescent tubes

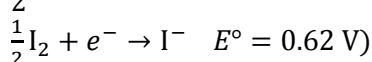
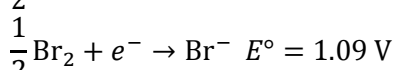
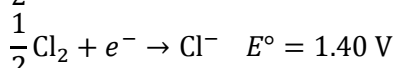
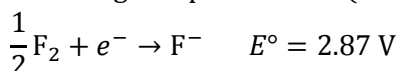
171. Complete hydrolysis of XeF<sub>2</sub> gives

- a) HF  
b) O<sub>2</sub>  
c) XeOF<sub>2</sub>  
d) Xe

172. Select the correct statement(s)

- a) Chile saltpetre (NaNO<sub>3</sub>) is a main source of I<sub>2</sub>  
b) IO<sub>3</sub><sup>-</sup> is reduced to I<sup>-</sup> and which in turn oxidized to I<sub>2</sub> by IO<sub>3</sub><sup>-</sup> in acidic medium  
c) Anhydrous HF is a non-conductor of electricity  
d) F<sub>2</sub> is obtained by electrolysis of molten KHF<sub>2</sub>

173. CHCl<sub>3</sub> and H<sub>2</sub>O form two separate immiscible layers Br<sub>2</sub>(orange) and I<sub>2</sub>(violet) are soluble in organic layer due to a greater extent. In test tube A (KI + CHCl<sub>3</sub> + H<sub>2</sub>O) and test tube B (KI + KBr + CHCl<sub>3</sub> + H<sub>2</sub>O) Cl<sub>2</sub> gas is passed then (Base on the  $E^\circ$  values gives



- a) Organic layer in A appear violet  
b) Organic layer in B appear orange  
c) Organic layer in B appear violet  
d) Organic layer in B first appear violet then orange
174. Concentrated sulphuric acid is
- a) Oxidising agent  
b) Hygroscopic  
c) Efflorescent  
d) Sulphonating agent
175. Select the correct statement(s)
- a) Colours of the halogens (F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, I<sub>2</sub>) in the gas phase are complimentary colours

- b) Colour is due to transition of an electron from the highest occupied  $\pi^*$  molecular orbital to the lowest unoccupied  $\sigma^*$  molecular orbital
- c)  $\text{ClO}_2$  is paramagnetic due to unpaired electrons
- d)  $\text{ClO}_2$  dimerises to  $\text{Cl}_2\text{O}_4$  as  $\text{NO}_2$  dimerises to  $\text{N}_2\text{O}_4$
176. Pyrophosphorous acid,  $\text{H}_4\text{P}_2\text{O}_5$
- a) Is dibasic acid
- b) Contains P in + 5 oxidation state
- c) Contains one P – O – P bond
- d) Is strongly reducing in nature
177. In the structure of
- a)  $\text{IF}_2^+$ , bond angle is smaller than the tetrahedral angle because of lone-pair lone pair repulsion
- b)  $\text{IF}_4^+$ , there is  $sp^3$  hybridisation with bond angle of  $109^\circ 28'$
- c)  $\text{IF}_6^+$ , there are six bonding electrons and no lone pairs
- d)  $\text{IF}_4^+$ , two F-atoms one at equatorial positions and two are inclined at an angle less than  $120^\circ$  due to lone pair-bond pair repulsion
178. Select the correct statement(s)
- a)  $\text{p}K_a$  value of HI (strongest halogen acid) is most negative
- b) High H – F bond strength makes H – F a weak acid in dilute aqueous solution
- c) Halogen forms clathrates by freezing solution in water
- d)  $K_a$  values of HX is in order of  $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$
179. Which of the following statements is/are correct?
- a)  $\text{XeF}_2$  is linear molecule
- b)  $\text{XeF}_2$  has square planar structure
- c)  $\text{XeF}_4$  is linear molecule
- d)  $\text{XeF}_4$  has square planar structure
180. In the conversion of  $\text{Br}^-$  to  $\text{BrO}_2^-$
- a) There is anodic oxidation in basic solution
- b) Equivalent mass of  $\text{Br}^-$  is 20 (atomic weight of Br = 80)
- c) There is anodic oxidation in acidic medium
- d) There is cathodic reduction in basic solution
181.  $sp^2$  hybridization is involved in the molecules of
- a) CO
- b)  $\text{SO}_3$
- c)  $\text{CO}_2$
- d)  $\text{SO}_2$
182. White phosphorus ( $\text{P}_4$ ) has
- a) P – P – P angle of  $60^\circ$
- b) Six P – P single bond
- c) Four P – P single bond
- d) Four lone pairs of electrons
183. Which of the following statement is incorrect?
- a)  $\text{B}_2$  is paramagnetic,  $\text{C}_2$  is also paramagnetic
- b)  $\text{O}_2$  is paramagnetic,  $\text{O}_3$  is also paramagnetic
- c)  $\text{O}_2$  is paramagnetic,  $\text{O}_3$  is diamagnetic
- d) Different observation is found in their bond lengths increase when  $\text{NO} \rightarrow \text{NO}^+$
184. Select the correct statement(s) about the  $\text{XeF}_4$
- a) They are thermodynamically stable
- b) Xe – F bond energy is very high
- c) They are endothermic compounds
- d) They are exothermic compounds
185. Which are correct statements?
- a) All halogens form oxoacids
- b) All halogens show –1, +1, +3, +5, +7 oxidation glass
- c) Hydrofluoric acid forms  $\text{KHF}_2$  and  $\text{K}_2\text{F}_2$  and attacks glass
- d) Oxidizing power is in order  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$
186. Oxidising agent(s) is/are
- a)  $\text{XeF}_2$
- b)  $\text{XeF}_4$
- c)  $\text{XeF}_6$
- d)  $\text{XeOF}_4$
187. Fractional evaporation of liquid argon under reduced pressure gives
- a) Rn
- b) Ne
- c) Kr
- d) Xe

188. In the conversion of  $\text{BrO}_3^-$  to  $\text{BrO}_4^-$
- There is no change in oxidation number
  - Reduction takes place in basic solution
  - Reaction also takes place by  $\text{XeF}_2$
  - Equivalent mass of  $\text{BrO}_3^-$  is one-half of ionic mass
189. Select the correct statement(s). Bond order of
- $\text{He}_2$  is zero
  - $\text{He}_2^+$  is 0.5
  - $\text{He}_2^{2+}$  is 1.0
  - $\text{Be}_2$  is zero
190. Which practical is/are supposed to be correct?
- Preparation of  $\text{XeF}_6$  in glass or quartz apparatus
  - Storing of HF in glass or quartz apparatus
  - Storing of  $\text{HNO}_3$  in Al vessel
  - Storing of NaOH in Al vessel
191. Which is/are Lewis acid as well as Lewis base (amphoteric)?
- $\text{XeF}_2$
  - $\text{XeF}_4$
  - $\text{XeF}_6$
  - $\text{XeF}_6^{2-}$
192. The correct statement(s) about  $\text{O}_3$  is (are)
- O – O bond length are equal
  - Thermal decomposition of  $\text{O}_3$  is endothermic
  - $\text{O}_3$  is diamagnetic in nature
  - $\text{O}_3$  has a bent structure
193. The unbalanced chemical reactions given in Column I show missing reagent or condition (?) which are provided in Column II. Match Column I with Column II and select the correct answer using the code given below the Column

|    | Column I  |    | Column II     |
|----|---|----|---------------|
| P. | $\text{PbO}_2 + \text{H}_2\text{SO}_4 \xrightarrow{?}$<br>$\text{PbSO}_4 + \text{O}_2 +$<br>other product     | 1. | NO            |
| Q. | $\text{Na}_2\text{S}_2\text{O}_3 + \text{H}_2\text{O} \xrightarrow{?}$<br>$\text{NaHSO}_4 +$ other<br>product | 2. | $\text{I}_2$  |
| R. | $\text{N}_2\text{H}_4 \xrightarrow{?}$ $\text{N}_2 +$<br>other product  | 3. | Warm          |
| S. | $\text{XeF}_2 \xrightarrow{?}$ $\text{Xe} +$ other<br>product   | 4. | $\text{Cl}_2$ |

#### Codes

P Q R S

a) 4 2 3 1

c) 1 4 2 3

b) 3 2 1 4

d) 3 4 2 1

194. Select the correct statement(s)
- $\text{ClO}_2$  and  $\text{Cl}_2\text{O}$  are used as bleaching agents for paper pulp and textiles
  - $\text{OCl}^-$  salts are used as detergents
  - $\text{OCl}^-$  disproportionates in alkaline medium
  - $\text{BrO}_3^-$  is oxidized to  $\text{Br}_2$  by  $\text{Br}^-$  in acidic medium
195. Select the correct statement(s)
- The noble gases are present to the extent of about 1% in the earth's atmosphere, the chief component being argon
  - Helium is the second most abundant element in the universe after hydrogen
  - There are two stable isotopes of helium  ${}^3_2\text{He}$ ,  ${}^4_2\text{He}$
  - ${}^4_2\text{He}$  is formed by thermonuclear fusion reaction in stars
- $$4 {}^1_1\text{H} \rightarrow {}^4_2\text{He} + 2 {}^0_1\text{e}$$
196. In the following reaction,
- $$\text{XeF}_2 + \text{BrO}_3^- + \text{H}_2\text{O} \rightarrow \text{BrO}_4^- + \text{Xe} + 2\text{HF}$$
- $\text{XeF}_2$  is an oxidizing agent
  - $\text{XeF}_2$  is a reducing agent
  - $\text{BrO}_3^-$  is oxidized to  $\text{BrO}_4^-$
  - $\text{XeF}_2$  is reduced to HF

197. Which of the following is present in an electric discharge tube containing helium?  
a)  $\text{He}^{2+}$                       b)  $\text{He}_2$                       c)  $\text{H}^+$                       d)  $\text{He}^+$

**Assertion - Reasoning Type**

This section contain(s) 0 questions numbered 198 to 197. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1  
b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1  
c) Statement 1 is True, Statement 2 is False  
d) Statement 1 is False, Statement 2 is True

198

**Statement 1:** Among chalcogens, tendency of catenation is maximum for sulphur.

**Statement 2:** S-S bond dissociation energy is higher than O-O bond dissociation energy.

199

**Statement 1:** The van der Waals' forces are directly proportional to the ionisation potentials

**Statement 2:** Van der Waals' forces increase as the size and diffuseness of the electron clouds increase

200

**Statement 1:**  $\text{PCl}_5$  is covalent in gaseous and liquid states but ionic in solid state

**Statement 2:**  $\text{PCl}_5$  in solid state consists of tetrahedral  $\text{PCl}_5^+$  cation and octahedral  $\text{PCl}_6^-$  anion

201

**Statement 1:** Helium and beryllium have similar outer electronic configuration of the type  $ns^2$

**Statement 2:** Helium and beryllium both are chemically inert

202

**Statement 1:** Oxygen is more electronegative than sulphur, yet  $\text{H}_2\text{S}$  is acidic, while  $\text{H}_2\text{O}$  is neutral

**Statement 2:** H – S bond is weaker than O – H bond

203

**Statement 1:**  $\text{OF}_2$  is named as oxygen difluoride.

**Statement 2:** Oxygen is less electronegative than fluorine.

204

**Statement 1:** White phosphorus is more reactive than red phosphorus.

**Statement 2:** Red phosphorus consists of  $\text{P}_4$  tetrahedral units linked to one another to form linear chains.

205

**Statement 1:** Helium is the only substance that can't be solidified at atmospheric pressure

**Statement 2:** The zero point energy of helium is very high

206

**Statement 1:** Red phosphorus is less volatile than white phosphorus

**Statement 2:** Red phosphorus has a discrete tetrahedral structure

207

**Statement 1:** The ionization energy of gallium remains nearly same as that of aluminium.

**Statement 2:** This is due to shielding of outer shell electrons from the nucleus by the d electrons of gallium.

208

**Statement 1:** All the noble gases have  $ns^2np^6$  electronic configuration in their outermost shell

**Statement 2:** In noble gases all the energy levels which are occupied are completely filled

209

**Statement 1:** The aqueous solution of  $XeF_2$  is powerful oxidizing agent

**Statement 2:** The hydrolysis of  $XeF_2$  is slow in dilute acid but rapid in basic solution

210

**Statement 1:** Liquid  $NH_3$  is used for refrigeration.

**Statement 2:** Liquid  $NH_3$  does not vaporize quickly.

211

**Statement 1:** Ozone is a powerful oxidizing agent in comparison to  $O_2$

**Statement 2:** Ozone is diamagnetic but  $O_2$  is paramagnetic

212

**Statement 1:**  $PCl_5$  and  $PbCl_4$  are thermally unstable

**Statement 2:** They produce same gas on thermal decomposition

### Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

213. Match list I (Molecules) with list II (Boiling points) and select the correct answer

**Column-I**

**Column- II**

- |                    |          |
|--------------------|----------|
| (A) $\text{NH}_3$  | (p) 290K |
| (B) $\text{PH}_3$  | (q) 211K |
| (C) $\text{AsH}_3$ | (r) 186K |
| (D) $\text{SbH}_3$ | (s) 264K |
| (E) $\text{BiH}_3$ | (t) 240K |

**CODES :**

|           | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> | <b>E</b> |
|-----------|----------|----------|----------|----------|----------|
| <b>a)</b> | r        | q        | t        | s        | p        |
| <b>b)</b> | t        | r        | q        | r        | p        |
| <b>c)</b> | p        | s        | t        | q        | p        |
| <b>d)</b> | p        | q        | r        | s        | p        |

214. Match molecules/ions (in Column I) with their shapes (in Column II)

|     | <b>Column-I</b>    | <b>Column- II</b> |
|-----|--------------------|-------------------|
| (A) | $\text{ClF}_3$     | (p) Square planar |
| (B) | $[\text{PCl}_4]^+$ | (q) T-shaped      |
| (C) | $\text{XeF}_4$     | (r) Tetrahedral   |
| (D) | $\text{XeO}_3$     | (s) Pyramidal     |

**CODES :**

|           | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----------|----------|----------|----------|----------|
| <b>a)</b> | b        | a        | d        | c        |
| <b>b)</b> | c        | a        | b        | d        |
| <b>c)</b> | b        | c        | a        | d        |
| <b>d)</b> | d        | c        | a        | b        |

215. Match the compounds (in Column I) with the structures (in Column II)

|     | <b>Column-I</b> | <b>Column- II</b>        |
|-----|-----------------|--------------------------|
| (A) | $\text{XeF}_4$  | (p) Distorted octahedral |
| (B) | $\text{XeF}_6$  | (q) Tetrahedral          |
| (C) | $\text{XeO}_3$  | (r) Square planar        |
| (D) | $\text{XeO}_4$  | (s) Pyramidal            |

**CODES :**



|           | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----------|----------|----------|----------|----------|
| <b>a)</b> | c        | a        | d        | b        |
| <b>b)</b> | d        | c        | a        | b        |
| <b>c)</b> | a        | b        | d        | c        |
| <b>d)</b> | b        | d        | a        | c        |

216. All the compounds listed in Column I react with water. Match the result of the respective reactions with the appropriate option listed in Column II

| <b>Column-I</b>                           | <b>Column- II</b>             |
|---|-------------------------------|
| <b>(A)</b> $(\text{CH}_3)_2\text{SiCl}_2$ | (p) Hydrogen halide formation |
| <b>(B)</b> $\text{XeF}_4$                 | (q) Redox reaction            |
| <b>(C)</b> $\text{Cl}_2$                  | (r) Reacts with glass         |
| <b>(D)</b> $\text{VCl}_5$                 | (s) Polymerization            |
|   | (t) $\text{O}_2$ formation    |

**CODES :**

|           | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----------|----------|----------|----------|----------|
| <b>a)</b> | a        | a,b,e    | a,b,c,d  | b        |
| <b>b)</b> | a,d      | a,b,c,d  | a,b,e    | a        |
| <b>c)</b> | a        | a, d     | a,b,e    | a,b,c,d  |
| <b>d)</b> | a,b,e    | a,b,c,d  | a        | a, d     |

217. Match the acids (in Column I) with number of acid salts formed by them (in Column II)

| <b>Column-I</b>                  | <b>Column- II</b> |
|----------------------------------|-------------------|
| <b>(A)</b> Hypophosphorous acid  | (p) Two           |
| <b>(B)</b> Orthophosphorous acid | (q) Zero          |
| <b>(C)</b> Orthophosphoric acid  | (r) One           |
| <b>(D)</b> Mellitic acid         | (s) Five          |

**CODES :**

|           | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----------|----------|----------|----------|----------|
| <b>a)</b> | b        | c        | a        | d        |
| <b>b)</b> | c        | a        | b        | d        |
| <b>c)</b> | a        | b        | d        | c        |
| <b>d)</b> | b        | d        | a        | c        |

218. Match the types of glass (in Column I) with their characteristics (in Column II)

| Column-I                           | Column- II                       |
|------------------------------------|----------------------------------|
| (A) Alumino –silicate glass        | (p) Very high transparency       |
| (B) Calcium –alkali silicate glass | (q) Cheap laboratory glass-wares |
| (C) Lead glass                     | (r) Optical glass                |
| (D) Soda glass                     | (s) Domestic glass for window    |
|                                    | (t) Low coefficient of expansion |

**CODES :**

|    | A | B | C | D |
|----|---|---|---|---|
| a) | A | b | c | d |
| b) | e | d | c | b |
| c) | e | d | b | c |
| d) | d | b | e | c |

219. Match the compounds (in Column I) with the structures (in Column II)

| Column-I     | Column- II             |
|--------------|------------------------|
| (A) $P_4$    | (p) Crown              |
| (B) $S_8$    | (q) Dimer              |
| (C) $AlCl_3$ | (r) Tetrahedral        |
| (D) $PCl_5$  | (s) Linear             |
|              | (t) Trigonal bipyramid |

**CODES :**

|    | A | B | C | D |
|----|---|---|---|---|
| a) | c | d | a | c |
| b) | a | b | c | e |
| c) | c | e | a | b |
| d) | c | a | b | e |

### Linked Comprehension Type

This section contain(s) 19 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

**Paragraph for Question Nos. 220 to -220**

Due to the presence of two lone pairs of electrons on the central atom, hydrides of this group elements have

bent (V) shapes. The central atom in these hydrides is  $sp^3$  hybridized. Due to strong H-bonding m.p. and bp. of hydride of oxygen are very high. On moving down the group, the covalent character increases. This can be explained on the basis of Fajans rule, which states that the tendency to form covalent bonds increases as the size of the anion  $M^{2-}$  increases. As the size of the atom in  $H_2M$  increases, the strength of H – M bond decreases, Hence, the tendency to release hydrogen as proton increases down the group

220. Bond angle is minimum for

- a)  $H_2Se$                       b)  $H_2S$                       c)  $H_2Te$                       d)  $H_2O$

#### Paragraph for Question Nos. 221 to - 221

The trihalides of this group elements are predominantly covalent and have pyramidal structures, with a lone pair of electrons in the fourth orbital. Except  $NE_3$  and  $PF_3$ , the trihalides are readily hydrolysed by water. They are Lewis bases because of the presence of lone pair of electrons. Due to absence of  $d$ -orbitals in its valence shell, nitrogen does not form pentahalides, while P, As and Sb form pentahalides due to unsymmetrical shape where some bond angles are of  $90^\circ$  and other are of  $120^\circ$ .  $PCl_5$  is not very stable. It behave as a good chlorinating agent

221. Which of the following compound is not known?

- a)  $NCl_5$                       b)  $NI_3$                       c)  $SbCl_3$                       d)  $NCl_3$

#### Paragraph for Question Nos. 222 to - 222

The noble gases have closed shell electronic configuration and are monatomic gases under normal conditions. The low boiling points of the lighter noble gases are due to weak dispersion forces between the atoms and the absence of other interactions. Xenon reacts directly only with  $F_2$  and gives compound from oxidation states II to VIII are known.  $XeF_4$  and  $XeF_6$  are violently hydrolysed by water to give stable aqueous solution of  $XeO_3$

222.  $XeF_6$  on reaction with  $XeO_3$  gives

- a)  $XeO_2F_2$                       b)  $XeOF_2$                       c)  $Xe$                       d)  $XeOF_4$

#### Paragraph for Question Nos. 223 to - 223

It is difficult to liquify noble gases as their atoms are held by weak van der Waals' forces. Noble gases have stable  $ns^2np^6$  fully filled electronic configuration, so, ionisation energy of noble gases is very high. They are slightly soluble in water. Their solubility generally increases with the increases in atomic number. The m. p and b. p. increases from He to Rn because of increase in magnitude of van der Waals' forces

223. Which of the following noble gases is the least polarizable?

- a) Ne                      b) Ar                      c) He                      d) Xe

#### Paragraph for Question Nos. 224 to - 225

Peroxydisulphuric acid and its salts are powerful oxidizing agents, thus can be used to estimate reducing agents and also to study the kinetics of the reaction

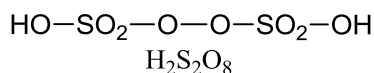
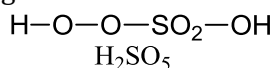
Answer the following questions

224. Peroxydisulphuric acid

- a) Is also called Marshall's acid  
b) Has two peroxy linkages  
c) Liberates I<sub>2</sub> with KI in a fast reaction  
d) Has oxidation number of sulphur as +7

**Paragraph for Question Nos. 225 to - 226**

Two acids have been derived from H<sub>2</sub>O<sub>2</sub> by replacing H by (SO<sub>2</sub>OH) group. Both the acids have one peroxy linkage H – O – O – H



Based on the above study answer the following questions

225. Which is called Marshall's acid and which is called Caro's acid?

- a) H<sub>2</sub>SO<sub>5</sub>, H<sub>2</sub>S<sub>2</sub>O<sub>8</sub>      b) H<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, H<sub>2</sub>SO<sub>5</sub>      c) H<sub>2</sub>SO<sub>5</sub>, H<sub>2</sub>S<sub>2</sub>O<sub>7</sub>      d) H<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, H<sub>2</sub>SO<sub>5</sub>

**Paragraph for Question Nos. 226 to - 227**

Sodium thiosulphate is the laboratory reagent used in iodometric and iodimetric titration. This also finds used in photography

Based on the above passage , answer the following questions

226. If I<sub>2</sub> is the titre in a titration A and I<sub>2</sub> is formed in situ in a titration B, then these are respectively

- a) Iodometric, iodimetric      b) Iodimetric, Iodometric  
c) Both Iodimetric      d) Both Iodometric

**Paragraph for Question Nos. 227 to - 228**

When metallic copper is heated with conc. sulphuric acid , various types of products are formed depending on standard reduction potential

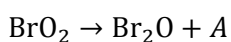
Answer the following questions based on the above study

227. Which reaction is possible?

- a)  $\text{Cu} + 2\text{H}^+ \rightarrow \text{Cu}^{2+} + \text{H}_2$       b)  $\text{Cu}^{2+} + \text{H}_2 \rightarrow \text{Cu} + 2\text{H}^+$   
c) Both (a) and (b)      d) None of the above

**Paragraph for Question Nos. 228 to - 228**

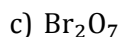
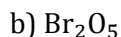
Consider the following change,



BrO<sub>2</sub> and A are formed by the change of equal number oxidation number

Based on this change, answer the following questions

228. Oxide A could be

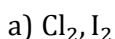
**Paragraph for Question Nos. 229 to - 229**

This question concerns the elements of Group 17 – fluorine, chlorine, bromine and iodine

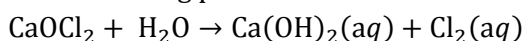
When sodium chloride is treated with concentrated sulphuric acid, a colourless gas,  $X$ , which fumes in moist air, is formed. When sodium iodide is treated in the same way a coloured vapour,  $Y$ , is product

If 90% phosphoric(v) acid is used instead of sulphuric acid, a colourless gas is produced in each reaction

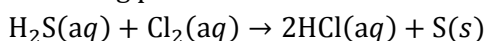
229. Gases  $X$  and  $Y$  are respectively

**Paragraph for Question Nos. 230 to - 230**

Water pollution can be by dissolved gases. Bad smell of water is due to  $\text{H}_2\text{S}$  and can be removed by treatment with bleaching powder

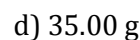
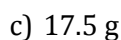
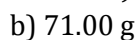
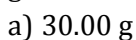


Bleaching powder

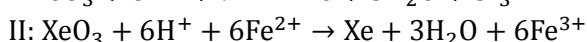
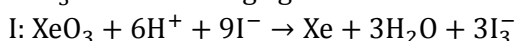


Based on the above treatment answer the following questions

230. If  $\text{H}_2\text{S}$  content of contaminated water is 22 ppm by mass,  $\text{Cl}_2$  required to remove all the  $\text{H}_2\text{S}$  from 200 gallons of water (1 gallon = 3.785 L) is

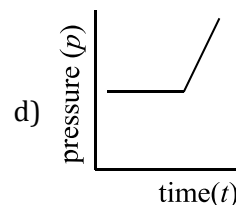
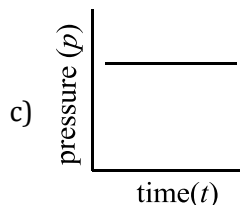
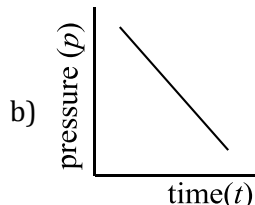
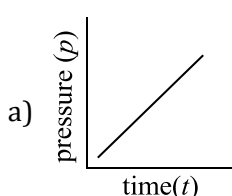
**Paragraph for Question Nos. 231 to - 231**

$\text{XeO}_3$  is an oxidizing agent and this can be used to estimate reducing agents

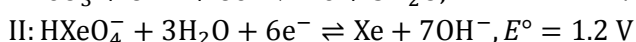
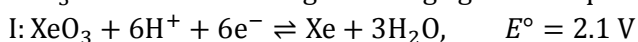


Answer the following questions

231. Reaction can be studied by measuring pressure of the reaction mixture with time variation can be of the type

**Paragraph for Question Nos. 232 to - 232**

$\text{XeO}_3$  is one of the strong oxidising agents in aqueous media :



Answer the following questions

232. Which reaction is more spontaneous theoretically?  
 a) I                                      b) II                                      c) Both equally                      d) Can't be predicted

**Paragraph for Question Nos. 233 to - 233**

Bleaching powder and bleach solution are produced on a large scale and used in several house hold products. The effectiveness of bleach solution is often measured by iodometry

233. 25 mL of household bleach solution was mixed with 30 mL of 0.50 M KI and 10 mL of 4 N acetic acid. In the titration of the liberated iodine, 48 mL of 0.25 N  $\text{Na}_2\text{S}_2\text{O}_3$  was used to reach the end point. The molarity of the household bleach solution, is  
 a) 0.48 M                                      b) 0.96 M                                      c) 0.24 M                                      d) 0.024 M

**Paragraph for Question Nos. 234 to - 234**

The reaction of  $\text{Cl}_2$  gas with cold-dilute and hot concentrated NaOH in water give sodium salts of two (different) oxoacids of chlorine, *P* and *Q* respectively. The  $\text{Cl}_2$  gas reacts with  $\text{SO}_2$  gas, in the presence of charcoal, to give a product *R*. *R* reacts with white phosphorus to give a compound *S*. On hydrolysis, *S* gives an oxoacid of phosphorus *T*

234. *P* and *Q* respectively, are the sodium salts of  
 a) Hypochlorous and chloric acids                                      b) Hypochlorous and chlorous acids  
 c) Chloric and perchloric acid    d) Chloric and hypochlorous acids

**Integer Answer Type**

235. In the following reaction ,  
 $\text{XeO}_3 + 6\text{H}^+ + 6\text{Fe}^{2+} \rightarrow \text{Xe} + 3\text{H}_2\text{O} + 6\text{Fe}^{2+}$   
 equivalent mass of  $\text{XeO}_3 = \frac{\text{molar mass}}{\dots\dots}$
236.  $\text{Cl}_2$  disproportionates to  $\text{Cl}^-$  and species *A* such that equivalent mass of  $\text{Cl}_2$  is 71. Thus, oxidation number of chlorine in species *A* is .....
237. How many of the following can be the oxidizing agent?  
 $\text{H}_2\text{S}, \text{H}_2\text{SO}_4, \text{H}_2\text{SO}_3, \text{H}_2\text{S}_2\text{O}_3$
238. How many S – S bonds are there in  $\text{S}_3\text{O}_9$ ?
239. For inert gases  $\frac{C_p}{C_v} = \frac{5}{\dots}$
240. Bond -order of  $\text{He}_2^{2+}$  is .....
241. How many lone-pairs and bond-pairs are present in  $\text{IF}_7$ ?
242.  $\text{ClO}_2$  is paramagnetic due to ..... unpaired electron(s)
243.  $\text{O}_2$  is paramagnetic due to ..... unpaired electrons
244.  $\text{CaOCl}_2$  (bleaching powder) has two types chlorine with different oxidation numbers . Sum of oxidation number is .....
245.  $\text{SO}_2$  turns lime water milky, 3.2 g of  $\text{SO}_2$  gives milkyness ..... g
246. In  $\text{XeF}_4$  there are ..... lone pairs of electron
247. Number of electrons forming bond between Cl and O in  $\text{ClO}_2$  is .....
248. Reaction of  $\text{Br}_2$  with  $\text{Na}_2\text{CO}_3$  in hot aqueous solution gives sodium bromide and sodium bromate with the

- evolution of  $\text{CO}_2$  gas. The number of sodium bromide molecules involved in the balanced chemical equation is .....
249. In the following reaction ,  
 $\text{XeF}_2 + \text{BrO}_3^- + \text{H}_2\text{O} \rightarrow \text{Xe} + \text{BrO}_4^- + 2\text{HF}$   
 equivalent mass of  $\text{BrO}_3^- = \frac{\text{molar mass}}{\dots\dots}$
250. Total number of hybrid orbitals in  $\text{XeO}_3$  is .....
251. Maximum oxidation state shown by sulphur in its compound is.....
252. *s*-character in  $\text{XeO}_4$  is 1/ ..... of total hybrid orbitals
253. Out of F, Cl, Br, I, Xe, Ne, O, how many forms compounds with positive oxidation state?
254. How many of them are water insoluble?  
 $\text{AgF}, \text{AgCl}, \text{AgBr}, \text{AgI}, \text{CaF}_2, \text{BaSO}_4$
255. How many lone- pairs are present in  $\text{ClI}_3$ ?
256. How many SOS angles are there in  $\text{S}_3\text{O}_9$ ?
257.  $\text{ClO}_2$  has odd-electron bonds. How many electrons are involved in (Cl – O) bond?
258.  $\text{SO}_2$  reduces  $\text{Cr}_2\text{O}_7^{2-}$  to  $\text{Cr}^{3+}$ ; change in oxidation number of Cr is.....
259. There is also formation of insoluble  $\text{CuS}$  (black) when copper reacts with conc.  $\text{H}_2\text{SO}_4$ . What is change in oxidation number of sulphur?
260. Maximum acidic character is shown by the oxyacids of halogens with oxidation number of halogens as .....
261. How many of the following  
 have peroxy linkages?  
 $\text{H}_2\text{S}_2\text{O}_3, \text{H}_2\text{S}_2\text{O}_8, \text{H}_2\text{SO}_5, \text{CrO}_5, \text{BaO}_2, \text{KO}_2$
262. 500 mL of chlorine contaminated water is treated with KI and mixture required 100 mL of 0.01 M hypo. What is concentration of  $\text{Cl}_2$  in millimoles per litre?
263.  $\text{Br}^-$  and  $\text{BrO}_x^-$  in acidic medium forms  $\text{Br}_2$  where  $x =$
264.  $\text{XeF}_6$  reacts with quartz forming  $\text{XeO}_3$   
 $2\text{XeF}_6 + x\text{SiO}_2 \rightarrow$   
 What is the value of ?
265. Acid rain is due to dissolved non-mettalic oxides ( $\text{SO}_2, \text{NO}_2, \text{P}_2\text{O}_5$ , etc). 10 mL of acid rain sample required 5 mL of 0.01 M  $\text{Ca}(\text{OH})_2$  for making it neutral. What is pH of acid rain?
266. Ozonolys is of 2, 5 –dimethyl -2, 4-hex-diene gives total number of carbonyl compounds.....
267. How many of the following have underlined atoms in different oxidation state s?  
 $\text{K}_2\text{Hg}\underline{\text{I}}_4, \text{CaO}\underline{\text{Cl}}_2, \text{Na}_2\underline{\text{S}}_2\text{O}_3, \text{Na}_2\underline{\text{S}}_4\text{O}_6,$   
 $\text{H}_2\underline{\text{S}}\text{O}_5, \text{H}_2\underline{\text{S}}_2\underline{\text{O}}_8, \text{Cr}\underline{\text{O}}_5, \underline{\text{I}}_3^-$
268. 6.35 of impure bleaching powder paste is mixed with KI and  $\text{I}_3^-$  formed required 50 mL of 0.1 M hypo in neutral medium. Thus % purity of bleaching powder is.....
269. Number phases in the following equilibrium is  
 $\text{Ra}(\text{s}) \rightarrow \text{Rn}(\text{g}) + \text{He}(\text{g})$
270.  $3\text{Cl}_2 + x\text{NaOH} \rightarrow \text{NaCl} + \text{NaClO}_3$ ,  $x$  is.....
271. Electrons left in the valence shell when Xe is converted to  $\text{XeF}_6$  is .....
272.  $\text{XeF}_4$  disproportionates in aqueous solution to  $\text{Xe}(0)$  and  $\text{Xe}(\text{VI})$ .  $\text{Xe}(\text{VI})$  is formed from which oxidation state (.....)
273. Out of the following how many have Xe in  $sp^3d$  hybridisation?  $\text{XeF}_2, \text{XeF}_4, \text{XeF}_6, \text{XeOF}_2, \text{XeO}_3$
274. There are equal number of sulphur atoms in thiosulphuric acid, Marshall's acid and oleum. This number is.....
275.  $^{35}_{17}\text{Cl}$  and  $^{37}_{17}\text{Cl}$  are two isotopes of chlorine in mass ratio of 3:  $x$  where  $x =$ .....
276. One mole of  $\text{SO}_2\text{Cl}_2$  on hydrolysis gives acids which can be neutralized by ..... moles of NaOH
277.  $A(\text{s})$  changes to  $B(\text{s})$  in a nuclear reaction by  
 ${}_zA(\text{s}) \rightarrow {}_{z-8}B(\text{s})$   
 Emission of  $\alpha$ -particles only. Pressure exerted per unit volume in a closed vessel at temperature  $T$  K after two half-life was  $x RT$ . What is value of  $x$ ?

278. Number of series of salts formed by hydrofluoric acid is .....
279.  $\text{SO}_2$  reduces  $\text{MnO}_4^-$  to  $\text{Mn}^{2+}$ . Number of electrons involved in the reduction of  $\text{MnO}_4^-$  to  $\text{Mn}^{2+}$  is .....
280. There are total of .....  $\pi$ -bonds in  $\text{XeO}_3$
281. How many of the following have Cl atom in  $sp^3$  hybridised state?  
 $\text{ClO}_2, \text{Cl}_2\text{O}, \text{Cl}_2\text{O}_7, \text{Cl}_2\text{O}_6, \text{ClO}_4^-$
282. There are two types of sulphur with different oxidation states in thiosulphate ion. Difference in oxidation states is .....
283. 4.35 g of pyrolusite ( $\text{MnO}_2$  mineral) is digested with conc. HCl and KI added. Mixture required 5 mL of 1 M  $\text{Na}_2\text{S}_2\text{O}_3$  solution for complete reaction of  $\text{KI}_3$  formed. What is % of pure  $\text{MnO}_2$  in pyrolusite? (Mn = 55)



7.THE P-BLOCK ELEMENTS

**: ANSWER KEY :**

|        |        |        |        |             |             |             |        |
|--------|--------|--------|--------|-------------|-------------|-------------|--------|
| 1) d   | 2) b   | 3) d   | 4) d   | 161) d      | 162) b      | 163) d      | 164) b |
| 5) d   | 6) d   | 7) d   | 8) d   | 165) b      | 166) a      | 167) c      | 1) b   |
| 9) d   | 10) c  | 11) d  | 12) a  | a,c         | 2) a,b,d    | 3) a,b      | 4) b   |
| 13) b  | 14) a  | 15) c  | 16) d  | a,b,d       |             |             |        |
| 17) a  | 18) b  | 19) a  | 20) a  | 5) a,b,c,d  | 6) a,c      | 7) a,b,d    | 8) b   |
| 21) a  | 22) a  | 23) c  | 24) b  | a,b,c       |             |             |        |
| 25) d  | 26) c  | 27) a  | 28) d  | 9) a,c,d    | 10) a,c,d   | 11) a,b,c,d | 12) d  |
| 29) d  | 30) a  | 31) a  | 32) b  | a,d         |             |             |        |
| 33) a  | 34) c  | 35) d  | 36) c  | 13) a,b     | 14) b,d     | 15) a,b,d   | 16) d  |
| 37) d  | 38) b  | 39) d  | 40) c  | a,b,d       |             |             |        |
| 41) c  | 42) a  | 43) a  | 44) a  | 17) a,b,d   | 18) c,d     | 19) a,b,c,d | 20) d  |
| 45) b  | 46) d  | 47) d  | 48) a  | b,c,d       |             |             |        |
| 49) b  | 50) b  | 51) a  | 52) b  | 21) a,b,c,d | 22) a,b,c,d | 23) c       | 24) c  |
| 53) a  | 54) c  | 55) c  | 56) b  | 25) a,c,d   | 26) d       | 27) a,c,d   | 28) d  |
| 57) d  | 58) c  | 59) b  | 60) a  | a,b,d       |             |             |        |
| 61) a  | 62) b  | 63) b  | 64) c  | 29) a,c     | 30) a,c,d   | 1) a        | 2) d   |
| 65) a  | 66) c  | 67) b  | 68) d  | 3) b        | 4) c        |             |        |
| 69) c  | 70) d  | 71) b  | 72) d  | 5) a        | 6) a        | 7) b        | 8) a   |
| 73) b  | 74) b  | 75) a  | 76) b  | 9) c        | 10) a       | 11) d       | 12) b  |
| 77) c  | 78) b  | 79) b  | 80) a  | 13) a       | 14) b       | 15) b       | 1) b   |
| 81) a  | 82) a  | 83) b  | 84) a  | 2) c        | 3) a        | 4) b        |        |
| 85) b  | 86) c  | 87) a  | 88) b  | 5) a        | 6) b        | 7) d        | 1) c   |
| 89) a  | 90) b  | 91) c  | 92) b  | 2) a        | 3) a        | 4) c        |        |
| 93) b  | 94) a  | 95) d  | 96) c  | 5) a        | 6) b        | 7) b        | 8) b   |
| 97) c  | 98) a  | 99) a  | 100) c | 9) c        | 10) b       | 11) d       | 12) a  |
| 101) a | 102) a | 103) b | 104) d | 13) a       | 14) c       | 15) a       | 1) 6   |
| 105) a | 106) a | 107) c | 108) a | 2) 1        | 3) 2        | 4) 0        |        |
| 109) d | 110) c | 111) a | 112) c | 5) 3        | 6) 1        | 7) 7        | 8) 1   |
| 113) b | 114) d | 115) a | 116) b | 9) 2        | 10) 0       | 11) 6       | 12) 2  |
| 117) a | 118) d | 119) d | 120) a | 13) 3       | 14) 5       | 15) 2       | 16) 4  |
| 121) d | 122) c | 123) d | 124) d | 17) 6       | 18) 4       | 19) 5       | 20) 5  |
| 125) c | 126) c | 127) c | 128) c | 21) 2       | 22) 3       | 23) 3       | 24) 6  |
| 129) b | 130) d | 131) d | 132) a | 25) 8       | 26) 7       | 27) 4       | 28) 1  |
| 133) d | 134) d | 135) b | 136) d | 29) 3       | 30) 3       | 31) 2       | 32) 3  |
| 137) b | 138) b | 139) d | 140) a | 33) 6       | 34) 5       | 35) 2       | 36) 6  |
| 141) b | 142) d | 143) c | 144) a | 37) 0       | 38) 8       | 39) 2       | 40) 2  |
| 145) b | 146) c | 147) c | 148) a | 41) 1       | 42) 4       | 43) 3       | 44) 2  |
| 149) a | 150) b | 151) d | 152) d | 45) 5       | 46) 3       | 47) 5       | 48) 8  |
| 153) d | 154) a | 155) c | 156) d | 49) 5       |             |             |        |
| 157) c | 158) c | 159) a | 160) d |             |             |             |        |

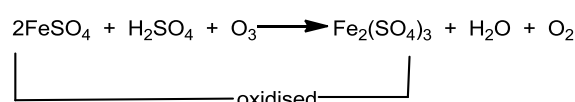
**: HINTS AND SOLUTIONS :**

- 1 **(d)**  
 $F_2 < Br_2 < Cl_2$
- 5 **(d)**  
 $Ba(N_3)_2 \rightarrow Ba(s) + 3N_2(g)$   
 Azide salt of barium can be obtained in purest form as well as the decomposition product contain solid Ba as by product alongwith gaseous nitrogen hence to additional step of separation is required.  
 Other reaction are  
 $NH_4NO_3 \xrightarrow{Heat} N_2O + 2H_2O$   
 $2NH_3 + 3CuO \xrightarrow{Heat} 3Cu + 3H_2O + N_2$   
 $(NH_4)_2Cr_2O_7 \xrightarrow{Heat} Cr_2O_3 + 4H_2O + N_2$
- 6 **(d)**  
 Oxygen family elements (O, S, Se, Te, Po) are called chalcogen
- 10 **(c)**  
 $H_3PO_2 \rightleftharpoons H^+ + H_2PO_2^-$   
 Monobasic, as only one  $H^+$  attached to O-atom
- $$\begin{array}{c} O \\ || \\ H-P-O-H \leftarrow \text{(Ionisable } H^+ \text{ ion)} \\ | \\ H \end{array}$$
- $$\begin{array}{c} O \\ || \\ C-O-H \leftarrow \\ | \\ C-O-H \leftarrow \text{(two } H^+ \text{ attached to O-atoms)} \\ || \\ O \end{array}$$
- dibasic
- $$\begin{array}{l} CH_2-NH_2 \text{] basic} \\ | \\ COOH \text{] acidic} \end{array} \text{ thus amphoteric}$$
- 14 **(a)**  
 $H_2SO_5$  ] peroxy sulphuric acid  
 $H_2S_2O_8$  ] peroxy disulphuric acid have peroxy linkage  
 $H_3PO_5$  ] peroxy phosphoric acid linkage  
 $HClO_4$  perchloric acid] no peroxy linkage
- 16 **(d)**  
 $HClO_2 + HClO_3 \rightarrow 2ClO_2 + H_2O$
- 17 **(a)**  
 Being smallest in size
- 18 **(b)**  
 $Na_2CO_3 + 2H_2O \rightarrow 2NaOH + H_2CO_3$   
 $2NaOH + SO_2 \rightarrow Na_2SO_3 + H_2O$
- 24 **(b)**

Pyrogallol dissolves  $O_2$ 

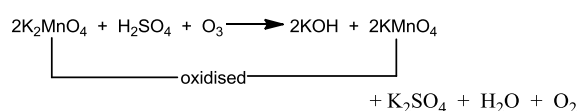
- 32 **(b)**  
 $2AgNO_3 + Na_2S_2O_3 \rightarrow Ag_2S_2O_3 + 2NaNO_3$   
 White  
 $Ag_2S_2O_3 + H_2O \rightarrow Ag_2S + H_2SO_4$   
 black

- 34 **(c)**
- (a)  
 $2KI + H_2O + O_3 \longrightarrow 2KOH + O_2 + I_2$   
 [ ] oxidised
- (b)

(c)  $KMnO_4 + O_3 \rightarrow$  no reaction

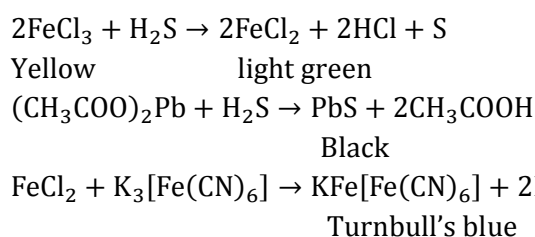
Because in  $KMnO_4$ , oxidation state of Mn is +7. Hence, it is the highest oxidation state of Mn, so  $KMnO_4$  is not oxidized by ozone.

(d)



- 36 **(c)**  
 $2MnO_4^- + 5SO_2 + 2H_2O \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 4H^+$

- 37 **(d)**  
 $FeS + 2HCl \rightarrow FeCl_2 + H_2S$   
 A B



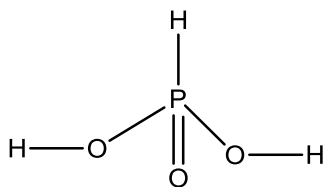
- 41 **(c)**  
 Black phosphorous is highest thermodynamic stable form in red, black, white and yellow allotropic forms of phosphorus because its

ignition temperature is highest hence it is inert and has a layer structure.

- 43 **(a)**  
 $\text{AgBr} + 2\text{Na}_2\text{S}_2\text{O}_3 \rightarrow \text{Na}_3[\text{Ag}(\text{S}_2\text{O}_3)_2] + \text{NaBr}$
- 47 **(d)**  
 $\text{HClO}_3 + \text{e}^- \xrightarrow{\text{H}^+} \text{HCl}$   
 $\text{Cr}_2\text{O}_7^{2-} + \text{e}^- \xrightarrow{\text{H}^+} \text{Cr}^{3+}$   
 $\text{MnO}_4^- + \text{e}^- \xrightarrow{\text{H}^+} \text{Mn}^{2+}$
- 48 **(a)**  
 $\text{Ba}(\text{NO}_2)_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HNO}_2$
- 49 **(b)**  
 $\text{HClO}_3 + \text{HClO}_4 \rightarrow 2\text{ClO}_3 + \text{H}_2\text{O}$
- 50 **(b)**  
 $\text{H}_2\text{SO}_4$  is dehydrating agent  
 $\begin{array}{c} \text{COOH} \\ | \\ \text{COOH} \end{array} \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CO} + \text{CO}_2 + \text{H}_2\text{O}$
- 53 **(a)**  
 $\text{CaOCl}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{Cl}_2$   
 $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow 2\text{HCl} + \text{O}$   
 $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{O (oxidn)}} \text{CH}_3\text{CHO}$   
 $\text{CH}_3\text{CHO} + 3\text{Cl}_2 \rightarrow \text{CCl}_3\text{CHO} + \text{HCl}$   
 $\text{CCl}_3\text{CHO} + \text{Ca}(\text{OH})_2 \rightarrow \text{CHCl}_3 + (\text{HCOO})_2\text{Ca}$
- 54 **(c)**  
 $\text{XeF}_6 \rightarrow \text{XeOF}_4 \rightarrow \text{XeO}_2\text{F}_2 \rightarrow \text{XeO}_3$
- 58 **(c)**  
 $\text{H}_2\text{SO}_4$  is the side produced in the extraction of Cu from  $\text{CuSO}_4$  called blue- vitriol
- 60 **(a)**  
 $2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2$   
 $\text{Br}_2$  also oxidizes KI to  $\text{I}_2$  forming violet layer in  $\text{CHCl}_3$   
 $2\text{KI} + \text{Br}_2 \rightarrow 2\text{KBr} + \text{I}_2$   
violet
- 62 **(b)**  
 Fluorine shows only (-1) oxidation state
- 63 **(b)**  
 $\text{KI} + \text{H}_2\text{O} + \text{O}_3 \rightarrow \text{I}_2 + \text{KOH} + \text{O}_2$   
 $\text{I}_2 + 2\text{Na}_2\text{S}_2\text{O}_3 \rightarrow 2\text{NaI} + \text{Na}_2\text{S}_4\text{O}_6$
- 64 **(c)**  
 $\text{H}_2\text{O}_2$  and  $\text{SO}_2$  are bleaching agent  
 $\text{PbS} + 4\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$   
 Black White  
 $\text{SO}_2 + 2\text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3 + 2\text{H}$   
Bleaching property
- 67 **(b)**  
 $\text{SO}_4^{2-}$ ,  $\text{ClO}_4^-$ ,  $\text{XeO}_4$  – tetrahedral  
 $\text{XeF}_4$  –  $sp^3d^2$
- 69 **(c)**  
 $\text{RbF}$  or  $\text{CsF} + \text{XeF}_4 \rightarrow [\text{Rb}]^+[\text{XeF}_5]^-$

- 74 **(b)**  
 Bond- energy decreases going down the group  
 $\text{Te} - \text{Te} < \text{Se} - \text{Se} < \text{S} - \text{S} < \text{O} - \text{O}$
- 75 **(a)**  
 ${}^{226}_{88}\text{Ra} \rightarrow {}^{222}_{86}\text{Rn} + {}^4_2\text{He}$
- 76 **(b)**  
 Oxidising power of  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$
- 79 **(b)**  
 White phosphorus on reaction with limited supply of oxygen gives lower oxide  $\text{P}_4\text{O}_6$ . Therefore, air ( $\text{O}_2 + \text{N}_2$ ) is a good source for controlled supply of oxygen and the best choice for controlled oxidation of white phosphorus into lower oxide  $\text{P}_4\text{O}_6$ .
- 81 **(a)**  
 $\text{CH}_3\text{CH} = \text{CHCH}_3 \xrightarrow[\text{H}_2\text{O}]{\text{O}_3/\text{Zn}} 2\text{CH}_3\text{CHO}$   
 $\text{H}_2\text{O}_2$  is formed as side product when reacts with Zn or DMS and thus further oxidation of  $\text{CH}_3\text{CHO}$  to  $\text{CH}_3\text{COOH}$  is prevented
- 83 **(b)**  
 $2\text{X}_2\text{O} \rightarrow 2\text{X}_2 + \text{O}_2$
- 86 **(c)**  
 $\text{CaOCl}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{Cl}_2$   
 $\text{Cl}_2 + 2\text{KI} \rightarrow 2\text{KCl} + \text{I}_2$   
 $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow 2\text{NaI} + \text{Na}_2\text{S}_4\text{O}_6$   
 $\text{CaOCl}_2 \equiv \text{Cl}_2 \equiv \text{I}_2 \equiv 2\text{Na}_2\text{S}_2\text{O}_3$   
 Hypo =  $100 \times 10$  milliequivalent  
 = 0.1 equivalent  
 Thus,  $\text{CaOCl}_2 \equiv 0.1$  equivalent  
 =  $\frac{12.7}{2}$  g = 6.35 g in 10 g sample  
 Thus, % purity = 63.5%
- 90 **(b)**  
 $\text{SO}_2 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} \text{SO}_2\text{Cl}_2$
- 91 **(c)**  
 $\text{B}(\text{OH})_3 + \text{H}_2\text{O} \rightarrow \text{B}(\text{OH})_4^- + \text{H}^+$   
 $\text{H}^+$  ion is released by  $\text{H}_2\text{O}$
- 93 **(b)**  
 $\text{H}_2\text{S}_2\text{O}_8$  (Marshall's acid) has O—O linkage. Structure of  $\text{H}_2\text{S}_2\text{O}_8$  is given as follows:
- $$\begin{array}{ccccccc} & & \text{O} & & \text{O} & & \\ & & || & & || & & \\ \text{H} & - & \text{O} & - & \text{S} & - & \text{O} & - & \text{O} & - & \text{O} & - & \text{S} & - & \text{O} & - & \text{H} \\ & & & & || & & & & & & || & & & & & & \\ & & & & \text{O} & & & & & & \text{O} & & & & & & \end{array}$$

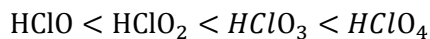
- 95 **(d)**  
 Ions are formed hence conducting
- 98 **(a)**  
 The structure of  $\text{H}_3\text{PO}_3$  is given as



In this structure two —OH group are present, so it is dibasic acid. In it one P—H bond is present, so it provides hydrogen and due to such hydrogen it acts as reducing agent.

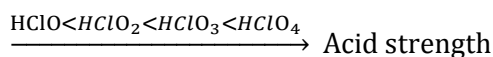
101 (a)

Acid strength  $\propto$  oxidation number of Cl atom



102 (a)

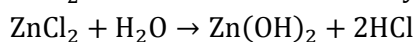
If acid is weak, its conjugate base is strong and vice-versa



$\text{ClO}_4^-$  is the weakest base

103 (b)

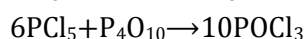
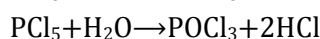
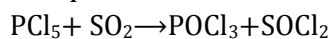
$\text{ZnCl}_2$  solution is acidic due to hydrolysis



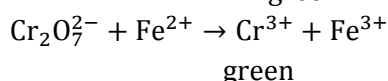
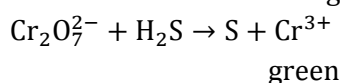
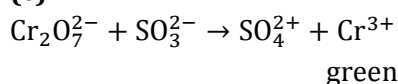
$\text{ZnS}$  is not precipitated in acidic medium, but in neutral medium.  $\text{HCl}$  formed is neutralized by  $\text{NH}_4\text{OH}/\text{NH}_4\text{Cl}$

104 (d)

$\text{PCl}_5$  produces  $\text{POCl}_3$  with the following reagents

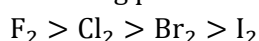


107 (c)

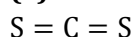


108 (a)

Oxidizing power of  $X_2$



111 (a)



$d$ -orbital is present in sulphur (in excited state)

115 (a)



117 (a)

Boron is electron-deficient in  $\text{BF}_3$

118 (d)

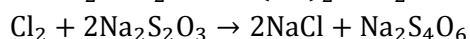
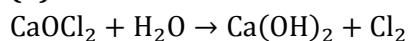
Due to steric effect

119 (d)

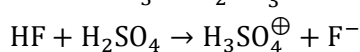
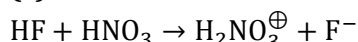
Oxidation number of Cl = +7

Thus, maximum value

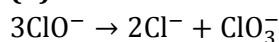
121 (d)



127 (c)

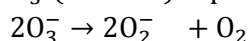


129 (b)



133 (d)

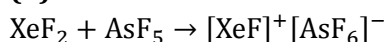
$\text{O}_3^-$  (ozonide) is paramagnetic



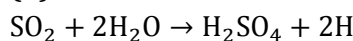
Superoxide

Stability decreases as size of  $M^+$  (alkali metal ion) decreases

134 (d)

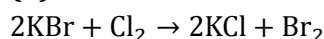


135 (b)

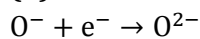


H acts as reducing agent

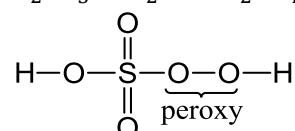
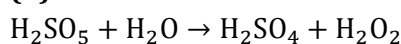
136 (d)



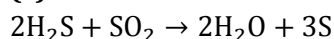
141 (b)



145 (b)



147 (c)



148 (a)

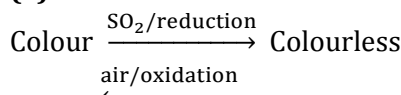
$\text{O} = \text{O}$  double bond

$\text{H} - \text{O} - \text{O} - \text{H}$  single bond

$\text{O} = \text{O} \rightarrow \text{O}$  between double bond and single bond

Bond length  $\propto \frac{1}{\text{Number of bonds}}$

149 (a)



154 (a)

$\text{H}_2\text{S}_2\text{O}_8$  has maximum oxidation state of sulphur and thus cannot be further oxidized by  $\text{KMnO}_4$

156 (d)



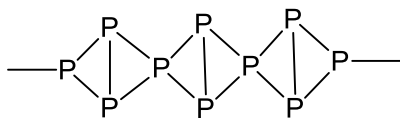
$\uparrow$

+7 (least oxidizable)

- 160 **(d)**  
 $\text{AsF}_5 + \text{XeF}_4 \rightarrow [\text{XeF}_3]^+ [\text{AsF}_6]^-$   
 $\text{BF}_3 + \text{XeF}_4 \rightarrow [\text{XeF}_3]^+ [\text{BF}_4]^-$   
 $\text{HF} + \text{XeF}_4 \rightarrow [\text{XeF}_3]^+ [\text{HF}_2]^-$
- 163 **(d)**  
 $\text{ClO}_2^-$  is chlorite
- 164 **(b)**  
Mixture is called **aqua-regia**  
 $\text{HNO}_3 + 3\text{HCl} \rightarrow \text{NOCl} + 2\text{H}_2\text{O} + 2\text{Cl}$
- 166 **(a)**  
Acidic nature increases down the group  
 $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$   

$$\begin{array}{c} K_a \xrightarrow{\hspace{10em}} \\ \hspace{10em} \xleftarrow{\hspace{10em}} \\ \text{p}K_a \end{array} \text{max.}$$
- 167 **(c)**  
 $\text{C} + \text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{SO}_2$
- 169 **(a,b,d)**  
 $\text{He}_{II}$  has extremely low viscosity and readily form films only a few hundred atom thick, which flow without friction
- 171 **(a,b,d)**  
Complete hydrolysis of  $\text{XeF}_2$  gives  $2\text{XeF}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Xe} + \text{O}_2 + 4\text{HF}$
- 174 **(a,b,d)**  
Concentrated sulphuric acid  $\text{H}_2\text{SO}_4$  is hygroscopic oxidising agent and sulphonating agent. It is not an efflorescent
- 176 **(a,c,d)**  
Pyrophosphorus acid is diacidic acid as it contains two P – OH bonds, strongly reducing in nature due to the presence of two P – H groups and contains one P – O – P bond
- 179 **(a,d)**  
 $\text{XeF}_2$  is linear ( $sp^3d$  hybridisation) and  $\text{XeF}_4$  is square planar ( $sp^3d^2$  hybridisation)
- 181 **(b,d)**  
Both  $\text{SO}_2$  and  $\text{SO}_3$  involve  $sp^2$  hybridization of the central sulphur atom. Both CO and  $\text{CO}_2$  involves  $sp$ -hybridisation and are linear
- 182 **(a,b,d)**  
White phosphorus has tetrahedral structure in which each P atom lies at the corners of the regular tetrahedron. These are six single P – P bonds, four lone pairs of electrons and P – P – P bond angle of  $60^\circ$
- 183 **(a,b,d)**  
 $\text{O}_2 \rightarrow$  Paramagnetic molecule with two unpaired electrons in antibonding  $p$ -orbital  
 $\text{O}_3 \rightarrow$  Diamagnetic molecule  
 $\text{B}_2 \rightarrow$  Paramagnetic with two unpaired electrons
- $\text{NO} \rightarrow \overset{+}{\text{NO}}$ , electrons removes from antibonding orbital, thus bond length decreases
- 187 **(b,c,d)**  
Fractional evaporation of liquid argon under reduced pressure gives neon, krypton and xenon
- 197 **(a,c,d)**  
In an electric discharge tube containing helium,  $\text{He}_2$  can't be present because it has a bond order zero and does not exist
- 198 **(a)**  
Catenation means the tendency of an element to form chains of identical atoms which is pronounced in sulphur among chalcogens.
- 199 **(d)**  
Van der Waals' forces or London forces are inversely proportional to the ionisation potential of the atoms
- 200 **(b)**  
 $\text{PCl}_5$  is trigonal bipyramidal containing  $sp^3d$  hybridised P atom in liquid and gaseous state. Whereas, in solid state it consists of tetrahedral  $\text{PCl}_4^+$  cation and octahedral  $\text{PCl}_6^-$  anions
- 201 **(c)**  
Helium is a noble gas but beryllium is a member of alkaline earth metal. Thus, beryllium is chemically active and helium is inactive
- 202 **(a)**  
H – S bond is weaker than H – O bond hence,  $\text{H}_2\text{S}$  is more acidic than  $\text{H}_2\text{O}$
- 203 **(a)**  
The compound of oxygen and fluorine is more electronegative than oxygen fluorides as fluorine is more electronegative than oxygen
- 204 **(b)**  
White P exists as discrete  $\text{P}_4$  tetrahedral molecule having P-P-P bond angle  $60^\circ$ . Hence, molecule is under strain and more reactive while red P exists as  $\text{P}_4$  tetrahedral joined together through covalent bonds giving polymeric structure.
- 205 **(a)**  
Zero point energy of helium is so high that it outweighs the weak interatomic forces which are not strong enough to bind the helium atoms into the crystalline state
- 206 **(c)**

Red phosphorus is less volatile than white phosphorus because it exists in linked tetrahedral structures.



207 (a)

In Ga, 10-d electrons in penultimate shell shield the nucleus change less effectively, the outer electrons is held firmly by the nucleus. As result, the ionisation energy remains nearly the same as that of aluminium in spite of the fact that atomic size increase.

208 (d)

All the noble gases except He, have  $ns^2np^6$  electronic configuration in their outermost shell

209 (b)

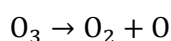
$XeF_2$  oxidise HCl to  $Cl_2$  and Ce(III) to Ce (IV). Its oxidation potentials is +2.64 V

210 (a)

Liquid ammonia has a large heat of vaporization (0.327 cal/g). It is therefore used in ice plants.

211 (b)

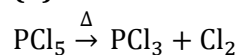
Due to the ease with which it can liberate nascent oxygen,  $O_3$  acts as a powerful oxidising agent.



$O_2 \rightarrow$  Paramagnetic due to presence of two unpaired electrons

$O_3 \rightarrow$  Diamagnetic molecules

212 (b)



$PCl_5$  decomposes into  $PCl_3$  and  $Cl_2$  as in its structure two P – Cl axial bonds are longer than other three P – Cl equatorial bonds

213 (b)

Except ammonia the boiling point generally increases down, the group due to increase in magnitude of van der waals' forces. Ammonia shows intermolecular hydrogen bonding hence its boiling point is higher than  $AsH_3$ , but lower than  $SbH_3$ .

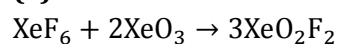
220 (c)

Bond angle decreases as the electronegativity of the element  $M$  in  $H_2M$  decreases. It is minimum for  $H_2Te$

221 (a)

Due to non availability of  $d$ -orbitals in case of nitrogen,  $NCl_5$  is not known

222 (a)



223 (c)

Due to small size of helium (He), it is least polarizable