Self Practice Paper (SPP)

1. The manufacture of fluorine is done by :
(1) heating anhydrous HF and MnO_2.
(2) electrolysis of aqueous HF.
(3) electrolysis of anhydrous HF mixed with KHF_2.
(4) heating a mixture of KF, MnO_2 and conc. H_2SO_4.

2. The catalyst used in Decons process is :
(1) $CuCl_2$ (2) Cu (3) $CuSO_4$ (4) CuS

3. Which electrolyte is used in Dennis method for the preparation of fluorine ?
(1) KHF_2 solution in anhydrous HF (2) molten cryolite
(3) pure dry molten KHF_2 (4) none of these

4. Chlorine is liberated when we heat :
(1) $KMnO_4$ + NaCl (2) $K_2Cr_2O_7$ + MnO_2 (3) $Pb(NO_3)_2$ + MnO_2 (4) $K_2Cr_2O_7$ + HCl

5. An easy way of obtaining Cl_2 gas in the laboratory is :
(1) by heating NaCl and concentrated H_2SO_4. (2) by heating NaCl and concentrated MnO_2.
(3) by mixing HCl and $KMnO_4$. (4) by passing F_2 through NaCl solution.

6. When chlorine reacts with turpentine oil, the product formed is :
(1) carbon (2) carbon and HCl (3) turpentine chloride (4) none of these

7. Which of the following does not decolourise iodine ?
(1) Na_2SO_3 (2) $Na_2S_2O_3$ (3) NaCl (4) NaOH

8. In the reaction, $3Br_2 + 6CO_3^{2-} + 3H_2O \longrightarrow 5Br^- + BrO_3^- + 6HCO_3^-$:
(1) bromine is oxidised and carbonate is reduced (2) bromine is both oxidised and reduced
(3) bromine is reduced and water is oxidised (4) bromine is neither oxidised nor reduced

9. A greenish yellow gas reacts with an alkali metal hydroxide to form a halate which can be used in fire works and safety matches. The gas and halate respectively are :
(1) Br_2 , $KBrO_3$ (2) Cl_2 , $KClO_3$ (3) I_2 , $NaIO_3$ (4) none

10. Two gases X & Y bring about bleaching of flowers, X bleaches by reducing the colouring matter. White Y bleaches due to oxidation of dye. X and Y are respectively
(1) SO_2, Cl_2 (2) Cl_2, SO_2 (3) SO_2, O_2 (4) None of these

11. Which of the following gases can be dried by concentrated H_2SO_4 ?
(1) HCl (2) HBr (3) HI (4) H_2S

12. H_2SO_4 cannot be used for obtaining HBr from KBr because :
(1) HBr oxidises H_2SO_4. (2) HBr reduces H_2SO_4.
(3) HBr undergoes disproportionation. (4) KBr reacts very slowly.

13. Which of the following is weakest acid ?
(1) HF (2) HCl (3) HBr (4) HI

14. Among the following which reaction is not correct :

(1) $NaAlO_2 + HCl + H_2O \longrightarrow NaCl + Al(OH)_3$ (2) $Ca_3N_2 + HCl \longrightarrow CaCl_2 + NH_3$

(3) $Au + H+ NO_3^- + Cl^- \longrightarrow AuCl_3^- + NO + H_2O$ (4) $Pt + H^+ + NO_3^- + Cl^- \longrightarrow PtCl_6^{2-} + NO + H_2O$

15. Order of boiling point is

(1) HF > HI > HBr > HCl (2) HF > HBr > HI > HCl

(3) HCl > HBr > HI > HF (4) HCl > HI > HBr > HF

16. Euchlorine is :

(1) obtained by heating perchlorate with conc. HCl.

(2) a chloride of europium

(3) a mixture of Cl_2 and Cl_2O_7

(4) a mixture of Cl_2 and Cl_2O_2

17. Consider the oxy acids $HClO_n$ series here value of n is 1 to 4, then incorrect statement regarding these oxyacids is :

(1) Acidic chloride of oxy acids increases with increasis n.

(2) Oxidising power of oxy acids increases with decreasis n.

(3) Thermal stability oxy acids decreases with increasis n.

(4) Cl–O bond order decreases with decreasis n.

18. How many of the following are correctly match :

(1) Cl_2O - (a) yellow-brown gas (b.p. 10°C).

(2) ClO_2 - (b) React with O_3 gives Cl_2O_6 (dark red) it is a mixed anhydride of $HClO_3$ and $HClO_4$.

(3) Cl_2O_7 - (c) It is anhydride of $HClO_4$ (only).

(4) Cl_2O_7 - (d) Oily explosive colourless liquid.

(5) Cl_2O_7 - (e) has 2 type of O–Cl bond length.

(6) I_2O_5 - (f) Obtained by reaction between I_2 and CO.

(1) (1) - (a); (2) - (b); (3) - (c); (4) - (d) (2) (3) - (b); (4) - (e); (5) - (d); (6) - (f)

(3) (1) - (b); (2) - (a); (3) - (c); (4) - (d) (4) (2) - (c); (3) - (b); (4) - (d); (5) - (e)

19. The strongest acid amongst the following is :

(1) $HClO_4$ (2) $HClO_3$ (3) $HClO_2$ (4) HClO

20. Which of the following is not the characteristic of interhalogen compounds ?

(1) They are more reactive than halogens.

(2) They are quite unstable but none of them is explosive.

(3) They are covalent in nature.

(4) They have low boiling points and are highly volatile.

21. Which of the following statement is correct.

(1) All interhalogen compounds are gaseous at room temperature.

(2) Interhalogen are either gaseous or liquid at room temperature.

(3) Interhalogens can solid or liquid or gaseous at room temperature.

(4) Interhalogen compounds are liquid at room temperature.

22. In which following statement are incorrect

(1) Pseudohalogen ions are not spherical

(2) Pseudohalides are generally less electronegative than the lighter halide (F^-, Cl^-)

(3) OCN^-, NNN^- pseudohalide are bidentate ligands

(4) Pseudohalogens form dimers and form molecular compound with non metal and Ionic compounds with alkali metal.

23. Ionisation energy values are given for Xenon (Xe) and Radon (Rn)

Element	IE(KJ/mol)
Xe	1169
Rn	1036

Predict a suitable reason for the fact that the chemistry of Rn has not been studied significantly while that of Xe has been extensively studied.

(1) Rn appears to be more reactive (2) Xe is less reactive than Rn

(3) Rn isotopes have shorter lifetimes (4) Rn is heavior than Xe.

24. In the clathrates of xenon with water, the nature of bonding between xenon and water molecule is :

(1) covalent (2) hydrogen bonding

(3) co-ordinate (4) dipole-induced dipole interaction

25. Among noble gases (from He to Xe) only xenon reacts with fluorine to form stable fluorides because xenon :

(1) has the largest size. (2) has the lowest ionization enthalpy.

(3) has the highest heat of vaporization. (4) is the most readily available noble gas.

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

(1) $XeSiO_4 + HF$ (2) $XeF_2 + SiF_4$ (3) $XeOF_4 + SiF_4$ (4) $XeO_3 + SiF_2$

27. Which of the following are partial hydrolysis gives $XeOF_2$.

(1) XeF_2 (2) XeF_4 (3) XeF_6 (4) $XeOF_4$

28. The ratio of total number of lonepairs in XeF_2 and XeF_4 are :

(1) 3 : 2 (2) 9 : 14 (3) 14 : 19 (4) 9 : 19

29. Xenon reacts with $P + F_6$ to form

(1) XeF_2 (2) $Xe^+ [P + F_6]^-$ (3) $Xe^-[Pt\ F_6]^+$ (4) XeF_4

30. Which among the following statement is **incorrect.**

(1) XeF_4 and SbF_5 combine to form salt

(2) XeF_6 on complete hydrolysis gives XeO_3

(3) XeF_6 react with H_2 produce XeF_2 and HF

(4) Xenon hexaflouride react with silica to form a Xenon compound and this Xenon compound have oxidation of Xenon is +6.

31. Acid used for making permanent markings on the glass surface is:

(1) HNO_3 (2) HF (3) HIO_3 (4) H_2SO_4

32. One gas bleaches the colour of flowers by reduction while the other by oxidation. The gases are

(1) SO_2, CI_2 (2) CO, CI_2 (3) H_2S, Br_2 (4) NH_3, SO_3

33. Which pseudo-halogen does not have dimeric nature

(1) cyanogen (2) azide (3) thiogene (4) selenothigen.

34. Which gas is mixed with oxygen by sea-divers at the high underwater pressure ?

(1) Nitrogen (2) Neon (3) Helium (4) Argon.

35. Of the interhalogen compounds, CIF_3 is more reactive than BrF_3 has higher conductance in the liquid state. The reason is that

(1) BrF_3 has higher molecular weight (2) CIF_3 is volatile

(3) BrF_3 dissociates into BrF_2^+ & BrF_4^- more easily (4) CIF_3 is most reactive

36. Which of the following is a ''super acid''

(1) $(HF + SbF_5)$ in SO_2 (2) $(H_2SO_4 + SO_3)$ in SO_2

(3) $(HNO_3 + BF_3)$ in SO_2 (4) $(H_3PO_4 + PF_5)$ in SO_2

37. The interhalogen compound that cannot exist is

(1) IBr_5 (2) ICl_7 (3) IF_4 (4) BrF_5

38. The compound that cannot be formed by xenon is

(1) XeO_3 (2) XeF_4 (3) $XeCl_4$ (4) $XeOF_4$

39. Hydrogen fluoride is a liquid at room temperature due to

(1) dimerisation (2) dissociation followed by aggregation.

(3) association (4) polymerisation

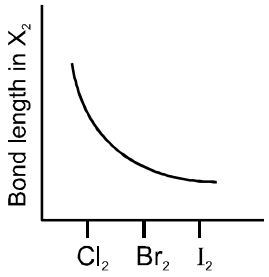
40. Concentrated sulphuric acid on reaction with NaCl, NaBr and NaI produces HCl, bromine and iodine respectively. What order of oxidizing ability of halogens with reference to sulphuric acid can be established on the basis of this reaction ?

(1) $H_2SO_4 > I_2 > Br_2 > Cl_2$ (2) $Cl_2 > H_2SO_4 > Br_2 > I_2$

(3) $H_2SO_4 > Cl_2 > Br_2 > I_2$ (4) $Cl_2 > Br_2 > I_2 > H_2SO_4$

41. Which graph correctly describes a trend found in the halogen group?

(1)



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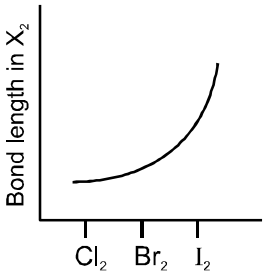

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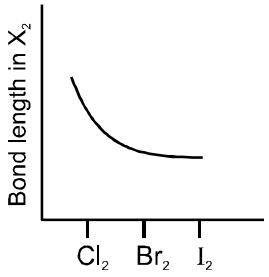

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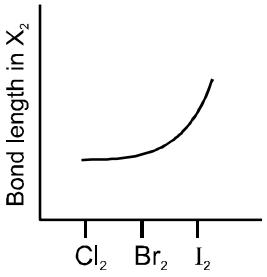

42. Which behave like pseudohalide in following

(1) $(CN)_2$ (2) $(SCN)_2$ (3) N_3^- (4) I_3^-

43. Which of the following on treatment with XeF_6 gives Xe?

(1) H_2 (2) HCl (3) OH^- (conc) (4) All of these

44. Radioactive inert gas is :

(1) technetium (2) radon (3) xenon (4) curium

45. The gas which liberates bromine from a solution of KBr is

(1) Cl_2 (2) I_2 (3) SO_2 (4) HI

SPP Answers

1.	(3)	**2.**	(1)	**3.**	(1)	**4.**	(4)	**5.**	(3)	**6.**	(2)	**7.**	(3)
8.	(2)	**9.**	(2)	**10.**	(1)	**11.**	(1)	**12.**	(2)	**13.**	(1)	**14.**	(3)
15.	(1)	**16.**	(4)	**17.**	(3)	**18.**	(1)	**19.**	(1)	**20.**	(4)	**21.**	(3)
22.	(3)	**23.**	(3)	**24.**	(4)	**25.**	(2)	**26.**	(3)	**27.**	(2)	**28.**	(2)
29.	(2)	**30.**	(3)	**31.**	(2)	**32.**	(1)	**33.**	(2)	**34.**	(3)	**35.**	(3)
36.	(1)	**37.**	(3)	**38.**	(3)	**39.**	(3)	**40.**	(2)	**41.**	(2)	**42.**	(3)
43.	(4)	**44.**	(2)	**45.**	(1)								

SPP Solutions

1. Moissan method

$$KHF_2 \xrightarrow{\text{electrolysis}} KF + HF$$

$$\rightleftharpoons$$

At Cathode K^+ + At Anode F^-

$K^+ + e^- \longrightarrow K$ $\qquad$ $F^- \longrightarrow F + e^-$

$K + HF \longrightarrow KF + H$ $\qquad$ $F + F \longrightarrow F_2$

$H + H \longrightarrow H_2$

2. $4HCl + O_2 \xrightarrow[400°C]{CuCl_2} 2Cl_2 + 2H_2O$

3. KHF_2 solution in anhydrous HF

4. Only $K_2Cr_2O_7$ and HCl will give Cl_2

$K_2Cr_2O_7 + 8\,HCl \longrightarrow 2KCl + 2CrCl_3 + 4H_2O + 3O$

$2HCl + O \longrightarrow H_2O + Cl_2 \times 3$

$K_2Cr_2O_7 + 14\,HCl \longrightarrow 2KCl + 2CrCl_3 + 7H_2O + 3Cl_2$

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5. $2KMnO_4 + 16HCl \longrightarrow 2KCl + 2MnCl_2 + 8H_2O + 3Cl_2$

6. $C_{10}H_{16} + 8Cl_2 \longrightarrow 10C + 16HCl$

Terpentine oil

7. NaCl has no reaction with iodine.

8. $3Br_2 + 6CO_3^{2-} + 3H_2O \longrightarrow 5Br^- + BrO_3^- + 6HCO_3^-$ (disproportionation reaction)

In this reaction O.S. of Br changes from 0 (in Br_2) to –1 (in Br^-) and +5 (in BrO_3^-). Thus, in this reaction bromine is both oxidised (increase in O.S.) and reduced (decrease in O.S.) –disproportionation reaction.

11. HCl is dried over conc. H_2SO_4. Because HBr, HI and H_2S are oxidised by H_2SO_4.

12. The HBr so formed reduces H_2SO_4 and itself gets oxidised to evolve Br_2.

$$2HBr + H_2SO_4 \longrightarrow 2H_2O + SO_2 + Br_2$$

13. Acid strength order : HI > HBr > HCl > HF
Amongs these HI, HBr, HCl are strong acids whereas HF is a weak acid.

14. $Au + H^+ + NO_3^- + Cl^- \longrightarrow AuCl_4^- + NO + H_2O$

15. BP↑ with increase in atomic mass of the hologes. HF has highest BP due to association of HF molecule through H-bonding.

16. When $KClO_3$ is heated with conc. HCl, a mix. of Cl_2 and ClO_2 is formeed known as euchlorine.

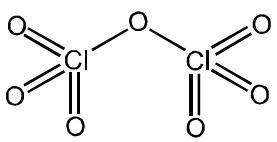
$$2KClO_3 + 4HCl \longrightarrow 2KCl + \underbrace{2ClO_2 + Cl_2}_{\text{euchlorine}} + 2H_2O$$

17. (1) Acidic chloride : $HOCl < HClO_2 < HClO_3 < HClO_4$
(2) Oxidising power : $HOCl > HClO_2 > HClO_3 > HClO_4$
(3) Thermal stability : $HOCl < HClO_2 < HClO_3 < HClO_4$
(4) Cl–O bond order : $HOCl < HClO_2 < HClO_3 < HClO_4$

18. $ClO_2 + O_3 \xrightarrow{0°C} Cl_2O_6$ (drark red)

$Cl_2O_6 + H_2O \longrightarrow HClO_3 + HClO_4$

$2HClO_4 \xrightarrow{-H_2O} Cl_2O_7$

$Cl_2O_7 \equiv$ 

$2 : O - Cl$ bond $\overset{(1.71Å)}{}$

$6 : O = Al$ bond $\overset{(1.41Å)}{}$

$I_2O_5 + 5CO \longrightarrow I_2 + CO_2$ (this I_2 titrated by hopo solution).

19. ClO_4^- , conjugate base is most stable as charge is dispersed over four oxygen atom and so $HClO_4$ is the strongest acid.

20. Interhalogen compounds are mostly liquid or solid at room temperature and are not highly volatile.

22. OCN^- , NNN^- are ambidentate and monodentate ligends both denate only one lone pair. So both are monodentate ligand.

23. Due to short life-times, Rn has not been studied.

24. In clathrates the bonding between noble gas atom and water is dipole-induced dipole interaction.

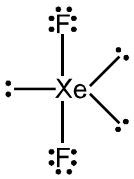
25. Out of He, Ne, Ar, Kr and Xe, Xe has the lowest ionisation energy as ionisation energies decreases down a group.

26. $2XeF_6 + SiO_2 \longrightarrow SiF_4 + 2XeOF_4$

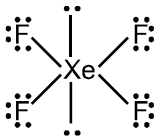
27. (1) $XeF_2 + H_2O \longrightarrow Xe + 2HF + ½O_2$ (2) $XeF_4 + H_2O \longrightarrow XeOF_2 + 2HF$

(3) $XeF_6 + H_2O \longrightarrow XeOF_4 + 2HF$ (4) $XeOF_4 + H_2O \longrightarrow XeO_2F_2 + 2HF$

28.



Total number of lone pair = 9



Total number of lone pair = 14

Ratio = 9 : 14

30. (1) $XeF_4 + SbF_5 \longrightarrow [XeF_3]^+ [SbF_5]^-$

(2) $XeF_6 + H_2O \longrightarrow XeO_3 + HF$

(3) $XeF_6 + H_2 \longrightarrow Xe + HF$

(4) $SiO_2 + XeF_6 \longrightarrow \overset{+6}{X}eOF_4 + [SbF_5]^-$

35. But error in dissociation of BrF_3. It dissociates into BrF_2^+ and BrF_4^-

41. With increasing number of electrons in the molecule and hence increasing molecular size and increase in van der Waal's forces.

42. N_3^- is pseudohalide

$(CN)_2$ and $(SCN)_2$ behave like pseudohalogen

I_3^- is polyhalide.

43. $XeF_6 + 3H_2 \longrightarrow Xe + 6HF$

$XeF_6 + 6HCl \longrightarrow Xe + 6HF + 3Cl_2$

45. Cl_2 is oxidising agent.