QB365 Question Bank Software Study Materials

p - Block Elements - II Important 2 Marks Questions With Answers (Book Back and Creative)

12th Standard

Chemistry

Total Marks : 40

2 Marks

20 x 2 = 40

1) Explain why fluorine always exhibit an oxidation state of -1?

Answer : (i) Fluorine is most electronegative atom.

(ii) It has only one unpaired electron.

2) Give the oxidation state of halogen in the following.

a) OF_2

b) O_2F_2

c) Cl_2O_3

d) I_2O_4

Answer : (a) OF_2

$+ 2 + 2(x) = 0$

$+2 = -2x$

$2 x = -2 \Rightarrow x = -1$

(b) O_2F_2

$2(+1) + 2x = 0$

$2x = -2$

$x = -1$

(c) Cl_2O_3

$2(x) + 3(-2) = 0$

$2x = +6$

$x = +3$

(d) I_2O_4

$2(x) + 4(-2) = 0$

$2x = +8$

$x = +4$

3) Give a reason to support that sulphuric acid is a dehydrating agent.

Answer :

$$\underset{\text{Sucrose}}{C_{12}H_{22}O_{11}} + H_2SO_4 \rightarrow 12C + H_2SO_4 \cdot 11H_2O$$

$$\underset{\text{Formic acid}}{HCOOH} + H_2SO_4 \rightarrow CO + H_2SO_4 \cdot H_2O$$

$$\underset{\text{Oxalic acid}}{(COOH)_2} + H_2SO_4 \rightarrow CO + CO_2 + H_2SO_4 \cdot H_2O$$

4) Give the uses of argon.

Answer : Argon prevents the oxidation of hot filament and prolongs the life in filament bulbs.

5) What happens when PCl_5 is heated?

Answer : On heating PCl_5, it decomposes into PCl_3 and chlorine.

$$PCl_{5(g)} \rightarrow PCl_{3(g)} + Cl_{2(g)}$$

6) Suggest a reason why HF is a weak acid, whereas binary acids of the all other halogens are strong acids.

Answer : HF is a weak acid i.e. 0.1 M solution is only 10% ionised, but in 5M & 15M solution, HF is stronger acid due to chemical equilibrium.

$$HF + H_2O \rightleftharpoons H_3O^+ + F^-$$

$$HF + F^- \rightleftharpoons HF_2^-$$

7) Deduce the oxidation number of oxygen in hypofluorous acid – HOF.

Oxidation number of F = -1

Answer :

Oxidation number of H = +1

Oxidation number of O in HOF =x

(+1) + x + (-1) = 0

x = 0

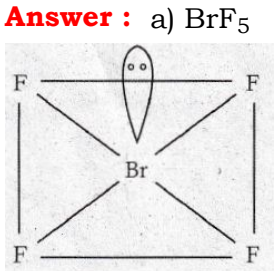
Oxidation number of O in HOF = 0

8) What type of hybridisation occur in

a) BrF_5

b) BrF_3

Answer : a) BrF_5



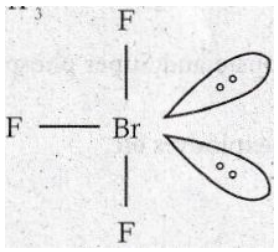
Valence electron of bromine atom 7+ Number of fluorine atom (5) = 12

$X = \frac{12}{2} = 6$

Hybridization: sp^3d^2 ;

Geometry: Square Pyramidal

b) BrF_3



Valence electron of bromine atom 7+ Number of fluorine atom (3) = 10

X = $\frac{10}{2} = 5$

Hybridization: sp^3d^2;

Geometry: Triangular bipyramidal (T - shaped)

9) Complete the following reactions.

1. $NaCl + MnO_2 + 4H_2SO_4 \longrightarrow$
2. $NaNO_2 + HCl \longrightarrow$
3. $P_4 + 3NaOH + 3H_2O \longrightarrow$
4. $AgNO_3 + PH_3 \longrightarrow$
5. $Mg + 10HNO_3 \longrightarrow$
6. $KClO_3 \xrightarrow{\Delta}$
7. $Cu + Con.\ Hot\ H_2SO_4 \longrightarrow$
8. $Sb + Cl_2 \longrightarrow$
9. $HBr + H_2SO_4 \longrightarrow$
10. $XeF_6 + H_2O \longrightarrow$
11. ${XeO_6}^{4-} + Mn^{2+} + H^+ \longrightarrow$
12. $XeOF_4 + SiO_2 \longrightarrow$
13. $Xe + F_2 \frac{\text{Ni/200 atm}}{400^\circ\text{C}}$.

Answer : $(i)\quad 4NaCl + MnO_2 + 4H_2SO_4 \rightarrow Cl_2 + MnCl_2 + 4NaHSO_4 + 2H_2O$

$(ii)\quad NaNO_2 + HCl \rightarrow NaCl + HNO_2$

$(iii)\quad P_4 + 3NaOH + 3H_2O \rightarrow 3NaH_2PO_2 + PH_3 \uparrow$

$(iv)\quad 3AgNO_3 + PH_3 \rightarrow Ag_3P + 3HNO_3$

$(v)\quad 4Mg + 10HNO_3 \rightarrow 4Mg(NO_3)_2 + N_2O + 6H_2O$

$(vi)\quad 2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2 \uparrow$

$(vii)\quad Cu + Con.\, Hot H_2SO_4 \rightarrow CuSO_4 + 2H_2O + SO_2 \uparrow$

$(viii)\quad 2Sb + 3Cl_2 \rightarrow 2SbCl_3$

$(ix)\quad 2HBr + H_2SO_4 \rightarrow 2SO_2 + 2H_2O + Br_2$

$(x)\quad XeF_6 + 3H_2O \rightarrow XeO_3 + 6HF$

$(xi)\quad 5XeO_6^{4-} + 2Mn^{2+} + 14H^+ \rightarrow 2MnO_4^- + 5XeO_5 + 7H_2O$

$(xii)\quad 2XeOF_4 + SiO_2 \rightarrow 2XeO_2\, F_2 + SiF_4$

$(xiii)\quad Xe + 3F_2 \overset{Ni/200atm}{\underset{400^0C}{\longrightarrow}} XeF_6$

10) Write the products formed in the reaction of nitric acid (both dilute and concentrated) with zinc.

Answer : (i) $Zn + dil \cdot HNO_3 \rightarrow Zn(NO_3)_2 + H_2 \uparrow$

(ii) $Zn + con.\, HNO, \rightarrow Zn(NO_3)_2 + NH_2(NO_3)_2 + H_2 \uparrow$

11) Arrange the following as indicated below:

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

(ii) HF, HCI, HBr, HI - increasing acidic strength.

Answer : (i) l_2 < F2 < Br_2 < Cl_2.

(ii) HF < Hq < HBr < HI.

12) Explain Why inspite of nearly the same electronegativity, nitrogen forms hydrogen bonding while chlorine does not - Give reason.

Answer : Nitrogen has smaller size and can polarise N-H bond d more efficiently than chlorine can do in a CI-H bond. Hence, nitrogen forms H- bond, while chlorine does not.

13) How is phosphine prepared?

Answer : Phosphine is prepared by the action of NaOH with white phosphorus in an inert atmosphere of CO_2 (or) hydride.

$$P_4 + 3NaOH + 3H_2O \rightarrow \underset{\text{Sodium hypo phosphite}}{3NaH_2PO_2} + \underset{\text{Phosphine}}{PH_3} \uparrow$$

14) Give examples for the basic nature of phosphine.

Answer : PH_3 is weakly basic and forms phosphonium salts with halogen acids.

$$PH_3 + HI \rightarrow PH_4I$$

$$PH_4I + H_2O \xrightarrow{\Delta} PH_3 + H_3O^+ + I^-$$

15) Prove with an example the reducing property of phosphine.

Answer : Phosphine precipitates some metal from their salt solutions.

$$3AgNO_3 + PH_3 \rightarrow Ag_3P \downarrow + 3HNO_3$$

16) How is dioxygen prepared?

Answer : The decomposition of H_2O_2 in the presence of catalyst (MnO_2) or by oxidation with $KMnO_4$.

$$2H_2O_2 \rightleftharpoons 2H_2O + O_2$$

$$5H_2O_2 + 2MnO_4^- + 6H^+ \rightarrow 5O_2 + 8H_2O + 2Mn^{2+}$$

17) H_2SO_4 is a good oxidising agent. Prove it.

Answer : It produces nascent oxygen.

$$H_2SO_4 \rightarrow H_2O + SO_2 + \underset{Nascent\ oxygen.}{(O)}$$

$$C + 2H_2SO_4 \rightarrow 2SO_2 + 2H_2O + CO_2$$

18) What is the action of bleaching powder with mineral acid?

Answer : $CaOCl_2 + 2HCl \rightarrow CaCl_2 + H_2O + Cl_2$

$CaOCl_2 + H_2SO_4 \rightarrow CaSO_4 + H_2O + Cl_2$

19) Write the Redox reaction of chlorine.

Answer : Chlorine displaces bromine from bromides and Iodine from iodide salts.

$Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

$Cl_2 + 2KI \rightarrow 2KCl + I_2$

20) Write the uses of HCl.

Answer : (i) HCl is used for the manufacture of chlorine, NH_4Cl, glucose from corn starch etc.

(ii) Extraction of glue from bone and also for purification of bone black.