CHEMISTRY STUDY MATERIALS FOR CLASS 12 (NCERT Based Reasoning of Chapter -07) GANESH KUMAR DATE:- 05/01/2021

P – block elements

Question 49: Draw the structures of the following molecules: (i) XeF_4 (ii) BrF_3 Answer: (i) XeF_4



Shape : Square planar

(ii) BrF₃



Shape : T-shape

Question 50: Complete the following chemical reaction equations :

(i)
$$P_4$$
 (s) + NaOH (aq) + H_2O (1) \rightarrow
(ii) I^- (aq) + H_2O (1) + O_3 (g) \rightarrow

Answer:

(i)
$$P_4(s) + 3NaOH(aq) + 3H_2O(l) \longrightarrow$$

 $PH_3(g) + 3NaH_2PO_2(s)$
 $Phosphine \qquad Sodium$
 $hypophosphite$
(ii) $2I^-(aq) + H_2O(l) + O_3(g) \longrightarrow$
 $I_2(s) + 2OH^-(aq) + O_2(g)$

Question 51.

Complete the following chemical reaction equations:

(i) XeF₂ (s) + H₂O (I) \rightarrow (ii) PH₃ + HgCl₂ \rightarrow

Answer:

(i)	2XeF ₂ Xenondifi	(s) uorid	+ 2H ₂ O(l) le	→ 2Xe(g) - Xenon	ł	4HF(aq) Hydrogen fluorid	+ e	O ₂ (g)
(ii)	2PH ₃ Phosphine	+ Mere	3HgCl ₂ curic chloride	$ Hg_3P_2$ Mercuric phosph	id	+ 6HCl		

Question 52: Draw the structures of white phosphorus and red phosphorus, phosphorus is more reactive and why? Which one of these two types of Answer:





Structure of white phosphorus : Tetrahedral structure

Structure of red phosphorus : Polymeric structure

White phosphorus is more reactive due to its discrete tetrahedral structure and angular strain.

Question 53.

Draw the structural formulae of molecules of following compounds: (i) BrF_3 (ii) XeF_4 Answer: (i) BrF_3



Shape : T-shape

(ii) XeF₄



Shape : Square planar

Question 54: Complete the following chemical reaction equations:

(i)
$$I_2 + HNO_3(Conc.) \rightarrow$$
 (ii) $HgCl_2 + PH_3 \rightarrow$

Answer:

(i)
$$I_2 + 10HNO_3 \longrightarrow 2HIO_3 + 10NO_2 + 4H_2O$$

(ii) $2PH_3 + 3HgCl_2 \longrightarrow Hg_3P_2 + 6HCl$
Phosphine Mercuric chloride Mercuric phosphide

Question 55: Draw the structural formulae of the following compounds :

(i)
$$H_4P_2O_5$$
 (ii) XeF_4

Answer:



Question 56: Complete the following chemical reaction equations : (All India 2010)

(i) NaOH + $Cl_2 \rightarrow$ (ii) $XeF_6 + H_2O \rightarrow$ (cold and dilute) (excess)

Answer:

(i) $2NaOH + Cl_2 \longrightarrow NaCl + NaOCl + H_2O$ (cold and dilute) Sod. hypochlorite (ii) $XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$ (excess)

Question 57: State reasons for each of the following:

(i) The N-O bond in NO_2 is shorter than the N-O bond in NO_3 .

(ii) SF₆ is kinetically an inert substance. (Delhi 2011)

Answer: (i) The resonating structure of NO₂ and NO₃show that in NO₂ two bonds are sharing a double bond while in NO−3, 3 bonds are sharing a double bond. That's why NO₂ has shorter bond than that of NO₃. Answer:



(ii) Because SF_6 is showing steric hindrance due to 6 (six) fluorine atoms which make it unable to react further with any other atom.

Question 58: State reasons for each of the following:

(i) All the P-Cl bonds in PCl₅ molecule are not equivalent.

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

Answer:

(i) The PCI₅ molecule has sp³d hybridization and trigonal bipyramidal geometry. Therefore it has 3 equatorial P – CI bonds and two axial P-CI bonds. Since two axial P-CI bonds are repelled by 3 bond pairs while 3 equatorial bonds are repelled by two bond pairs, so axial bonds are longer than equatorial bonds.



- (ii) The greater catenation tendency of sulphur is due to two reasons :
- (a) The lone pair of electrons feels more repulsion in 0-0 bond than S-S bond due to its small size and thus S-S forms strong bond.
- (b) As the size of atom increases down the group from O PO, the strength of bond increases and therefore catenation tendency also increases.