

Daily Tutorial Sheet 5 JEE Advanced (Archive)

61. $2H_2S + NaHSO_3 + H^+ \rightarrow 3S \downarrow + 3H_2O + Na^+$

62.
$$2P + 3I_2 + 6H_2O \longrightarrow 2H_3PO_3 + 6HI$$

- With increasing size of the atom the covalent bond becomes less stable because the larger atoms are unable to exert a greater attraction on the bonding electrons pair that holds the molecule together. It is due to this reason that holds the molecule having larger atoms have low dissociation energy. However this is true for Cl_2 , Br_2 and I_2 , but F_2 is an exception. The factors responsible for lower dissociation energy of F_2 are:
 - (a) Larger repulsion between the non-bonding electrons on the fluorine atoms of the fluorine molecule. It is due to small size of fluorine atom.
 - (b) No possibility of multiple bonding in fluorine due to non-availability of d-orbitals. Other halogens have possibility of forming multiple bonds by the overlap of filled p-orbitals of one atom with empty d-orbitals of the other atom. Multiple bonds are always stronger than single bonds.
- **64.** $2NH_3 + NaOCl \longrightarrow H_2N \cdot NH_2 + NaCl + H_2O$ (Hydrazine)
- **65.(BC)** To make the fused mixture very conducting and to reduce the temperature of the melt.
- **66.(B)** Silicon is used in solar cells.
- **67.(B)** Nitrogen cannot form pentahalide because it cannot expand its octet due to non-availability of d-orbitals. So E is not correct explanation of S.
- **68.(B)** HBr is not prepared by heating NaBr with concentrated H_2SO_4 because HBr is a strong reducing agent and it reduces $H_2SO_4 + SO_2$ and is itself oxidised to Br_2 .

$$NaBr + H_2SO_4 \longrightarrow NaHSO_4 + HBr$$

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

69.(C) Four : $\ddot{O} = P$

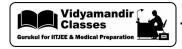
(Structure of P₄O₁₀)

In the structure of P_4H_{10} , each P-atom is liked with 4-O atoms.

- **70.** In both (nitrogen and fluorine) the atomic size is small and both have high electron density, they repel the bonded pair of electrons leadings to larger bond length than expected.
- **71.** N^{3-} is smaller in size and having high charge so it becomes more susceptible to hydrolysis.

 $N^{3-} + 3H_2O \longrightarrow NH_3 + 3OH^-$

Cl⁻ being a weak conjugate bease (HCl is a strong acid) does not undergo hydrolysis.



- 72. In case of $(SiH_3)_3N$, lone pair of electrons on nitrogen is involved in $p\pi$ - $d\pi$ back bonding, white in case of $(CH_3)_3N$, the $p\pi$ - $d\pi$ back bonding is not possible due to the absence of vacant d-orbitals in carbon. Because of this $(CH_3)_3N$ is more basic than $(SiH_3)_3N$.
- **73.(C)** KF + HF \longrightarrow KHF₂ \rightleftharpoons K⁺ + HF₂
- **74.(C)** We can represent $CsBr_3$ as $Cs^+Br_3^-$

Solution | Workbook-6 38 p-Block Elements-II