## CHEMISTRY

41. (3)

Electronegativity of carbon atom is not fixed. It varies with the state of hybridisation. Electronegativity of carbon increases as the s-character of the hybrid orbital increases. C($sp$) > C ($sp^2$) > C($sp^3$)

42. (3)

Hybridisation of Br in $BrO_3^-$

$$H = \frac{1}{2}(7+0-0+1) = 4$$

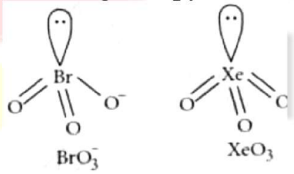
i.e. $sp^3$ hybridisation

Hybridisation of Xe in $XeO_3$:

$$H = \frac{1}{2}(8+0-0+0) = 4$$

i.e. $sp^3$ hybridisation

In both $BrO_3^-$ and $XeO_3$ the central atom is $sp^3$ hybridised and contains one lone pair of electrons, hence in both the cases, the structure is trigonal pyramidal.




43. (1)

Number of electron pairs at the central atom = Number of atoms bonded to it $+\frac{1}{2}$ [Group number of central atom – Valency of the central atom ± Number of electrons equals to the units of charges]

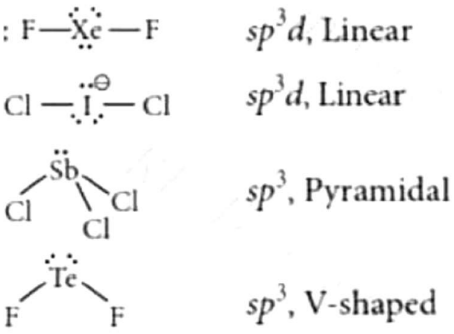
Number of electron pairs at the central atom in $NO_3^- = 3+\frac{1}{2}[5-6+1] = 3$

($sp^2$ hybridisation).

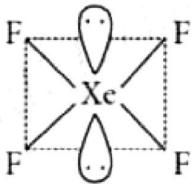
Number of electron pairs at the central atom in $H_3O^+ = 3+\frac{1}{2}[6-3-1] = 4$

($sp^3$ hybridisation).

44. (4)




45. (1)




$sp^3d^2$ hybridisation (octahedral geometry, square planar shape)

46. (1)

2.6 has two significant figures.

0.260 has three significant figures.

0.002600 has four significant figures.

2.6000 has five significant figures.

47. (2)

$$\underset{10\text{ g}}{H_2} + \frac{1}{2}O_2 \rightarrow H_2O$$

$\left(\frac{10}{2}=5\text{ mol}\right)$ $\underset{64\text{ g}}{\left(\frac{64}{32}=2\text{ mol}\right)}$

In this reaction oxygen is the limiting agent. Hence, amount of $H_2O$ produced depends on the amount of $O_2$ taken

Since, 0.5 mole of $O_2$ gives $H_2O$ = 1 mol

Therefore, 2 mole of $O_2$ gives $H_2O$ = 4 mol

48. (3)

| Number of molecules | |
|---|---|
| Moles of $CO_2 = \frac{44}{44} = 1$ | $N_A$ |
| Moles of $O_3 = \frac{48}{48} = 1$ | $N_A$ |
| Moles of $H_2 = \frac{8}{2} = 4$ | $4N_A$ |
| Moles of $SO_2 = \frac{64}{64=1}$ | $N_A$ |

49. (3)

50% of X (Atomic mass 10), 50% of Y (Atomic mass 20).

Relative number of atoms of X = $\frac{50}{10} = 5$

and than Y = $\frac{50}{20} = 2.5$

Simple Ratio 2 : 1. Formula $X_2Y$

50. (1)

Mass ratio of H : C = 1 : 12

However, given mass ratio of

H : C = 1 : 3

Therefore, for every C atom, there are 4 H atoms, hence empirical formula = $CH_4$