

CHEMISTRY

31. (4)

Hybridisation of SO_4^{2-} ion is given by

$$H = \frac{1}{2}[V + M + A - C]$$

Where V = valency of central metal atom
M = number of monovalent atoms surrounding central metal atom.

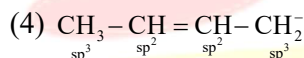
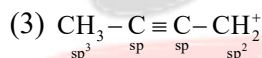
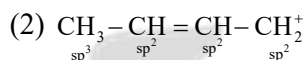
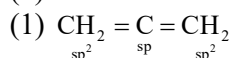
A = charge on anion, C = charge on cation

For SO_4^{2-} V = 6, M = 0, A = 2, C = 0

$$\therefore H = \frac{1}{2}[6 + 0 + 2 - 0] = 4$$

i.e., sp^3 hybridisation and tetrahedral shape.

32. (3)



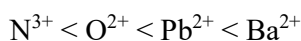
Note: Carbocations and carboanions are sp^2 and sp^3 hybridised respectively

33. (4)

According to Fajan's rule :

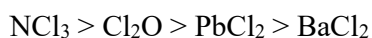
$$\text{Covalent character} \propto \frac{1}{\text{Size of cation}} \\ \propto \text{size of anion}$$

Among the given species order of size of cations



order of size of anions $\text{O}^{2-} > \text{Cl}^-$.

Hence the order of covalent character is



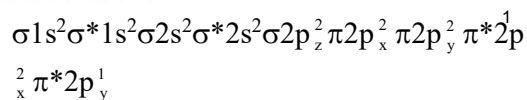
BaCl_2 is most ionic in nature.

34. (3)

M.O. electronic configuration of CN^- is $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \pi 2p_x^2 \pi 2p_y^2 \sigma 2p_z^2$

$$\therefore \text{B.O.} = \frac{10 - 4}{2} = 3$$

M.O. electronic configuration of O_2^- is



$$\therefore \text{B.O.} = \frac{9 - 4}{2} = 2.5$$

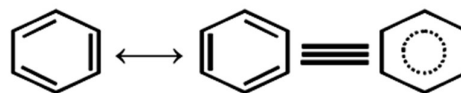
M.O. electronic configuration of NO^+ is $\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2p_z^2 \pi 2p_x^2 \pi 2p_y^2$

$$\therefore \text{B.O.} = \frac{10 - 4}{2} = 3$$

$\therefore \text{CN}^-$ and NO^+ have bond order equal to 3

35. (3)

Benzene has the following resonance structures

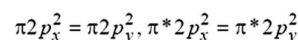
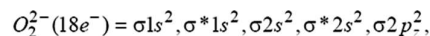
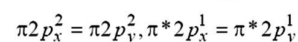
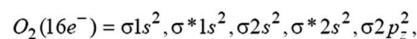
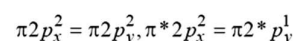
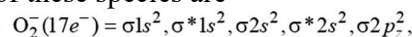


Hence, its bond order is

$$\frac{\text{no of possible resonating structures}}{2} = 1.5$$

36. (1)

Molecular orbital electronic configuration of these species are



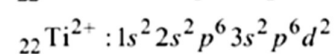
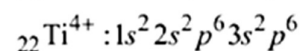
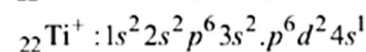
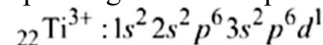
Hence number of antibonding electrons are 7, 6 and 8 respectively.

37. (4)

HF form linear polymeric structure due to hydrogen bonding.

38. (4)

The electronic configuration of different species given in the question are



39. (4)

40. (3)

$$E_{\text{Cu}^{2+}|\text{Cu}}^0 = 0.34 \text{ V}$$

other has -ve $E_{\text{R.P.}}^0$

$$E_{\text{Co}^{2+}|\text{Co}}^0 = 0.28 \text{ V}$$

$$E_{\text{Ni}^{2+}|\text{Ni}}^0 = -0.25 \text{ V}$$

$$E_{\text{Fe}^{2+}|\text{Fe}}^0 = -0.44 \text{ V}$$

**PARISHRAMA
NEET ACADEMY**