

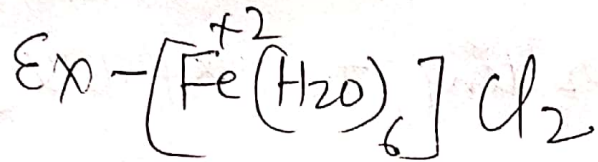
TDC-II  
Paper-III  
Coordination

## Sidgwick Theory of Effective Atomic Number (E.A.N.)

- It is regarding the stability of coordination compounds by following noble gas configuration
- EAN  $\equiv$  The sum of electron on metal plus the electrons donated from the ligands is called Effective Atomic Number (EAN).
- When EAN of metal in complex is equal to 36 (Kr), 54 (Xe), 86 (Rn), then EAN is said to be obeyed otherwise complex is said to be unstable and still have the ~~the~~ tendency to gain/lose ~~the~~ electron.

$$\text{EAN} = \text{Atomic Number} - \text{Oxidation state on metal} + 2 \times \text{NO. of electron pair accept.}$$

$$EAN = Z - O.S. + 2 \times \text{No. of } \sigma \text{ bonds} - \text{dentate ligands}$$



$$EAN = 26 - 2 + 2 \times 6 = 36 (\text{Kr})$$

EAN obeyed



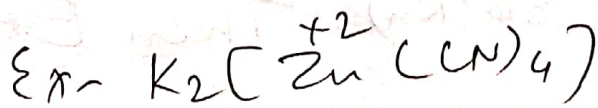
$$EAN = 29 - 1 + 2 \times 4 = 36 (\text{Kr})$$

EAN obeyed



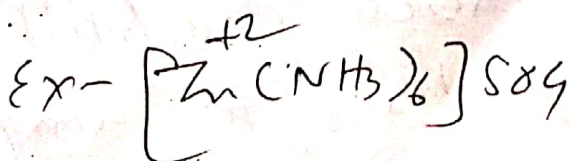
$$EAN = 27 - 3 + 2 \times 6 = 36 (\text{Kr})$$

EAN obeyed



$$EAN = 30 - 2 + 2 \times 4 = 36 (\text{Kr})$$

EAN obeyed



$$EAN = 30 - 2 + 2 \times 6 = 40$$

EAN not obeyed