7.6 FACTORS AFFECTING ELECTRON TRANSFER REACTION RATE

Halpern summarised the factors affecting the rates of direct electron – transfer reactions :

(i) Electrostatic repulsion between ions of like charges increases the activation energy; hence the rate of exchange of electrons decreases.

(ii) When there is no change in the shapes of the molecules, possibility of fast electron transfer always remain.

(iii) Fast electron transfer takes place, when due to coupling or by an-atomic ligand, electrons reach on the surface of the complex.

(iv) Generally, in comparison to ligand exchange, electron exchange is fast. The value of rate constant depends upon cation present in the solution. Due to formation of ion-pair, activation energy repulsion decreases, because the electrostatic repulsion decreases, resulting in increase in the rate.

(v) With the increase in the conductivity of the ligand electron transfer increases.

(vi) When the difference in the shapes of oxidant and reductant are much high, then there is possibility of slow reaction.

(vii) Higher is the negative value of ΔG^{o} for the reaction, faster is the reaction.

Check Your Progress-1

Notes : (1) Write your answers in the space given blow.

(2) Compare your answers with those given at the end of the unit.

a (i) Redox reactions involve.....from one atom to the other.

(ii) Electron – exchange reaction involving no net chemical change follow ..... electron transfer mechanism and can be traced by .....

(iii) The reaction in which electron – transfer results in net chemical change follow ..... mechanism and can be traced by .....

b (i) For electron – transfer it is necessary that energy of the participating electronic orbitals .....

(ii) During electron transfer the ..... and ..... of metal ligand bond help in getting required configuration.

(iii) The exited state electron transfer of.....opens the path of the production of hydrogen using solar energy.