UNIT- VII PHOTOCHEMISTRY

Principles of Photochemistry: Photochemistry is the study of the interaction of electromagnetic radiation with matter resulting into a physical change or into a chemical reaction.

Primary processes include:

1. one molecule is excited into an electronically excited state by absorption of a photon, it can undergo a number of different primary processes.
2. Photochemical processes are those in which the excited species dissociates, isomerizes, rearranges, or react with another molecule.
3. Photo physical processes include radiative transitions in which the excited molecules emit in the form of fluorescence or phosphorescence and returns to the ground state, and intra-molecular non-radiative transitions in which some or all of the energy of the absorbed photon is ultimately converted into heat.

Laws Governing absorption of Light

Lambert's law: This law states that decrease in the intensity of monochromatic light with the thickness of of the absorbing medium is proportional to the intensity of ~~intensity~~ incident light.

$$-\frac{dI}{dx} \propto I$$

OR $$-\frac{dI}{dx} = KI \quad \text{——} (1)$$

Integrating equation (1) we get

$$I = I_0 e^{-kx}$$

Where, I_0 = Intensity of transmitted light

K = Absorption coefficient

Beer's law: This law states that decrease in the intensity of monochromatic light with the Thickness of the solution is not only proportional to the intensity of the incident light but also to the concentration 'c' of the solution.

Mathematically, $-dI/dx \propto IC$

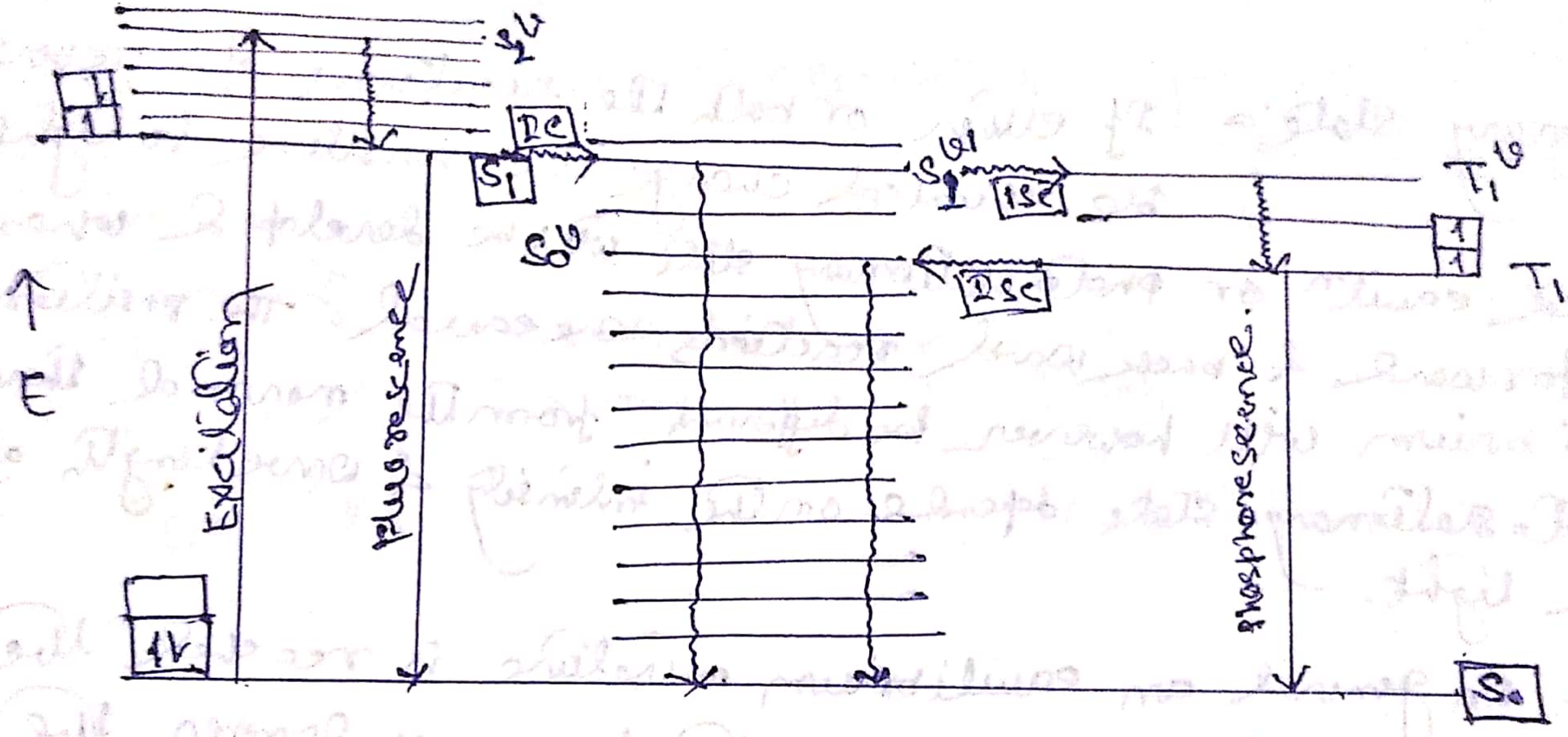
OR $$-dI/dx = \varepsilon IC \quad \text{——} (1)$$

on integrating equation ①, we get

$$I = I_0 e^{-\varepsilon c x}$$

where, ε = Molar absorption coefficient

Jablonski diagram :-



$S_1 \rightarrow S_0$ radiative transition give rise to fluorescence

$T_1 \rightarrow S_0$ radiative transition is emission of phosphorescent radiation.