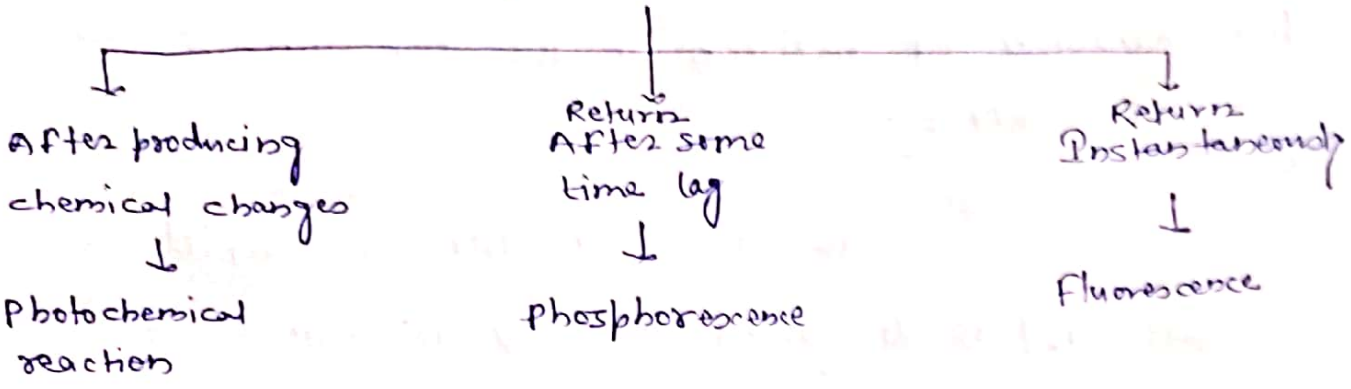
*. FLUORESCENCE & PHOSPHORESCENCE :-

Molecules which are excited to a higher energy state by absorption of photon do not remain indefinitely in such state Because molecules are unstable in excited state. If the excitation energy is not removed by suitable collision or excited molecules donot dissociate, & comes to lower energy state.
Then, molecules having following choices -



If the excited molecule will comes to lower energy state instantaneously ~~after some time lag~~ i.e. between 10^{-8} to 10^{-10} sec. This re-radiation of energy is known as fluorescence.
fluorescence stop as soon as source is cut off. Because, it is a allowed transition i.e. transition occurs from singlet to singlet.

$$S_1 \longrightarrow S_0 .$$

As soon as when source is cut off all the electrons (in molecule) are drained off from S_1 to S_0.
while, on the other hand phosphores-cence stop after some time lag Because, it is a forbidden transition i.e. $T_1 \longrightarrow S_0$ (Triplet to Singlet) and takes some time of the order of 2nd or more after the exciting radiation is cut off. The time lag between 10^{-8} sec

or greater. since, the transition involves spin inversion which needs time for its occurance.

Examples:-

(1). The electron attracting group like $-NO_2$, $-Cl$, when introduced in Organic compounds tends to reduce fluorescence.

(2). The electron releasing group $-NH_2$ gradually increase the fluorescence.

(3). The excitation of thallium atom to fluorescence.

$$Hg + h\nu \longrightarrow Hg^*$$
(Excited)

The excited Hg^* atom collides with Tl and a part of its energy is transferred to it which is then raised to higher energy level.

$$Hg^* + Tl \longrightarrow Tl^* + Hg$$

The excited Tl^* atom returns to normal state and a fluorescent radiation is emitted.

$$Tl^* \longrightarrow Tl + h\nu.$$

Other examples of phosphorescent light are:-

(1). Zinc sulphide and sulphides of alkaline earths are an excellent examples of phosphoresent substance.

(2). Many dyes when dissolved in a liquid such as fused boric acid or glycerol and cooled unit to forms a rigid glass emitts phosphorescence light.