

FACTORS AFFECTING FLUORESCENCE

INTENSITY

The ability & extend of fluorescence or phosphorescence depends upon 2 major factors

a)Chelation: The carbon-carbon linkages can affect the fluorescence

For example

Aromatic Compounds which are highly active compounds

Simple Aliphatic Compounds are inactive to Fluorescence

Complexed ring Compounds are active to Fluorescence

Unsaturated molecule show fluorescence by absorption of UV/visible radiation.

Fluorescence increases as aromatic ring increase.



b)Nature of substituent group

Electron donating groups increases Fluorescence.

For example NH_2 , OH , OMe , OEt , CN , NHR , NH_2 , NR_2 , NO , NO_2

Electron withdrawing groups decreases fluorescence.

For example COOH , CHO , COR , COOR , SH , F , Cl , Br , I

Groups having no effect on Fluorescence are SO_3H , NH_4^+ , Alkyl groups

Nature of substituent group

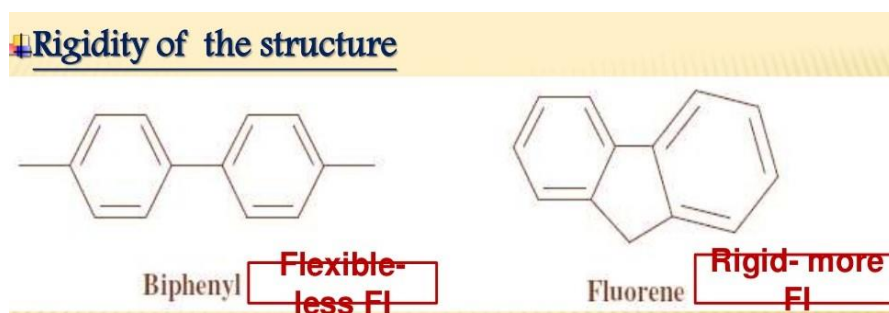
EDG's– FI \uparrow
EWG's– FI \downarrow

Groups increases FI	NH_2 , OH , OMe , OEt , CN , NHR , NH_2 , NR_2 , NO , NO_2
Groups decreases FI	COOH , CHO , COR , COOR , SH , F , Cl , Br , I
Groups having no effect on FI	SO_3H , NH_4^+ , Alkyl grp

c) Rigidity of the structure

Flexible aromatic compounds show less fluorescence because most of energy dissipate during movement of molecule.

Rigid compounds show more fluorescence. Rigid compounds are those in which bonds cannot move, rotate and vibrate.

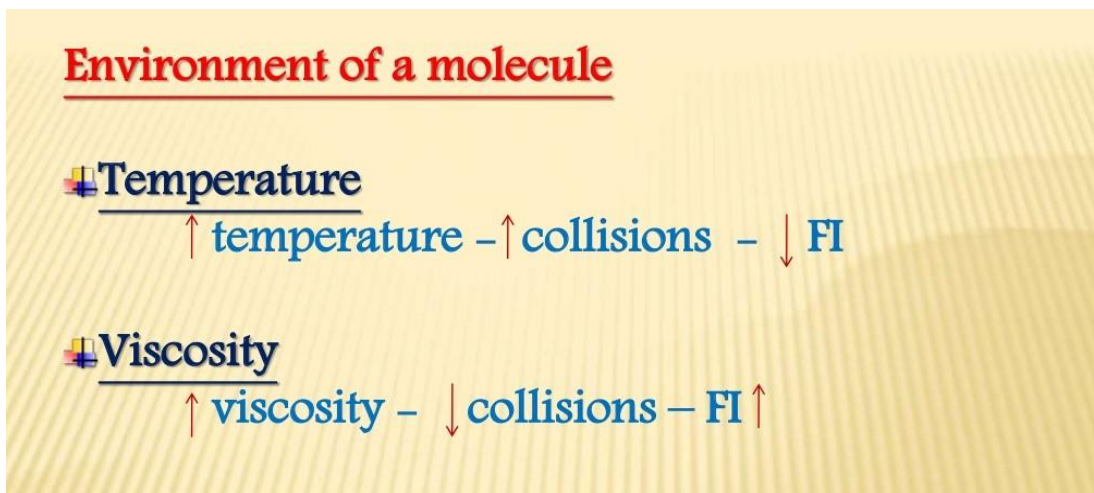


d) Temperature

As temperature increase, collision between atoms increase because of increase in their kinetic energy and fluorescence quantum yield decrease because non-radiative processes increase and energy can be lost in the form of heat or can be transfer to other atoms. As a result fluorescence intensity decrease. And If temperature is decrease, collision decrease as a result no heat loss takes place and fluorescence intensity increase.

e)Viscosity:

We can discuss solvent. In viscous solution chances of collision less as a result fluorescence increase



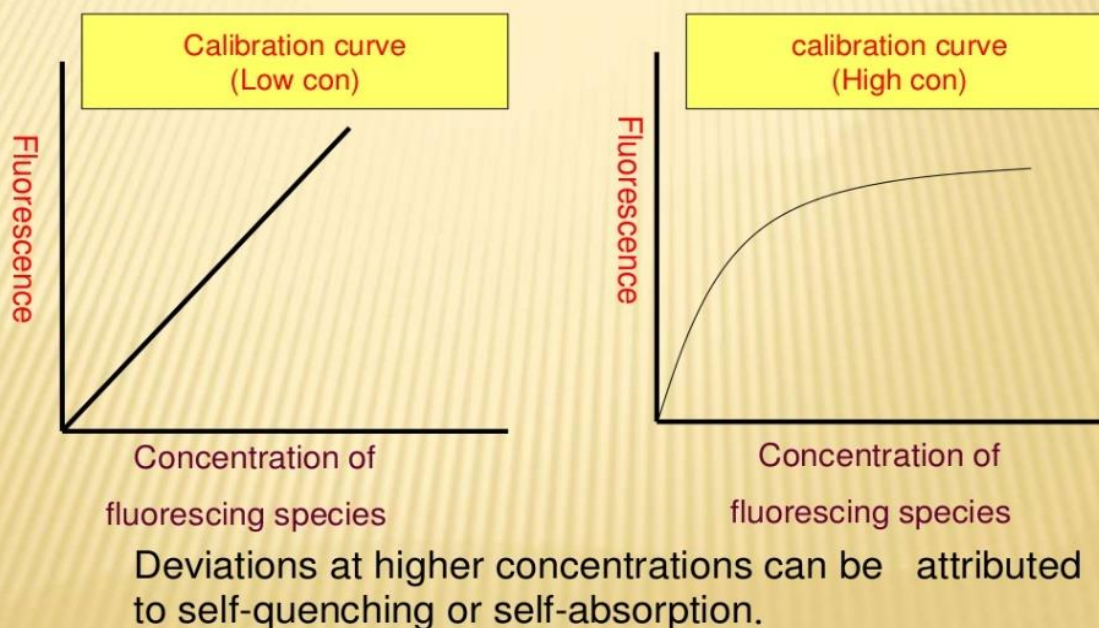
f) Concentration

As we know that fluorescence also obey Beer Lambert Law

$$F \propto C$$

This may follow up to the limit because at high concentration F disobey the law. Because when concentration increase the chances of collision increase and transfer energy to neighboring atoms(also called self-quenching or conc. quenching). As a result fluorescence intensity decrease.

Concentration of solution



g) PH of solution:

In different media compound exist in different form.

Phenol can show fluorescence in alkaline or basic medium.

While **Aniline** can show fluorescence in acidic as well as alkaline medium.

In acidic medium, aniline show fluorescence light in visible region. While in basic medium UV light emit as a result of fluorescence which cannot be seen by naked eye.

Ph of solution

Phenols : **acidic** – undissociated– **NO** fluorescence
alkaline– dissociated– **good** fluorescence

Aniline : **acidic**– fluorescence in **visible** region
alkaline/neutral– fluorescence in **UV** region

h) Polarity of Solvent

Polar Solvent Increases Fluorescence intensity

Non-polar solvents decreases Fluorescence in intensity.

i)Effect of dissolved oxygen in solution:

The presence of dissolved oxygen can decrease the fluorescent intensity as a result fluorescence decrease in solution.