

Kinetic, ~~and~~ optical ~~and~~ ~~optical~~ properties of Colloids or Brownian movement, Tyndal effect, ~~and electrophoresis~~.

1. Kinetic property of Colloidal particles i.e Brownian movement: → When we observe Colloidal solution by ultramicroscope, we see Colloidal particles are moving in zig-zag motion in Colloidal solution. The continuous zig-zag motion of Colloidal particles in Colloidal solution is called Brownian movement. ~~Robert~~ ~~of~~ ~~an~~ Robert Brown studied the pollen grain particles are in zig-zag motion on water surface that's why this type of motion of Colloidal particle is called Brownian movement.

Cause of Brownian movement: → When the particle of dispersion medium strike on the Colloidal particles then Colloidal particle moves without direction or in zig-zag motion, this ~~is~~ strike on the Colloidal particle is from different side by dispersion medium particle which is responsible for Brownian movement.

Important points of Brownian movement →

1. Brownian movement is independent from the nature of Colloidal particles.

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- ii. Brownian movement depends on the size of colloidal particles and viscosity of the colloidal solution.

Size of colloidal particles $\propto \frac{1}{\text{Brownian movement}}$

Viscosity of colloidal solution $\propto \frac{1}{\text{Brownian movement}}$

- iii. When a beam of light enters in a dark room through small ~~hole~~ hole (like in Cinema hall) then movement of dust particles are observed in zig-zag motion, which is example of Brownian movement, but the visibility of particle is optical effect.

Importance of Brownian movement:-

- i. Due to Brownian movement colloidal particles do not settle down due to influence of gravity.
- ii. It supports kinetic theory of gas, i.e. ceaseless motion of the gaseous molecules.
- iii. Avogadro no. can be calculated by the help of Brownian movement.

11. Optical properties of colloidal particles
i.e Tyndal effect: →

When we pass a beam of light through colloidal solution we see the path of beam is illuminated it is called Tyndal effect, this phenomenon is due to presence of light so it is also called optical properties of colloids, in the above process illuminated path by beam of light is called Tyndal cone.

Important points of Tyndal effect: -

1. Lyophobic colloidal solution shows strong Tyndal effect whereas lyophilic colloidal solution shows weak Tyndal effect.

11. Tyndal effect shows heterogeneous characterisation of colloidal solution.

111. When we send a beam of light in colloidal solution then light scatters which is Tyndal effect. Here it is important to know why it happens so? Actually the size of colloidal particles is smaller than the wavelength of visible light so

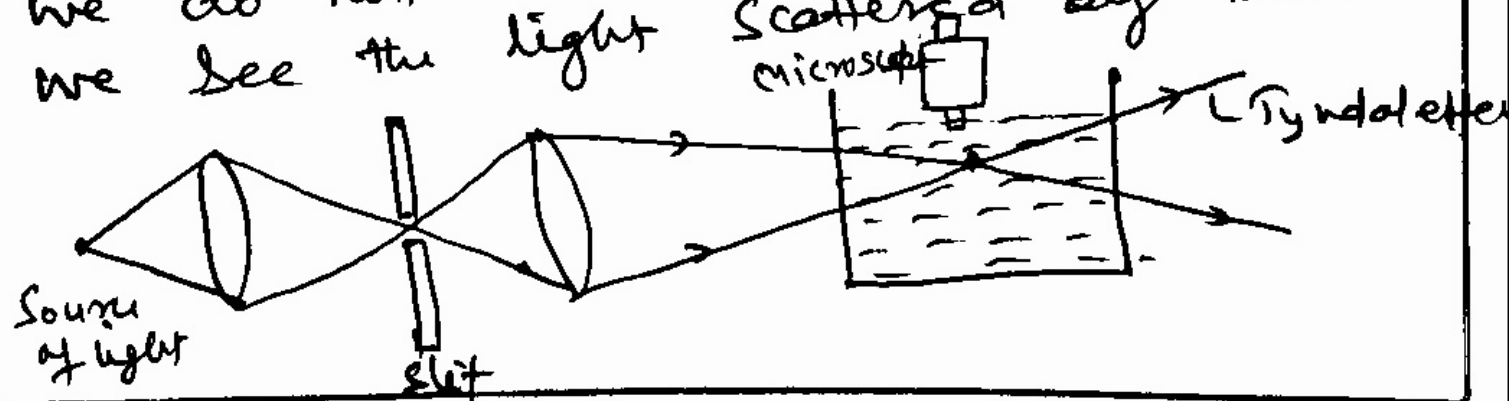
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Colloidal particles can not reflect the light rather it scatters the light. In other words we can say if the size of colloidal particles are greater than the wavelength of visible light then Tyndal effect will not take place. Hence scattering of light depends on two parameters i) size of particles & ii) wavelength (λ) of visible light.

iv) Scattering of light $\propto \frac{1}{\lambda^4}$. This is the reason red light scatters least while blue light scatters most.

v) ~~True~~ True solution can not show Tyndal effect at all.

vi) When microscope is placed at right angle to the beam of light then only we can see the scattering of light, the colloidal particles are visible as bright spot, actually we do not see the colloidal particles rather we see the light scattered by them.



Circumstances or Conditions for Tyndal effect.

1. The diameter of dispersed phase particle should not be much smaller than the wavelength of visible light used.

ii. The refractive indices of dispersed phase and dispersion medium should differ greatly in magnitude.

