

# Colloids

**Colloids:** → is a dispersion of particles of one substance " the dispersed phase " Throughout a dispersing medium made of another substance.

## Note that

- Colloidal particles are much larger than the normal solute molecules.
- They range from  $1 \cdot 10^3$  pm to  $1 \cdot 10^6$  pm.
- The dispersed phase and the dispersing medium can be gas, liquid, solid or a combination of different phases.

**Aerosol:** → consist of liquid droplets or solid particles dispersed in a gas as "smoke, fog, mist"

**Emulsion:** → consist of liquid droplet dispersed in another liquid "Mayonnaise".

**Sol:** → a suspension of solid particles in a liquid "milk of magnesia".

## Types of colloids

Dispersing medium	Dispersed phase	Name	Example
gas	liquid	aerosol	Fog, mist
gas	solid	aerosol	smoke
liquid	gas	foam	Whipped cream
liquid	liquid	emulsion	mayonnaise
liquid	solid	sol	Milk of magnesia
solid	gas	foam	Plastic foams
solid	liquid	gel	Jelly/ butter
solid	solid	Solid sol	Certain alloys "steel ,opal"

**Tyndall effect:** → is used to distinguish a solution from a colloid.

- When a beam of light passes through a colloid, it is scattered by the dispersed phase.
- No such scattering is observed with ordinary solution, because the solute molecules are too small to interact with visible light.
- Another demonstration of the Tyndale effect is the scattering of sunlight by dust or smoke in air.

## Hydrophilic and hydrophobic colloids

**Hydrophilic colloids:** → are usually solutions containing extremely large molecule such as protein.

- ❖ In aqueous phase protein like hemoglobin folds in such a way that the hydrophilic parts of the molecules are on the outside surface.

**Note that**

All these groups can form hydrogen bond with water.

- Hydrophilic groups in the surface of protein stabilizes the molecules in water.

**Hydrophobic colloids:** → wouldn't be stable in water , and the particles would clump together.

- Like a droplet of oil in water merging to form a film of oil at water surface.

In both hydrophilic and hydrophobic the dispersing medium is **water**.

**Hydrophilic** → **water loving.**

**Hydrophobic** → **water fearing.**

Hydrophobic can stabilize by

Adsorption.

The presence of hydrophilic groups on their surface.

## Adsorption

- ✓ Adsorption of ion in their surface.
- ✓ These adsorbed ions can interact with water, thus stabilizing the colloid.
- ✓ At the same time, the electrostatic repulsion between the particles prevents them from clumping together.

## What is the different between Adsorption, Absorption?!

Adsorption → Adherence into the surface.

Absorption → passage to the interior of the medium.

### Example

Consider sodium stearate, a soap molecule that has a polar head and non-polar tail.

- The cleansing action of soap is the result of the dual nature of hydrophobic tail and hydrophilic and group.
- The hydrocarbon tail is readily soluble in oily substances which are also non polar, while the ionic "COO<sup>-</sup>" group remains outside the oily surface.
- When enough soap molecules have surrounded an oil droplet, the entire system become stabilizes in water.



6) ..... Consist of liquid droplet dispersed in another liquid.

- A) vapor  
B) aerosol  
C) foam  
D) emulsion

7) ..... Consist of liquid or solid particles dispersed in gas.

- A) foam  
B) sol  
C) gel  
D) aerosol

8) ..... is a suspension of solid particle in liquid.

- A) aerosol  
B) sol  
C) gel  
D) emulsion

9) The example on emulsion phase is .....

- A) fog  
B) mayonnaise  
C) sol  
D) smoke

10) Mayonnaise is an example of.....

- A) emulsion  
B) sol  
C) aerosol  
D) gel

11) Solid sol is a name of ..... In .....

- A) liquid-solid  
B) solid-gas  
C) liquid-gas  
D) solid-solid

12) Steel and opal are an example of .....

- A) foam  
B) solid  
C) solid sol  
D) emulsion

13) Milk of magnesia is an example of .....

- A) foam  
B) sol  
C) solid sol  
D) aerosol

14) Tyndall effect used to distinguish a solution from.....

- A) colloid  
B) gas  
C) emulsion  
D) foam

15) The energy associated with molecular vibration is.....

- A) Vander walls effect  
B) Tyndall effect  
C) Boltzmann effect  
D) Blank effect

16) Tyndall effect is used to distinguish..... from colloid.

- A) solution  
B) solid  
C) emulsion  
D) solid sol

17) Beam of light scattered when pass through.....

- A) solution  
B) emulsion  
C) solid sol  
D) colloid





23) Hydro phobic colloid..... be stable in water.

- A) would  
B) wouldn't  
C) in some cases would and in other cases wouldn't

24) ..... are usually solutions containing extremely large molecules such as "protein".

- A) hydrophobic  
B) hydrophilic  
C) emulsion  
D) solid sol

25) ..... is adherence into the surface.

- A) adsorption  
B) absorption  
C) adhesion  
D) solvation

26) ..... is passage to the interior of the medium.

- A) adsorption  
B) absorption  
C) adhesion  
D) solvation