

B.Sc. (Honours) Part-II
Paper-IIIA

Topic: Emulsion

UG

Subject-Chemistry

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Emulsions

Emulsion is a dispersion in which the dispersed phase is composed of small globules of a liquid distributed throughout a vehicle in which it is immiscible.

The dispersed phase is the *internal phase* and the dispersion medium is the external phase or continuous phase. A third phase which is essential for emulsion formation is the emulsifying agent.

Emulsions basically consist of a dispersion of two liquids that are immiscible with each other. One of the liquids act as the dispersion medium and the other will act as the dispersed phase. In simple words, emulsions are colloids in which both the dispersed phase and dispersion medium are liquids. Oil and the mixtures of water are the emulsions when are shaken together. The oil forms drop and then disperses throughout the water.

The term emulsion is also applied to a group of mixed systems called as solutions, or gels or suspensions. Take, For example, the photographic emulsion is a gelatin gel consisting of tiny crystals dispersed in it. Some other examples of emulsions include butter which is an emulsion of water in fat and egg yolk containing lecithin.

Types of emulsions:

Emulsions can be classified on the basis of the properties of the dispersed phase and the dispersion medium.

1) Oil in water (O/W):

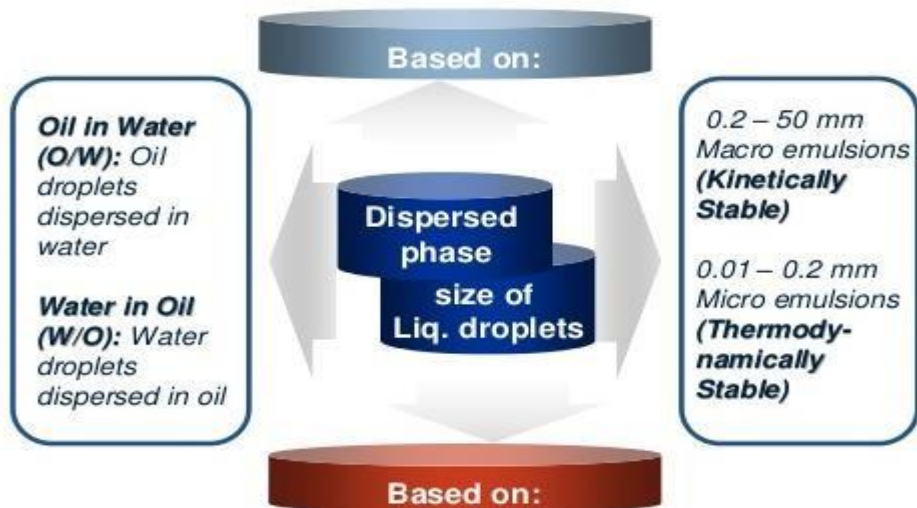
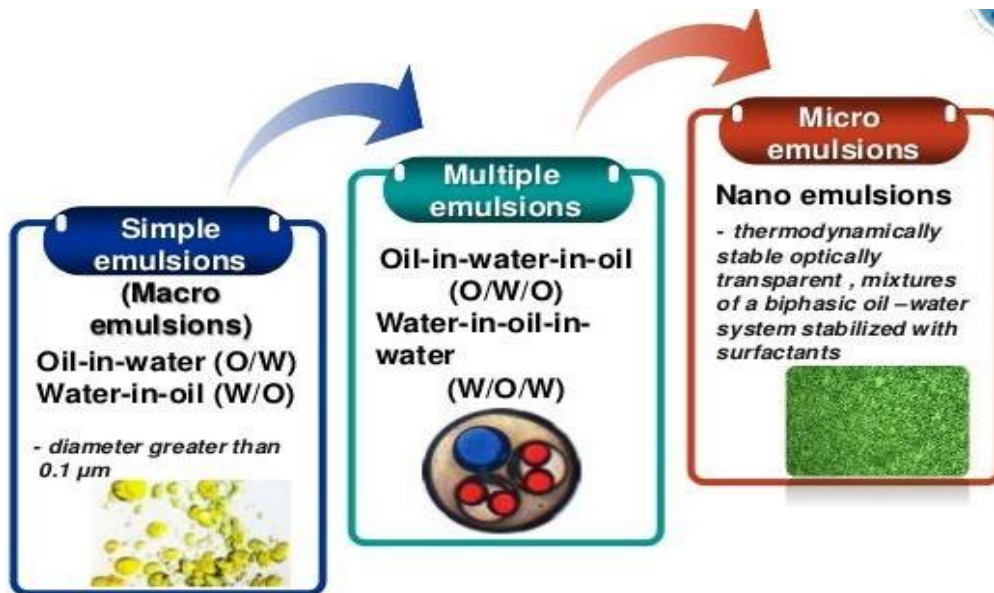
In this type of emulsion, the oil will be the dispersed phase and water will be the dispersion medium. The best example for o/w emulsion is milk. In milk, the fat globules(which act as the dispersed phase) are suspended in water (which acts as the dispersion medium).

DISPERSED PHASE	DISPERSION MEDIUM	TYPE OF COLLOID	EXAMPLE
Solid	Solid	Solid	Some Coloured Glasses And Gemstones
Solid	Liquid	Solid	Paints, Cell Fluids
Solid	Gas	Aerosol	Smoke, Dust
Liquid	Solid	Gel	Cheese, Butter, Jellies
Liquid	Liquid	Emulsion	Milk, Hair Cream
Liquid	Gas	Aerosol	Fog, Mist, Cloud, Insecticide Sprays
Gas	Solid	Solid	Pumice Stone, Foam Rubber
Gas	Liquid	Foam	Froth, Whipped Cream, Soap Lather

2) Water in oil (w/o):

In this type, water will be the dispersed phase and oil will be the dispersion medium.

Margarine (a spread used for flavouring, baking and working) is an example of water in oil emulsion.



Purpose of emulsions and of emulsification:

1. Facilitate the preparation of relatively stable and homogenous mixtures of two immiscible liquids.
2. Permits administration of a liquid drug in the form of minute globules rather than in bulk.
3. Administration of distasteful oil by dispensing it in a sweetened, flavored aqueous vehicle.
4. Reduced particle size of the oil globules may render the oil more digestible and more readily absorbed for example increased efficacy of mineral oil as a cathartic when emulsified.

Stability of emulsions

Emulsion is considered to be physically unstable if

- a. The internal or dispersed phase upon standing tends to form aggregates of globules.
- b. Large globules or aggregates of globules rise to the top or fall to the bottom of the emulsion to form a concentrated layer of the internal phase.
- c. If all or part of the liquid of the internal phase separates and forms a distinct layer on the top or bottom of the emulsion as a result of the coalescing of the globules of the internal phase.

There are many types of instability:

1. Flocculation.
2. Creaming which is either upward or down ward creaming.
3. Aggregation and coalescence.
4. Breaking.

Application of emulsions:-

- 1) Asphalt emulsified water is used for buiding roads without necessity of melting Asphalt.
- 2) Several oily drugs are in the form of emulsions.
- 3) The cleaning action of ordinary soap for washing clothes, crockery, is based upon formation of water-oil emulsion.
- 4) Certain disinfectants like Dettol are emulsions of oil-in-water type on mixing with water.