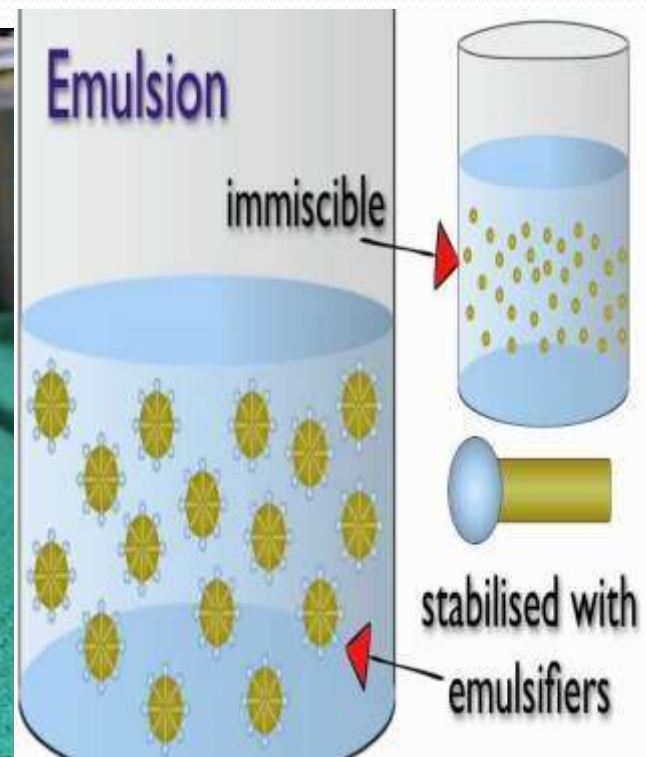


STABILITY OF EMULSION

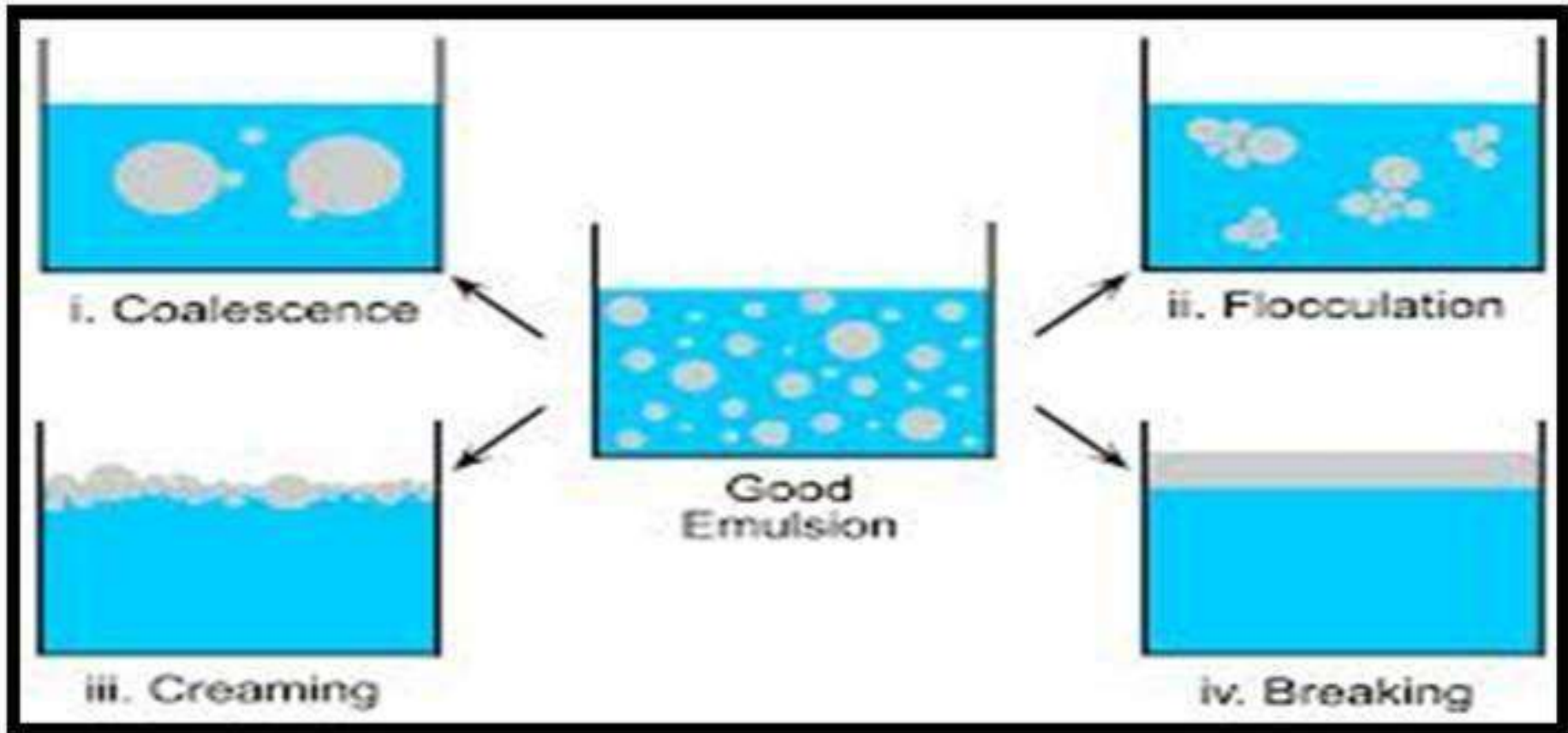
INTRODUCTION

- An emulsion is said to be stable , if it remain as such after its preparation i.e. the dispersed globules are uniformly distributed throughout the dispersed medium During its storage.
- The emulsion should be chemically stable and there should not be any bacterial growth During its self life.



MAJOR THREE CHANGES ARISE WHILE STORAGE OF EMULSION

- (1) Cracking
- (2) Creaming
- (3) Phase inversion



CRACKING

➤ Cracking mean the separation of two layers of disperse and continuous phase, Due to the coalescence of disperse phase globules which are difficult to redispers

THE CRACKING IS DUE TO FOLLOWING:-

(1) Addition of emulsifying agent of opposite type

(2) Decomposition or precipitation of emulgent (3) Addition of common

solvent

(4) Microorganism

(5) Change in temperature

(6) creaming



O / W



W / O

(1) Addition of emulsifying agent of opposite type:-

- Soap of monovalent metals produce o/w type emulsion whereas soap of divalent metals produce w/o type emulsion.
- But the addition of monovalent soap to a divalent soap emulsion or divalent soap to monovalent soap leads to cracking of emulsion.

(2) Decomposition or precipitation of emulgent:-

- When an acid is added to an alkali soap emulsion (turpentine liniment), it causes the decomposition of an emulgent and thus leads to cracking of emulsion.
- When sodium chloride is added to sodium or potassium soap which leads to precipitation of emulgent and cracking of emulsion.

(3) Addition of common solvent:-

When a solvent is added to an emulsion, the solvent may be miscible or dissolved the emulgent or disperse phase or continuous phase leads to formation of clear liquid or solution. Leads to cracking of emulsion

Eg. Addition of alcohol to turpentine liniments causes cracking

(4) Microorganism:-

if emulsion are not stored properly which leads to microbial contamination on to the emulsion, hence the microbes get deteriorate the emulsion and leads to cracking of emulsion.

So use preservatives to prevent the microbial growth on to emulsion.

(5) Change in temperature:-

When store in high temperature leads to decreasing the viscosity of emulsion and cause creaming and get deteriorate, while store in cool or freezed condition leads to formation of ice of dispersion medium leads to cracking of emulsion.

(6) Creaming:-

Creamy emulsion are more rapidly cracked than other emulsion.

CREAMING

- Creaming may be defined as the upward movement of dispersed globules to form a thick layer at the surface of the emulsion.
- Creaming is temporary phase because it can be re-distributed mild shaking or stirring to get again a homogenous emulsion . As far as possible creaming of an emulsion should be avoided because it may leads to cracking with complete separation of two phases.

According to stokes law rate of creaming are depended upon number of factors are following;-

$V = \frac{2}{9} \frac{r^2 (d_1 - d_2) g}{\eta}$ Where v = rate of creaming r = radius of globules

d_1 = density of dispersed phase

d_2 = density of dispersion medium

g = gravitational constant

η = viscosity of dispersion medium



WHY CREAMING

(1) Radius of globules:- As per the Stokes law the larger the size of globules the rate of creaming is faster than that of small globules.

Once the size is reducing then the creaming can be minimized.

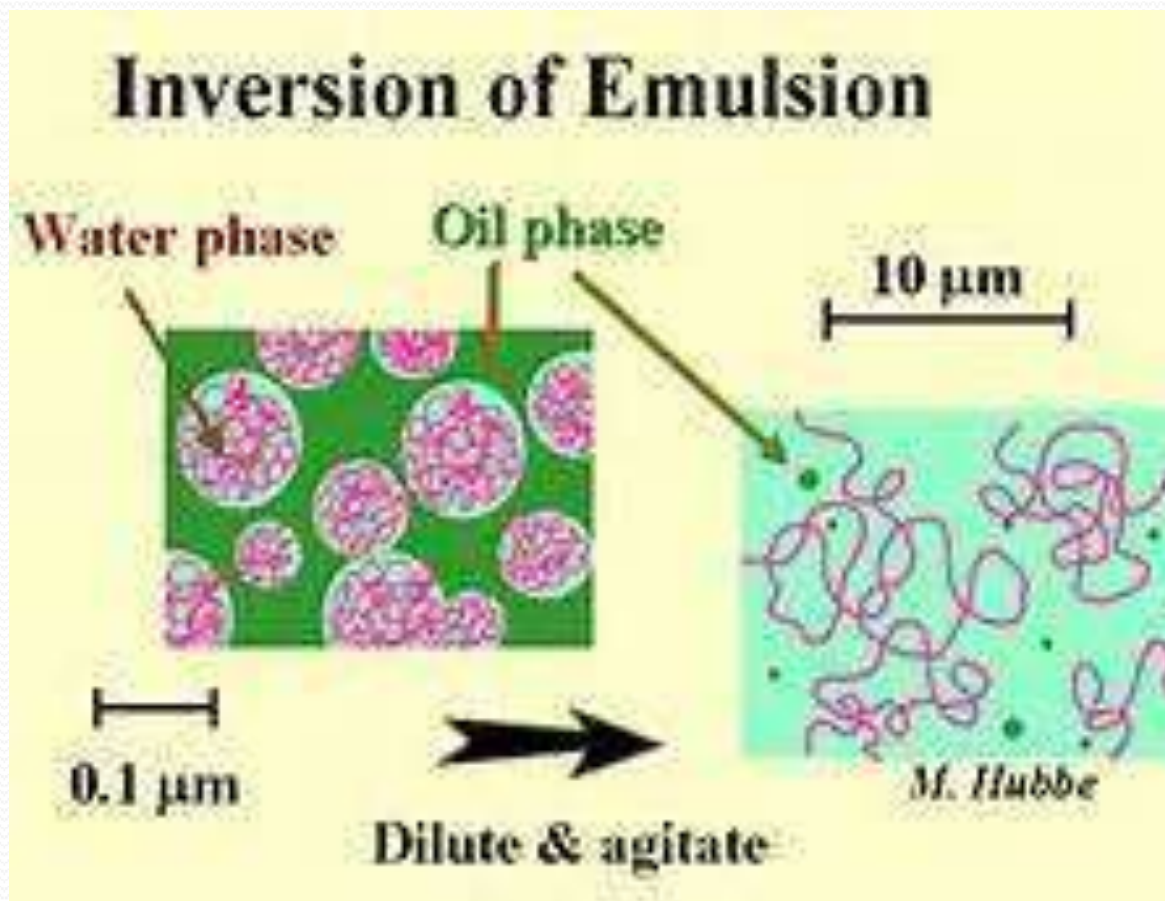
(2) Different density of dispersed phase and continuous phase:- As per the Stokes law, the greater the density difference between the dispersed phase and the continuous phase, the higher the creaming rate.

(3) Viscosity of the dispersion medium:- As per the Stokes law, the lower the viscosity of the medium, the higher the creaming rate.

(4) Storage condition :- Rate of creaming is also dependent on the temperature of storage condition.

PHASE INVERSION

It means the change of one type of emulsion into the other type.
i.e. oil in water emulsion changes into water in oil type and *vice versa*.





WHY PHASE INVERSION

- (1) By the addition of electrolytes**
- (2) By changing the phase volume ratio**
- (3) By temperature change**
- (4) By changing the emulgent**

CONTAINER

- The emulsion should be packed in container having an adequate air space above the Emulsion, so as to permit adequate shaking before its use.
- The emulsion which are meant for internal use , should be packed in comparatively wide mouth bottle, so that it is easy to remove it without any difficulty.
- Metallic closer should be avoided .
- Wide mouth amber glass bottle are most suitable for the storage of emulsion

LABELING

A secondary label **“SHAKE WELL BEFORE USE”** is required to be fixed on the container.

STORAGE

- An emulsion should be store in air tight container
- Protected from sun light, freezing and high temperature
- The emulsion are required to be store in a cool place.