Experiment

Aim

To compare the effectiveness of a number of emulsifying agents in forming emulsions.

Theory

Different emulsifying agents have different capacities for emulsifying a given oil. An emulsifying agent lowers the inter facial tension between water and oil and gets concentrated at the surface between two liquids. Due to the reduced inter facial tension, the tiny droplets of oil do not coalesce and thus the emulsions become stable. Since different emulsifying agents have different tendencies to lower the inter facial tensions, they have different capacities for emulsifying a given oil.

Material Required

Five stoppered bottles, measuring cylinder, stop-watch or simple watch, 5 ml pipettes, Castor oil, 1% solutions of sodium oleate, soap, detergent, gelatin and gum acacia.

Procedure

1. Take five stoppered bottles and wash them with water and label them as A, B, C, D and E.
2. Take 5 ml of castor-oil in each of five bottles, A, B, C, D and E.
3. Add 50 ml of distilled water to each bottle.
4. Add 5 drops of sodium oleate solution to bottle A, shake it vigorously for one minute and allow it to stand.
5. Note the time taken for the two layers to separate out.
6. Similarly, take tube, B, C, D and E and add 5 drops of soap solution, detergent solution, gelatin solution and gum acacia solution respectively to them. Shake vigorously for one minute and observe the time taken for the two layers to separate out in each case. Record the observations.

Observations

Volume of castor oil taken in each tube = 5 ml

Volume of distilled water added = 5 ml

Table.2.

Bottle or Tube	Emulsifier added	Volume of Emulsifier added	Time taken for separation of layers
A.	Sodium oleate	5 drops	
B.	Soap	5 drops	
C.	Detergent	5 drops	
D.	Gelatine	5 drops	
E.	Gum acacia	5 drops	

Result

It is clear from the above observations that _____ emulsifier when added causes the emulsion to take the longest time to break and is rated 1 while _____ when added causes the emulsion to take the minimum time to break and is rated 5. The effectiveness of the given emulsifying agents is in the _____ order.

Precautions

1. Add an equal number of drops of soap solution to all the bottles.
2. Each bottle should be shaken vigorously and for same time.
3. The time should be recorded carefully. Start the stopwatch immediately after shaking is stopped and stop it immediately when the two layers get separate.

VIVA VOCE

Q 1. What are emulsifying agents?
Ans. Emulsifying agents, also known as surfactants, are compounds that stabilize emulsions by reducing the interfacial tension between immiscible liquids, allowing them to form and remain stable.

Q 2. Why is it important to compare the effectiveness of emulsifying agents in forming emulsions?
Ans. Comparing emulsifying agents helps in understanding their ability to stabilize emulsions, which is crucial for various applications in industries such as food, pharmaceuticals, cosmetics, and paints.

Q 3. What characteristics make an emulsifying agent effective?
Ans. Effective emulsifying agents should have both hydrophilic (water-attracting) and lipophilic (oil-attracting) properties, allowing them to interact with both immiscible liquids and stabilize the resulting emulsion.

Q 4. How can the effectiveness of emulsifying agents be determined?
Ans. The effectiveness of emulsifying agents can be determined by evaluating the stability, droplet size, and rate of formation of emulsions formed using different agents under standardized conditions.

Q 5. What are some examples of common emulsifying agents?
Ans. Common emulsifying agents include natural substances such as proteins (e.g., egg yolks), carbohydrates (e.g., gums), and phospholipids, as well as synthetic surfactants like sodium stearoyl lactylate and polysorbates.

Q 6. How do emulsifying agents stabilize emulsions?
Ans. Emulsifying agents stabilize emulsions by forming a protective layer around the dispersed droplets, preventing them from coalescing or separating from the continuous phase.

Q 7. Can you explain the mechanism of action of emulsifying agents?
Ans. Emulsifying agents work by adsorbing at the interface between the immiscible liquids, reducing the interfacial tension and forming a stable film around the dispersed droplets.

Q 8. What are some factors that can influence the effectiveness of emulsifying agents?
Ans. Factors such as concentration of the emulsifying agent, pH of the system, temperature, and presence of electrolytes can influence the effectiveness of emulsifying agents in stabilizing emulsions.