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Commentary

An Overview of Membrane Emulsification and its Properties

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DESCRIPTION

Membrane Emulsification (ME) is a relatively new technique for producing single and multiple emulsions for Drug Delivery Systems (DDS), solid micro carriers for drug or nutrient encapsulation, solder particles for surface-mount technology, and mono distributed polymer microspheres for analytical column packing, enzyme carriers, liquid crystal display spacers, and toner core particles. The polymer solution is forced through the pores of a micro porous membrane directly into the continuous liquid phase in this procedure. A drop-by-drop mechanism forms and dissociates emulsified raindrops at the end of the porous structure. The benefits of membrane emulsification over traditional emulsification methods include the ability to produce extremely delicate emulsions with controlled droplets and narrow droplet size distributions. Membrane emulsification allows the use of shear-sensitive substances such as starch and proteins while using less emulsifier and energy.

The membrane emulsification technique is usually carried out in a stirred cell or in cross-flow (continuous) mode. Low micro emulsion flow velocity was a major limiting factor in Membrane Emulsification (ME). The productivity of this method had to be increased in order to expand its industrial applications. Some studies have been carried out to identify and other problems, such as membrane fouling. It has been recently demonstrated that high particles flux can be accomplished by using single-pass circumferential gap cross flow membranes.

An emulsion is a liquid diffusion in another solvent. These liquids do not mix or they are only partially soluble in each other. The diffused liquid is present as particles in the continuous liquid phase. Emulsions and emulsion production are widely investigated concepts. Emulsions are used in a wide range of applications, which include food products, pharmaceutical drugs, cosmetic products, paints, crop protection agents, and hydrocarbons. Rotor-stator systems, colloid mills, and high-pressure homogenizers are commonly used for large-scale emulsion production.

A granular emulsion is organized by stirring and transmitted to the emulsification equipment. Stress concentrations in the narrow space between the rotor and the stator particles in an emulsion machine, which is a rotor-stator system. Membrane emulsification technology, which was introduced in Japan in 1988, it is a drop-by-drop emulsification method by using a porous membrane. Since, involvement in the technique has grown substantially from both a scientific and technological perspective. A critical analysis of the patents can provide directions and developments in the improvement of membrane emulsification after approximately twenty-five years of study and inventions. Patents are an effective tool for evaluating a technology's development phase and forecasting its potential impact on a large scale.

Emulsions are classified into three types: temporary, semi-permanent, and permanent. Simple vinaigrette is an example of a temporary emulsion, whereas mayonnaise is an example of a permanent emulsion. Seed, and egg emulsifier, mono- and diglycerides, polysorbates, carrageenan, guar gum, and canola oil all are common emulsifiers in modern food production. Emulsion is a colloidal solution in which the dispersed phase and medium both are liquids for example Milk, face cream. Milk is oil in water emulsion; margarine is water in oil emulsion; and ice cream is an oil and air in water emulsion containing solid ice particles. Mayonnaise, salad dressings, and sauces such as Bearnaise and Hollandaise are examples of food emulsions.

Properties of emulsion

Membrane Emulsions (EM) contain all of the characteristics of a colloidal solution, such as Brownian movement, the particle effect, and electrophoresis. The addition of polyvalent metal ion-containing electrolytes polymerizes the particles, demonstrating their negative charge.

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