International Journal of Humanities Social Science and Management (IJHSSM)
Volume 2, Issue 5, Non.-Dec. 2022, pp: 233-237 www.ijhssm.org

Nano Emulsion

A brief Research on development, Chemical Composition, Method of preparation, Types, Mechanisms, Advantages, Disadvantages and Applications of pharmacy.

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Date of Submission: 11-11-2022 Date of Acceptance: 25-11-2022

Abstract
A heterogeneous system known as a nano emulsion is made up of one immiscible liquid that is dispersed as droplets within another liquid.The Nano emulsion ranges in size from less than 20 nm to 500 nm.The diameter, nonionic, zwitterionic, cationic, and anionic surfactants of a nano emulsion have a significant impact on the formulation's biological behavior.The advantages, disadvantages, applications, mechanism of action, chemical compositions, and methods of preparation for increasing the formulation's stability are all discussed in this paper in relation to nano emulsion.

Keywords: Nanomelia, stwald ripening, microemulsion, nano emulsion, co-surfactant, phase inversion, and micro fluidization.

I. INTRODUCTION

The term "nano emulsion," where "nano" refers to extremely minute particles and "emulsion" refers to a mixture of two liquids that cannot mix, is the introduction.A nano emulsion is an oil-in-water emulsion with droplet diameters between 50 and 100 nm.The typical droplet size ranges from 100 to 500 nm.Gamma tocopherol, caffeine, plasmid DNA, aspirin, methyl salicylate, insulins, and others are examples of nano emulsions used for transdermal drug delivery.

Nano emulsion is a special case of a emulsion.Shearing a mixture of two immiscible liquid phases and one or more co-surfactants yields a nano emulsion.nano emulsion is nano sized emulsion.these are thermodynamically stable.

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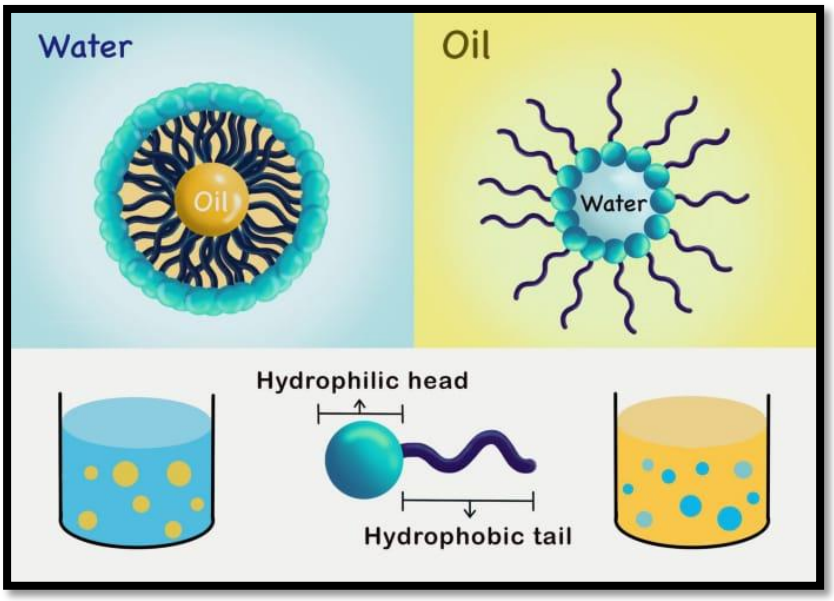

Diagram

Objectives

- Quicken the rate of absorption.
- Eliminates absorption fluctuation.
- Aids in the drug's solubilization.
- Increases bioavailability.
- The medication can be delivered by a number of different methods, including topical, oral, and intravenous.
- Beneficial for disguising tastes.
- The drug moiety penetrates quickly and effectively.
- Patient compliance is increased by liquid dose forms.

Types

1- nano emulsion in water (continuous aq. Phase)
2- Nano-emulsion of water and oil (continuous oil phase)
3- Nanomoles that are bicontinuous.

Chemical composition

Oil, emulsifying agents such oleic oil, ethyl oleate, caster oil, and triglycerides make up the majority of the nano emulsion's chemical makeup. Propanol and ethylene glycol give the nano emulsion stability, whereas polyethylene glycol 400, polyethylene glycol 200, and ethanol can be employed in place of liposomes.

Mechanism

The entropy was changed in a way that favours dispersion more than the energy needed to increase the surface of dispersion; as a result, the free energy in conventional emulsion is a direct function of the energy needed to create new surfaces between the oil and water phases and the addition of an emulsifying agent to lower interfacial tension, which led to the stabilisation of the emulsion.

Preparation

The medication is dissolved in the lipophilic portion of the nano emulsion during preparation. the aq. Surfactant and cosurfactant are coupled with phase. the aq. Until the system is transparent, phase is gradually added while being stirred. With the aid of a pseudo ternary phase diagram, the maximum amount of surfactant and co-surfactant that can be included should be established. In order to achieve the appropriate range of scattered globules, ultra-so nicator might be utilised. then it was given time to balance. Carbomer is the most often used gelling agent. Make the nanodroplets more stable. To encourage the creation of nano emulsion, the interface needs to be adaptable.

Formulation:-
-Oil phase: Castor oil, isopropyl, and cater.
-Surfactant: isopropanol amine, potassium and sodium stearate, etc.
-Co-surfactant, such as propanol, ethanol, etc.
-Antioxidant -Modifiers of tonicity
Agents for adjusting PH Preservatives

Nano emulsion preparation method

Method1 of high energy emulsification

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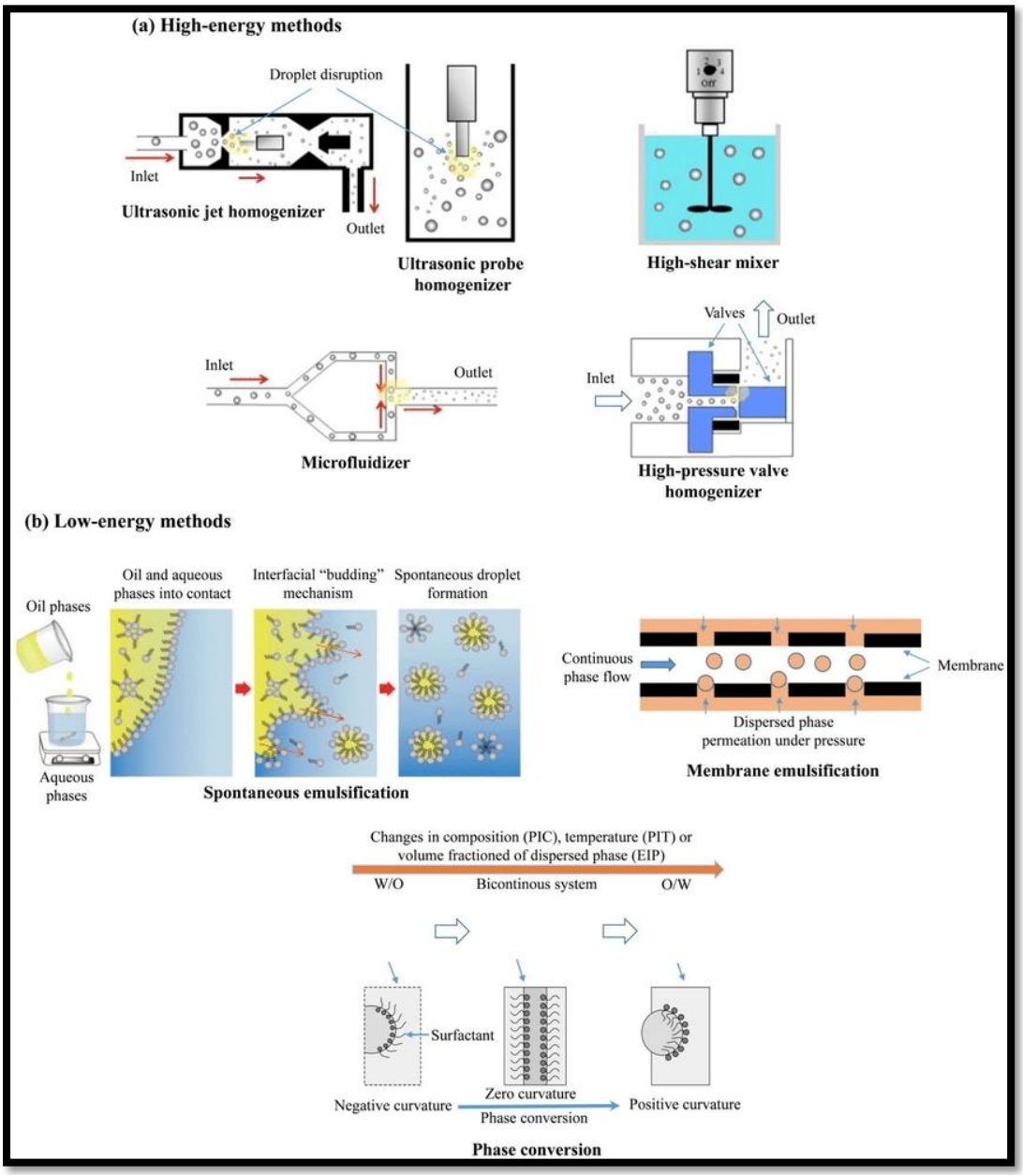
Method 2 of low-energy emulsification
Method of high energy emulsification
High mechanical energy was required for this emulsification technique. To force the development of a large interfacial area, a variety of equipment is employed, including rotor/stators, sniRers or ultrasonic generators, high pressure homogenizers, etc.

Method of low energy emulsification

Low mechanical energy is needed to create emulsions using the second low energy emulsification method. mechanical energy used after that to create the emulsion Phase inversion method and subsequent emulsification are employed. A homogenous organic solution is prepared, an organic phase is introduced to the aqueous phase, and then the water-miscible solvent is removed using an evaporator.



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Physical characteristics
1. Nano emulsion's relative transparency
2. How they react to rheology or mechanical shear

Nano emulsion characterisation
- Preliminary characterization

Morphology and structure
- In vitro skin examination
- Analysis of droplet size
- Refractive index
- Zeta persistent
- Viscosity

Merits
Nano emulsion helps to solubilize lipophilic medicines.
Enhances the rate of medication absorption.
Different drugs, such as oral and intravenous, can be employed to deliver the products.
It increases the medicine's bioavailability.
It has a steady thermodynamic state.
Possibilities of medication targeting and controlled drug release.

Drawback
It has a restricted ability to dissolve substances with a high melting point.
The high surfactant and co-surfactant concentration required for stabilising the nanodroplets.
Environmental factors like temperature and pH have an impact on the stability of nano emulsions. The surfactant ought to be safe to use in medicinal applications.

Limitation
The formulation of nano emulsion is an expensive procedure, which is one of its limitations.
Oswald maturing might harm the nano emulsions.
The stability issues may be brought on by PH changes.

Application
1. Parenteral medication administration
2. Ocular drug administration
3. Pulmonary medication administration
4. Transdermal or topical medication administration
5. Intranasal medication administration for the treatment of cancer
6. Oral medication administration

The parentral medication delivery method can be utilised with or without nano emulsions.
The parenteral nano emulsion formulation of the following drugs has been documented: carbamazepine, diazepam, dexamethasone, etc. In general, the intravenous route is preferable.

Ocular drug administration Nano emulsion lengthens the duration of the medications in the eye continuously.
-Lessen the requirement for repeated administration.
-dorzolamide and HCL nanoemulsion exhibit strong therapeutic efficacy

Pulmonary medication administration Ensure that the pharmacological dose is distributed among the alveoli fairly evenly additionally to move pulmonary epithelial cells. A new pressurised aerosol delivery device for salbutamol in the lungs.

Transdermal or topical medication administration Nanosized emulsions are easily able to enter the skin's pores and reach the systemic circulation in transdermal medication delivery.
Without a nano emulsion of caffeine, indomethacin, cyclopean, etc., a transdermal delivery system has been devised.

Intranasal medication administration The creation of magnetic nano emulsion is a cutting-edge method for treating cancer. These can be used to administer photosensitizers, such as Focsani, to deep tissue layers of the skin, causing hypelhermia.

Oral medication administration Nano emulsion lengthens the drug's continuous duration in the eye.
Dorzolamide nanoemulsion. High therapeutic efficacy and lasting effects are displayed by HCL.

Other applications
Antimicrobial nano emulsions
Technology based on cell culture
Vaccine distribution

Benefits
- Body moisturiser nano emulsion use in cosmetic products

Vitamin nano emulsion-containing facial lotion
Face cream with vitamin Nano emulsion for application at night.
- Antimicrobial properties

Oil-in-water droplets known as nano emulsions have a diameter of 200–600 nm.
The broad-spectrum activity of the nano emulsion against bacteria, viruses, fungus, etc.
- Food preservation
- Deliveries of food ingredients
- Improving the effectiveness of food
- Improving food safety

- Agents for flavour and colouring

II. Result

Nano emulsions are generated to enhance the delivery of medicinal substances that are active on a molecular level.

III. Conclusion

Nano emulsion is gaining interest as a drug carrier to enhance the delivery of active medicinal components due to its numerous benefits and uses for new drug delivery.

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