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Observation and Assessment of Pluronic lecithin organogel of Flurbiprofen

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ABSTRACT

The current work planned to make an index to calculate the typical efficiency of a series of nonsteroidal anti-inflammatory drugs Organogel, a viscoelastic system, can be regarded as a semi-solid preparation which has an immobilized external apolar phase. The apolar phase gets powerless within spaces of the three-dimensional networked arrangement formed due to the physical interactions amongst the self-assembled structures of compounds regarded as gelators. In common, organogels are thermodynamically stable in the environment and have been exploring as matrices for the delivery of bioactive agents. In the current document, attempts have been made to understand the properties of organogels, various types of organogelators, and some applications of the organogels in a controlled delivery.

KEYWORDS: *Organogel, Gel, Gelator, Drug delivery, Biocompatibility.*

I. INTRODUCTION

The essentials of successful observation are to distribute the active material at the target organ with minimal discomfort and side effects. In this respect, the transdermal route excels because of the prevention of hepatic first-pass metabolism, typical peak-trough plasma profile, ease of management, etc. Drug release through the skin has been used to aim the epidermis, dermis, and deeper tissues and for universal delivery. The major barrier for the transport of drugs through the skin is the stratum corneum, with most transport occurring during the intercellular region.

Current submission can potentially limit universal unpleasant events by increasing local effects and minimizing universal concentrations of the drug. Different type of topical formulations includes creams, ointments, pastes, gels, etc. Out of which gels are getting more popular nowadays because they are more constant and also can provide controlled release than other semisolid preparations. The U.S.P. defines gels as a semisolid system consisting of dispersal made up of either small lifeless particle or large natural particle enclosing and interpenetrated by a liquid.

The lifeless element forms a three-dimensional "house of cards" arrangement. A topical gel is a gel substance, which often contains some form of medicine and is applied to the skin or the mucus membranes. . In most cases a topical gel is clear and it tends to be more willingly immersed by the skin than is a lotion or cream. Individual drugs have different degrees of diffusion. A balance between lipid and aqueous solubility is needed to optimize infiltration, and the use of prodrug esters has been suggested as a way of attractive permeability. Methods of Preparation of gels include fusion method, cold method, and dispersal method.

The penetration of drugs during skin can be enhanced by physical methods such as motorized disruption, electrical disruption, chemical modification, and chemical penetration enhancers e.g. sulphoxides, pyrrolidone, alcohols, glycols, surfactants, and terpenes. These compounds increase skin permeability by increasing the partition coefficient of the drug into the skin and by increasing the thermodynamic activity of the drug in the vehicle. Substance diffusion enhancers adapt the barrier properties of the layer corneum and hence increase drug permeability across the skin.

Preferably, the effects of the penetration enhancer on the skin should be reversible, non-toxic, non-allergenic, and compatible with drugs and recipients, and non-irritating.

II. PREPARATION OF PLURONIC LECITHIN ORGANOGEL

Pluronic lecithin organogel is mostly collected from Pluronic F-127, soya lecithin, and IPP/IPM. In general, it is made up of two phases, the first pluronic phase and second lecithin phase i.e., pluronic gel mutual with lecithin based oil. Pluronic lecithin organogel gel looks and feels like a cream but is a gel. When the aqueous phase is mutual with the lecithin oil base creates a mixture that forms together due to the pluronic gel and the thickness of that gel at room temperature. The Chilling of PLO converts the gel into a liquid, which later gets divided into oil and aqueous phases.

A. AQUEOUS PHASE

The pluronic gel is prepared by taking a specific quantity of Pluronic F-127 NF in ice-cold water, agitating incessantly, and placing the mixture overnight for the complete dissolution of Pluronic F-127. About 0.2% w/w potassium sorbate is added as an additive.

B. OIL PHASE

Lecithin phase is equipped by taking a particular amount of lecithin, IPP/IPM, and 0.2-0.3% w/w sorbic acid as an additive, then keeping the mixture overnight for complete termination of lecithin. Finally, the PLO gel is being prepared by mixing lecithin: IPP liquid phase and the Pluronic phase together well. The incorporation of air should be minimized.

III. CHARACTERIZATION OF PLURONIC LECITHIN ORGANOGELS

In dissimilarity to the ease of training, the description of LOs is moderately difficult on account of their interior structural design build-up on the self associated supramolecules. These microstructures, the result of varied polar-nonpolar interactions, are highly sensitive and pose difficulties in the analytical studies. Though, dissimilar classification studies are extremely useful while investigating the potential applications of organogel systems as a topical vehicle.

A. STRUCTURAL FEATURES

A well-organized description methodology for any organogel system begins with its structural clarification. The isotropic nature and the optical clarity of LOs makes their study feasible by various spectroscopic techniques, namely, nuclear magnetic resonance (NMR) spectroscopy, and Fourier transformed infrared (FTIR) spectroscopy.

B. RHEOLOGICAL BEHAVIOR

For any vehicle to be used for current drug liberation applications, it is necessary to study its rheological behavior. The critical parameters such as spreadability, adhesiveness, cohesiveness, and gel consistency need to be modified in a favorable manner. These systems, before gelling exhibit Newtonian behavior but follow Maxwell's rheological behavior on the addition of the polar phase.

C. PHASE: TRANSITION TEMPERATURES

The phase behavior of organogels varies on changing temperature conditions. The phase transition temperature (PTT) gives an imminent into the nature of microstructures that form the gelling cross-linked network. The phase evolution temperatures also help in optimizing the organogel composition. For the determination of PTTs, hot stage microscopy (HSM) and high sensitivity discrepancy scanning calorimetry (HSDSC) have been reported to be useful as precise and sensitive techniques. Though, the inverse flow method, a simple technique based on visual observations has also been employed.

D. WATER CONTENT

Water satisfied with an organogel system is critical, as the water loss by evaporation can lead to a resultant decrease in thickness thus moving the gel constancy. Nastruzzi and Gambri have proposed near-infrared (NIR) spectroscopy as a simple, rapid, and non-destructive technique for determining the water content in LOs. The researchers performed NIR studies on the lecithin/IPP/water organogel system by measuring the water amalgamation in the NIR region (1800–2200 nm).

IV. ADVANTAGES OF PLURONIC LECITHIN ORGANOGEL SYSTEM

Pluronic lecithin organogels have the following advantages over other transdermal drug delivery system: The inclusion of pluronics as co-surfactants in organogel makes the organ gelling feasible with lecithin of relatively lesser purity.
More stable than other types of gel.

- Easy to originate.
- Have a high uptake capacity for active drugs.
- Do not grow mold if the gel becomes infected.
- Improved drug infiltration through the skin.
- The drug would go through to the subjacent tissues attaining high concentrations in the affected muscles/joints while maintaining low blood levels.
- The poorly water-soluble drug can be simply formulated using PLO.
- They can alternate for oral management of medication when that route is inappropriate.
- They are less slippery and can be simply removed from the skin.
- Restricted effect with minimum universal side effects.

A. PREFORMULATION STUDY

- classification Of Drug
- Organoleptic Properties
- Solubility purpose
- Partition Co-efficient
- Particle Size
- Melting Point
- Standard Curve Of Flurbiprofen In Ethanol

V. PROPOSED SYSTEM

A. DETERMINATION OF Λ MAX

100 mg Of Flurbiprofen was dissolved in 100ml of ethanol. 1ml of the equipped stock solution was further diluted to 100 ml and finally scanned for maximum absorbance using a double beam U.V. spectrophotometer in the range from 230 to 360 nm. Average of triplicate readings were taken.

B. SOLUBILITY DETERMINATION

Qualitative: 10 mg of drug dissolved in 10 ml of solvent to detect the solubility of the drug in the dissimilar solvents. The different solvents used for the solubility determination are:-

- Methanol
- Ethanol
- Acetone
- Chloroform
- Hexane
- Octanol
- Water

C. SEPARATION COEFFICIENT

A drug solution of 1mg/ml was prepared in Chloroform 25ml of this solution was taken in a separating funnel and shaken with an equal volume of distilled water for 10 minutes and allowed to stand for two hrs then separated. Both the phases were analyzed for the drug concentration using a U.V. spectrophotometer. The partition coefficient was calculated by taking the ratio of the drug concentration in Chloroform to drug concentration in aqueous phase readings were taken.

D. PARTICLE SIZE

I) Calibration of Eyepiece: Use standard stage micrometer to calibrate the eyepiece micrometer and calculate for the least count = No. Of Stage Division / No. Of Eye Piece Div x 10.

II) Mounting Of The Sample*:* Transfer a small portion of the given sample on a clean slide and disperse it uniformly and place the slide on the stage of the microscope.

III) Measurement of Particle Size*:* Focus the slide in low magnification. Observe the particles than shift to high power and focus the slide. Calculate the size of each particle in terms of eyepiece divisions. A total of 100 particles should be measured. Classify the diameter into size ranges and average regularity of particles in terms of no. allocation.

E. MELTING POINT DETERMINATION

acceptable results to select the drug for the transdermal drug delivery system.

The melting point of the drug was resolute by taking a small amount of the drug in a capillary tube closed at one end and was placed in Thiel's melting point apparatus and the temperature at which the drug melts was noted. Average of triplicate readings were taken.

F. STANDARD CURVE OF FLURBIPROFEN IN ETHANOL

100 mg of Flurbiprofen was precisely weighed and dissolved in ethanol in a 100 ml volumetric flask and the volume was made up to the mark using ethanol. The above-prepared solution of Flurbiprofen was consequently diluted with ethanol to get 2, 4, 6, 8, 10, 12 µg per ml of the final solution. Then the absorbance was measured by spectrophotometer at 248nm using ethanol as blank. Average of triplicate readings were taken.

G. DRUG- EXCIPIENT INTERACTION STUDY

A small quantity of drug material with recipients that is, a physical mixture of the drug and recipients was placed in a vial, and a rubber stopper was placed on the vial and sealed correctly. A storage period of 2 weeks at 60°C and the same sample was retained for 2 months at 40°C. After storage, the sample was observed physically for liquefaction, caking, odor, or gas formation, discoloration.

VI. CONCLUSION

Any preparation for its penetration through the skin should be thermodynamically active, must be lipophilic as well as hydrophilic in nature having a favorable separation coefficient. The preformulation study for the drug was conducted. The λmax of Flurbiprofen was found at 247-248 nm, which is reasonably the same as given in the Merck Index. This shows that the drug is pure. By the determination of organoleptic properties, it was observed that the Flurbiprofen is a white or slightly yellow crystalline powder, bitter in taste and odorless drug. Results of qualitative solubility studies show that the Flurbiprofen is more soluble in organic solvents and insoluble in water. The divider coefficient was found to be 3.89, which is suitable for transdermal drug delivery. The obtained value of the partition coefficient of Flurbiprofen was more than 1 which showed that the Flurbiprofen is lipophilic in nature. The average particle size of Flurbiprofen was calculated by the microscopy method was found to be 7.145 micrometers. The melting point was observed at 110-112 0C and this range is nearly the same as reported in Merck Index, it shows the drug is crystalline in nature. The preformulation study of Flurbiprofen showed

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