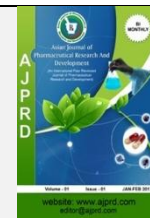


Available online on 15.2.2022 at <http://ajprd.com>

Asian Journal of Pharmaceutical Research and Development

Open Access to Pharmaceutical and Medical Research

© 2013-21, publisher and licensee AJPRD, This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited

Open  Access

Review Article

New Topical Drug Delivery System Pharmaceutical Organogel: A Review

Jaya Sharma*, Dilip Agrawal, Ashok Kumar Sharma, Mohit Khandelwal, Shaneza Aman

Mahatma Gandhi College of Pharmaceutical Sciences, Jaipur, Rajasthan

ABSTRACT

A simple working definition of this term 'Gel' is a soft, durable or solid material, containing both solids and liquid parts, where the solid part (gelator) exists as a mesh / network of aggregates, viz immobilize part of the liquid, a strong network prevents the liquid from leaking flow, especially by local pressure. The gel is called a hydrogel or Organogel depending on the type liquid component: water in hydrogel and a living solvent in organogels. Organogels have been discovered as a multipurpose tool in pharmaceuticals for topical as well as transdermal delivery of various drugs. They are semisolid classifications consists of apolar phase and a solid phase. Gels are formed through the mechanism of entrapment of a polar segment into the three-dimensional networked assembly of solid phase. Apolar phase is included as a solvent such as isopropyl palmitate, isopropyl myristate etc. an organogelator such as sorbitan monostearate, lecithin etc. are consist by solid phase Organogel, non-crystalline, non glassy thermo reversible (thermoplastic) solid materials and viscoelastic system, can be considered semi-solid an immobilized preparation external apolar phase. Apolar the section closes between spaces of a three-dimensional network a structure built due to physical condition negotiation between collectors compound properties considered as gelators. Generally, these programs are supported in structural integration molecules. These systems are good transporter for both hydrophilic and lipophilic therapeutic agents. The present review describes a number of important properties of organogel, different types of organogel based on organogelator, method of preparation and various applications in pharmaceuticals.

KEYWORDS: Organogel, advantage, disadvantage, classification, properties, applications

ARTICLE INFO: Received; 10 Nov. 2021 Review Complete; 25 Jan. 2022 Accepted; 14 Feb. 2022 Available online; 15 Feb. 2022



Cite this article as:

Sharma J, Agrawal D, Sharma AK, Khandelwal MK, Aman S, New Topical Drug Delivery System Pharmaceutical Organogel: A Review, Asian Journal of Pharmaceutical Research and Development. 2022; 10(1):75-78.

DOI: <http://dx.doi.org/10.22270/ajprd.v10i.1088>

*Address for Correspondence:

Dr Jaya Sharma, Research Scholar, Mahatma Gandhi College of Pharmaceutical Sciences, Jaipur, Rajasthan

INTRODUCTION:

The gel is best applied to all of these essential mechanisms excellent appearance, smoothness, consistency you want, fast drug release, simplification and quality testing and excellent stability. Recently gel production has been done prepared to produce an early drug delivery system known as Orthanogels. It was found that lipid-based composition very effective for improving login through leather but the drawback to such a structure is that they change hydration condition on the skin, causing dermatitis. On the other hand, water-based formulations that are able to maintain a bioactive state skin but shows good penetration. So a new kind of gel the so-called organogel promising car is designed to deliver various agents on the skin due to the presence of both phase

oil and liquid phase and lecithin organogel brings a bioactive agent in the treatment of skin aging. Gels can be divided into bonds present in the gelato network: portable gels containing weak muscle strength attractions such as van der Waals' interactions with hydrogen bonds, and chemical jars held by tight bonds. Depending on the type of liquid component, such Gels are They are basically divided into two types, such as organogels or hydrogels.¹

Hydrogels:- Hydrogel is a 3-dimensional (3D) network of hydrophilic polymers that can be swollen in water and hold large amounts of water while maintaining structure due to the chemical or physical bonding of each polymer chain. Hydrogels were first reported by Wichterle and Lim (1960). By definition, water must make at least 10% of the total weight (or volume) for an object to be a hydrogel.

Hydrogels also have a level of flexibility very similar to natural tissue due to their important water content. Network hydrophilicity is caused by the presence of hydrophilic groups such as -NH₂, -COOH, -OH, -CONH₂, -CONH-, and -SO₃H.²

Organogel: -Organ gel is thermodynamically stable, clear, viscoelastic, biocompatible and isotropic gels composed of phospholipids, a suitable organic and polar solvent. The formation of three-dimensional networks at organogel is the result of a change in the micellar level fluid in a low viscous network that includes a span that causes micelles in natural fluids that are not cool.

These reversible circular structures of microcarbide lipid aggregates, the twins progressively form micelles long tubular with background addition, followed by interference to create a three-dimensional temporary network with multiple solutions.

However, the clarity and optical isotropy of the organogel remains to be maintained. Because of this, these systems are commonly referred to as polymers such as micelles and are also called living or equivalent polymers, such as worms or string like micelles.

ADVANTAGE OF ORGANOGELS:-

1. **Template vehicle:** - Organogel offers the opportunity to combine a variety of materials.

with different physicochemical properties namely: chemical environment, melting, molecular weight, size etc.⁴

2. **Process benefits:** - Automatic organogel formation due to super molecular self-assembled the arrangement of the surfactant molecule makes the process much easier and easier to manage.

3. **Structural /physical stability :-** Thermodynamically stable, structural integrity

4. The organogels are stored for a long time.⁵

5. **Chemical stability:** -organogels are sensitive to moisture and being organic are also microbial resistant pollution (.5)

6. **Topical delivery potential:** - A good balance of hydrophilic and lipophilic character, can properly separates from the skin and thus improves skin penetration and molecular transport.⁶

7. **Safe:**-The use of biocompatible, biodegradable and non-immunogenic materials makes them safe for long-term use.⁶

DISADVANTAGE:-

1. **Partition coefficient :-**Drugs with a reasonable partition coefficient otherwise the drug will not be approved on the skin.

2. **Route:-**The route is not drug-friendly irritating or irritating the skin. The organogel contains oily properties

3. **Purity:** - In Organogel, lecithin should be pure otherwise no gelling will occur and If dirt is present, there is no gelling happen.

4. **Lecithin:-**lecithin is very expensive and is not available on a large scale.

5. **Storage:-**Requires proper storage condition. It should be kept in good condition.

6. **Temperature:** - • Temperature is unstable.(7)

CLASSIFICATION OF ORGANOGELS:-

Lecithin Organogels:-

Lecithin is a phospholipid, extracted from various plants and animal tissues separately from the egg cell. Lecithin derived from natural sources can form gelled structures and has been caused by the presence of incomplete chemicals within its structure. Synthetic lecithin and hydrogenated soy lecithin failed to develop organogels. Apart from the chemical structure, the purity is excluded. Lecithin also plays a key role in the formation of organogel. Experimental results show that lecithin fails to initiate the gellification process of apolar solvent when lecithin contains <95% phosphatidyl content. Lecithin-based organogels were found to be thermodynamically strong, thermoreversible (sol-to-gel transition temperature at 40°C), transparent, viscoelastic, biocompatible.^{6,7}

Pluronic Lecithin Organogel (PLO):-PLO is an organogel based on soy lecithin containing isopropyl palmitate or isopropyl myristate, water and Pluronic F127 (also known as Poloxamer 407). PLO may or may not contain sorbic acid, which acts as a preservative, in both stages. It occurs as a yellow, odorless and invisible gel that is absorbed by the skin quickly.^{8,9}

3) Premium Lecithin Organogels (PrLOs):-PrLO is the second most common organogel of lecithin and is able to glide high without its oily and non-tacky nature, providing beauty pleasant reception. This gel does not have a Pluronic derivative, which leads to avoid skin irritation and thus reactions to the skin intolerance. This gel has been used successfully to detoxify various bioactive agents, namely, diclofenac, ibuprofen, ketoprofen and progesterone, and has been considered the vehicle of choice for the delivery of intradermal drugs.^{10,11}

Limonene GPI / PG Organogel:-Limonene, terpene, has been found to be an excellent entry enhancer as well therefore it has been incorporated into various types of transdermal formulations to improve the penetration of bioactive agents across the transdermal layer, thus to improve the bioavailability of the bioactive agent within the skin tissues.¹¹

Gelatin-Stabilized Microemulsion-based Organogel (MBG):-Gelatin is a protein used as a building agent in various food arrangements for having an extremely aqueous phase. Build a gelled structure there a hot gelatin solution with a temperature of more than 40°C cooled to a temperature below 35°C. Preferred Microemulsions for gelatin-stabilized development organogels due to natural thermostable and easy to prepare the same.¹²

Sorbitan Organogels derived from fatty acids:- Gelators in this category include sorbitanmonostearate and sorbitanmonopalmitate. These hydrophobic non-ionic molecules have more active properties and the ability to block various solvents, namely, isopropyl myristate and vegetable oils. These gelators form a solid-fiber matrix when heated. The gelator solution in the apolar solvent cools down. Jelly formation is mentioned in the formation of toroidal reverse micelles as temperature lowered.^{13,14}

Polyethylene Organogels:- Polyethylene organogels are colorless in nature, and are formed there LMW polyethylene is dissolved in mineral oil at a temperature of > 130°C and cooled by shock. These organogels are widely used as fuel foundations. The formation of the gelled structure may be due to the physical interaction of solid-fibers formed due to polyethylene rainfall molecules.¹⁴

Properties of Organogels:

Viscoelasticity:- Viscoelastic materials mean, materials with both viscous and elastic properties. Organogel exhibits a flexible material in a solid state, where it has a low shear rate. As the shear rate increases, the elastic material decreases, because excessive shear stress will disrupt the physical interaction between the fibers present at organogel.^{15,16,17}

Non-Birefringence:- Organogels are naturally isotropic, meaning that bright light cannot pass through them. This organogel character is called a non-birefringent. To look like a dark matrix when tested under polarized light.^{18,19}

Thermo Reversibility:- Organogels are more stable than critical temperatures, so that if the system temperature rises above critical temperature it will flow due to the disruption of the solid matrix as a structure. However, it can be reversed by cooling down.²⁰

Temperature:- Generally, organogels are stable in temperature. The stability of the organogel thermo depends on the gelator, which will build a structure that binds itself together in the right conditions and forms a gel system. The free energy of organogel may be reduced due to the gelator molecules that bind to each other and provide stable, less powerful organogels.²¹

Visual clarity:- Like other gels, organogels may not always be obvious in nature. These can be opaque or transparent. The visual acuity of these systems depends on the composition of the gel. Eg organogels prepared with sorbitanmonostearate will appear opaque and lecithin appears naturally.²²

Chirality:- The emergence of chiral center in gelator molecules enables them to pack active cells, so that these are thermodynamically and kinetically stable in nature.²³

Biocompatibility:- Initially, a variety of non-biocompatible materials were used in the manufacture of organogel and made organogel as non-biocompatible. Later organogel was developed with several biocompatible drug delivery.²⁴

Application of organogels :-

Organogel as a Matrix for Transdermal Transport for Drugs:- Organogel have been successfully investigated as dermal drugs. Example- Aceclofenac [for osteoarthritis,

rheumatoid arthritis, and ankylosing spondylitis causes stomach upset when taken orally that is avoided topical transdermal delivery with Ethyl oleate-based lecithin organogel [EO / Lecithin] aceclofenac can be avoid delivery of topical transdermal drugs [applicable to regular hydrogel]. Topical Microemulsion for Aceclofenac is also formulated but with no side effects as needed a large number of surfactants and co-surfactants of solidification of nano-droplets, poor viscosity and dispersion. Although lecithin organogels do not require such a type surfactant or penetration enhancer, as it has both properties. Organogel has a better spread as well viscosity rather than microemulsion. Soyabean lecithin organogels are better than regular pieces of scopolamine as well broxaterol as it shows the rapid rate of delivery of transdermal drugs. Diclofenac and Indomethacin skin absorption have been found to be increase when used with isopropyl palmitate.²⁵

Organogel as Iontophoretic Transdermal Drug Delivery system:- drug delivery rate rises sharply by Intophoresis [especially large hydrophilic topical delivery types such as proteins, peptides etc. well-fitting during passive condition] .But, aeries problems if they occur on time application of the solution. This problem overcomes the loaded drugs gels [assists in drug administration] and hydrogels use as a reservoir of iontophorois is drugs but the biggest drawback is it microbial contamination of such aquatic systems. Which leads to cracking of the gel structure, redox reaction and pH change. This problem can be avoided by using organogels as the presence of a living solvent as a continuous phase therefore inhibiting microbial growth.

Organogel as Ophthalmic Drug Delivery Systems:- Eye drops are widely used for eye drug delivery however retreat when most of the drug is not absorbed targeted tissue due to rapid cleansing by the flow of tear therefore a double dose was required. Which leads to the unwanted side outcome and patient adherence. Suspension cannot help this condition as drug release depends on the degre elimination of different drug particles due to continuity changes in the formation and release of lachrymal fluid. The effectiveness of treatment can be increased by increasing communication the duration of treatment which can be done by extension viscosity but the addition of a viscosity builder like CMC is not possible to improve the situation and in the state of water solubility oil visual acuity was affected. This is difficult can be overcome by oragnogel. High viscosity and organic the solvent as a continuous phase, makes it difficult to wash them. Due to the three-dimensional network of gel drug release in solid level.²⁶

Organogel in cosmetics: Skin care products in particular emulsion-based [contains water and oil phase respectively lipid]. Some products also contain oil category only. Fat but also organogel belong to this group. That's right it is mainly recommended for skin problem, so it is used in dermatological cosmetics. People with a skin boundary disruption depends on the high dose of life-sustaining lipids due to a certain group on organogel this problem is solved again gain more value. In this case, lip gels are recommended. In contrast to liquid-oils have the same consistency as emulsion cream [gel-like and semi-solid].²⁵

Nutraceutical applications:- Scientists have synthesized fossil fuels and discovered them as an alternative to trans

fats and saturated fats, so it can be use in many food products required a specific texture as well rheology without creating significant changes in the final product quality. This method can be completed by synthesis of certain molecules [polymers, amphiphiles, waxes become oily to make oleogels. A polymer similar to Ethylcellulose[is used as a basis for the preparation of many articles and chemicals stable than lubricating oils] that build up oleogels by binding oils at 10% levels have a variety of different properties. Sorbitantooglycerylmonostearatesolegogel with different types of vegetable oil [which can be biodegradabletraditional greasing grease]. Oils like rapeseed as well Soy bean oil [with low-viscosity] produces very strong gels high rates of direct viscoelastic operations.²⁵

CONCLUSION:

Today more research is being done to improve the features of the organogel system. The range of organogel systems is increasing due to easy preparation, thermoreversible environment, long shelf life and also successful. Apart from this, the range of organogel increases due to its ability to absorb various hydrophilic and lipophilic drugs. Thanks to the wide range of applications, organogel can be an excellent drug delivery system in the future.

REFERENCE:

- Sharma AK et al. Pharmaceutical gel: A review, International Journal of Pharmacy & Technology, Dec. 2020. 12(4), 7223-7233.
- Dhiman S, Singh GT, Rehani AK. Transdermal patches: a recent approach to new drug delivery system. Int J Pharm Pharm Sci 2011;3:26-34.
- Sharma C, Agrawal D, Goyal R, Sharma AK, Khandelwal M, Organogel : A new approach in topical drug delivery system, European Journal of Pharmaceutical And Medical Research 8(11):304-307.
- A introduction to hydrogels and some recent application by Morteza Bahram, Namiashmohseni Moghtadar submitted october 20 /2015 ,reviewed 18/may/2016 ,published 24/ aug/2016.
- R.Gupta , M.K. Gupta, and H.K Sharma, —A Review on Organogels and Fluid Filled Methodl International Journal of Scientific Research and Reviews 2014:280- 282.
- Prakash T. Sangale and GadhavManoj V, — Organogel: A Novel approach for Transdermal Drug Delivery Systeml World Journal of Pharmaceutical Research 2014; 427-428.
- Kumar, R. and O.P. Katare, Lecithin Organogels as a Potential Phospholipid-Structured System for Topical Drug Delivery: A Review. AAPS PharmSciTech, 2005; 298-310.
- Schurtenberger, P., et al., Structural and dynamic properties of polymer-like reverse micelles. The Journal of Physical Chemistry, 1990: 3695-3701.
- Swati C. Jagdale, Priya S. Khawale, Bhanudas S. Kuchekar, and Aniruddha R. Chabukswar, —Development and Evaluation of Pluronic Lecithin Organogel Topical Delivery of Tapentadoll American Journal of Pharmaceutical Sciences and Nanotechnology, 2015.
- Veena S Belgamwar, Mohit S Pandey, Dhiraj S Chauk, Sanjay J Surana, —Pluronic lecithin organogel l Asian Journal of Pharmaceutics 2008; 134-135.
- GargTarun, Bilandi Ajay, Kapoor Bhawana, Kumar Sunil, — Organogel: Advance and Novel drug deliveryl International Research Journal of Pharmacy. Nov-2011 pp:3-4
- Nigar Kadar Mujawar*, SangramsinhLaxmanGhatage And Veerendra C. Yeligar, —Organogel: Factors And Its Importancel International Journal of Pharmaceutical, Chemical and Biological Sciences. 2014 ; 764-766.
- Hongzhuo Liu, Yongjun Wang, Fei Han, Huimin Yao, Sanming Li, —Gelatin-StabilisedMicroemulsion-Based Organogels Facilitates Percutaneous Penetration of Cyclosporin A In Vitro and Dermal Pharmacokinetics In Vivo l Wiley Inter Science. Dec-2006; 3001
- GargTarun, Bilandi Ajay, Kapoor Bhawana, Kumar Sunil, — Organogel: Advance and Novel drug deliveryl International Research Journal of Pharmacy. 2011; 3-4
- Varsha Gupta, MeenuNagpal, Imran Khan, Geeta Aggarwal, Rupinder Kaur, Sukhdev Singh, TapanBehl, Mehta et al. / Indian J. Pharm. Biol. Res., 2016; 4(3):28-37 Review Article 37
- Upendra Kumar Jain, —A Review On Non-Ionic Surfactant Based Organogel For Transdermal Delivery l World Journal of Pharmacy and Pharmaceutical Sciences .2014; 3[9]:154.
- S. Kantaria, G. D. Rees and M. J. Lawrence, J. Control. Rel. 1999; 60, 355.
- K. K. Upadhyay, C. Tiwari, A. J. Khopade, H. B. Bohidar and S. K. Jain, Drug Dev. Ind. Pharm. 2007; 33:617.
- Agrawal D, Goyal R, Bansal M, Sharma AK, Khandelwal M, Development And Evaluation Of Econazole Organogel; International Journal of Current Pharmaceutical Review and Research., 13(2), Pages: 15-23.
- Sharma A K, Naruka P S, Soni S, Khandelwal M, Shaneza A, Sharma M, Development And Evaluation Of Hydrogel of Kitoconazole; International Journal of Current Pharmaceutical Review and Research., Aug. 2019; 11(3):01-11.
- Sharma A K, Naruka P S, Soni S, Sarangdewot YS, Khandelwal M, Shaneza A, Formulation, Development And Evaluation of Luliconazole Hydrogel; International Journal of Current Pharmaceutical Review and Research., Nov. 2018; 10(4):01-06.
- Raj Kapoor Balasubramanian, Abdussalam A Sughir, Goupale Damodar, —Oleogel: A promising base for transdermal formulationsl Asian Journal of Pharmaceutics 2012; 5-7.
- B.V. Mikari, K.R.Mahadik, Formulation and evaluation of topical liposomal gel for fluconazole. S.A. Korde, Indian J .Pharm.Sci., 2010. 44(4), 324-325.
- Rupal Jani, Kaushal Jani, Setty C.Mallikarjuna, Preparation and evaluation of topical gel Valdecocixib. Dipti Patel, Inter.journal.Pharm.Sci. Research. 2010; 2(1):51-54.
- Shah VP: Transdermal drug delivery system regulatory issues. In: Guy R.H. and had graft J. (eds.), Transdermal drug delivery. Marcel Dekker, New York, 2003; 361-367.
- Carter SJ: Disperse system In: Cooper and Gunn's Tutorial Pharmacy. 6th ed. New Delhi: CBS Publishers and Distributors; 2000: 68-72.