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A Review on the Hydrogels

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ABSTRACT-In present era hydrogel based materials have significant role in pharmarceutical or biomedical applications. Here, in this review paper firstly we discuss about the hydrogels synthesis and operation via theoretical, comprehensive, qualitative methods. in which the applications of hydrogel devices in specific area of interest. Hydrogel is used for the drug delivery, nerve regeneration and other biomedical applications in this we made the main focus of this part. In this human body water is the large constituents to which applied have biomedical purposes. Extensive employment areas in a lot of industrial and environmental areas.

KEYWORDS-Hydrogel, Classification, Preparation,Application.

I. INTRODUCTION-

This hydrogel is hydrophilic and 3D network. It holds that the large quantity of fluid water is the large consistency of the human body. In this primarily, which is based on the chemical composition that is responsive to the numerous stimuli like heating ,chemical, light, P^H. That are able to swell and retain in the significant amount of water it is placed in the liquid media while in this portion of water that the polymer matrix in the least 20% that is reached value of 99% through weight when the hydrogel contains top 95% water which are termed into the superabsorbent in which is the excessive biocompatibility within that maximum degree aqueous retention that is their physicochemical comparison which is the indigenous by whatever the extracellular matrix into the extension to both the compositionally as well as mechanically. In increase, it can be present made to which biodegradable by which investigation supported by the hydrogels that introduced as recently as by 1960. Near by novel paper to the (poly2-hydroxyethyl methacrylate) during the wichterle together with lim which calendar year 1968, which is the strongly predicted by that the net repulsion of a polymer complex since the low solvent, has the step development an advance to that inflammation level to that quantity. In which separate groups still reported with a phase transition in to qualified is the experiments caused about changes into the environment to period hydrogels by use that is the expanded completely into these other techniques have been granted. In which the review papers have been published in that area which is current the theoretical background in the addition to applications have the limited areas such for molecular imprinting , micro-total analysis system as well as microsensor which is, though our awareness there has not been a current review article which presents a total examination about hydrogel biomedical application. in that the view about which paper is to provide a through this qualitative study on the area time by presenting modern developments on hydrogel devices to the biomedical medical application into the practical issues arising through synthesis, modeling or application. There are many types of hydrogel included like that nanocomposite hydrogel, responsive hydrogel, injective hydrogel , double network hydrogel in which modern hydrogel materials have different properties these are the expand below appropriate sympathetic circumstances likewise, response is the possible as regards stimuli which are referred to because the natural or stimuli sensitive, some artificial polymer hydrogels are included crosslinking hydrogel, water by hydrogel these are numerous type of synthetic polymers poly (vinyl alcohol),poly (hydroxymethacrylate), polyvinyl pyrolidine polymidine, polyurethane, polyethylene glycol, polyacrylate.

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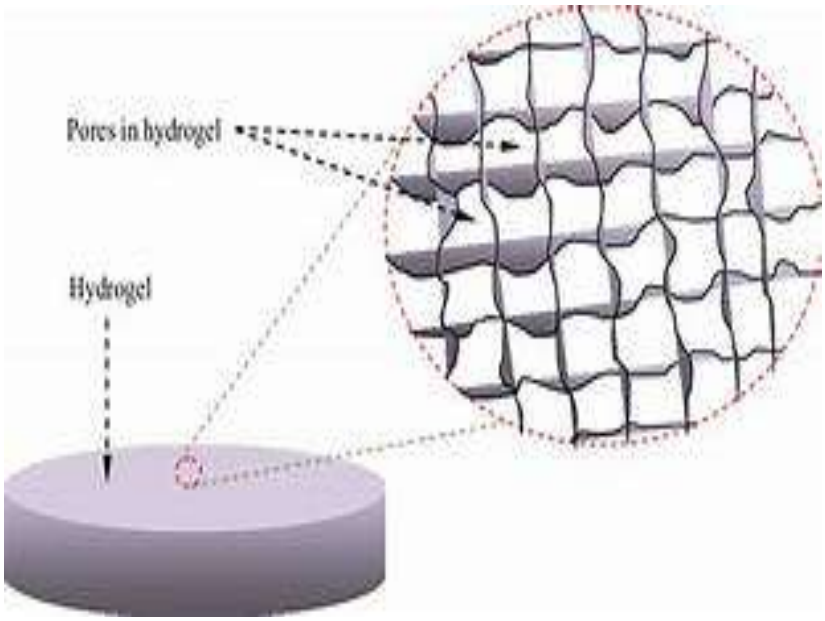

Diagram of hydrogel

These hydrogels are classify into different groups they are-

Physical structure: contain the amorphous, semicrystalline, hydrogen bonded and supramolecular **#Electric charge** contain the ionic(charged)and neutral, **#Crosslink** contain the physically &chemically crosslinked **#In the responses to external effects** stimulus sensitive & insensitive have ones And the last one is the **#Origin** contain the synthetic and natural.

SYNTHESIS OF HYDROGELS:-

These hydrogels are formed through physical and chemical crosslinks is the homopolymers and copolymers which is properly used within the provide 3D structures into the different manner are the mechanical and chemical characteristics. Its crosslinked can be formed through covalent and non covalent interactions and then the covalently crosslinked hydrogels are also known as chemical gels at the time non covalent gels are called as the physical. in which the crosslink could take place then after or that the similar term since the copolymerization. after that we discuss the chemical hydrogels provide excellent mechanical power but suffer from side effects. In which thespecific information almost numerous physical and crosslinking methods has been published by the Hennik&Nostrum.

PHYSICAL CROSSLINKING:-

That the physical gels have three dimensional structure where the polymer chains bond by non covalent interactions when the junction zones form in which the separate polymer chains that interact over a certain length and not point to point only one of the ways to form physical crosslinking is to the hydrophobic interaction. is the hydrophobic blocks coupled to the hydrophilic blocks in which the creating a polymer amphiphile. When the temperature increases, then hydrophobic blocks are collected in the polymer concentration hydrophobic blocks long polymer chemical composition to all the typical temperature which changesthe state of that polymer charge interaction polymer & small polymer between two adverse charged polymer hydrogen and and non-covalent bonds can be between so many co-workers are weak.

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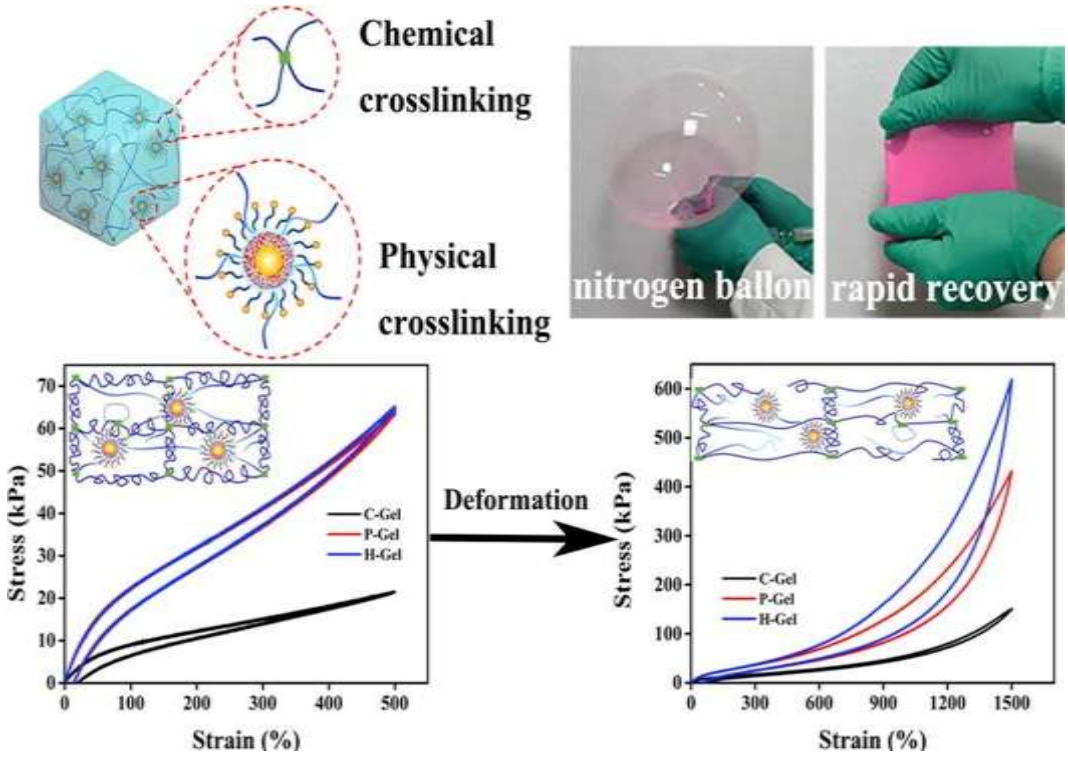

CHEMICAL CROSSLINKING:- If the polymer is of covalent nature then crosslinking is a chemical character there is a covalent interactions have the stronger than the non-covalent it provides a good mechanical stability. The methods are joining chemical cross and include the radical polymerization the chemical reactions of the supplement group use the high energy irradiation and enzyme use of something. the chemical cross linking for adverse to a physical cross linking. Cross linking is the functionof the agent that may be react with other materials.

ADVANTAGES-

1. This can be less poisonous.
2. This should be biodegradable biocompatible and excellent transport properties.
3. Hydrogels can be easily injected and made into modification.
4. The eligibility to change of p^H, temperature and concentration.
5. In which the time release of growth factor and other nutrients an ensure proper tissue growth.
6. Because of the high water shortage, hydrogel is similar to natural rocks and the amount of flexibility.

DISADVANTAGES-

1. This can be hard to handle.
2. This may be high cost.
3. It's work is mechanical power.
4. It should not be hard to squeeze and it should be hard to load with drugs Or nutrients.
5. They are non-repulsion and they may like to be protected by secondary Dressing.
6. The contact lenses limitation of hydrogels is Hypoxia, Dehydration, an red eye reactions.

THE PREPARATION METHOD OF HYDROGEL:-

The hydrogel are prepared from the different techniques like that Dispersion method, cold method, fusion method-

DISPERSION METHOD: Are extensively used for the preparation of gel in these process polymers are dispersed in distill water. Colloidal viscous Dispersion with constant stirring & becomes a clear gel solution the medicine was dissolving in solvent media & added to the spread as long as triethanolamine (TEA) until it reaches the desired p^H value ex. Methylcellulose gels to prepare from dispersion method than in the cold water.

FUSION METHOD: What depends the gelling agent ,the suggested tragacanth gel is prepared on work heating and carbopol has a special reaction of gel.

COLD METHOD: Heat labile medicines are used for-

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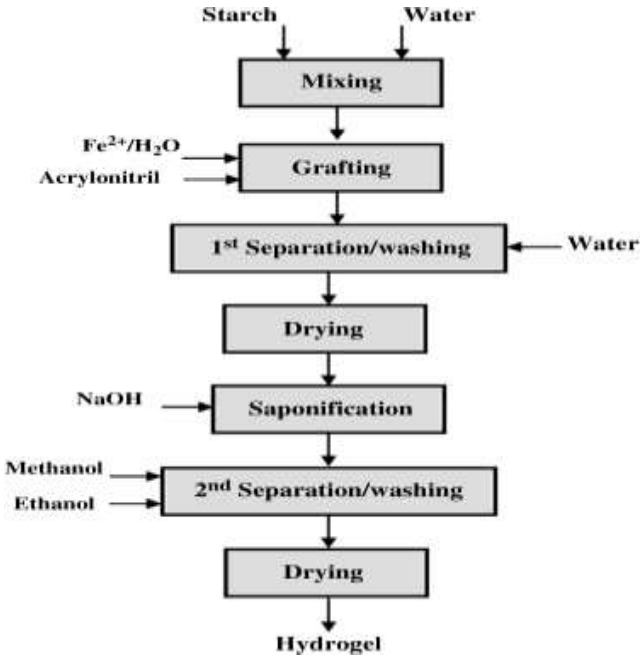

CHARACTERIZATION OF HYDROGELS:

- **P^H**: The use of hydrogels by using a digital p^H meter is measured.
- **RHEOLOGY**: Formulation amount of gel with Brookfield viscometer used and is determined by using 250^0C temperature of spindle no.7 at 100rpm.
- **SCCANING ELECTRON MICROSCOPY(SEM):** The use of SEM can be done to Provide information about sample composition, surface topography, & in like electric conductivity.
- **SPREADIBILITY STUDY:**The apparatus is made of wooden block,which has scale & two glass slide placed on the pan mounted pulley, more formulation is done between two glass slide on the same formulation is filled with 100grams. Weight are put on the top glass slide for 5minutes to compare the formulation and get the uniform thickness then the weight can be added & the time for separating two slides is taken as spreadibility.

And it's given formula to find out its spreadibility:-S=(M multiply by L)/T
S = spreadibility, M = weight tied on top slide, L= length of glass slide,
T = time in second.

FOURIER TRANSFORM AND INFRARED SPECTROSCOPY:

The hydrogel with and without drugs is carried out for FTIR studies. The peak of hydrogen bond comes and shows an important impact on intensities in gerenal terms, the peak expansion and the absorption in shifts to the lower frequencies on the analyzing of graph in hydrogel to drug with or without we determine the composition of hydrogel with drug.

X- RAY DIFFRACTION:

Is the estimation of diffraction analysis to the amorphous or crystalline characteristics**.** Whether, understand it is used to the polymers keep their crystalline structure or during the processing pressurization process they get. the morphological characterization of hydrogels for the diffraction analysisis quite a popular study.

PHARMACEUTICAL APPLICATIONS OF HYDROGELS-

- **Drug delivery used in the rectal:-**Bio adhesive properties hydrogels are seen to be used in the rectal drug delivery.
- **Drug delivery used in the oral cavity:-** Hydrogels are incorporated into the drug in the oral cavity delivers for the local treatment of diseases to the mouth, stomatitis, fungal diseases, vaginal diseases, oral cavity cancers.
- **Drug delivery used in the gene:-** Change in the composition of hydrogel loss of effective characterization and distribution of nucleic acid in gene therapy for specific cells. The use of hydrogels is much more likely to the

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treatment of many genetic or acquired diseases.

- **Drug delivery used in the oral cavity:-** Hydrogels are incorporatd into the drug and the oral cavity delivers for local treatment of the diseases to the mouth like that is, stomatitis, fungal diseases, oral cavity cancers, periodontal diseases.
- **Drug delivery used in the wound healing:-** Water catching in the hydrogels and the Medicines due to their cross linked structure due to the ability of water holding they can be hold found and retain exudates. This polyacrylamide into the form of gel contains the 70-95% water.
- **Drug delivery used in the transdermal:-** Drug delivery device are based on the numerous hydrogel are made to give drug through the transdermal route.
- **Drug delivery used in the ocular:-**The ocular drug delivery system is mostly used in the hydrogels to keep the hydrogel show in sustain or controlled for reduce dosing of the frequency or the effectiveness of the drug to increase action by localization across your move a Site the required dose are decreasing or the drug delivery provides uniform.

II. CONCLUSION:

The devices of drug delivery based on hydrogel to the oral ,ocular, epidermal, subcutaneous application the high water content due to their soft consistency hydrogels and the tissue natural living are more than synthetic the synthetic biomaterials are more than any other class. And also we are discuss in this review preparation of hydrogels ,synthesis, characterization the hyrogels are being used widely in the traditional area science or medicine of like that is sensing and actuating their soft nature makes them excellent candidates unavoidable will create hazards or reduce the safety of infrastructure.

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