OPEN ACCESS Freely available online

ISSN: 2155-9589
Journal of Membrane Science & Technology

Short Communication

The Use of Membrane Diffusion as an Apparatus for Separating and Characterizing Normally Occurring Polymers

Obed Adams*

Department of Polymer Science & Technology, Lovely Professional University, Jalandhar, India

ABSTRACT

Permeable polymeric films have arisen as the center innovation in the field of partition. Yet, a few difficulties stay for a few strategies utilized for layer manufacture, recommending the need for a basic audit of the writing. We present here an outline on permeable polymeric layer planning and portrayal for two regularly utilized polymers: Polysulfone and poly (vinylidene fluoride). Five distinct techniques for film manufacture are presented: Non-dissolvable prompted stage partition, fume prompted stage detachment, electro spinning, track scratching and sintering. The critical variables of every strategy are examined, including the dissolvable and non-dissolvable framework type and arrangement, the polymer arrangement piece and fixation, the handling boundaries and the surrounding conditions. To assess these techniques, a concise depiction on layer portrayal is offered identified with morphology and execution. One of the goal is to introduce the rudiments for choosing a proper technique and film manufacture frameworks with suitable handling conditions to deliver films with the ideal morphology, execution and soundness, just as to choose the best techniques to decide these properties.

Keywords: Membrane; Polymer; Polymeric membrane; Morphology

INTRODUCTION

A membrane is a layer of material which serves as a selective barrier between two phases and remains impermeable to specific particles, molecules or substances when exposed to the action of a driving force [1,2]. Some components are allowed passage by the membrane into a permeate stream, whereas others are retained by it and accumulate in the retentate stream. As for its structure, a membrane can be homogeneous or heterogeneous, symmetric or asymmetric, solid or liquid, neutral, may carry positive or negative charges or may be bipolar, with a thickness between less than 100 nm to more than a centimeter. Mass transport through the membrane may be caused by convection or by diffusion of individual molecules, induced by an electric field or a concentration, pressure or temperature gradient [3].

DESCRIPTION

The term "membrane", therefore, includes a great variety of materials and structures and a membrane can often be better described in terms of what it does rather than what it is. Some materials, though not meant to be membranes, show typical membrane properties and in fact are membranes, e.g., protective coatings or packaging materials [4]. IUPAC classifies membranes according to their pore diameter, as follows: Microporous (dp<2 nm) mesoporous (2 nm<dp<50 nm) and macroporous (dp>50 nm). Membranes can be generally classified into three groups: Inorganic, polymeric or biological. These three types differ significantly in their structure and functionality. An artificial or synthetic membrane is a synthetically created membrane, usually intended for separation purposes in laboratory or industry.

Correspondence to: Obed Adams, Department of Polymer Science & Technology, Lovely Professional University, Jalandhar, India; E-mail: obedad@gmail.com

Received: 25-Mar-2021, Manuscript No. JMST-24-9189; **Editor assigned:** 30-Mar-2021, PreQC No. JMST-24-9189 (PQ); **Reviewed:** 13-Apr-2021, QC No. JMST-24-9189; **Revised:** 16-Aug-2024, Manuscript No. JMST-24-9189 (R); **Published:** 13-Sep-2024, DOI: 10.35248/2155-9589.24.14.396

Citation: Adams O (2024) The Use of Membrane Diffusion as an Apparatus for Separating and Characterizing Normally Occurring Polymers. J Membr Sci Technol. 14:396.

Synthetic membranes have successfully been used for small and large-scale industrial processes since the middle of twentieth century [5]. Synthetic membranes can be fabricated from organic or inorganic materials including solids, such as metals or ceramics, homogenous films (polymers), heterogeneous solids (polymeric mixtures) and liquids. Even now, when ceramic, metal and liquid membranes are gaining more importance, the majority of membranes are and will be made from polymers due to the wide variability of barrier structures and properties which can be designed by polymer materials [6]. Polymeric membranes are the ones that take the form of polymeric interphases, which can selectively transfer certain chemical species over others. There are several mechanisms that could be deployed in their functioning. Among them, Knudsen diffusion and solution diffusion are the prominent ones, being classified based on their surface chemistry, bulk structure, morphology and production method. The chemical and physical properties of synthetic membranes and separated particles, as well as the choice of driving. Systems membranes-complex towards functional devices and coupled processes force define a particular membrane separation process. In industry, the most commonly used driving forces of a membrane process are pressure and concentration gradients. The particular membrane process is known as filtration. The synthetic membranes used in separation processes can be of different geometry and flow configuration and can be categorized based on their application and separation regime [7]. The best known synthetic membrane separation processes include water purification, reverse osmosis, dehydrogenation of natural gas, removal of cell particles by microfiltration and ultrafiltration, removal of microorganisms from dairy products and dialysis. Polymeric membranes are of particular importance in gas separation applications, with industrial applications in oxygen-nitrogen separation, removal of organics and natural gas enrichment. Being competitive in performance and economics, the polymeric membranes lead the membrane separation industry market. Many polymers are commercially available, but the choice of membrane polymer is not a trivial task. A polymer must have appropriate characteristics for the intended application, example, to offer a low binding affinity for separated molecules to withstand the harsh cleaning conditions and to be compatible with the chosen membrane fabrication technology. Moreover, the polymer has to be a suitable membrane in terms of its chains rigidity, chain interactions, stereo regularity and polarity of its functional groups [8].

CONCLUSION

The polymers can form amorphous and semi crystalline structures (with different glass transition temperatures), affecting the membrane performance characteristics.

The polymer has to be easily obtained at reasonable prices to comply with the low cost criteria of membrane separation process. Many membrane polymers are grafted, custom-modified or produced as copolymers to improve their properties. The most common polymers used in membrane preparation are cellulose acetates, nitrates and esters, polysulfone, poly (ether sulfone), polyacrylonitrile, polyamides, polyimides, polyethylene and polypropylene, polytetrafluoroethylene, poly (vinylidene fluoride), poly (vinyl chloride).

REFERENCES

1. Tan X, Rodrigue D. A review on porous polymeric membrane preparation. Part I: Production techniques with polysulfone and poly (vinylidene fluoride). Polymers. 2019;11(7):1160.
2. Jyoti G, Keshav A, Anandkumar J. Review on pervaporation: Theory, membrane performance and application to intensification of esterification reaction. J Eng. 2015;2015(1):927068.
3. Talukder ME, Alam F, Mishu MM, Pervez MN, Song H, Russo F, et al. Sustainable membrane technologies for by-product separate non-pharma com comp. Water. 2022;14(24):4072.
4. Zhang WJ, Wang S, Kang CZ, Lv CG, Zhou L, Huang LQ, et al. Pharmacodynamic material basis of traditional Chinese medicine based on biomacromolecules: A review. Plant Methods. 2020;16:1-28.
5. Chang SH. Utilization of green organic solvents in solvent extraction and liquid membrane for sustainable wastewater treatment and resource recovery-a review. Environ Sci Pollut Res Int. 2020;27(26): 32371-32388.
6. Sun L, Chen Q, Lu H, Wang J, Zhao J, Li P. Electrodialysis with porous membrane for bioproduct separation: Technology, features and progress. Food Res Int. 2020;137:109343.
7. Chen Z, Hu D, Ren N, Zhang ZP. Simultaneous removal of organic substances and nitrogen in pilot-scale submerged membrane bioreactors treating digested traditional Chinese medicine wastewater. Int Biodeterior Biodegrad. 2008;62(3):250-256.
8. Wang B, Wang X, Xiong Z, Lu G, Ma W, Lv Q, et al. A review on the applications of traditional Chinese medicine polysaccharides in drug delivery systems. Chinese Med. 2022;17(1):12.