WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

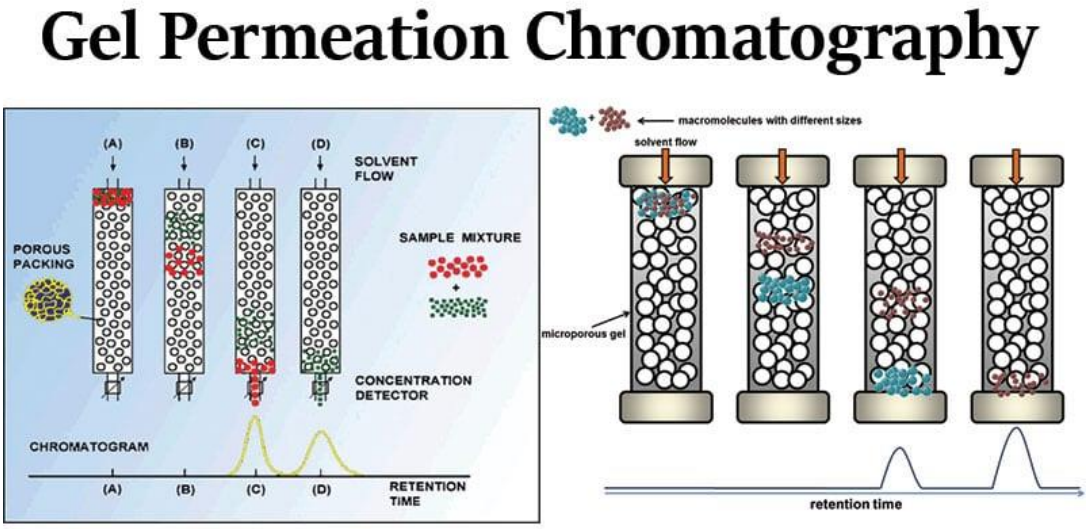
A REVIEW OF GEL PERMEATION CHROMATOGRAPHY

Arunima Aravind.V.P[1], Prof. (Dr) Ajith Babu.T.K[2]

Department of Pharmaceutical Analysis, Malik Deenar College of Pharmacy, Kasaragod, Bela (P.O), Pin: 671321

Principle:

Gel permeation chromatography (GPC), also known as size exclusion chromatography (SEC), separates molecules based on their size. The principle involves the use of a porous gel matrix through which molecules of different sizes can pass. Smaller molecules enter the pores and take longer to traverse the column, while larger molecules move more quickly through the larger openings, resulting in separation based on size.



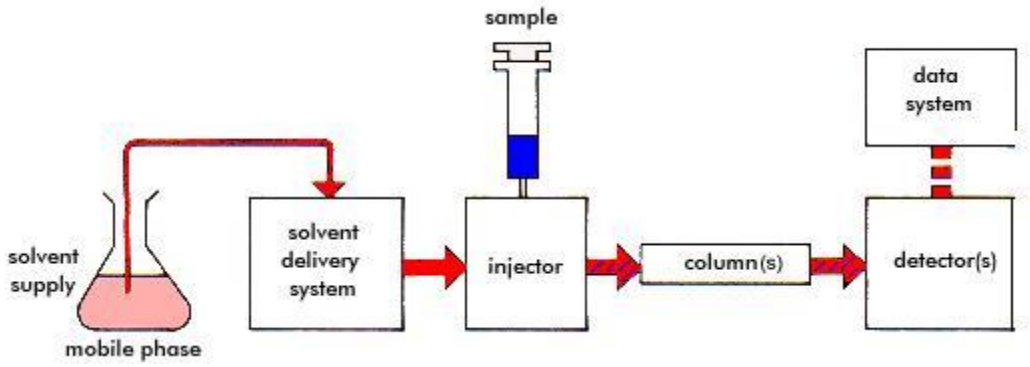
Procedure of Gel Permeation Chromatography (GPC)

- **Sample preparation**: The sample is dissolved in a suitable solvent and filtered to remove any particulates.
- **Column packing**: A column is packed with a gel matrix that has pores of different sizes.
- **Sample injection**: The sample solution is injected into the column.
- **Elution**: The mobile phase, typically a solvent, is pumped through the column.
- **Detection**: The eluted molecules are detected using a detector, such as a refractive index (RI) detector or an ultraviolet (UV) detector.
- **Data analysis**: The detector output is analyzed to obtain the molecular weight distribution of the sample.

Instrumentation of Gel Permeation Chromatography (GPC)

A typical GPC system consists of the following components:

- **Solvent reservoir**: This holds the mobile phase solvent.
- **Pump**: This pumps the mobile phase through the column at a controlled flow rate.
- **Injector**: This injects the sample solution into the column.
- **Column**: This contains the gel matrix that separates the molecules.
- **Detector**: This detects the eluted molecules.
- **Data acquisition system**: This records the detector output.



Advantages of Gel Permeation Chromatography (GPC):

- **Size Separation**: GPC is excellent for separating macromolecules based on their size, allowing for the analysis of polymers and large biomolecules.
- **Wide Applicability**: It can be used for a variety of sample types, including synthetic polymers, proteins, and nucleic acids.
- **Non-Destructive**: GPC is a non-destructive technique, meaning that samples can be recovered after analysis for further characterization.

Disadvantages of Gel Permeation Chromatography:

- **Limited Resolution**: GPC may have limited resolution for particles of similar size, making it challenging to distinguish closely related components.
- **Sample Solubility**: Sample solubility can be a concern, as GPC requires the sample to be soluble in the eluent.
- **Column Packing Issues**: Packing of the gel columns requires precision, and deviations can lead to variations in results.

Conclusion:

In conclusion, Gel Permeation Chromatography is a valuable tool for size-based separation of macromolecules. Its advantages lie in its broad applicability and non-destructive nature. However, limitations such as resolution challenges and sample solubility issues should be considered when choosing this technique. Overall, GPC is a powerful analytical method that provides valuable insights into the size distribution of polymeric and biological samples.

REFERENCES:

1. Skoog, D.A. 2006, Principles of Instrumental Analysis, 6th ed.; Thompson Brooks/Cole: Belmont, California, Chapter 28.
2. Khademhosseini A, Demirci U (2016). Gels Handbook: Fundamentals, Properties and Applications. World Scientific Pub Co Inc.
3. Seiffert S, ed. (2015).Supra molecular Polymer Networks and Gels. Springer. ASIN B00VR5CMW6
4. Ferry JD (1980). Viscoelastic Properties of Polymers. New York: Wiley.
5. Almdal, K.; Dyre, J.; Hvidt, S.; Kramer, O. (1993). "Towards a phenomenological definition of the term 'gel'". Polymer Gels and Networks.