

A
Mini Project Report
on

**A Review of Membrane Technology in Industries :
Case Study of Pharmaceutical and Food Processing Industries and
Waste Water Treatment Unit**



Submitted in partial fulfilment of the requirement of credits in second year of

**Bachelor of Technology
in
Chemical Engineering**

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ABSTRACT

Membrane technology has become a cornerstone in various industries, revolutionizing processes from pharmaceutical manufacturing to water treatment and food processing. In the pharmaceutical sector, membrane technology has significantly advanced drug production, wastewater treatment, and product recovery. Historical developments, applications, and future prospects of these technologies reflect substantial contributions from leading international enterprises. Concurrently, the escalating global demand for fresh water, driven by population growth and agricultural needs, has accelerated the development of desalination and water treatment methods. Membrane-based techniques, including microfiltration, ultrafiltration, nanofiltration, and reverse osmosis, have emerged as crucial solutions for addressing water scarcity and enhancing efficiency in desalination processes.

In the oil industry, advancements in drilling technologies such as sand-tar extraction, hydraulic fracturing, and enhanced oil recovery have dramatically increased the volume of wastewater requiring treatment. Recent research has focused on the use of membrane technologies for treating produced and refinery wastewater, with a particular emphasis on enhancing membrane efficiency and longevity. Membrane distillation and forward osmosis are highlighted as promising future technologies in this context.

Additionally, membrane technology has made notable strides in food processing, offering innovative solutions for separation and purification. The application of membrane processes in the food industry has not only improved efficiency but also facilitated the extraction of health-beneficial peptide fractions. This review underscores the broad impact of membrane technology across multiple sectors and highlights ongoing advancements and future research directions to further enhance its potential.

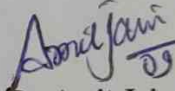
CERTIFICATE OF APPROVAL

This is to certify that the project entitled **Review of membrane technology in industry – Case study of Pharmaceutical, food and waste water treatment industry** submitted by Om Prakash (Roll No. : 22021131), Priyanjana Malakar (Roll No. : 22021139), Rangari Tejus (Roll No. : 22021143), Rahul Kumar (22021140), Sakshi Kumari (Roll No. : 22021149), Shreyansh Shukla (Roll No. : 22021155) in partial fulfilment of the requirement of credits in second year of Bachelor's of Technology, Chemical Engineering is a record of bonafide and original research work carried out by them under our guidance and this project does not include any work which has previously been submitted for the award of other degree, diploma, associate-ship, fellowship, or other similar titles to them. We, further certify that the work reported in this project was carried out independently by the candidate.

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