

Membrane for Dye / Color Removal from Wastewater



INVENTION

This U.S. patented invention is an adsorption biopolymeric membrane to remove dyes from industrial wastewater.

The removal process can easily be integrated in multi-stage industrial wastewater treatment process.

MARKET NEED

Synthetic dyes are used in textile, pharmaceutical, food, tanning and paper industry. Removal of dyes from water sources is necessary because of their recalcitrant, toxic and non-biodegradable nature. Around 300,000 tons of synthetic dye is discharged in textile wastewater every year worldwide.

Flocculation/coagulation, membrane filtration, photo degradation, ozonation, and chemical and/or biological degradation are commonly used industrial techniques to remove dye from water. However, there is always a need of more efficient and cost effective technique.

According to a Reports and Data report, North America is largest player for industrial wastewater treatment i.e., 35.5% of total market share. The global market is driven by depleting freshwater resources and stringent government regulations for emission and treatment of industrial waste.

COMPETITIVE ADVANTAGE

- Membrane is biodegradable
- Up to 98% dye removal capacity in a single run
- Low energy consuming process
- 10 minutes to remove more than 80% of dye
- Membrane can be easily regenerated for reuse without significantly affecting its dye removal capacity

PATENT PROTECTION

Patents US10399864, US10046985, US10508046 covers membrane composition and method of using it. The patent is owned by King Fahd University of Petroleum & Minerals (KFUPM).

TECHNOLOGY READINESS

- Batch-adsorption experiments were conducted in university lab to study dye removal capacity of the membrane
- Small pieces of 0.5 cm² membrane were tested in a pH7 solution
- Membranes were tested for Methylene Blue (MB) and Rhodamine B (RhB) dyes at a concentration range of 5-100mg/L. These dyes are commonly used in pharma, aquaculture, biological staining, biotech industries
- Membrane was regenerated by simple acid treatment and tested for four adsorption cycles
- Increase in adsorption efficiency was noted with increase in pH



Fig. MB and RhB Dye Removal at Different Concentrations

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ip-License@kfupm.edu.sa