A Novel Bio-Membrane filter for Drinking Water Purification (BIOMEM)

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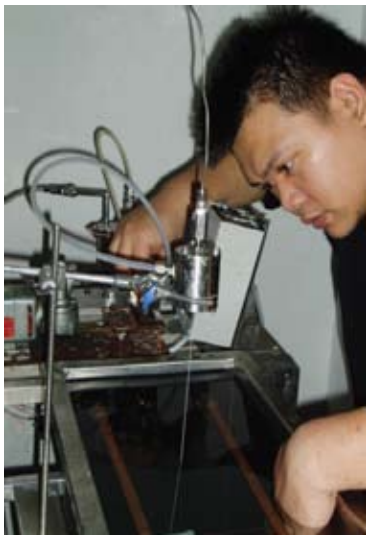
Abstract

Presence of potential bacteria and viruses enteric, undesirable color, tastes and odors in drinking water resulting from cross contamination of rust, silt, scale, mud, microorganisms and colloidal materials has demanded for extra post treatment process for safer potable water consumption. Hence a new innovative asymmetric Ultrafiltration holllow fiber membrane has been developed to treat potable water supply of poor water quality. The main principal advantages of this locally Malaysian membrane are ability to supply higher quality of potable water (surpassing National drinking water standards) that is totally free from colloidal, suspended solids and bacterial contamination. Bio-membrane is locally manufactured using the state-of-the-art production technique which ensures better membrane performance (quality and productivity) compared to the commercially available water filter. Bio-membrane is 83 times better (in term of separation performance) than that the conventional house hold membrane filter. This is due to its smaller pore size (approx. 6 nm or 68 kDa) compared to commercial available filter (0.5 µm to 5 µm). Its 6 nm pore size, which is 16 times smaller than the bacteria's diameter (100 nm) ensures 100% rejection. Besides its low energy consumption and more economical membrane filter compared to the commercial filter, bio-membrane permeation rate has been innovatively made to sufficient the flow of normal tap water flow rate (from 15 L/min to 20 l/min) and stays more durable (within five years) by manipulating the exclusive membrane recipe during membrane fabrication.

A Case study at Taman Mahkota Aman, Gambang Kuantan

Product Invention

Bio-membrane is synthesized from phase inversion technique using a dry-wet spinning machine. This membrane is fabricated from different dope formulation containing polysulfone polymers, addditives, N, N-dimethylacetamide and non-solvents. The novelty of this membrane fiber relies on our expertise in manipulating the indigeneous polymer formulation blending, rheological (dope viscosity, water activity) and operational process (jet stretch, DER and air gap).



Novelty

- Bio-membrane is locally manufactured using the state-of-the-art production technique.
- A proprietary solution formulation is used as barrier to discriminate microorganism, turbidity, suspended particle and organic matter.
- Bio-membrane (6 nm) is 83 times better (in term of separation performance) than the conventional house hold membrane filter (0.5 µm to 5 µm).
- Its 6 nm pore size is 16 times smaller than the bacteria's diameter (100 nm) ensures 100% rejection.
- Its 6 nm pore size is 4 times smaller than viruses size.
- Require low energy consumption which is 0.5 bar to 1 bar.
- More economical (5 times) membrane filter (USD 4.4/m2) compared to the commercial membrane filter (USD 20-25/m2).
- bio-membrane permeation rate has been innovatively made to sufficient the flow of normal tap water flow rate (from 15 L/min to 20 l/min).
- Stays more durable (within 5 years) by manipulating the exclusive membrane recipe during membrane fabrication.
- Ability to supply higher quality of potable water (surpassing National drinking water standards) that is totally free from colloidal, suspended solids and bacterial contamination.