REFORMED POLYIMIDE/NANOCRYTALLINE CELLULOSE FOR GAS SEPARATION

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Patent

- PI 2019002085 (Membrane for gas

Product Background

- Manufactured via single step coating-carbonization cycle to reduce production time and cost.
- Excellent thermal resistance and chemical stability.
- Perfect product for wide range of gas separation applications.
- Present various carbonization condition for supported carbon membrane.

Technical Novelty

- Fully carbonized carbon membrane was formed when reach an optimum temperature.
- Defect-free carbon membrane
- Increase the mechanical strength.

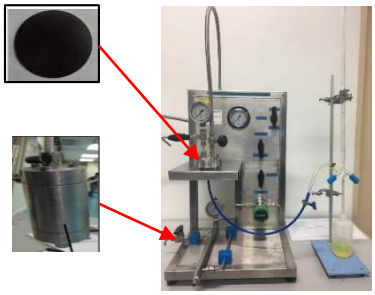
Usefulness and Applicability

- Contribute to Helium production
- Ability to separate gases based on differences in size and shape
- Economical support materials
- Excellent properties for production of carbon membrane

Cost Analysis

- Cost per membrane is RM 100.00
- Cost of single permeation gas is RM1000.00.

Product Image



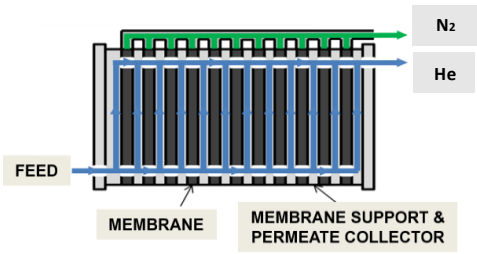
Environmental Impact

- Absence of hazardous chemicals
- Reduce risk to environment
- Reduce gas footprints, minimizing climate change issue

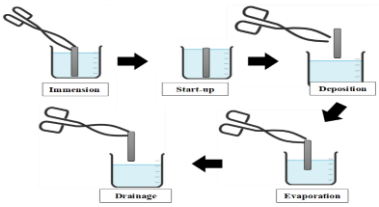
Achievement/Award

- Gold Award – CITREX2020
- CENLAB Special Award – CITREX2020
- Gold Award-CITREX 2019

State of the Art



- Carbon membrane separation mechanism is molecular sieving as it obtains micropores size that can achieve high gas permeance and selectivity that exceed Robeson
- Offer various carbonization condition for different thin defect free supported carbon membrane



- Dip coating produced thin layer carbon membrane that reduce the gas resistant during separation process

Marketability & Commercialisation

- Global opportunities for Gas purification.
- The global helium market was worth $10.6 billion in 2019. It is expected to grow at a compound annual growth rate (CAGR) of 11% and reach $15.73 billion by 2023.

Publications

1. Incorporation of thermally labile additives in polyimide carbon membrane for hydrogen separation, International Journal of Hydrogen Energy, 2020. (WoS, Q1, IF = 4.939)
2. Influence of intermediate layers in tubular carbon membrane for gas separation performance, International Journal of Hydrogen Energy, 2019. (WoS, Q1, IF = 4.939)
3. Impact of stabilization environment and heating rates on P84 co-polyimide/nanocrystalline cellulose carbon membrane for hydrogen enrichment, , International Journal of Hydrogen Energy, 2019. (WoS, Q1, IF = 4.939)
4. Development and characterization of disk supported carbon membrane prepared by one-step coating-carbonization cycle, Journal of Industrial and Engineering Chemistry, 2018. (WoS, Q1, IF = 5.278)
5. Carbon tubular membranes from nanocrystalline cellulose blended with P84 co-polyimide for H_2 and He separation, International Journal of Hydrogen Energy, 2017. (WoS, Q1, IF = 4.939)
6. Disk supported carbon membrane via spray coating method: Effect of carbonization temperature and atmosphere, Separation and Purification Technology, 2018. (WoS, Q2, IF = 5.774)
7. Exploiting pyrolysis protocols on BTDA-TDI/MDI (P84) polyimide/nanocrystalline cellulose carbon membrane for gas separations, Journal of Applied Polymer Science, 2018. (WoS, Q2, IF = 2.52)
8. Emerging technologies by hydrogen: A review, International Journal of Hydrogen Energy, 2020. (WoS, Q1, IF = 4.939)
9. Membranes for hydrogen separation: a significant review, The International Journal of Advanced Manufacturing Technology, 2020. (WoS, Q2, IF = 2.633)
10. A review of the application of carbon-based membranes to hydrogen separation, Journal of Materials Science, 2020. (WoS, Q1, IF = 3.553)