Membranes for gas/liquid separation

EXECUTIVE SUMMARY

Thin film composite membranes that are used for gas separation and also for pervaporation for aroma recovery. Uses include producing oxygen enriched air for medical applications and other medical and industrial uses.

TECHNOLOGY DESCRIPTION

A method for preparation of aromatic polyester based membranes from readily available raw materials by conventional methods, with high yield is described. These membranes can be used for separating various gases (e.g., hydrogen from methane, helium from nitrogen, oxygen from nitrogen etc.) A method for preparation of PDMS based thin film composite membranes that can be used for pervaporation/perstraction.

MARKET POTENTIAL

- The worldwide market demand for membranes has been predicted to reach $15 billion in 2012, growing at the rate of 8.6% annually*
- Global oxygen concentrator market has been valued at $1.2 billion in 2011 and further growth predicted^- illustrating the potential for use of membranes in this market
- Membranes have great potential to be used in the flavor and fragrance industry- which in 2010 had revenues of over $20 billion, and has a high growth rate**

*World Membrane Separation Technologies Industry Study with Forecasts for 2012 & 2017,Study #2468, April 2009, Page 393- Freedonia, ^Oxygen Concentrator Market Opportunities, Strategies, and Forecasts, 2005 -2011, Winter Green Research Inc., Dec 2005, Page122, **http://www.leffingwell.com/top_10.htm

VALUE/ADVANTAGES

- Gas separation membranes
- Made from readily available raw materials, conventional methods of preparation (low cost), with high yield
- Can be easily processed (the polymers used are soluble in common solvents)
- Possess a very good combination of gas selectivity and permeability
- Very stable at high temperatures
- Pervaporation(alcohol dehydration, aroma recovery) /Perstraction (recovery of nonvolatile acids) membranes
- High fluxes, high selectivity
- Operational simplicity
- Low energy requirements

APPLICATIONS

- O_2/N_2 enrichment (medical applications), biogas processing, H_2 recovery (hydroprocessing purge systems, ammonia & petrochemical plant), synthesis gas (H_2/CO) ratio adjustment
- Aroma recovery in perfume industry/ fragrance and flavor separation in food industry
- Removal of organics from water, water from organics, organic / organic separation
- Separation of acids (organic and inorganic) from complex mixtures like fermentation broths

TECHNOLOGY STATUS

- Demonstrated at the lab scale/prototype demo-ed for O_2 enrichment for medical appl.
- Ready to be licensed
- Patent granted: US # 6420511 B1

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