

**Korea Membrane Society Symposium**  
**Membrane-Based Vapor Separation:**  
**New Applications, Material Selection and Membrane Development**

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Membrane-based gas separation is an important new technology in the chemical process industry. The most widely used membrane processes involve (a) the separation of air for production of 98+% nitrogen, b) recovery of hydrogen from refinery waste-gas streams, and c) removal of carbon dioxide from natural gas. The separation of organic vapors from chemical process gas streams is another opportunity for membrane technology with considerable industrial importance. Membrane Technology and Research, Inc. (MTR) is the leading U.S. supplier of membrane systems for the recovery of organic vapors from industrial waste-gases. To date, MTR has sold more than 50 commercial vapor separation systems worldwide. Examples of highly successful membrane-based vapor separation applications include (a) ethylene or propylene recovery from nitrogen in polyolefin plants, (b) ethylene recovery from argon-containing purge-gas streams in ethylene oxide plants, and (c) vinyl chloride monomer recovery in poly(vinyl chloride) operations. This presentation will provide an overview of the state-of-the-art of membrane-based vapor separation. Optimum membranes for vapor separation applications must have the following characteristics: (a) high flux, (b) high selectivity, (c) mechanical stability, (d) chemical resistance, and (e) tolerance to temperature variations. Guidelines for optimum membrane material selection, based on differences in gas solubility and diffusivity in rubbery and glassy polymers, will be discussed.