Comparison of Hexane Vapour Permeation Indifferent Membranes.

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Nowadays, the industrial development causes a rapid increase of anthropogenic pollution of environment. Therefore, there is a need of an intensive search for sustainable and "green" technologies. One of the current issue is to minimalize the emissions of hydrocarbons into atmosphere. The emission of organic volatile compounds (VOCs) means not only an ecological problem but also an economic loss. Therefore, it is necessary to avoid a further increasing of the emissions as well as to solve the capture of the pollutants.

The separation of VOCs can be realised by various methods such as condensation, absorption, adsorption, etc. In recent decades, membrane technology has attracted attention as an alternative and versatile tool. Its advantages consist in its low operating cost, simple operation, compact design, and modular equipment.

The aim of this work was the VOC removal from a polluted air stream. The model mixture contained nitrogen saturated by various concentrations of hexane. The mixture was chosen as a representative binary mixture of the polluted air by gasoline vapours. The nitrogen represented the major component of air and hexane represented the gasoline vapours, respectively.

Vapour permeation experiments were carried out at various conditions using the test stand apparatus [1, 2]. The apparatus allow to measure at different pressures above and under the membrane, cell temperatures, saturation temperatures, two flow arrangements (co- or counter-current flow) and two modes with either sweeping gas or vacuum applied at the permeate side of the membrane.

The transport and separation properties were compared for three different kind of membranes, namely supported ionic liquid membrane [1], low density polyethylene and polyamide thin film composite membrane. Further, the influence of the membrane material on the transport and separation properties was discussed. The highest flux was obtained for the supported ionic liquid membrane while the permeability of hexane through the polyethylene membrane was the lowest. The differences between the fluxes in different membranes were almost two orders of magnitudes.

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Literature

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