**Influence of Temperature and Pressure on Isooctane Permeability in Polydimethylsiloxane Membrane**

Lenka Moravkova, Karolina Machanova, Petr Stanovsky, Zuzana Petrusova

*Institute of Chemical Process Fundamentals of the Czech Academy of Sciences, Rozvojova 135, 165 02, Prague 6, Czech Republic*

*\*Corresponding author: moravkova@icpf.cas.cz*

**Highlights**

* Separation ability of flexible PDMS is influenced on operation conditions
* Isooctane permeability depends significantly on trans-membrane pressure
* Isooctane permeability is negligible influenced by process temperature
* Reproducibility of isooctane permeability is within 5 %
* Membrane flux does not show any hysteresis for the change of feed concentration

**1. Introduction**

Generally, sorption and diffusion are the key parameters for gas and vapor permeation in the polymeric dense membrane. The diffusivity is higher for smaller molecules, while sorption is stronger for larger condensable molecules. The permeability mainly depends on the VOC concentration in the feed stream as well as the condensability of the relevant VOC. One of the main applications is the separation of volatile organic vapors from a permanent gas [1].

**2. Isooctane and nitrogen permeability in PDMS membrane**

The membrane was prepared by a casting knife from Elastosil polydimethylsiloxane (PDMS, Silicones and more) as a dense film with the thickness of 100 microns. Nitrogen and (isooctane + nitrogen) permeation experiments were carried out at three temperatures: 25°C, 30°C and 35°C and at four trans-membrane pressures: 100/50 kPa, 150/50 kPa, 200/50 kPa and 250/50 kPa. The membrane flux was determined from the increase of permeate pressure in time. The basic test apparatus was described previously in a detail [2].

**3. Results and discussion**

The representative figures of membrane flux are shown at various experimental conditions in Figure 1. PDMs polymer is a flexible material and it can be expected that operation conditions will influence the membrane flux. The temperature and trans-membrane pressure were changed within 25–35°C and 50–200 kPa. It was found that the flux increases with the isooctane feed concentration as expected because of a high solubility of organic vapors in polymeric membranes. The temperature influence was found to be small (Figure 1A) while the trans-membrane pressure influenced the membrane flux significantly (Figure 1B).

|  |  |
| --- | --- |
| A | B |
|  |  |

**Figure 1.** Influence of temperature (A) and trans-membrane pressure (B) on (isooctane + nitrogen) flux in PDMS.

**4. Conclusions**

It was found that the trans-membrane pressure has a significantly bigger influence on the flux in flexible PDMS polymeric membrane than temperature. None hysteresis was observed when the isooctane feed concentration increased and then decreased.

The increase of transmembrane-pressure from 50 kPa to 200 kPa caused almost three times higher membrane flux. While the membrane flux increased only negligible when the temperature increased from 25 °C to 35 °C. Interestingly, the increase of membrane flux was 40 % with the increasing isooctane feed concentration at the highest temperature while the membrane flux increased less at the highest trans-membrane pressure (by 17 %).

**Acknowledgement**

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**References**

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