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Purification of flue gas by new non-porous membranes

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Abstract

One of the main sources of industrial emissions is combustion technology. In addition to solid waste, a number of compounds produced by combustion leave the system in the gaseous state. Currently, various methods are available for purifying flue gases released into the atmosphere to comply with emission standards fully. However, these technologies are now reaching the maximum limits for their separation capabilities.

This work aims to test various novel membranes using our unique apparatus for the separation of gaseous mixtures under the presence of humidity as in real systems. The presented automatized testing apparatus has a membrane cell with a variable area of tested membrane, water vapor saturators, and humidity sensors for all streams allowing fast modification of the experimental conditions and the whole system as well as gas analyzer allows measurement of acid gases as a CO₂ or SO₂ in the complex gas mixture.

In this contribution, we present the purification of feed gas to levels required by the legislation of the European Commission for thin film composite membrane with a polyamide functional layer in the presence of humidity. Other polymeric membranes based on ionic liquids and polymers with intrinsic microporosity were tested with single gases or their mixtures at various level of feed pressure and their performance (permeability, selectivity, stage-cut) will be presented.

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