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SIMULTANEOUS HYDROGEN SULPHIDE AND CARBON DIOXIDE REMOVAL FROM BIOGAS BY WATER–SWOLLEN REVERSE OSMOSIS MEMBRANE

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Abstract: In spite of the increasing attention for alternative sources of energy, a biogas seems to be a very good candidate. The energy consumption has continuously risen[1,2] and the energy supply plays a fundamental role for the sustainability of the modern age to ensure the current quality of the human life[2]. Nowadays, the energy demand is supplied by fossil fuels for approximately 88%[3]. However, fossil fuels pollute the atmosphere by emissions of greenhouse gases like carbon dioxide, sulphur dioxide, and nitrogen oxides[4].

The simultaneous removal of carbon dioxide and hydrogen sulphide was studied for agrobiogas pre-treatment, using water–swollen thin hydrophilic film composites (TFC) based on industrially produced membranes. The hydrogen sulphide permeance was higher than that of carbon dioxide, owing to its higher solubility in water. Contrary to plasticization of glassy polymer membranes in humid environment, the presence of humidity in the feed stream is necessary for the separation mechanism, which relies on a much higher solubility of H_2S and CO_2 in the water sorbed into the TFC membrane in comparison with CH_4. Based on our current research, a good water–swollen membrane should have the following features: high porosity of the membrane support layer, significant decrease of the size and number of the biggest pores caused by water swelling, good swelling of the selective skin polyamide layer, presence of a sufficient number of amido groups inside the upper layer of the hydrophilic composite.

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