

3rd International Conference and Exhibition on Mechanical & Aerospace Engineering

October 05-07, 2015 San Francisco, USA

Study of the selectivity of methane over carbon dioxide and inert gases using composite inorganic membranes

Habiba Shehu and Edward Gobina Robert Gordon University, UK

N atural gas is an important fuel gas that can be used as a power generation fuel and as a basic raw material in petrochemical industries. Its composition varies extensively from one gas field to another. Although there is variation in the composition from source to source, the major component of natural gas is methane with inert gases and carbon dioxide. Hence, all natural gas must undergo some treatment with about 20% of total reserves requiring extensive treatment before transportation via pipelines. The question is can mesoporous membrane be highly selective for methane and be used for the treatment of natural gas? A methodology based on the use of dip-coated silica and zeolite membrane was developed. A single gas permeation test using a membrane reactor was carried out at a temperature of 293 K and a pressure range of 0.02 to 0.1 MPa. The permeance of CH_4 was in the range of 1.15×10^{-6} to 2.88×10^{-6} mols⁻¹m⁻²Pa⁻¹ and a CH_4/CO_2 selectivity of 1.27 at 293 K and 0.09 MPa was obtained. The pore size of the membrane was evaluated using nitrogen adsorption and was found to be 2.09 nm. The results obtained have shown that it is possible to use a mesoporous membrane to selectively remove carbon dioxide from methane to produce pipeline quality natural gas. There is a need for further study of the transport mechanism of methane through the membrane since this is essential for the separation of other hydrocarbons that could be present as impurities.

Biography

Habiba Shehu is currently undergoing her PhD programme at the Robert Gordon University, Aberdeen, with the research topic Catalytic Membrane Reactor-Separator for Environmental Applications. She has over 5 journal publications and is a Member of the Royal Society of Chemist.

h.shehu@rgu.ac.uk

Notes: