Pakkarada Sansuksom 2011: Synthesis of Zeolite SUZ-4 Membrane Coated on Mullite Tube for NO_x Reduction. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Paisan Kongkachuichay, Ph.D. 87 pages.

The zeolite SUZ-4 membrane was synthesized for further use in De-NOx reaction. Firstly, the zeolite SUZ-4 crystals were synthesized via Sol Gel hydrothermal process using rice husk ash (RHA) as raw material altogether with other chemicals. A mullite tube was used as a support for SUZ-4 membrane. Before spin-coating in SUZ-4 colloidal solution, the mullite was modified its surface charge from negative to positive by pretreatment with polyamine solution at pH 3.85. After varying coating time and concentration of polyamine solution, it was found that the optimum coating time was 15 minute with 4 wt.% polyamine solution. The obtained SUZ-4 membrane has 20 μm thickness having 0.058 wt.% of the support. In addition, the thickness of the membrane was increased about 20 μm for each re-spin-coating. The synthesized SUZ-4 membranes have the specific surface areas in the range of 17.6-23.1 m^2/g and its pore size distribution reveals tri-modal distribution having the average size in the range of 20-80 Å.

Gas permeation performances of a single gas and binary gases through a zeolite SUZ-4 membrane were investigated at 30-150 ^oC. The permeance of single gas and binary gas decreased in following order: $H_2 > CO > O_2 > N_2 > NO$ and $NO/H_2 > NO/CO > O_2/H_2 > O_2/CO > N_2/H_2 > N_2/CO$. These decreases are related directly to the increasing of kinetic diameter of corresponding gas molecules. In addition, the permeation under the tested temperature was followed two regimes depending on the temperature: surface diffusion at temperature below 80 ^oC and gas translation diffusion at temperature above 80 ^oC. It was also found that the obtained experimental selectivity was different from the ideal selectivity. This means that there are some interactions occurring between the mixed gases. Moreover, when the binary gases of H_2 and NO were tested their permeation at 120-150^oC, the N_2 was produced N_2 from the reduction of NO by H_2 and the maximum NO conversion was 28.04% at 150 ^oC.

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