Isolation of adulterants from liquid fuels using synthetic zeolite membranes

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Isolation of adulterants from liquid fuels by synthetic membrane ZSM-22 was studied. Crystallization for synthesis of ZSM-22 membrane was carried out at a static condition under autogenous high pressure and temperature of 200°C. The synthesized membranes were characterized by x-ray diffraction, scanning electron microscopy, energy dispersive spectroscopy and Fourier transformed infra-red techniques. Characterization of the material suggested that the synthesized membrane was highly crystalline in nature possessing hollow rod like structure (elongated rods ~200 nm long and 20-50 nm in diameter) and having crystals in the range ~ 5-10 µm. Effect of various parameters such as separation time, temperature, molar concentration, degree of swelling, zeolite loading for petrol-kerosene mixtures has been studied. The effect of time on separation of kerosene was studied by varying the time between 1 to 7 hours. The swelling percentage increases with increase in temperature till 170 and thereafter no considerable change in swelling with increase in temperature was observed. Swelling was also found to increase with increase in amount of zeolite membrane. It is observed that the degree of swelling increased almost linearly with increasing mass % of kerosene. The membrane thus used for isolation of adulterant from liquid fuel is found to be selective and cost effective.

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