Mesoporous materials modified by metal ion for denitrogenation and desulfurization of raw diesel fuel

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Now days the oil industry is under pressure from legislators to improve the quality of oil production to decrease nitrogen and sulfur concentration in transportation fuels. Selective adsorption appears to be a promising approach to ultra deep desulfurization and denitrogenation.

In this study two kind of metal ion modified mesoporous silica materials were synthesized for selectively adsorptive denitrogenation and desulfurization from refinery fuels. Adsorption properties such as adsorptive capacity, selectivity, affinity toward nitrogen and sulfur compounds and regeneration ability were studied using a diesel fuel through batch experiments. The adsorptive capacity and selectivity for metal ion modified adsorbents were examined and compared with adsorptions properties of commercial Si−Zr cogel provided by refinery factory.

Metal ion modified adsorbents selectively adsorbed nitrogen compounds than the sulfur compounds. Both metal ion modified silica materials showed a much stronger adsorption affinity for nitrogen compounds than for sulfur compounds and have higher adsorption capacity than commercial Si−Zr cogel.