483e Interactions of Thiophene Molecules with Alkaline-Y Zeolites

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Adsorption mechanisms of thiophene (diluted in *n*-heptane solutions) onto alkaline-Y (Si/Al = 2.4, Li^+, Na^+ and Cs^+ cations) zeolites were studied through dynamic adsorption experiments.

This analysis was mainly carried out by means of equimolar competitive adsorption experiments with another similar sorbate (among methylthiophene, toluene and benzene molecules) at 0.025 $mol.L^{-1}$. The study was completed by single-solute thiophene adsorption experiments in order to provide its adsorption isotherms. Adsorbent particles without binder material were processed at room temperature.

It is known that the main adsorption sites for thiophenic and aromatic compounds in such adsorbents are cationic S_{II} sites. However, 12R window (W) frames provide an adapted surrounding to the adsorption of benzene, while branched compounds are sterically hindered. The adsorption experiments were aimed in order to determine the possibility for thiophene adsorption in W sites.

Selectivities resulting from competitive adsorption experiments led us to conclude that thiophene interacts with W sites in addition of S_{II} sites, despite the nucleophily of its S atom. Moreover, peculiar shapes of thiophene adsorption isotherms were observed on NaY and LiY zeolites. Such specificity is attributed to the adsorption of thiophene molecules in W sites only after the occurrence of thiophene adsorption onto S_{II} sites (1 molecule per □-cage). This was confirmed by variations in selectivity with concentration for thiophene/toluene and thiophene/methylthiophene equimolar competitive adsorption experiments.