# Adsorption and thermal regeneration of acetone and toluene on DAY-zeolite

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Adsorption and thermal regeneration dynamics of acetone and toluene on dealuminated Y-zeolite (DAY-zeolite) were studied. The isotherms of acetone on DAY-zeolite changed from Type-II to Type-III with an increase in temperature, whereas the isotherms of toluene were Type-I. The adsorption amount of acetone was higher than that of toluene at low temperatures, but its adsorption affinity was weaker. Due to the differences in isotherm shape, acetone and toluene showed different adsorption and desorption dynamic behaviors. The breakthrough point of acetone was achieved faster than that of toluene, but the saturation time was reached later. On the other hand, in the regeneration step via a hot nitrogen purge, acetone could be obtained more quickly and at higher concentration from the DAY-zeolite bed. A non-equilibrium and non-adiabatic model were used to simulate the dynamic behaviors of concentration and temperature during the adsorption and thermal regeneration steps. The effects of operating variables were studied and also, the specific energy requirement and purge gas consumption were evaluated to discuss the process efficiency of the DAY-zeolite bed.