Propane\Propylene Separation by PSA on SiCHA

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Separation of propane/propylene is very difficult and it is one of the most energy-intensive separations in the petrochemical industry (the relative volatility for this system is between 1.0 and 1.1 at temperatures in the range of 244-327K and total pressure of 1.7-22bar). Propane\propylene mixtures are usually obtained from the thermal or catalytic cracking of hydrocarbons. An important use of Propylene is as a monomer feed stock for polypropylene elastomer production where propylene must have a purity of at least 99.5 mol%. The propane fraction can be recycled to the cracking step or used as liquefied petroleum gas (LPG) for household heating.

Recent studies have shown that 8-ring- silica zeolites, notably SiCHA, show surprisingly high kinetic selectivity for propylene over propane, suggesting that a kinetically controlled adsorption separation process may be practically feasible and capable of yielding a high purity olefin product with good recovery.

Among the commercial adsorbents evaluated so far in the literature for this separation, 4A zeolite is most promising. A comparative evaluation of SiCHA and 4A zeolites for propane/propylene separation by pressure swing adsorption has been undertaken. Preliminary simulation results based on equilibrium and kinetic data taken from published sources will be presented at the conference.

Key words: propane, propylene, pressure swing adsorption, SiCHA, 4A zeolite.