

Pongnarin Jamrak 2008: Water Vapor Adsorption and Desorption Abilities of Molecular Sieve 3A and Local Materials in Anhydrous Ethanol Process. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Attasak Jaree, Ph.D. 131 pages.

This research objective was comparing water vapor adsorption and desorption abilities of industrial anhydrous-ethanol adsorbent: molecular sieve 3A with local materials by using pressure swing fixed bed adsorber. In case of water vapor adsorption, adsorption isotherms (at 110 and 130°C) and adsorptive breakthrough curves with the feed rate of ethanol (95.5 wt%) at 5.90, 7.86, and 9.83 ml/min were investigated. For water vapor desorption, desorptive breakthrough curves under vacuum of -0.4 to -0.3 bar with feed flow rate of anhydrous ethanol at 0.98, 1.97, and 2.95 ml/min at 110 and 130°C were investigated. Different kinds of local material were tested primarily in order to determine their adsorptive breakthrough curves and to compare with the adsorptive breakthrough curve of molecular sieve 3A. The results showed that half grain glutinous corn and mixed fly ash and cement could adsorb water vapor from mixed vapor of ethanol and water. Consequently, they were used for water vapor adsorption and desorption ability testing under the same operating conditions as used for testing the molecular sieve 3A.

The results showed that water vapor adsorptive capacity of molecular sieve 3A was 2.9 times higher than that of half grain glutinous corn and 7.4 times higher than that of mixed fly ash and cement with the ratio of 3:1 by volume. These three kinds of adsorbent could produce 99.5 wt% ethanol and anhydrous ethanol could also be used for water vapor desorption from these adsorbents.

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