

Separation by fixed-bed adsorption of hexane isomers in zeolite BETA pellets

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Author(s): [Barcia PS](#), [Silva JAC](#), [Rodrigues AE](#) Source: INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH Volume: 45 Issue: 12 Pages: 4316-4328 Published: JUN 7 2006 Times Cited: [14](#) References: [23](#) [Citation](#)

[Map](#) Abstract: An experimental study of single and binary fixed-bed adsorptions of hexane isomers n-hexane (nHEX), 3-methylpentane (3MP), 2,3-dimethylbutane (23DMB) and 2,2-dimethylbutane (22DMB) was performed in commercial pellets of zeolite BETA, covering the temperature range between 423 and 523 K and partial pressures up to 0.3 bar. The effect of partial pressure and temperature on the shape of the breakthrough curves was addressed. From these data, single and binary adsorption equilibrium isotherms were collected. On the basis of the analysis of sorption events at the molecular level, two different models were used to interpret, with good accuracy, the equilibrium data: dual-site Langmuir (DSL) for nHEX and 3MP and multisite Langmuir (MSL) for 23DMB and 22DMB. Thereafter, a dynamic adsorption model was developed and tested, predicting with good accuracy the behavior of the fixed-bed experiments. At the partial pressures studied, it was found that the affinity of the isomers to the zeolite is $nHEX > 3MP > 23DMB > 22DMB$. The selectivity between the isomers is higher at low partial pressures, decreasing as the amount adsorbed increases. The Ideal Adsorbed Solution Theory using the DSL model to describe the pure component equilibrium of nHEX and 3MP and the MSL model for the dibranched isomers 22DMB and 23DMB gives a good prediction of the mixture adsorption data. Document Type: Article Language: English KeyWords Plus: MASS-TRANSFER; SILICALITE; PARAFFINS; ISOTHERM; MODEL Reprint Address: Rodrigues, AE (reprint author), Univ Porto, Lab Separat & React Engn, Dept Engn Quim, Fac Engn, Rua Dr Roberto Frias S-N, P-4200465 Oporto, Portugal Addresses:

1. Univ Porto, Lab Separat & React Engn, Dept Engn Quim, Fac Engn, P-4200465 Oporto, Portugal
2. Inst Politecn Braganca, Escola Super Tecnol & Gestao, P-5301857 Braganca, SP Portugal E-mail Addresses: arodrig@fe.up.pt Publisher: AMER CHEMICAL SOC, 1155 16TH ST, NW, WASHINGTON, DC 20036 USA Subject Category: Engineering, Chemical IDS Number: 048GD ISSN: 0888-5885 DOI: 10.1021/ie0513954