中国化学工程学报 2002 10 (2): 228-235 ISSN: 1004-616x CN: 44-1063/R

REVIEWS

变压吸附数学模型30年进展

曾嵘, 关建郁

Research Institute of Chemical Engineering, South China University of Technology, Guangzhou 510640, China

收稿日期 修回日期 网络版发布日期 接受日期

摘要 The pressure swing adsorption (PSA) models discussed here are divided into three categories: partialdifferential equation model, electrical analogue model and neural network model. The partial differential equationmodel, including equilibrium and kinetic models, has provided an elementary viewpoint for PSA processes. Usingthe simplest equilibrium models, some influential factors, such as pressurization with product, incomplete purge,beds with dead volume and heat effects, are discussed respectively. With several approximate assumptions i.e.,concentration profile in adsorbent, "frozen" column, symmetry and heat effects of bed wall, the more complexkinetic models can be simplified to a certain degree at the expense of a limited application. It has also been foundthat the electrical analogue model has great flexibility to handle more realistic PSA processes without any additionalhypothesis.

关键词 gas separation pressure swing adsorption mathematical model

分类号

DOI:

Progress in Pressure Swing Adsorption Models During the Recent 30 Years

ZENG Rong, GUAN Jianyu

Research Institute of Chemical Engineering, South China University of Technology, Guangzhou
510640, China

Received Revised Online Accepted

Abstract The pressure swing adsorption (PSA) models discussed here are divided into three categories: partialdifferential equation model, electrical analogue model and neural network model. The partial differential equationmodel, including equilibrium and kinetic models, has provided an elementary viewpoint for PSA processes. Usingthe simplest equilibrium models, some influential factors, such as pressurization with product, incomplete purge,beds with dead volume and heat effects, are discussed respectively. With several approximate assumptions i.e.,concentration profile in adsorbent, "frozen" column, symmetry and heat effects of bed wall, the more complexkinetic models can be simplified to a certain degree at the expense of a limited application. It has also been foundthat the electrical analogue model has great flexibility to handle more realistic PSA processes without any additionalhypothesis.

Key words gas separation; pressure swing adsorption; mathematical model

通讯作者:
曾嵘
作者个人主页: 曾嵘; 关建郁