

液-固吸附体系中扩展的Langmuir方程的推导和检验

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摘要 从气-固吸附体系中推导出的Langmuir方程,近一世纪来只能经验性地描述液相吸附。本研究以液-固界面上的溶质计量置换模型为基础,考虑到液-固吸附体系中各组分之间的相互作用,从理论上推导出了在液-固体系中描述在不同溶剂浓度条件下的溶质吸附的扩展的Langmuir公式,并称其为扩展的Langmuir公式。将Langmuir公式中经验参数与液相色谱中的计量置换平衡中的参相关联,还将其扩展到在不同溶剂浓度条件下的溶质定量吸附的描述,为Langmuir方程在描述不同溶剂浓度条件下的组分吸附奠定了理论基础,扩大了Langmuir公式的应用。以不同溶剂浓度条件下所得到的吸附等温线数据对理论推导出的扩展的Langmuir公式进行了验证,并与计算置换平衡中的参数相关联,表现用吸附等温线法计算的计量置换参数Z与用高效液相色谱法得到的Z值符合程度很好。

关键词 吸附 L-B膜 液固界面 计量置换模型

分类号 0647

Derivation and verification of extended langmuir equation

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Abstract The Langmuir equation, originally derived for gas-solid system, has been widely used to describe empirically solute adsorption from solution for almost a century. In this research, the Langmuir equation for solute adsorption from a liquid-solid adsorbed system was theoretically derived, taking into account various interactions among components in liquid-solid adsorbed system, by using the stoichiometric displacement model for the adsorption of solute for the same system. The parameters in the Langmuir equation were related to that of the stoichiometric displacement equilibrium making it possible to describe solute adsorption under various concentrations of the solvent present. The equation was tested to be valid for the adsorption isotherm data obtained from different solvent concentrations. A good agreement between the values of the stoichiometric displacement parameter (Z) obtained from the isotherm data and those from high performance reversed-phase liquid chromatography was observed.

Key words ADSORPTION L-B MEMBRANE LIQUID-SOLID INTERFACE

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扩展功能

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