原子能科学技术 2011 45 (3): 272-276 ISSN: 1000-6931 CN: 11-2044/TL

化学

二氧化铀对CO和CO_2的吸附热力学

李赣[1];张志[2];汪小琳[1]

1.表面物理与化学国家重点实验室，四川 绵阳621907 2.中国工程物理研究院，四川 绵阳621900

收稿日期 修回日期 网络版发布日期:

摘要 采用静态吸附容量法，测定了温度273～303 K、压力0～1 kPa范围内，CO和CO_2在UO_2表面的吸附等温线，研究了CO和CO_2的吸附热力学性质。结果表明，Langmuir方程和Freundlich方程分别是描述CO和CO_2吸附的最优模型方程。CO_2的吸附强度明显高于CO的，实验条件下，CO和CO_2的最大吸附量分别为0.36和1.25 μmol/g。CO的吸附热为26 kJ/mol，表明吸附为物理吸附；CO_2的吸附热随吸附量增加而减小，当吸附量由0.3 μmol/g增至0.8 μmol/g时，吸附热由46 kJ/mol降至37 kJ/mol，表明吸附同时存在化学吸附和物理吸附。

关键词 UO_2 CO CO_2 吸附 热力学

分类号

Thermodynamics of CO and CO_2 Adsorption on Uranium Dioxide

LI Gan[1];ZHANG Zhi[2];WANG Xiao-lin[1]

1.National Key Laboratory for Surface Physics and Chemistry, Mianyang 621907, China; 2.China Academy of Engineering Physics, Mianyang 621900, China

Abstract Using static volumetric method, adsorption isotherms of CO and CO_2 on UO_2 were measured for temperature range 273-303 K and pressure up to 1 kPa, and corresponding thermodynamic properties were studied. The Langmuir and Freundlich equations are found to describe best the adsorption of CO and CO_2, respectively. The strength of adsorption for CO_2 is much greater than that for CO with maximum adsorption amounts of 0.36 and 1.25 μmol/g respectively in current experimental condition. The heat of adsorption for CO equals to 26 kJ/mol, which indicates the adsorption of CO is physical adsorption. The heat of adsorption for CO_2 decreases from 46 kJ/mol to 37 kJ/mol for increasing adsorption amount from 0.3 μmol/g to 0.8 μmol/g, which indicates both chemical and physical adsorptions of CO_2 take place.

Key words UO_2 CO CO_2 adsorption thermodynamics

DOI

通讯作者