煤炭学报 2013, 38(04) 662-667 DOI: ISSN: 0253-9993 CN: 11-2190

论文

微细高岭石颗粒在惰性电解质溶液中的质子化和去质子化作用

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摘要：

为掌握微细高岭石颗粒在惰性电解质溶液中的质子化/去质子化过程对其电动特性的影响规律，通过ZetaProbe 分析仪测定不同浓度NaCl溶液中高岭石颗粒表面ζ电位，用Gouy-Chapman理论和Nernst 方程对高岭石颗粒在不同溶液环境中的质子化/去质子化作用进行理论分析。结果表明：两种不同浓度NaCl溶液中，高岭石颗粒表面ζ电位与pH的关系为：在溶液pH值为4.0和7.5附近产生一个非IEP的交点；当NaCl的浓度由0.001 mol/L增加到0.010 mol/L时，高岭石的IEP从pH=3.3降低到3.0，当NaCl的浓度≥0.100 mol/L时，高岭石颗粒在整个pH范围内均荷负电荷；在pHIEP <pH<4.0和pH>7.5时，高岭石颗粒表面ζ电位与NaCl浓度成正比。NaCl溶液中电解质离子在溶液pH<pHPZNPC 时对高岭石颗粒HD面的质子化反应的抑制作用和在pH>pHPZNPC 时对HD面的去质子化反应的促进作用是微细高岭石颗粒在NaCl溶液的电动特性的主要成因。

关键词： 高岭石；惰性电解质；质子化/去质子化；电动特性；ζ电位

Protonation and deprotonation of fine kaolinite particles in the inert electrolyte solutions

Abstract:

The zeta potential of the kaolinite particles at various NaCl concentrations were determined by using the ZetaProbe Analyzer，and the protonation/deprotonation of the kaolinite particle surfaces was analyzed based on Gouy Chapman theory and the Nernst equation.The results show that the IEPs of the kaolinite particles at the various NaCl concentrations are different，with pH 3.3 and pH 3.0 at 0.001 and 0.010 mol/L NaCl，respectively.Once the NaCl concentration becomes higher than or equal to 0.100 mol/L，the kaolinite particle surface is negatively charged，and no IEP appeared in the entire pH range.There are two common intersection points in the zeta potential curves，appearing at pH 4.0 and pH 7.5.In a pH range of 4.0 to 7.5，the negative zeta potential increases as NaCl concentration also increases.The protonation of the HD face is negatively affected at pH<pHPZNPC and the deprotonation of the HD face is strengthened at pH>pHPZNPC by the presence of NaCl in the suspension.These maybe the main causes of electrokinetic characteristics of fine kaolinite particles in NaCl solutions.

Keywords: kaolinite；inert electrolyte；protonation/deprotonation；electrokinetic characteristics；zeta potential

收稿日期 2012-11-23 修回日期 2013-01-09 网络版发布日期 2013-04-25

DOI:

基金项目:

国家自然科学基金资助项目（51174006）；安徽省自然科学基金资助项目（11040606M121）；安徽省科技计划资助项目（1106b0105063）

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