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研究论文

EDTA吸附特性及其对α半水脱硫石膏晶形的影响

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摘要: 用扫描电镜、显微红外、紫外吸收光谱、X光电子能谱等研究了乙二胺四乙酸(简称EDTA)在α半水石膏表面的吸附特性, 从晶体生长角度分析了EDTA的调晶机理。结果表明: EDTA在α半石膏表面吸附为化学吸附, 其吸附等温线符合Langmuir方程, 最大吸附量为15.2 mg/g, 吸附层厚度6.5 nm; EDTA改变了α半水石膏晶体生长习性与形貌, 晶体在c轴生长被抑制, 晶形有长棒状转变为短柱状, 且晶体尺度增大; EDTA调晶效果对pH值较敏感, EDTA在中性区间调晶效果最佳。EDTA通过羟基与Ca^{2+}的络合作用选择吸附在α半水石膏(111)面, 抑制其c轴方向生长, 使晶体沿c轴方向生长的比较优势被削弱甚至逆转, 导致α半水石膏晶体生长习性和形貌发生变化。

关键词: 无机非金属材料 α半水脱硫石膏 调晶剂 吸附 晶体形貌

Adsorption Characteristics of EDTA on α-Hemihydrate Desulfurization Gypsum Surface and Its Influence on Crystal Morphology

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Abstract: The adsorption characteristics of EDTA on α-hemihydrate desulfurization gypsum surface and its influence on crystalline habit and crystal morphology were studied by use of SEM, MICRO-FTIR, UV adsorption spectrophotometer and XPS technique. Its crystal modifying mechanism was also analyzed from the viewpoint of crystal growth. The results show that the adsorption of EDTA on α-hemihydrate desulfurization gypsum is chemical adsorption. The adsorption isotherms curve basically follows Langmuir equation, its max adsorption amount is 15.2mg and the thickness of adsorption layer 6.5 nm. The addition of EDTA evidently changes the crystalline habit and crystal morphology of α-hemihydrate desulfurization gypsum, and the growth in the C axis direction is inhibited, leading to large crystal size and transformation of crystal shape from long clavate-like to short prismatic or lamellar - shaped. The crystal modifying effect of EDTA is susceptive to pH values, and the optimum pH condition in liquid phase is neutral. EDTA is selectively chemisorbed on the (111) face of gypsum crystal by complex reaction between hydroxyl and
Ca2+, which inhibits the growth of c axis and weackens the relative advantage of the growth rate of in different c－axis directions, consequently leading to the transformation of crystalline habit and crystal morphology of dihydrate gypsum.

Keywords: inorganic non-metallic materials α-hemihydrate desulfurization gypsum crystal modification agent adsorption crystal morphology

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