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论文

先驱体物相转变对浆态床合成甲醇催化剂活性的影响

李忠, 郭启海, 张小兵, 郑华艳, 范辉, 谢克昌

太原理工大学煤化工研究所, 煤科学与技术教育部和山西省重点实验室, 太原 030024

摘要:

采用并流共沉淀法, 通过考察老化温度, 研究CuO/ZnO/Al₂O₃催化剂先驱体晶相及组成的变化对浆态床催化合成甲醇的反应活性的影响. 结果表明, 先驱体的物相转变对浆态床合成甲醇活性影响显著, 单斜晶系锌孔雀石(Cu,Zn)₂CO₃(OH)₂和斜方晶系绿铜锌矿(Cu,Zn)₅(CO₃)₂(OH)₆晶体是产生高活性催化剂的主要物相. 随着Cu²⁺/Zn²⁺进入Zn₅(CO₃)₂(OH)₆/Cu₂CO₃(OH)₂晶格, 离子同晶取代量增加, 催化剂先驱体中形成了固定铜锌比的锌孔雀石和绿铜锌矿物相. 焙烧后催化剂比表面积增大, CuO-ZnO固溶体协同作用加强, 浆态床催化合成甲醇的活性提高.

关键词: CuO/ZnO/Al₂O₃催化剂; 先驱体; 物相转变; 浆态床; 甲醇合成

Influence of the Precursor Phase Transition on the Catalyst Activity in Slurry Methanol Synthesis

LI Zhong*, GUO Qi-Hai, ZHANG Xiao-Bing, ZHENG Hua-Yan, FAN Hui, XIE Ke-Chang

Institute of Coal Chemical Engineering, Key Laboratory of Coal Science and Technology of Ministry of Education and Shanxi Province, Taiyuan University of Technology, Taiyuan 030024, China

Abstract:

The CuO/ZnO/Al₂O₃ catalyst precursor were prepared by co-current precipitation and the crystal composition and phase-transition of the precursor prepared at different aging temperature were investigated in order to study the effect of the crystal composition and phase-transition of the precursor on the catalyst activity for slurry methanol synthesis. The results show that phase-transition of precursors are prominent influence on catalytic activity for slurry methanol synthesis. The (Cu,Zn)₂CO₃(OH)₂ and (Cu,Zn)₅(CO₃)₂(OH)₆ crystal phase are critical precursor to produce the catalytic active centre. The degree of substitution between Cu²⁺ and Zn²⁺ is increased with increasing Cu²⁺/Zn²⁺ entering crystal lattices of Zn₅(CO₃)₂(OH)₆/Cu₂(CO₃)₂(OH)₂, and the ratio of copper to zinc in Rosasite and Aurichalcite is unchangeable. The calcined catalyst has more specific surface area and strong interaction between CuO-ZnO, and gets high activity in slurry methanol synthesis.

Keywords: CuO/ZnO/Al₂O₃ catalyst; Precursor; Phase-transition; Slurry reactor; Methanol synthesis

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通讯作者: 李忠, 男, 博士, 教授, 主要从事催化和一碳化学研究. E-mail: lizhong@tyut.edu.cn

作者简介:

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