催化学报 » 2012, Vol. 33 » Issue (6) :952-961 DOI: 10.1016/S1872-2067(11)60376-8

研究论文

NiMo/γ-Al_2O_3 Catalysts from Ni Heteropolyoxomolybdate and Effect of Alumina Modification by B, Co, or Ni

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摘要 A hydrotreating NiMo/γ-Al_2O_3 catalyst (12 wt% Mo and 1.1 wt% Ni) was prepared by impregnation of the support with the Anderson-type heteropolyoxomolybdate $(NH_4)_4Ni(OH)_6Mo_6O_{18}$. Before impregnation of the support, it was modified with an aqueous solution of H_3BO_3, $Co(NO_3)_2$, or $Ni(NO_3)_2$. The catalysts were investigated using N_2 adsorption, O_2 chemisorption, X-ray diffraction, UV-Vis spectroscopy, Fourier transform infrared spectroscopy, temperature-programmed reduction, temperature-programmed desorption, and X-ray photoelectron spectroscopy. The addition of Co, Ni, or B influenced the Al_2O_3 phase composition and gave increased catalytic activity for 1-benzothiophene hydrodesulfurization (HDS). X-ray photoelectron spectroscopy confirmed that the prior loading of Ni, Co or B increased the degree of sulfidation of the NiMo/γ-Al_2O_3 catalysts. The highest HDS activity was observed with the NiMo/γ-Al_2O_3 catalyst with prior loaded Ni.

关键词： nickel cobalt boron nickel heteropolyoxomolybdate hydrodesulfurization

Abstract: A hydrotreating NiMo/γ-Al_2O_3 catalyst (12 wt% Mo and 1.1 wt% Ni) was prepared by impregnation of the support with the Anderson-type heteropolyoxomolybdate $(NH_4)_4Ni(OH)_6Mo_6O_{18}$. Before impregnation of the support, it was modified with an aqueous solution of H_3BO_3, $Co(NO_3)_2$, or $Ni(NO_3)_2$. The catalysts were investigated using N_2 adsorption, O_2 chemisorption, X-ray diffraction, UV-Vis spectroscopy, Fourier transform infrared spectroscopy, temperature-programmed reduction, temperature-programmed desorption, and X-ray photoelectron spectroscopy. The addition of Co, Ni, or B influenced the Al_2O_3 phase composition and gave increased catalytic activity for 1-benzothiophene hydrodesulfurization (HDS). X-ray photoelectron spectroscopy confirmed that the prior loading of Ni, Co or B increased the degree of sulfidation of the NiMo/γ-Al_2O_3 catalysts. The highest HDS activity was observed with the NiMo/γ-Al_2O_3 catalyst with prior loaded Ni.

Keywords: nickel, cobalt, boron, nickel heteropolyoxomolybdate, hydrodesulfurization

收稿日期: 2011-12-16; 出版日期: 2012-05-09

引用本文:

Radostina PALCHEVA, Luděk KALU?A, Alla SPOJAKINA等 .NiMo/γ-Al_2O_3 Catalysts from Ni Heteropolyoxomolybdate and Effect of Alumina Modification by B, Co, or Ni[J] 催化学报, 2012,V33(6): 952-961

Radostina PALCHEVA, Luděk KALU?A, Alla SPOJAKINA etc .NiMo/γ-Al_2O_3 Catalysts from Ni Heteropolyoxomolybdate and Effect of Alumina Modification by B, Co, or Ni[J] Chinese Journal of Catalysis, 2012,V33(6): 952-961

链接本文:

http://www.chxb.cn/CN/10.1016/S1872-2067(11)60376-8 或 http://www.chxb.cn/CN/Y2012/V33/I6/952

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