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Efficiency of using heteropoly compounds of the type $(NH_4)_2[Co(H_2O)_4]_2[Mo_8O_{27}]\cdot 6H_2O$ as catalysts for the production of ethylene

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Abstract

Carrying out heterogeneous acid catalysis with the use of heteropoly compounds has received considerable attention due to the great economic and environmental benefits. In spite of this, its industrial application is limited as there are difficulties in catalyst regeneration (settling) caused by its relatively low thermal stability. The aim of present work was to search and select catalysts related to the class of heteropoly compounds for propane cracking, to test the selectivity of the prosses as well as to discuss possible approaches for solving the problem of catalyst deactivation, that can contribute to achieve stable characteristics of solid heteropoly catalysts. Among these approaches are: the development of new catalysts with high thermal stability, the modification of catalysts to promote coke combustion, the inhibition of coke formation on heteropoly compound catalysts during the process, carrying out the reactions in supercritical media and also the cascade reactions using a multifunctional heteropoly catalyst. The obtained catalyst was also studied by physicochemical methods to get deep knowledge about which features of these compounds influence on the catalytic activity. A highly active and selective catalyst for ammonium octomolybdenocobaltate(II) ammonium $(NH_4)_2[Co(H_2O)_4]_2[Mo_8O_{27}]\cdot 6H_2O$ was synthesized for cracking associated petroleum gases. The qualitative, quantitative, and structural composition as well as the specific surface area of the obtained catalyst was established by the methods of X-ray diffraction, X-ray phase and fluorescence analysis. It was revealed that ammonium octomolybdenocobaltate(II) crystallizes in a triclinic syngony with cell parameters: a = 8.6292(9) Å b = 9.4795(10) Å c = 12.2071(13) Å α = 104.326(2)° β = 109.910(2)° γ = 100.820(2)°.

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