KINETICS OF CO OXIDATION ON Cu-Co-Fe OXIDE CATALYSTS SUPPORTED ON CARBON NANOTUBES

The kinetics of Co oxidation over Cu-Co-Fe oxide system supported by CNTs is investigated in the present paper.

One of the problems of the "green" catalysis is the purification of air from CO in the closed working rooms. To solve the latter the search for active low-temperature catalytic systems is intensified last decades. Optimization of the catalyst composition, type of the support and technology of the impregnation can lead to the catalysts that possess much higher activity than the starting object (the catalytically active compound). Previous research showed that ternary Cu-Co-Fe oxide systems of different composition possess high activity, with maximum at 102°C full CO conversion for Cu:Co:Fe=90,25:4.75:5,00 mass %. The method for synthesis of this active mass supported on different carbonic materials (namely thermally exfoliated graphite, fruit stone activated carbon, synthetic active ted carbons with of without nitrogen content, carbon nanotubes) was previously developed. From the latter list, solely CNT-based supported catalysts obtained by this method showed higher activity towards CO oxidation than the original ternary Cu-Co-Fe system of the upmentioned contents.

The kinetics of CO oxidation over CNT-supproted catalysts was investigated at atmospheric pressure in the fixed bed reactor with forced circulation of the gas mixture. Gas velocity was 100 cm^3/min. Each experimental point at certain pressures of CO and O_2 was measured after stabilizing the catalyst for at least 30 min. The reaction showed to be nearly first-order by CO and nearly zero-order by O_2, thus indicating the Eley-Rideal mechanism. Found values of the activation energy (assuming strict first order by CO) were from 70 kJ/mol for the least active sample down to 25 kJ/mol for the most active one.

Key words: catalyst, carbon monoxide, kinetics, carbon nanotubes, oxide Cu-Co-Fe system.