Shape dependent catalytic CO Oxidation performance of ruthenium oxide nanomaterials

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In this study, spherical and rod-shaped ruthenium oxide (RuO_x) nanocatalysts were prepared on the γ-Al_2O_3 and its CO oxidation performace was evaluated. Polyethylene glycol (PEG) was used as a surfactant and its effect on the physico-chemical properties such as morphology, crystallinity, porosity and the oxide nature of the catalyst were studied in detail. It was observed that addition of polymeric surfactant changed the morphology of RuO_x from spherical to one-dimensional rod-shaped nanomaterials. In addition, the pore volume and pore radius were increased as compared to the catalyst prepared without PEG. The CO conversion efficiency of the above catalst was found to depend mainly on the reactor temperature and the amount of catalyst loading. The total conversion was observed at 175 and 200°C with 1wt.% loading for PEG-stabilized and un stabilized catalysts, respectively. At any experimental temperature, the PEG-stabilized catalyst exhibited a notable, higher catalytic activity as compared to the un stablized catalyst. It is persumed that increase in the activity is due to the changes in the pore characteristics, distribution of the catalsty and the shape dependency.