

Wet air oxidation of phenol over transition metal oxide catalysts supported on ceria-zirconia mixed oxides prepared by supercritical synthesis

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Continuous hydrothermal synthesis in supercritical water (supercritical synthesis) is a method to prepare highly crystalline nanoparticles of homogeneous complex metal oxides as well as single metal oxides rapidly and continuously using supercritical water as antisolvent. Ceria-zirconia mixed oxide has widely been used as catalytic promoter due to its oxygen storage capacity (OSC). Ceria-zirconia mixed oxide with high surface area could be prepared by the supercritical synthesis, so that it also has the potential application as catalyst support due to its high surface area. In this study, ceria-zirconia mixed oxide with high surface area prepared by the supercritical synthesis was used as a support of transition metal (Mn, Fe, Co, Ni, and Cu) oxide catalysts for wet air oxidation of phenol. Intermediate selectivity and mineralization selectivity were investigated together with catalytic activity. Ceria-zirconia mixed oxide prepared by supercritical synthesis is a promising catalyst support for wastewater treatment. Its oxygen storage capacity can assist the active element in removing organic pollutant such as phenol.