

Catalytic Wet Oxidation of Reactive Dyes with H₂/O₂ Mixture on Pd-Pt/Al₂O₃ Catalysts

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The Pd-Pt/Al₂O₃ bimetallic catalysts showed extremely high activities toward the wet oxidation of the reactive dyes in the presence of 1% H₂ together with excess oxygen. Palladium acted as a promoter to spillover the adsorbed H₂ onto the surface of the oxidized Pt surface, and thereby the reducibility of the Pt increased greatly. The organic dye molecule had higher chance to adsorb on the reduced Pt surface under the competition with excess oxygen, which is an essential step for the catalytic wet oxidation. The Pd-Pt/Al₂O₃ catalysts also produced H₂O₂ from H₂/O₂ mixture, and the hydroxyl radical was formed through the subsequent decomposition of H₂O₂. Additional oxidation of the reactive dyes was obtained with hydroxyl radical. The extremely high activities of the Pd-Pt/Al₂O₃ catalysts were believed to be due to the combined effects of the faster redox cycle resulting from the increased reducibility of Pt surface and the additional oxidation of the reactive dyes with hydroxyl radical.