

Abstract

Nanosized monometallic or bimetallic particles owing to their unusual physical and chemical properties compared to bulk metals has been widely studied in various domains of chemistry, physics and material sciences. In the field of metal nanoparticle catalyzed reactions, metal nanoparticles are alloyed with other metallic particles for overall change the electronic as well as catalytic properties. Specially, the catalytic reduction of 4-nitrophenol (4-NP) to 4-aminophenol (4-AP) has been largely studied over Ag and Au nanoparticles or AuAg bimetallic alloy particles. The catalysts are found to be very active as reported in the literature. However, transition metal catalyzed catalytic reduction of 4-NP to 4-AP are very scarce in the literature or earlier reports presents lower activity for the title reaction. In this dissertation, an investigation has been carried out for the catalytic reduction of 4-NP to 4-AP over unsupported Cu, Ni and NiCu and manganese oxide supported Cu, Ni and NiCu catalysts. Among the different catalysts systems, NiCu system in both unsupported and supported is more active for the title reaction. The apparent rate constant values has been calculated for the reaction following pseudo-first order rate kinetics and presented in this dissertation. The dissertation has been divided into 6 chapters which describe the synthesis, characterization and catalytic reduction of 4-NP to 4-AP over different catalysts along with necessary theoretical background.