

## The influence of polyvinylpyrrolidone(PVP) upon the formation of platinum-silica heterogeneous nanocomposite particles using chemical reduction process

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The chemical reduction of platinum (Pt) ions allows the preparation of heterogeneous Pt-silica (Pt-SiO<sub>2</sub>) nanocomposite particles, with amino (NH<sub>2</sub>) groups on the surface of SiO<sub>2</sub> nanoparticles serving to bind the Pt nanoparticles. The Pt nanoparticles that formed on the surfaces of the SiO<sub>2</sub> nanoparticles had an average diameter of ca. 3 nm. The dimensions and degrees of aggregation of the Pt nanoparticles on the SiO<sub>2</sub> surface were influenced by the concentration of polyvinylpyrrolidone (PVP), the reducing agent, and the molar ratio of the reducing agent to Pt in the reaction medium. In addition, the functional groups present on the surfaces of the SiO<sub>2</sub> nanoparticles had a profound influence on the coverage of the Pt nanoparticles. When NH<sub>2</sub> groups were present on the surfaces of the treated SiO<sub>2</sub> nanoparticles, the number of immobilized Pt nanoparticles increased upon the PVP concentration.