Sonochemistry: Applications and Advantages

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Abstract

The present study is a discussion on sonochemistry and its advantages over other nano-material synthesis methods. With the advent of modern technologies and easy access of electricity, it is right time we replace inefficient and slow nanoparticle synthesis methods with efficient sonochemical method. Sonochemistry manifests acoustic cavitation phenomena caused by ultrasound to develop a local region to carry out reactions at higher rates. The local temperatures and pressures reach as high as 5000^0C and 500 atmospheres [1]. These conditions have very short lifetime of a few microseconds, thus creating unique conditions for reactions to take place. The shock waves form the implosion of cavitation bubbles cause high impactful inter-particle collisions which can leads to production of fine and uniform nanoparticles. Other methods for nanomaterial production include, chemical vapour deposition (CVD), sol gel method, hydrothermal methods, aerosol processes etc. This review paper address the key advantages of the sonochemistry over these processes[2]. Sonochemistry finds its applications in homogenous as well as heterogeneous reactions. It is mainly used in preparation of nanomaterials, initiation of catalytic reactions, in situ polymerization of monomers, synthesis of colloids, removal of pollutants in water, degradation and modification of ploymers etc. Ultrasound can also lead to special phenomena like sonoporation, sonolysis etc., which makes sonochemistry versatile and widely used.

Keywords: Sonochemistry, Ultrasound, Cavitation, Sonoporation, Sonolysis

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