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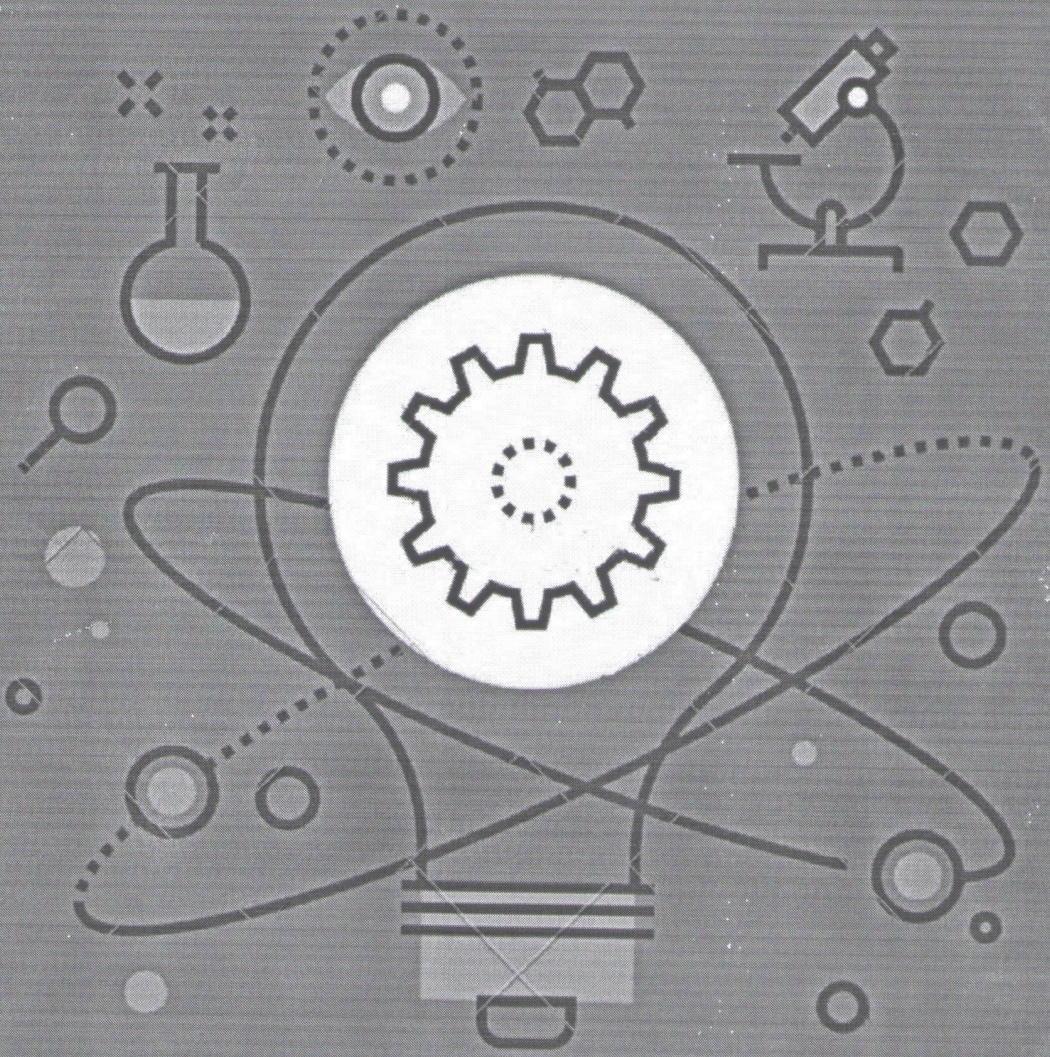

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INFLUENCE OF OXIDIZER TO FUEL RATIO ON ZnO FOR VISIBLE PHOTOCATALYTIC DEGRADATION

R. Manimozhi and A. P. GnanaPrakash*

Department of Studies in Physics, University of Mysore, Manasagangothri, Mysuru 570006, Karnataka, India.

* *Email: gnanaprakash@physics.uni-mysore.ac.in*

ABSTRACT

The ZnO nanoparticles was synthesised by efficient, simple and cheap solution combustion method with different oxidiser to fuel ratio (O/F = 0.25, 0.5, 0.75, 1, 1.25). Zinc nitrate hexahydrate and sucrose were used as a oxidizer and fuel respectively. An important parameter in solution combustion method is oxidizerfuel ratio (O/F), which determine the influence of the gases on the morphology and size of the particle[1, 2]. The synthesized nanoparticles subsequently characterized using various standard techniques. The XRD results reveals that the synthesized ZnO particles are highly crystalline and of wurtzite structure. It was also found that the crystallite size is varying inversely with oxidizer fuel ratio (upto O/F = 1) because, disintegration of agglomerates happen as more heat is taken away from the system [3]. The smallest size was observed for O/F = 1 (14 nm) and the crystallite size increased for fuel lean and fuel rich conditions. The band gap energy for ZnO is 3.1 eV for O/F = 1 and for other ratios 3.2 eV. The prepared ZnO with various oxidiser fuel ratio were tested for photocatalytic degradation of p-nitrophenol under visible light for 150 min. The photocatalytic efficiency of the samples is almost close to each other except O/F = 0.25 (fuel rich).The higher degradation efficiency (98%) also large porous surface area enhance the electron hole separation and increases the yield of hydroxyl radical of 4-nitrophenol was achieved for O/F = 1.25 due to high absorption of visible light.

Key words : ZnO nanoparticles, Oxidizer fuel ratio, Visible photodegradation, 4-Nitrophenol