

Abstract:

In this study, Nickel oxide nanoparticles were synthesized by using Green and chemical methods. Chemical method (Co-precipitation) was performed at room temperature using sodium hydroxide as oxidizing. In the green method, The leaf extract of *withania somnifera* plant was used. To evaluate the effect of plant extract on the size of Nickel oxide nanoparticles, The extract was used in values of 0.5, 1.0, 1.5 ml. Morphology and the size of nanoparticles were studied by field emission scanning electron microscopy (FESEM), X-ray diffraction (XRD) analysis, Fourier transform infrared (FT-IR) spectroscopy, Transmission electron microscopy (TEM) and Energy-dispersive X-ray spectroscopy (EDS). X-ray diffraction analysis showed the average size of nanoparticles to be in the range of 16-18 nm. Scanning electron microscopy images showed the hexagonal shapes for NPs. Fourier transform infrared spectra showed a strong absorption band around 419.54 cm^{-1} which indicates the presence of NiO in the composition. Finally, the effects of nanoparticles were studied on the lipid peroxidation and biochemical parameters in rat blood serum. Stock malondialdehyde (MDA) which indicates the amount of lipid peroxidation (oxidative damage of the lipid membranes of cells) and aminotransferases such as AST and ALT which are the most sensitive enzymes of the liver, were studied as potential mechanisms involved in the damages.

Keywords: NiO nanoparticles, *withania somnifera*, Chemical Co-precipitation method, green method, Biological activity.



University of Zabol
Graduate school
Faculty of Science
Department of Chemistry

**The Thesis Submitted for the Degree of M.Sc
(In the Field of Organic Chemistry)**

**Synthesis, characterization, biological activity and size
variation of NiO nanoparticle via chemical (Precipitation)
and green (*Withania somnifera*) methods**

Supervisors:

Dr. Alireza Samzadeh Kermani

Advisers:

Dr. Hamid Beyzaei

Dr. Reza Aryan

By:

Sedigheh Bameri

January 2015