

## **Influence of pH variations on zinc oxide nanoparticles and their antibacterial activity**

### **ABSTRACT**

Zinc oxide nanoparticles (ZnONPs) were synthesized by the sol-gel method at various pH values. XRD, FTIR, FESEM, UV-vis and PL were accomplished to characterize the structural, functional groups, morphology, and optical properties of the samples. The disk diffusion method was conducted to investigate the antibacterial properties of the ZnONPs. The particle sizes of the ZnONPs synthesized between pH 7-11 were explored and varied from 59.56–46.45 nm and were mostly in spherical shape. Ultraviolet-visible analysis (UV-vis) also revealed the optical properties with the optical band gap of 3.29, 3.31, 3.33, 3.31 and 3.29 eV corresponding to ZnONPs in pH 7-11. While the highest PL spectra of ZnONPs display a blue emission band around 484 nm in the UV range at pH 9. The highest diameter of inhibition zone after 120 h was found at  $4.4 \pm 0.1$  cm at pH 11 of ZnONPs. In this research, the average particle size of ZnONPs and the intensities of the XRD pattern decrease with the increasing pH values. However, with the increasing pH values, the antibacterial activity becomes effective.

**Keyword:** Zinc oxide nanoparticles (ZnONPs); XRD, FTIR, FESEM, UV-vis and PL; Ultraviolet-visible