

## Structural Properties and Antibacterial activity of Copper Oxide Nanoparticles

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Copper oxide (CuO) NPs have been synthesised by simple Co-precipitation method at different annealing temperature for Optimization. Samples are characterized using X-ray diffraction (XRD), Energy Dispersive X-ray Analysis (EDAX), Fourier transform infrared spectroscopy (FTIR), Scanning Electron microscopy (SEM) and UV-visible absorption spectroscopy (UV). Anti-bacterial activity of the optimized sample has been assessed using disc diffusion method. It is proven by structural analyses that CuO exists as a monoclinic structure in all samples. Annealing effects on purity of the sample and the particle size of the prepared CuO nanoparticles studied successfully. Using X-ray broadening, crystallite sizes and lattice strain on the peak broadening of CuO- NPs have been investigated using Williamson-Hall (W-H) analysis and the precise lattice parameter values calculated using the Nelson-Riley function. Monoclinic CuO nanostructures have been confirmed by FTIR measurements of all the samples, also elastic properties are studied. Chemical compositions are identified by EDAX spectra. Optical studies indicate that energy bandgap of as-prepared samples varies as 2.67 – 3.17 eV and absorbance peak as 240 nm - 257 nm. The antibacterial activity of the CuO nanomaterial is determined by using disc diffusion method against Gram positive and Gram-negative bacteria. Gram-negative bacterial strains show more sensitivity than gram-positive because of their membrane structure. The results show a strong decline of bacterial strains after a short contact with nanoparticles.

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