

SYNTHESIS AND CHARACTERIZATION OF ZnO AND CeO₂ NANOPARTICLES WITH POSSIBLE APPLICATION FOR NITRITE IONS REMOVAL IN WATERS

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Abstract. First zinc hydroxide and cerium hydroxide were prepared by the hydrothermal method and heated at 90°C to dry. Second, they were annealed at 400°C to produce nanoparticle of ZnO and CeO₂, respectively. The obtained samples were characterized using by X-ray diffraction to ascertain their structure and chemical composition. The surface morphology analysis of the nanoparticles was performed using scanning electron microscopy. Atomic force microscopy was employed to characterize the imaging surface and ascertain the surface roughness. The functional groups present at the surface of the nanoparticles were investigated using Fourier transform infrared spectroscopy method. The optical properties of these particles were investigated using the UV-visible spectrometer. Further, the produced nanoparticles were used to adsorb NO₂⁻ ions from aqueous solutions. The results showed that the nanoparticles which were heated at 90°C (hydroxide forms) presented a higher activity for nitrite ions removal activity than that were heated at 400°C (oxide forms). This may be relating to nitrite ions preferential adsorption to hydroxide forms rather than oxide forms; in both cases (90°C and 400°C), zinc oxide nanoparticles presented higher nitrite removal activity.

Keywords: zinc oxide, cerium dioxide, nanoparticle, nitrite ion, pollutant, environment.