

The Effect of Dissolved Gas on Synthesis of NiO/C Composite and Its Influence for Removal of Toxic Metal Ion from Wastewater

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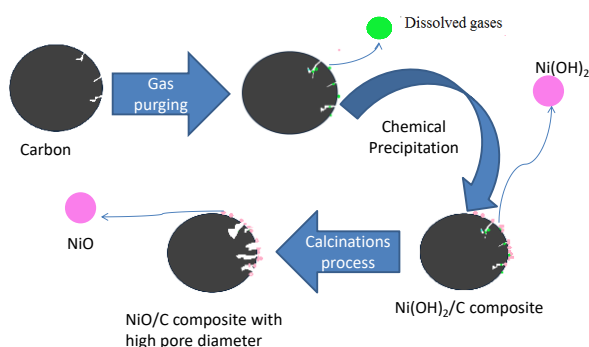
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Abstract

The porous nickel oxide/carbon composite was successfully synthesized via a precipitation method in presence of dissolved gases medium. The porous NiO/Carbon composite was widely used in the supercapacitor, removal of toxic metal ion wastewater. In this study, carbon was prepared from Prosopisjuliflora wood by biochar process. Then NiO/Carbon was synthesized via two different precipitation method using Nickel nitrate, NaOH and dissolved air. This study explained the effect of dissolved gases on structural changes of metal oxide/carbon composite. The adsorption of dissolved air on carbon surface influenced the pore size variation on metal oxide composite. The mechanism of adsorption of dissolved gas on carbon surface in solvent explained. The apparent characters and physical chemistry performances of NiO/C composite were investigated by X-ray diffraction (XRD), BET adsorption, scanning electron microscopy (SEM) and Energy Dispersive X-Ray Analysis (EDX) mapping. The efficiency sorption parameters of both solid nano NiO/C composite, such as; pH study, contact time, the dosage of composite and competitive adsorption behaviours were studied. The surface area, pore volume, mean diameter were increased ~ 2 times presence of dissolved gases. The removal efficiency was also increased from 88% to 94% then Thermodynamic parameter values (ΔS_1 , ΔH_1 , ΔG_1) indicated the dependency of temperature by the adsorption reaction process between adsorbent and adsorbate and their spontaneous and exothermic nature was also justified.

Graphical abstract:



Keywords: Biochar, NiO, NiO/C composite, dissolved gases, lead removal