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FINAL YEAR PROJECT 2 - RESEARCH PROJECT

**ADSORPTIVE REMOVAL OF COPPER IONS BY THE DIVALENT ZN-FE
LAYERED DOUBLE HYDROXIDE (LDH)**

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DIVALENT ZN-FE LAYERED DOUBLE HYDROXIDE (LDH)**

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ABSTRACT

ADSORPTIVE REMOVAL OF COPPER IONS BY THE DIVALENT ZN-FE LAYERED DOUBLE HYDROXIDE (LDH)

The heavy metal ions at high concentrations in the aqueous solution are a serious hazard to human health and the environment. The conventional heavy metal removal methods are usually associated with a high cost, secondary pollutants and poor efficiency. Thus, it is necessary to approach efficient and sustainable treatment methods. Layered double hydroxides (LDHs) are anionic clay materials with a unique layered structure and surface hydroxyl groups that enhance their function as adsorbents. In this study, zinc-iron layered double hydroxide (Zn-Fe LDH) was synthesized and evaluated for the removal of copper ions from aqueous solution. The co-precipitation method was used to prepare a mixture of 0.1 M ZnCl₂ and 0.03 M FeCl₃ at a 3:1 cation ratio. The effect of pH, contact time and initial copper concentration was investigated. A removal efficiency of 100%, 99.86% and 99.91% was achieved at optimum conditions at pH 8, initial copper concentration of 10 ppm and contact time of 60 minutes, respectively. The samples were further confirmed the adsorption performance of Zn-Fe LDH using FTIR, ICP-OES, SEM-EDX and turbidity measurements. The findings indicate that Zn-Fe LDH exhibits high adsorption efficiency under optimized conditions, demonstrating its potential as a cost-effective adsorbent for copper removal and its applicability in sustainable wastewater treatment.

Keywords: Layered double hydroxide, Zinc-iron LDH, Heavy metals, Adsorption

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