

## **Preparation of hydroxyapatite from industrial waste phosphogypsum by hydrothermal method; its application in waste treatment**

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**P**hosphogypsum (PG) is an industrial waste derived from the production of phosphoric acid where the phosphate ore is dissolved in sulfuric acid. About 5 tons of phosphogypsum are produced for every ton of P<sub>2</sub>O<sub>5</sub> manufactured. Worldwide PG production is huge, and it is estimated that 200.000 tons are produced annually in phosphoric acid plants. In fact, 85% of the worldwide production remains at present stored into piles near the factory that occupy considerable land resources, or completely discharged into water, which lead to serious contamination. In consequence, valorizing and minimizing the negative effects of this hazardous waste increasingly

grab the attention of researchers all around the world. In the present work, the conversion of an industrial sub-product phosphogypsum (PG) into hydroxyapatite (H-Ap) was investigated. Hydrothermal synthesis was applied by reacting PG with a salt at different times, temperatures, while adjusting pH using sodium hydroxide solution NaOH (1M). The obtained H-Ap exhibited a hexagonal structure, a high purity and nanorod-like shaped of 44nm x 12nm.. The prepared nano-hydroxyapatite was characterized by X-ray diffraction (XRD), Fourier transformed-infrared spectroscopy (FT-IR), transmission electron microscopy (TEM) and scanning electron microscopy (SEM). The findings showed that PG recycling could be accomplished using an easy synthesis route with relatively cheap reactants in order to produce nano-crystalline H-Ap. The elaborated hydroxyapatite powder was used as an effective adsorbent of organic dyes/heavy metals from wastewater.

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