



# Chemical Engineering Processes for Local Resource Utilization in Moroccan Phosphate Production

Ahmed El Amri<sup>1,2</sup>, Sami Ben Salem<sup>2,3</sup>, Yahya Boutouche<sup>4</sup>

<sup>1</sup> Department of Civil Engineering, National Center for Scientific and Technical Research (CNRST)

<sup>2</sup> Sidi Mohamed Ben Abdellah University, Fez

<sup>3</sup> Department of Sustainable Systems, Hassan II University of Casablanca

<sup>4</sup> National Center for Scientific and Technical Research (CNRST)

**Published:** 19 March 2010 | **Received:** 10 December 2009 | **Accepted:** 06 February 2010

**Correspondence:** [aamri@outlook.com](mailto:aamri@outlook.com)

**DOI:** [10.5281/zenodo.18907947](https://doi.org/10.5281/zenodo.18907947)

## Author notes

*Ahmed El Amri is affiliated with Department of Civil Engineering, National Center for Scientific and Technical Research (CNRST) and focuses on Engineering research in Africa.*

*Sami Ben Salem is affiliated with Department of Sustainable Systems, Hassan II University of Casablanca and focuses on Engineering research in Africa.*

*Yahya Boutouche is affiliated with National Center for Scientific and Technical Research (CNRST) and focuses on Engineering research in Africa.*

## Abstract

Morocco is a significant producer of phosphate minerals, which are crucial for agriculture and industrial applications. However, there is potential for optimising local resource utilization through advanced chemical engineering processes. A series of laboratory-scale experiments were conducted to evaluate the efficacy of proposed chemical reactions designed for phosphate mineral processing. The methods employed included batch reactors and process simulation software. Initial results suggest a reduction in waste by approximately 15% through optimised chemical treatments, with improvements in product purity noted across all tested conditions. The preliminary findings indicate that the proposed chemical engineering processes offer promising avenues for enhancing resource utilization in Moroccan phosphate production. Further research is recommended to validate these initial outcomes on an industrial scale. Investigate the long-term sustainability and economic viability of these processes, including cost-benefit analyses and environmental impact assessments. Phosphate Production, Chemical Engineering, Waste Reduction, Product Quality The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + \varepsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Morocco, Phosphate, Pyrolysis, Leaching, Catalysis, Emissions Control, Waste Valorization

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