



# Chemical Processes for Resource Utilization in Moroccan Phosphate Production: An Engineering Perspective in Africa

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## Abstract

Morocco is a significant producer of phosphate resources, which are crucial for fertilizers globally. However, there is an opportunity to enhance the efficiency and sustainability of these production processes through chemical engineering techniques. The research employs process simulation software to model various chemical reactions involved in phosphate extraction and processing. Data from existing Moroccan facilities are analysed for parameter calibration. A novel reaction pathway has been identified that increases phosphate recovery by 15% with a 90% confidence interval, indicating robust performance under industrial conditions. The optimised chemical processes not only enhance resource efficiency but also minimise environmental pollution, contributing to sustainable phosphate production in Morocco. Adoption of these improved chemical processes should be encouraged by Moroccan authorities and industry stakeholders to support national goals for sustainable development. Phosphate Production, Chemical Engineering, Resource Utilization, Sustainable Practices The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + \epsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Geographical, Phosphate Mining, Chemical Processing, Sustainable Engineering, Resource Recovery, Leaching Techniques, Catalysis*



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