



Chemical Engineering Strategies for Local Phosphate Resource Utilization in Morocco

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Abstract

Morocco is a significant phosphate producer in Africa, but local resources are limited. Efficient chemical engineering processes can enhance resource utilization and reduce environmental impact. A combination of computational fluid dynamics (CFD) simulations and empirical testing were employed to optimise the existing phosphate processing plant. Key parameters such as temperature and pressure were varied to identify optimal conditions. The CFD models predicted a 15% reduction in energy consumption when operating under optimised process conditions, while waste water treatment plants achieved a 20% decrease in effluent discharge compared to baseline practices. The chemical engineering strategies demonstrated significant improvements in resource utilization and environmental performance, providing a cost-effective solution for local phosphate production. Further pilot-scale trials should be conducted to validate the model predictions before full-scale implementation. Additionally, ongoing research into bioremediation techniques could enhance waste management. Phosphate Production, Chemical Engineering, Process Intensification, Waste Minimization The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + v + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *North African, Kinetic Modelling, Separatory Operations, Waste Minimization, Leaching Techniques, Precipitation Processes, Catalysis*

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