

# REGENERATION OF SPENT BLEACHING EARTH: OPTIMIZATION AND REUSABILITY STUDIES

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## Abstract

Spent bleaching earth (SBE) generated from edible oil refining is classified as hazardous waste due to its residual oil content and adsorbed impurities, yet it retains significant adsorptive capacity. This study investigates thermal and solvent-based regeneration methods to restore the adsorptive performance of SBE and extend its service life. SBE samples were characterized before and after regeneration using BET surface area analysis, thermogravimetric analysis (TGA), FTIR, and SEM. Regeneration efficiency was assessed by measuring re-adsorption performance against a standard chlorophyll solution. Results show that thermal regeneration at 350°C under controlled atmosphere restores 80–90% of original adsorptive capacity, while solvent washing followed by mild thermal treatment achieves comparable results at lower energy cost. Multiple regeneration cycles were evaluated, confirming that SBE can be reused at least five times without significant performance loss, offering substantial cost and environmental benefits for edible oil refiners.

**Keywords:** Spent bleaching earth, optimization, solvent extraction, regeneration, acid activation, residual oil recovery.

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