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UTILIZATION OF AGRICULTURAL WASTE ASH FOR REDUCTION OF TOTAL POLAR MATERIALS IN USED COOKING OIL: PROCESS OPTIMIZATION STUDIES

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Abstract

The study focuses on reducing the total polar materials (TPM) in used cooking oil (UCO) by adsorption using agro-waste ash such as coir pith ash (CPA), rice husk ash (RHA), and sugarcane bagasse ash (SBA). The efficiency of adsorbents on UCO regeneration was studied by batch adsorption. The effect of process parameters treatment time, adsorbent quantity, UCO quantity, UCO quality, and oil type on reducing the TPM of UCO was analysed. The results indicate that RHA was most effective in reducing the TPM content. Increasing the adsorbent quantity and treatment time had a positive impact on TPM reduction, whereas the increase in UCO quantity leads to a decrease in the performance improvement (PI). Initial TPM percentage highly influenced the PI whereas the type of oil doesn't have a significant effect on the same. Further optimization of process variables on TPM reduction using RHA was studied using response surface methodology. Under optimized conditions, an 89.6% reduction in TPM was achieved. The present study concludes that adsorption treatment using RHA was effective in improving the quality of UCO. This study provides valuable evidence regarding removal of TPM using agricultural wastes as adsorbents. The method presented is cost-effective and can be utilized in small scale food industries.

Key words: adsorption processing, coir pith ash, rice husk ash, sugarcane bagasse ash, total polar materials, used cooking oil

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