

## Waste Bone Based Catalyst: Characterization and Esterification Application

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**Abstract :** Waste bone, produced in large quantity (8-10 kg./day) from a slaughterhouse, could be a cheap (cost \$0.20 per kg) substitute for commercial catalysts. In the present work, catalyst for esterification reaction was prepared from waste bone and characterized by various techniques. Bone was deoiled and then sulfonated. Fourier-transform infrared spectroscopy (FTIR) spectra of prepared catalyst predicted -OH vibration at 3416 and 1630  $\text{cm}^{-1}$ , S-O stretching at 1124  $\text{cm}^{-1}$  and intense bands of hydroxyapatite in a region between 500 and 700  $\text{cm}^{-1}$ . X-ray diffraction (XRD) predicts peaks of hydroxyapatite, CaO, and tricalcium phosphate. Scanning electron microscope (SEM) was employed to reveal the presence of non-uniformity deposited fine particles on the catalyst surface that represents active acidic sites. The prepared catalyst was employed to study its performance on esterification reaction between acrylic acid and ethanol in a molar ratio of 1:1 at a set temperature of 60 °C. Results show an equilibrium conversion of 49% which is matched to the commercial catalysts employed in literature. Thus waste bone could be a good catalyst for acrylic acid removal from waste industrial streams via the process of esterification. **Keywords—** Heterogeneous catalyst, characterization, esterification, equilibrium conversion

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