

Catalytic Activity of Aluminum Impregnated Catalysts for the Degradation of Waste Polystyrene

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Abstract : Abstract— The aluminum impregnated catalysts of Al-alumina (Al-Al₂O₃), Al-montmorillonite (Al-Mmn) and Al-activated charcoal (Al-AC) of various percent loadings were prepared by wet impregnation method and characterized by SEM, XRD and N₂ adsorption/desorption (BET). The catalytic properties were investigated in the degradation of waste polystyrene (WPS). The results of catalytic degradation of Al metal, 20% Al-Al₂O₃, 5% Al-Mmn and 20% Al-AC were compared with each other for optimum conditions. Among the catalyst used 20% Al-Al₂O₃ was found the most effective catalyst. The BET surface area of 20% Al-Al₂O₃ determined was 70.2 m²/g. The SEM data revealed the catalyst with porous structure throughout the frame work with small nanosized crystallites. The yield of liquid products with 20% Al-Al₂O₃ (91.53 ± 2.27 wt%) was the same as compared to Al metal (91.20 ± 0.35 wt%) but the selectivity of hydrocarbons and yield of styrene monomer (56.32 wt%) was higher with 20% Al-Al₂O₃ catalyst.

Keywords : Impregnation; catalytic degradation; waste polystyrene; styrene.

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