

Vapor Phase Alkylation of Aniline Over Ferrite Nanoparticles

Malvika Kadian¹, R.K Gupta²

Guru Jambheshwar University of Science and Technology, Hisar-125001
malvikadian@gmail.com

ABSTRACT

Various ferros spinels of Copper and Cobalt viz. CuFe_2O_4 (CF-1), $\text{Cu}_{0.75}\text{Co}_{0.25}\text{Fe}_2\text{O}_4$ (CF-2), $\text{Cu}_{0.5}\text{Co}_{0.5}\text{Fe}_2\text{O}_4$ (CF-3), $\text{Cu}_{0.25}\text{Co}_{0.75}\text{Fe}_2\text{O}_4$ (CF-4), CoFe_2O_4 (CF-5) were prepared by low temperature co-precipitation method. They were characterised by various techniques. On scanning by I.R, they showed two strong bands, one at 700 cm^{-1} due to stretching vibration of tetrahedral M-O group and the other at 500 cm^{-1} due to stretching vibration of octahedral M-O group. XRD analysis showed the single phase spinel structure for all the compositions. Their particle size calculated using XRD was found to be at nanometer scale. Surface morphology of the $\text{Cu}_{1-x}\text{Co}_x\text{Fe}_2\text{O}_4$ ($x=0, 0.25, 0.5, 0.75$ and 1) nanoparticles was investigated by scanning electron microscopy. The vapor phase alkylation of aniline with methanol was carried out in a fixed-bed down-flow reactor. The composition of the product mixture was analysed by using high performance liquid chromatography (HPLC). Among the different composition of the system, ferros spinels possessing low 'x' values were found to be highly active and selective for NMA at temperature 350°C , WHSV 0.5 h^{-1} and molar ratio of methanol to aniline 5. The surface area and acidity of the ferros spinels follow the order $\text{CF-1} < \text{CF-2} < \text{CF-3} < \text{CF-4} < \text{CF-5}$.
