

CHARACTERIZATION OF CALCIUM OXIDE/ 4A ZEOLITE COMPOSITE PREPARED THROUGH THERMAL METHOD FOR VEHICLE EXHAUST ADSORPTION

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Vehicles emissions cause serious damage to the environment. Adsorption of the emissions is the usual technique used for remediation. The present work focuses on developing a composite using 4AZeolite and Calcium oxide (CaO) for absorbing vehicle emissions effectively. The properties of the composite under different temperatures and compositions were investigated. Two different composites were prepared from top layer and precipitate of the mixture of 4A Zeolite / CaO in appropriate composition. Both the top layer and the precipitate of the composite mixture were dried and annealed at different temperatures such as 120 °C, 450 °C, 550 °C, 650 °C and their properties investigated using X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy and scanning electron microscope (SEM) techniques.

XRD analysis reveals a phase change in both top and precipitate of the composite. When increasing the temperature, new peak at 37.4° was observed in the precipitate and some XRD peaks disappeared in both composites at elevated temperatures. FTIR spectra of the composite shows peaks relevant to both zeolite and CaO at wavelength range from 715 cm⁻¹ to 1450 cm⁻¹. When temperature was increased, the intensity of peak at 1415 cm⁻¹ was gradually decreased and broad peaks were observed in the range from 875 cm⁻¹ to 900 cm⁻¹ in both top and precipitate layers. SEM images show the morphology changes of composites prepared using both top and precipitate with increasing temperature. Phase change, morphology and the surface area change observed in the present study would considerably affect the effective adsorption of vehicle emissions.

Keywords: 4A Zeolite, Calcium oxide, temperature series

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