

# Valorisation of fly ash: Zeolite synthesis and its application

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An increasing trend of coal usage in power generation facilities in Asian countries especially Pakistan, India and China produces abundant amount of fly ash. Burning of 1 ton of coal produces approximately 230 to 300kg of fly depending on the type of coal. Dry and wet disposal strategies have been practiced to dispose of the huge amount of ash. The deposits of fly ash not only occupy the useful land but also pose a serious threat to surrounding ecosystem due to the leaching of harmful metals to ground water and soil. This necessitates the reutilization of fly ash to combat the environmental impacts of fly ash.

Fly ash owns cementitious properties due to the presence of alumino-silicates and this also makes the material suitable for zeolite synthesis. The fly ash based zeolites can be used for further applications involving reaction engineering and waste treatments. In this work, the research results will summarize the change in properties of synthesized material by varying proportions of alkali mixture which were fused with fly ash at particular temperature. The porosity was improved and the BET surface area rises from 9m<sup>2</sup>/g to 60m<sup>2</sup>/g. The x-ray diffraction studies confirmed the formation of zeolite from raw ash. Various other characterization techniques like XRF (X-ray fluorescence spectroscopy), TGA (Thermo gravimetric analysis) and SEM (Scanning electron microscopy) were used to assess the quality of synthesized zeolite. The fly ash based zeolite was also employed to treat the dye bearing wastewater. The uptake was found to be 151 mg/g. The thermodynamic and equilibrium isotherm analysis was also made to analyze the feasibility of pollutant removal process.