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Title: Synthesis of Zeolite from Aluminium Etching By-Product: the Effect of Reaction Temperature on Crystallinity and Its CO2 Adsorption Property

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Abstract: The synthesis of zeolite from the by-product of aluminium etching process was investigated. The starting by-product reactant had high aluminium content, 92.17% wt. as Al2O3. Si and Na compositions were adjusted by the addition of sodium metasilicate, in the hydrogel process. The reaction time was fixed at 1 hr, while the stirring speed was controlled at 200 rpm and the temperature varied in the range of 60-90oC. The mole ratio of the starting reactants were also fixed at 2 (SiO2/Al2O3 = 2, Na2O/Al2O3 = 2). The product properties were found to depend on reaction temperature. The better zeolite product in the range of these experiments was found at 90°C, containing 75% crystallinity as referred to the commercial zeolite A. The percentage crystallinity of the synthesized zeolite was found to increase with increasing reaction temperature. Analysis of the X-Ray diffraction (XRF) and FT-IR spectra confirmed that the synthetic zeolite was of type A. The CO2 (99.5% purity) absorption test was performed with the zeolite sample synthesized at 90°C, using N2 (99.9% purity) as carrier at total flow rate of 15 cc min- 1, resulting in 0.00386 mL of CO2 adsorption g- 1. The study showed the potential of developing the by-product of aluminium etching process into a higher value added product of zeolite A. Further economic study of the process was suggested.