

Measurement of Brönsted Acidity of Silica-Alumina Solid Catalyst by Base Exchange Method

M. A. RAHMAN, M. A. K. AZAD, S. AHSAN, S. ISLAM, M. A. MOTIN and M. ASADULLAH*

Department of Applied Chemistry and Chemical Technology, University of Rajshahi, Rajshahi 6205, Bangladesh.

Abstract — Silica-Alumina catalysts having three different Si/Al ratios were prepared. Surface acidity of these catalyst samples was measured by the base exchange method using aqueous ammonium acetate, $\text{CH}_3\text{COONH}_4$ solution and the results were compared with those measured by the base exchange method using KOH and NH_4OH as adsorbates from aqueous solution. The amount of K^+ and NH_4^+ adsorbed was determined titrimetrically and spectrophotometrically, respectively for measuring the concentration of K^+ and NH_4^+ in the solution before and after adsorption. It was found that the surface acidity was more pronounced when ammonium acetate solution was used as an adsorbate. With the use of NH_4OH and KOH as bases considerable dealumination takes place with a consequent decrease of surface acidity of the catalyst samples. In all cases, the surface acidity increased with decrease of sample size. It is seen that surface acidity measured with NH_4OH becomes closer to that measured with KOH at the same(?) Si/Al ratio, but contrary to this, surface acidity measured with NH_4OH becomes closer to that measured with $\text{CH}_3\text{COONH}_4$ at high Si/Al ratio. This phenomenon is attributed to dealumination of silica-alumina catalyst samples by the strong base.