

Synthesis and Characterization of Quaternary Ammonium Salt on Silica Gel Prepared from Rice Hull Ash

Dyah Purwaningsih^{1*}, Nuryono², Regina Tutik Padmaningrum¹

¹ Department of Chemical Education, Faculty of Mathematics and Natural Sciences, Yogyakarta State University, Karangmalang, Yogyakarta, INDONESIA

² Department of Chemistry, Faculty of Mathematics and Natural Sciences Gadjah Mada University, Bulaksumur, Yogyakarta, INDONESIA

*E-mail: dyahuny@yahoo.com, tel. +62 274 586168 ext. 215, fax. +62 274 565500

In the present work, synthesis of quaternary ammonium salt on silica gel prepared from rice hull ash (RHA) and used for anion exchanger was investigated.

Sodium silicate (Na_2SiO_3) solution was prepared by destruction of rice hull ash with 4 M NaOH solution. The synthesis of ethylenediamino-silica hybrid (ESH) was carried out by adding 3 M HCl solution to the mixture of (3-ethylenediaminopropyl)-trimethoxysilane (EDAPTMS) and sodium silicate solution till pH 7. The gel was characterized by using infrared spectroscopy (FTIR), X-ray Diffraction (XRD) and Surface Area Analyzer (SAA). The ESH then was reacted using methyl iodide and sodium chloride (perchlorate) solution to form quaternary ammonium salt (ESH/ Cl^-). The salt was then characterized using infrared spectroscopy (FTIR), Thermogravimetry (TG), Kjeldahl analysis and potentiometric titration.

Result of characterization with FTIR showed that ESH had been successfully synthesized, indicated by the presence of characteristic absorbance of functional groups silanol (Si-OH), siloxane (Si-O-Si), amine ($-\text{NH}_2$) and methylene ($-\text{CH}_2$). The XRD data showed amorphous structure of ESH. From SAA result, the specific surface area and total pore volume of ESH was obtained. The ESH/ Cl^- had been successfully synthesized based on the data from FTIR, Kjeldahl analysis and potentiometric titration. From TG, it was discovered that ESH/ Cl^- was thermically stable.

Keywords: *synthesis, quaternary ammonium salt, silica gel, rice hull ash*