

HYDROGEN STORAGE PERFORMANCE OF ACTIVATED NATURAL ZEOLITE AND ITS MODIFICATION WITH ACTIVATED CHARCOAL

Latifah Hauli ^{a*}, Chika Lutfi Adiningrum ^b, Muhammad Safaat ^a, Indri Badria Adilina ^a,
Silvester Tursiloadi ^a, Lenny Marlinda ^b, Dian Susanthi ^c, Muflikhah ^d

^aResearch Center for Chemistry, National Research and Innovation Agency (BRIN), B.J. Habibie Science and Technology Area,
60, Raya Puspiptek str., Setu, South Tangerang, Banten 15314, Indonesia

^bDepartment of Chemistry, Faculty of Science and Technology, Universitas Jambi, 15, Jambi – Muara Bulian No.KM. str., Jambi
Luar Kota, Muaro Jambi, Jambi 36361, Indonesia

^cDepartment of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Gadjah Mada, Bulaksumur, Depok, Sleman,
Yogyakarta 55281, Indonesia

^dResearch Center for Radiation Detection and Nuclear Analysis Technology, National Research and Innovation Agency (BRIN),
B.J. Habibie Science and Technology Area, 60, Raya Puspiptek str., Setu, South Tangerang 15314, Indonesia

*e-mail: latifah.hauli@brin.go.id

Abstract. The modification of zeolite with activated charcoal for hydrogen adsorption was investigated. The aims of this research were to activate natural zeolite (Z), modify Z with commercial activated charcoal (AC/Z), and study the properties of these materials for hydrogen storage. The Z was prepared by the desilication method. The obtained Z was modified by activated charcoal using the wet impregnation method. The obtained materials were characterized by surface area analyzer, X-ray diffraction (XRD), fourier transform infrared spectroscopy (FTIR), and scanning electron microscopy with energy dispersive spectrometry (SEM-EDS). The hydrogen storage performance (at 298 K and 1 atm) was observed by Hydrogen-temperature programmed desorption (H₂-TPD). The results showed that the presence of activated charcoal on the zeolite surface increased the specific surface area, reached 188.54 m²/g. However, Z exhibited the highest hydrogen storage capacity of 0.57 mmol/g.

Keywords: zeolite, activated charcoal, adsorbent, hydrogen storage.