

## RINGKASAN

Material anorganik jenis zeolit sering dimanfaatkan sebagai material pendukung. Zeolit alam mempunyai luas permukaan yang terbatas. Luas permukaan yang dibutuhkan untuk amobilisasi enzim cukup besar, sehingga perlu dilakukan modifikasi zeolit alam. Zeolit alam dimodifikasi dengan metode dealuminasi, kalsinasi, dan variasi ukuran partikel. Dealuminasi dilakukan dengan cara, zeolit alam dengan ukuran masing-masing 30, 60, dan 90 mesh direndam dalam HCl 6 N, kemudian dikalsinasi pada suhu 400 °C selama 4 jam. Zeolit hasil modifikasi dianalisis dengan BET untuk menentukan luas permukaan, dan penentuan keasaman menggunakan adsorpsi gas NH<sub>3</sub>. Enzim diamobilisasi dengan metode adsorpsi fisik. Zeolit dengan ukuran masing-masing 30, 60, dan 90 mesh direndam dalam larutan enzim dan diagitasi selama 24 jam. Enzim yang teramobilisasi ditentukan dengan mengukur kadar protein dalam larutan sebelum dan sesudah adsorpsi dengan metode Lowry. Aktivitas enzim yang teramobilisasi ditentukan dengan mengukur kadar glukosa dengan metode Nelson-Somougyi.

Dari hasil penelitian dapat ditunjukkan bahwa luas permukaan dan keasaman zeolit hasil modifikasi semakin besar dengan meningkatnya ukuran zeolit. Luas permukaan zeolit dengan ukuran masing-masing 30, 60, dan 90 mesh yaitu 61,95; 110,14; dan 226,15 m<sup>2</sup>/g, sedangkan keasamannya berturut-turut 1,0283; 1,1132; dan 1,7619. Kadar protein larutan enzim sebelum adsorpsi yaitu 1,74 mg/mL. Prosentase enzim yang teradsorpsi pada zeolit sebelum dilakukan pencucian dengan ukuran masing-masing 30, 60, dan 90 mesh yaitu 89 %, 95 %, dan 97 %. Aktivitas enzim yang teramobilisasi semakin besar dengan meningkatnya ukuran zeolit. Aktivitas enzim yang teramobilisasi dengan masing-masing ukuran berturut-turut 0,5346; 0,7676; and 0,9665 mg/100mL.

SEMARANG

## SUMMARY

The inorganic materials of the zeolite species usually used as support material. The natural zeolite have limited surface areas. The surface areas of the zeolite to immobilize enzyme have to be large enough, therefore modification of the natural zeolite is carried out. The natural zeolite was modified by means dealumination, calcination, and variation of the particle size. Dealumination by means the zeolite for each size of 30, 60, and 90 mesh was soaked in HCl 6 N, then calcined at 400 °C for 4 hours. The zeolite was analyzed by BET to determine the surface areas, then the determination of the acidity use NH<sub>3</sub> adsorption. The enzyme was immobilized by physical adsorption methods. The zeolite for each size of 30, 60, and 90 mesh was soaked in enzyme solution, then agitated for 24 hours. The immobilized enzyme was determined by measuring of the protein contents in solution before and after adsorption by Lowry method. The activity of immobilized enzyme was determined by measuring of the glucose contents by Nelson-Somougyi method.

The result showed that the surface areas and the acidity of the zeolite become greater by increasing size of the zeolite. The surface areas of each size the zeolite size of 30, 60, and 90 mesh are 61.95, 110.14, and 226.15 m<sup>2</sup>/g, whereas acidity of each the zeolite size are 1.0283, 1.1132, and 1.7619. The protein contents in solution before the adsorption is 1.74 mg/mL. The percentage of adsorped enzyme at the zeolite before washing for each size of 30, 60, and 90 mesh are 89 %, 95 %, and 97 %. The activity of immobilized enzyme become greater by increasing size of the zeolite. The activity of immobilized enzyme for each size are 0.5346, 0.7676, and 0.9665 mg/100mL.

