ABSTRAK

SINTESIS ZEOLIT FILIPSIT DARI ABU SEKAM PADI DAN ABU LIMBAH KEMASAN BERLAPIS ALUMINIUM FOIL UNTUK MENURUNKAN KESADAHAN

Zeolit filipsit adalah zeolit alam yang biasanya ditemukan di dasar laut Pasifik. Filipsit cukup sulit disintesis di laboratorium karena waktu inkubasi yang lama dan suhu tinggi. Sintesis zeolit ini terus dikembangkan, baik dalam segi sumber, prekursor maupun metode sintesisnya. Penelitian ini bertujuan untuk mensintesis zeolit filipsit menggunakan abu sekam padi sebagai sumber silika dan abu limbah kemasan berlapis aluminium sebagai sumber alumina, serta untuk mengetahui sifat adsorpsinya terhadap Ca^{2+} pada air sadah. Zeolit filipsit disintesis menggunakan bahan utama silika abu sekam padi, aluminium dari abu limbah kemasan, NaOH, dan KOH dengan metode non hidrotermal pada suhu 90 ºC dengan variasi waktu inkubasi 200, 240, dan 280 jam dengan komposisi adalah yaitu Al = 1 Si = 5,5 (K+Na) = 1,65 KOH = 0,825 H_2O = 29,41. Kristalinitas zeolit filipsit hasil sintesis dikarakterisasi dengan XRD, morfologi zeolit dikarakterisasi dengan SEM dan komposisi kimia zeolit dikarakterisasi dengan XRF. Hasil karakterisasi dengan SEM menampilkan bentuk granular kecil dengan ukuran partikel sekitar 1-5 µm. Hasil karakterisasi dengan XRD menunjukkan zeolit filipsit berhasil disintesis pada waktu inkubasi 200 jam. Sedangkan pada waktu inkubasi 240 jam dan 280 jam terbentuk zeolit filipsit dengan paduan zeolit kankrinit. Hasil karakterisasi XRF menunjukkan terbentuknya filipsit-K, filipsit-Ca dan kankrinit-Ca dengan kandungan kalium dan kalsium yang besar yaitu 41,3% dan 2,54%. Berdasarkan hasil pengujian absorpsi zeolit filipsit terhadap Ca^{2+} pada larutan $Ca(NO_3)_2$ dan air sadah menunjukkan kemampuan absorpsi hingga 98,75%.

Kata-kata kunci: zeolit filipsit; abu sekam padi; limbah aluminium; adsorpsi; kesadahan.

ABSTRACT

SYNTHESIS OF PHILLIPSITE ZEOLITE FROM SILICA OF RICE HUSK ASH AND ALUMINIUM FOIL WASTE ASH OF LAYER SACHET FOR REMOVAL OF WATER HARDNESS

Phillipsite zeolite is a natural zeolite that is usually found on the Pacific seabed. Phillipsite is quite difficult to synthesize in the laboratory because of the long incubation time and high temperature. Synthesis of this zeolite continues to be developed, both in terms of sources, precursors and synthesis methods. In this study aims to synthesize zeolite phillipsite using rice husk ash as a source of silica and aluminum foil ash waste of layer sachet as a source of alumina, and to determine the adsorption properties of Ca^{2+} in water hardness. Zeolite phillipsite was synthesized using the main ingredients of silica rice husk ash, aluminum from packaging waste, NaOH, and KOH using a non-hydrothermal method at a temperature of 90ºC with variations in incubation time of 200, 240, and 280 hours using mole ratio Al = 1 Si = 5,5 (K + Na) = 1.65 KOH = 0.825 H2O = 29.41. The crystallinity of synthesized phillipsite zeolite was characterized by XRD, the morphology of zeolite was characterized by SEM and the chemical composition of zeolite was characterized by XRF. The results of the characterization by SEM showed small granular shapes with particle sizes around 1-5 µm. The results of XRD characterization showed that the filipsite zeolite was successfully synthesized at an incubation time of 200 hours. Whereas at incubation time 240 hours and 280 hours formed filipsite zeolite with a combination of carcinrin zeolite. The XRF characterization results showed the formation of K-phillipsite, Ca-phillipsite and Ca-cancrinite with a large potassium and calcium content of 41.3% and 2.54%. Based on the results of absorption testing of filipsite zeolite against Ca^{2+} in a solution of $Ca(NO_3)_2$ and hard water showed an absorption ability of up to 98.75%.

Keywords: *zeolit phillipsite; rice husk ash; aluminium foil waste; adsorption; water hardness.*