

ABSTRAK

Desa Serut, Kecamatan Gedangsari, Kabupaten Gunungkidul, Daerah Istimewa Yogyakarta merupakan salah satu lokasi penambangan zeolit. Aktivitas penambangan mengakibatkan tersingkapnya lapisan tufa zeolitik baru yang belum diteliti karakteristiknya. Penelitian ini bertujuan untuk mengetahui karakteristik tufa zeolitik di daerah tersebut dan pemanfaatannya sebagai adsorben desalinasi air laut. Metode yang digunakan untuk mengetahui karakteristik mineralogi tufa zeolitik yaitu analisis megaskopis, petrografi, XRD (*X-Ray Diffraction*), ICP-AES (*Inductively Coupled Plasma Atomic Emission Spectroscopy*), SEM (*Scanning Electron Microscopy*), analisis sifat fisik meliputi KPK (Kapasitas Pertukaran Kation) dan pH. Berdasarkan karakteristik mineraloginya, tufa zeolitik berwarna putih kehijau-hijauan hingga hijau keputih-putihan, berukuran butir lanau - pasir sedang, kekerasan 2,5 – 3 skala Mohs, komposisinya tersusun oleh gelas 59,97 wt%, mineral zeolit (mordenit 10,35 wt% dan klinoptilolit 8,02 wt%), montmorillonit 5,17 wt%, kuarsa 5,17 wt%, hematit 4,2 wt%, plagioklas 5,25 wt%, dan klorit 1,87 wt%. Berdasarkan analisis sifat fisik, tufa zeolitik memiliki KPK efektif 11,20 – 102,80 me/100 gr, dan KPK potensial 19,60 – 112,40 me/100 gr, serta tingkat keasaman 7,51 – 7,79 yang tergolong netral. Pada percobaan pemanfaatan tufa zeolitik sebagai adsorben desalinasi air laut menggunakan metode *batch*, perlakuan aktivasi kimia dengan menggunakan larutan asam jenis H_2SO_4 0,5 M dan HCl 0,5 M tidak memberikan hasil yang lebih baik daripada aktivasi termal sehingga kondisi optimum adsorpsi diperoleh ketika menggunakan 9 gr tufa zeolitik yang telah diaktivasi termal pada suhu 300 °C selama 3 jam ($\eta = 59\%$ dan nilai $\Delta TDS = 4159$ mg/L). Berdasarkan hal tersebut, maka tufa zeolitik di daerah penelitian efektif dimanfaatkan sebagai material adsorben desalinasi, keefektifan ini dapat ditingkatkan dengan penambahan dosis zeolit sehingga desalinasi mampu menghasilkan air tawar.

Kata kunci: Desa Serut, karakteristik tufa zeolitik, adsorben, metode *batch*, desalinasi air laut

ABSTRACT

Serut Village, Gedangsari District, Gunungkidul Regency, Daerah Istimewa Yogyakarta is one of the zeolite mining locations. Mining activities cause the disclosure of new zeolitic tuff layers whose characteristics have not been studied. This study aims to determine zeolitic tuff characteristics in that area and its utilization as sea water desalination adsorbent. The methods that used for obtaining mineralogical characteristics are megascopic, petrography, XRD (X-Ray Diffraction), ICP-AES (Inductively Coupled Plasma Atomic Emission Spectroscopy), SEM (Scanning Electron Microscopy) analysis, meanwhile for physical properties using CEC (Cation Exchange Capacity) and pH. Based on the mineralogical characteristics, zeolitic tuff has greenish white - whitish green colour, silt – medium sand grain size, 2.5 – 3 Mohs scale, composed of glass 59.97 wt%, zeolite minerals (mordenite 10.35 wt% and clinoptilolite 8.02 wt%), montmorillonite 5.17 wt%, quartz 5.17 wt%, hematite 4.2 wt%, plagioclase 5.25 wt%, and chlorite 1.87 wt%. Referring to the physical properties analysis, zeolitic tuff have effective CEC 11.20 - 102.80 me/100 gr, and potential CEC 19.60 - 112.40 me/100 gr, and acidity levels 7.51 - 7.79 which are classified as neutral. In the experiment of zeolitic tuff utilization as seawater desalination adsorbent using batch method, the chemical activation treatment using H_2SO_4 0.5 M and HCl 0.5 M acid solutions did not give better results than thermal activation so that the optimum adsorption conditions were obtained when using 9 gr zeolitic tuff which had been activated at 300 °C during 3 hours ($\eta = 59\%$ and $\Delta TDS = 4159$ mg / L). Based on this, zeolitic tuff in the study area are effectively utilized as desalination adsorbent materials, this effectiveness can be increased by adding zeolite doses so that desalination can produce fresh water.

Keywords: *Serut Village, zeolitic tuff characteristic, adsorbent, batch method, sea water desalination*