

Modifikasi Bentonit Tapanuli terinterkalasi alanin dengan variasi pH sebagai Adsorben logam berat timbal dan kadmium = Modification of bentonit Tapanuli intercalated by alanine with pH variation as adsorbent for heavy metal lead and cadmium

Galih Rakadya, author

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Abstrak

Organobentonit berhasil dibuat dengan proses interkalasi Na-Bentonit dengan senyawa Alanin. Bentonit yang digunakan berasal dari Tapanuli, Sumatera Utara. Na-Bentonit dibuat dari bentonit hasil sedimentasi untuk memperoleh kandungan montmorillonit yang terdapat pada bentonit. Kemudian dilakukan penyeragaman kation pada interlayer bentonit dengan Na⁺ menjadi Na-Bentonit.

Hasil penentuan nilai Kapasitas Tukar Kation dengan menggunakan [Cu(en)2]²⁺, diperoleh nilai KTK sebesar 45,336 meq/100 gram bentonit. Preparasi organobentonit menggunakan Na-Bentonit yang terinterkalasi Alanin, jumlah Alanin yang ditambahkan sesuai dengan 1 KTK dan 2 KTK dengan 3 variasi pH yaitu pH isoelektrik Alanin (pH 6,01), pH < pI (pH 5) dan pH > pI (pH 7). Hasil karakterisasi organobentonit menunjukkan senyawa Alanin telah berhasil terinterkalasi ke dalam bentonit dan terjadi perubahan pada d-spacing.

Organobentonit diuji kemampuan adsorpsinya terhadap ion logam berat Pb²⁺ dan Cd²⁺ dengan variasi konsentrasi antara 0,1 mM sampai 0,5 mM, dan membandingkan hasilnya dengan kemampuan adsorpsi dari bentonit alam. Berdasarkan data yang diperoleh menunjukkan bahwa kemampuan menyerap ion logam berat Pb²⁺ dan Cd²⁺, organobentonit tidak jauh berbeda dibandingkan Na-Bentonit.

Organobentonite was successfully made with the intercalation process of Na-Bentonite with Alanine compound. The bentonite was from Tapanuli, North Sumatera. Na-Bentonite was made of the bentonite that resulted from sedimentation process to obtain montmorillonite content in bentonite. Then, cation uniformity was done on bentonite interlayer with Na⁺ became Na-Bentonite.

In determining the value of Cation Exchange Capacity (CEC) by using [Cu(en)2]²⁺, the value of CEC obtained was 45,336 meq/100 gram bentonite. In the preparation of organobentonite using Alanine intercalated Na-Bentonite, the amount of Alanine added is in accordance to 1 CEC dan 2 CEC with 3 pH variation : isoelectric pH in Alanine (pH 6,01), pH < pI (pH 5), and pH > pI (pH 7). Characterization result of organobentonite shows that Alanine compound has successfully been intercalated into the bentonite and there has been a change in dspacing.

Organobentonite has been tested in its adsorption ability towards heavy metal ions Pb²⁺ and Cd²⁺ with the concentration variation lying among 0,1 mM until 0,5 mM and its result has also been compared with the adsorption ability of natural bentonite. Based on obtained data, it shows that organobentonite's adsorption ability toward heavy metal ions Pb²⁺ and Cd²⁺ is not significantly different than Na-Bentonite's.