Anion exchange capacity of chromate on modified zeolite clinoptilolite with HDTMA-Br and its regeneration

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Abstrak

Zeolite Clinoptilolite from Lampung, located in South of Sumatra, had been modified with surfactant hexadecyltrimethylammonium bromide (HDTMA-Br) as chromate anion exchanger. Surfactant modified zeolite (SMZ) Clinoptilolite in particle size range of 1.5 - 2.0 mm, which contained 196.7 mmol HDTMA-Br/kg zeolite, was used for anion exchange of chromate at neutral pH. This experiment was conducted in a glass column filled with 5 gram SMZ. The breakthrough chromate exchange capacity was found 1.262 mg/g SMZ, while the total capacity was found 2.107 mg/g SMZ. The regeneration of SMZ saturated with chromate was conducted using a mixed solutions of 0.28 M Na2CO3 and 0.5 M NaOH, compared with using a solution of 0.01 M Na2S2O4. The desorption of chromate achieved 92% with the mixed solutions of Na2CO3 and NaOH and 90% with the Na2S2O4 solution. The regenerated SMZ with Na2CO3-NaOH solutions was prior washed with HCl solution to remove the carbonate from SMZ, before being used for chromate sorption again. Its breakthrough capacity was reduced to 1.074 mg/g SMZ, and to 0.724 mg/g SMZ when regenerated with Na2S2O4 solution. These results indicated that regeneration of SMZ affected its exchange capacity for anion chromate. However, it is still could be acceptable, when Na2CO3/NaOH solutions were used for the regeneration of SMZ saturated with anion chromate.