SINTESIS DAN KARAKTERISASI ZIRKONIUM OKSIKLORIDA RENDAH TENORM DARI MINERAL ZIRKON

INTISARI

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Pasir zirkon di Indonesia merupakan sumber daya mineral tambang yang cukup potensial namun sampai saat ini belum diolah dengan optimal. Perlu dilakukan pengolahan zirkon menjadi produk zircon komersial seperti ZOC. Produk zircon komersil mempunyai ketentuan kandungan TENORM dengan intervensi paparan U+Th < 1 Bq/g. Sintesis ZOC rendah TENORM dilakukan dengan menggunakan bahan baku konsentrat pasir zircon tipe MC-111 dari PT Monokem Surya dengan melalui 3 tahapan yaitu peleburan, pelindian air dan pelindian asam dengan HCl. Proses sintesis ZOC pelindian asam dilakukan dengan pengaruh variasi suhu (5; 10; 20; 40; 60; 80; 100; 120 menit) dan variasi waktu reaksi (30; 50; 70; 90°C). Hasil sintesis ZOC dikarakterisasi menggunakan XRD, FTIR, Spektroskopi Alpa-Beta dan XRF. Hasil sintesis ZOC optimum berada pada titik suhu 90°C dengan nilai recovery 78% dan titik waktu reaksi 120 menit dengan nilai recovery 78%. Hasil sintesis ZOC telah dikonfirmasi dengan produk ZOC komersil dari hasil interpretasi data XRD dan FTIR. Hasil karakterisasi Spektroskopi Alpa-Beta dari sintesis ZOC diperoleh nilai tingkat radioaktivitas pada sinar alpa 0,091 Bq/g dan sinar beta 0,908 Bq/g, dengan dikatakan hasil sintesis ZOC pada penelitian ini rendah TENORM. Hasil yang didapat dari data XRF digunakan dalam perhitungan kinetika pelindian asam dengan mengikuti pendekatan model *shrinking core model* (SCM). Model kinetika reaksi pada pelindian asam sintesis ZOC dalam penelitian ini mengikuti model kinetika difusi lapisan abu mengontrol dengan nilai energi aktivasi sebesar 10,66291 kJ/mol.

Kata kunci : zirconium oksiklorida, pelindian, TENORM, kinetika reaksi

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ABSTRACT

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Zircon sand in Indonesia is a potential mining mineral resource but until now it has not been processed optimally. It is necessary to process zircon into commercial zircon products such as ZOC. Commercial zircon products have TENORM content requirements with a U+Th exposure intervention < 1 Bq/g. TENORM's low ZOC synthesis was carried out using zircon sand concentrate type MC-111 from PT Monokem Surya through 3 stages, namely smelting, water leaching and acid leaching with HCl. The acid leaching ZOC synthesis process was carried out under the influence of temperature variations (5; 10; 20; 40; 60; 80; 100; 120 minutes) and reaction time variations (30; 50; 70; 90°C). The ZOC synthesis results were characterized using XRD, FTIR, Alpha-Beta Spectroscopy and XRF. The optimum ZOC synthesis results were at a milk point of 90°C and a reaction time point of 120 minutes. The ZOC synthesis results have been confirmed with commercial ZOC products from the interpretation of XRD and FTIR data. The results of Alpha-Beta Spectroscopic characterization of ZOC synthesis showed that the radioactivity level in alpha rays was 0.091 Bq/g and beta rays was 0.908 Bq/g, so it can be said that the results of ZOC synthesis in this study were TENORM low. The results obtained from the XRF data were used in calculating the kinetics of acid leaching by following the shrinking core model (SCM) approach. The reaction kinetics model for acid leaching of ZOC synthesis in this study follows the control ash layer diffusion kinetics model with an activation energy value of 10.66291 kJ/mol.

Key words : zirconium oxychloride, leaching, TENORM, kinetic reaction