Perolehan Kembali Logam Kobalt dari Limbah Baterai Li-ion Melalui Proses Pelindian HCl dengan Penambahan H2O2 dan Ekstraksi dengan Cyanex 272 = Recovery of Cobalt Metal from Spent Li-ion Battery through HCl Leaching Process with Addition of H2O2 and Extraction with Cyanex 272

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Abstrak

Penumpukan limbah baterai Li-ion menimbulkan dampak buruk terhadap lingkungan karena terdapat kandungan logam berat pada elemen penyusunnya, salah satunya adalah kobalt. Melihat nilai ekonominya yang tinggi, logam kobalt berpotensi untuk dimanfaatkan kembali, salah satunya dengan metode pelindian (leaching) menggunakan asam anorganik, seperti asam klorida (HCl) dan reagen pereduksi, seperti hidrogen peroksida (H2O2) untuk meminimalisir dampak negatif asam anorganik terhadap lingkungan. Persentase maksimum pelindian kobalt mencapai 98,04% dengan kondisi rasio S/L 25 g/L, 2 M HCl, waktu pengadukan 60 menit, kecepatan 400 rpm, konsentrasi H2O2 3 vol.% dan suhu operasi 85. Studi kinetika reaksi dicocokan dengan model shrinking core diperoleh energi aktivasi sebesar 62.855 kJ/mol atau 15 kcal/mol. Proses dilanjutkan dengan metode ekstraksi cair-cair menggunakan ekstraktan Cyanex 272 untuk memperoleh kemurnian logam yang lebih tinggi. Diperoleh efisiensi ekstraksi maksimum mencapai 98,87%, pada kondisi 0,65 M Cyanex 272, rasio O:A 3:1, pH fasa akuatik 6,5, waktu pengadukan 60 menit, kecepatan 400 rpm, suhu operasi 30.

.....The accumulation of spent Li-ion batteries has an adverse effect on the environment because there are heavy metals content in its component, one of them is cobalt. Seeing its high economic value, cobalt metal has the potential to be recycled, one of which is by leaching using inorganic acid, such as hydrochloric acid (HCl) and reducing reagents, such as hydrogen peroxide (H2O2) to minimize the negative impact of inorganic acids on the environment. The maximum percentage of cobalt leaching reached 98.04% with the condition of the ratio S/L of 25 g/L, 2 M HCl, stirring time 60 minutes, speed of 400 rpm, H2O2 concentration at 3 vol.% And an operating temperature of 85. The reaction kinetics study was matched with shrinking core model with an activation energy of 62,855 kJ/mol or equivalent to 15 kcal/mol. The process is continued with the liquid-liquid extraction method using Cyanex 272 extractant to obtain higher metallic purity. Maximum extraction efficiency was obtained at 98.87%, at a condition of 0.65 M Cyanex 272, O:A ratio of 3: 1, pH of acuatic phase 6.5, stirring time 60 minutes, speed 400 rpm, operating temperature 30.