INTISARI

Neodimium sebagai bahan baku magnet permanen mulai dikembangkan aplikasinya secara global di berbagai bidang. Kualitas kemagnetan yang jauh lebih baik dibandingkan material – material seperti besi, baja, paduan Al-Ni-Co, Sm-Co, dan Sm-Fe-N menjadi pertimbangan tersendiri. Namun demikian, logam Nd harus dipisahkan dari unsur – unsur lainnya terutama itrium (Y). Adanya unsur Y dapat menurunkan kualitas magnet permanen yang dihasilkan karena Y memiliki sifat kemagnetan yang bertolakbelakang dengan Nd. Salah satu metode pemisahan yang dapat digunakan adalah ekstraksi cair – cair. Fasa air (campuran Nd dan Y dalam media asam nitrat 1 M) dan fasa organik (di-2-etil-heksil-fosfat (D2EHPA) dalam pengencer kerosin) dengan perbandingan volume 1:1, dikontakkan menggunakan *mechanical shaker* berkecepatan 200 rpm selama 25 menit. Campuran tersebut didiamkan selama 24 jam agar fasa air dan fasa organik benar – benar terpisah. Konsentrasi Nd dan Y dalam rafinat dianalisis menggunakan alat XRF – Ortec dengan sumber Am 241, sedangkan konsentrasi pada ekstrak dihitung menggunakan neraca massa. Hasil penelitian menunjukkan Y berhasil dipisahkan dari Nd dengan efisiensi ekstraksi 93,33% menggunakan D2EHPA 0,3026M. Data percobaan laboratorium pada berbagai variasi konsentrasi larutan umpan dan pelarut selanjutnya dikembangkan dalam penyusunan model kesetimbangan cair – cair untuk memprediksi distribusi Nd dan Y pada sistem ekstraksi tersebut. Model kesetimbangan stoikiometri dan non stoikiometri diajukan untuk mendekati data kesetimbangan ekstraksi Nd – Y. Model kesetimbangan non stoikiometri lebih dapat yang mewakili distribusi kesetimbangan sistem ekstraksi Nd/ Y dengan media HNO_3 dan pelarut D2EHPA serta pengencer kerosin. Model kesetimbangan ini memberikan kesalahan relatif rata – rata untuk Nd dan Y berturut – turut sebesar 7,69% dan 8,03%.

Kata kunci: ekstraksi, kesetimbangan cair – cair, neodimium, itrium, logam tanah jarang

ABSTRACT

Neodymium as raw material for permanent magnet begins to globally develop in various fields. The magnetic quality is far better than other material such as iron, steel, Al-Ni-Co, Sm-Co, and Sm-Fe-N alloy. However, Nd must be separated from other element especially yttrium (Y). The presence of Y can reduce the quality of permanent magnet produced since Y has magnetic properties opposite to Nd. One of the separating methods that can be applied is liquid – liquid extraction. Feed solution (solution of Nd and Y in the 1 M nitric acid media) and extractant (di-2-ethyl-hexyl-phosphate (D2EHPA) diluted in kerosene) with volume ratio 1 : 1 were contacted by using mechanical shaker with speed of 200 rpm for 25 minutes. The solution was settled for 24 hours in order to separate the aqueous and organic phase completely. Neodymium and ytrrium concentration in the aqueous phase were analyzed by using X-ray fluorescence with Am 241 sources, while the concentration in the organic phase wre calculated by using mass balance. The result of this study showed that Y has been successfully separated from Nd with the extraction efficiency of 93,33% by using D2EHPA 0,3026M. The data from laboratory experiments in various concentration of feed and solven then being developed into liquid – liquid equilibrium model to predict Nd and Y distribution in the extraction system. Equlibrium models based on stoichiometry and non stoichiometry were proposed to approximate equilibrium data of Nd – Y extraction. The equilibrium distribution of Nd and Y extraction system with nitric acid media and D2EHPA as the solven was better approximated by using non stoichiometry than stoichiometry equilibrium model. The mean relative error for distribution of Nd and Y by using this model were 7,69% and 8,03%.

Keywords*: extraction, liquid – liquid equilibrium, neodymium, yttrium, rare earth element*