PENGARUH KOMPOSISI KONSENTRAT PADA KEKUATAN IMOBILISASI SEMEN

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ABSTRAK

PENGARUH KOMPOSISI KONSENTRAT PADA KEKUATAN IMOBILISASI SEMEN. Telah dilakukan penelitian imobilisasi konsentrat laboratorium atau reaktor penelitian dengan simulasi komposisi 200 g/l $NaNO_3$, 0,2 g/l $Fe(NO_3)_3$, 0,1 g/l $Ni(NO_3)_2$, 0,1 g/l $Al(NO_3)_3$ dan 1 g/l NaF dari garam-garam murni dengan menggunakan semen. Kekuatan imobilisasi dari semen terhadap konsentrat limbah diuji berdasar kekuatan tekan/hancur dan kerapatan serta ketahanan dari matriks hasil imobilisasi tersebut. Sebagai pengotor limbah radioaktif dipakai larutan standar $Sr(NO_3)_2$ dengan aktivitas = $2,3 \times 10^{-4}$ µCi/ml. Pengaruh komposisi campuran konsentrat dan semen terhadap kekuatan imobilisasi ditentukan berdasarkan perbandingan berat konsentrat aktif terhadap berat air dan semen yang menghasilkan matriks hasil imobilisasi yang terbaik. Kualitas hasil imobilisasi semen tersebut diuji kekuatan tekannya dengan menggunakan alat uji kuat tekan Paul Weber, sedangkan ketahanannya terhadap media lindi diuji berdasarkan hasil analisis aktivitas yang terlindi memakai alat cacah α β buatan Canberra. Penambahan Ca- bentonit untuk memperbaiki kualitas dari matriks juga dilakukan dengan memvariasi persen berat dari 3 - 7 %, demikian pula pengaturan kondisi pH divariasi dari 6 - 12 agar sesuai untuk proses pemadatan jangka panjang. Dari hasil penelitian diperoleh data bahwa perbandingan berat air dan semen (A/S) = 0,35 menghasilkan kuat tekan terbaik = 32,50 N/mm^2; dan untuk imobilisasi konsentrat aktif yang menghasilkan kuat tekan terbaik = 27,01 N/mm^2 dicapai dengan perbandingan A/S = 0,35, penambahan Ca-bentonit 5%. ; sedangkan data dari hasil uji lindi pada hari ke 91 yang terbaik dalam media lindi air distilat = $0,48 \times 10^{-4}$ $g.cm^{-2}.hari^{-1}$ dan pada media lindi air laut = $0,65 \times 10^{-4}$ $g.cm^{-2}.hari^{-1}$.

ABSTRACT

THE EFFECT OF CONCENTRATE COMPOSITION ON THE STRENGTH OF CEMENT IMMOBILIZATION. The immobilization of simulation waste concentrate with the composition of 200 g/l $NaNO_3$, 0.2 g/l $Fe(NO_3)_3$, 0.1 g/l $Ni(NO_3)_2$, 0.1 g/l $Al(NO_3)_3$ and 1 g/l NaF from the pure salts using cement has been done. The strength of immobilization of cement against the waste concentrate was tested base on the compressive strength and density as well as the stability of the immobilized matrix. As the radioactive contaminant was used a standard solution of $Sr(NO_3)_2$ with the activity of 2.3×10^{-4} µCi/ml. The composition effect of concentrate and cement mixture upon the immobilization strength was determined base on the weight ratio of active concentrate against water and cement weights that resulted in the best of the immobilized matrix product. The quality of immobilized cements was tested on their compressive strength utilyzing Paul Weber's compressive strength testing equipment, while their stabilities against the leached media was tested base on the analysis results of their leached activity using alpha - beta counter of Canberra. The addition of Ca-bentonite for improving the matrix quality was also conducted by varying its percentage weights of 3 - 7%, where as the pH condition adjustment was also varied from 6 - 12 in order to satisfy for a long-term solidification process. From the experimental results were obtained data that the weight ratio of water and cement (w/c) = 0.35 resulted in the best compressive strength = 32.50 N/mm^2; and for the active concentrate which resulted in the best compressive strength = 27.01 N/mm^2 was gained with the w/c ratio = 0.35, Ca-bentonite addition of 5%; where as the best data from leach test on the 91st day in the leach medium of aquadest was = 0.48×10^{-4} $g.cm^{-2}.day^{-1}$ and in the leach medium of sea water = 0.65×10^{-4} $g.cm^{-2}.day^{-1}$.

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