ABSTRAK

PERHITUNGAN LAJU REAKSI NEUTRON DALAM REAKTOR GCFR (*GAS COOLED FAST REACTOR)* MODEL PERANGKAT *(ASSEMBLY)* HEKSAGONAL BERBAHAN BAKAR URANIUM

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Telah dilakukan penelitian tentang perhitungan laju reaksi fisi dan penangkapan neutron dengan filter dan tanpa filter serta pengaruh persentase pengayaan bahan bakar terhadap laju reaksi neutron pada reaktor *Gass Cooled Fast Reactor* (GCFR) model perangkat *assembly* heksagonal berbahan bakar Uranium. Penelitian ini dilakukan dengan cara menentukan persentase pengayaan bahan bakar 8,5-9,5%, menentukan ukuran geometri dan spesifikasi yang memenuhi standar reaktor GCFR, dan menentukan laju reaksi neutron. Dari penelitian yang dilakukan didapatkan hasil pada Material 1 dan Material 3 nilai laju reaksi fisi neutron menggunakan detektor filter dan tanpa filter meningkat dengan peningkatan persentase pengayaan. Sedangkan nilai laju reaksi penangkapan neutron dengan menggunakan filter ataupun tanpa filter mengalami penurunan seiring dengan meningkatanya presentase pengayaan. Pada Material 1 nilai tertinggi laju reaksi fisi dengan filter dan tanpa filter adalah 5,03036 x 10^{-1} reaksi/cm^3.s dan 1,18015 x 10^{-2} reaksi/cm^3.s, sedangkan nilai tertinggi laju reaksi penangkapan dengan filter dan tanpa filter adalah 11,8401 x10^{-1} reaksi/cm^3.s dan 2,73629 x10^{-3} reaksi/cm^3.s. Pada Material 3 nilai tertinggi laju reaksi fisi dengan filter dan tanpa filter adalah 5,03131 x10^{-1} reaksi/cm^3.s dan 1,18013 x10^{-2} reaksi/cm^3.s, sedangkan nilai tertinggi laju reaksi penangkapan dengan filter dan tanpa filter adalah 11,7083 x10^{-1} reaksi/ cm^3.s dan 2,73624x10^{-3} reaksi/cm^3.s. Nilai laju reaksi neutron dengan filter lebih kecil dibandingkan nilai laju reaksi neutron tanpa filter.

Kata kunci: laju reaksi neutron, GCFR, Uranium, SRAC

ABSTRACT

NEUTRON REACTION RATES CALCULATION IN A REACTOR GCFR (*GAS COOLED FAST REACTOR*) WITH HEXAGONAL (*ASSEMBLY)* MODEL FUELED BY URANIUM

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It has been done research on the calculation of fission reaction rates and neutron capture, both with and without filters, as well as the influence of fuel enrichment percentage on neutron reaction rates in a Gas Cooled Fast Reactor (GCFR) using a hexagonal assembly model with Uranium fuel. This research was conducted by determining fuel enrichment percentage between (8.5% until 9.5%), geometrical dimensions and specifications suitable with GCFR standards then calculating the neutron reaction rate. The result of this research are neutron fission reaction rate of Material 1 and Material 3 that this are increased by enrichment percentage for both with filter and without filter. Meanwhile, neutron capture reaction rates were decreased by enrichment percentage increased for both with detector with and without filter. The neutron capture reaction rate using filter or without filter were decreased with the increasing in the percentage of enrichment. In Material 1 the highest fission reaction rate with filter and without filter are 5.03036 x 10^{-1} *reaction/*cm^3*.s and 1.18015 x* 10^{-2} *reaction/*cm^3*.s, while the highest capture reaction rate with filter and without filter are 11.8401 x* 10^{-1} *reaction/*cm^3*.s and 2.73629 x* 10^{-2} *reaction/*cm^3*.s. In Material 3 the highest fission reaction rate with filter and without filter are 5.03131 x* 10^{-1} *reaction/*cm^3*.s and 1.18013 x* 10^{-2} *reaction/*cm^3*.s, while capture reaction rate with filter and without filter are 11.7083 x* 10^{-1} *reaction/*cm^3*.s and 2.73624 x* 10^{-2} *reaction/*cm^3*.s The neutron reaction rate with a filter is smaller than neutron reaction rate of the neutron without a filter.*

Keywords: *neutron reaction rates, GCFR,Uranium, SRAC.*