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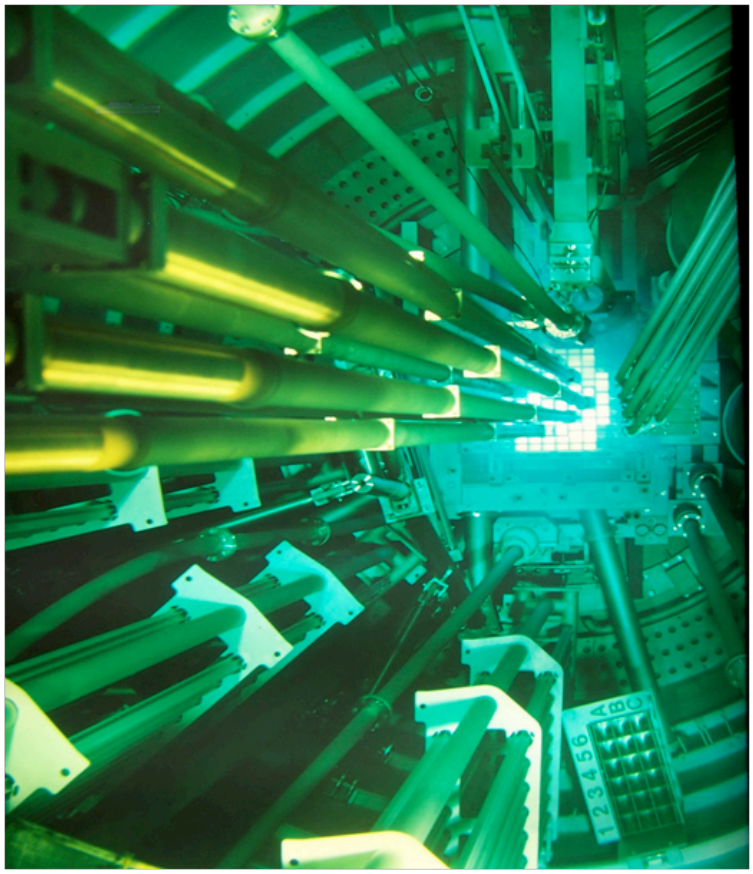

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MAILING ADDRESS :
Pusat Teknologi dan Keselamatan Reaktor Nuklir, BATAN
Gedung 80, Puspiptek Serpong 15310, Tangerang
TELP. (021) 7560912, FAX. (021)7560913, E-mail: jurtdm@batan.go.id
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PREFACE

Dear readers, with great pleasure we provide you with the first issue of Jurnal Teknologi Reaktor Nuklir (Journal of Nuclear Reactor Technology) Tri Dasa Mega in 2020 – Vol. 22 No. 1 (February 2020). This issue contains five articles discussing various applications of nuclear technologies and sciences. Articles were written by authors and co-authors from various universities and institutions in Indonesia.

"Design of Irradiation Facilities at Central Irradiation Position of Plate Type Research Reactor Bandung" was written by Epung Saepul Bahrum, Wawan Handiaga, Yudi Setiadi, Henky Wibowo, Prasetyo Basuki, Alan Maulana, Mohamad Basit Febrian, and Jupiter Sitorus Pane from the Center for Applied Nuclear Science and Technology, National Nuclear Energy Agency (BATAN), Bandung. One of the results from Plate Type Research Reactor Bandung (PTRRB) research program is PTRRB core design. Distribution of neutron flux at central irradiation position (CIP) is of high importance especially in radioisotope production. In this study, CIP was modeled as a stack of four to five aluminum tubes (AT), each filled by four aluminum irradiation capsules (AIC). For irradiation sample, 1.45 gr of molybdenum (Mo) was put into AIC. Neutron flux distribution at Mo sample was calculated using TRIGA MCNP and MCNP software. Analyses of excess reactivity show that, after installing irradiation AT and Mo sample was put into each configuration, the excess reactivity is less than 10.9 %. The highest calculated thermal neutron flux at Mo sample is 5.08×10^{13} n/cm^2.s.

"Nuclides Composistion of Experimental Power Reactor (RDE) Spent Fuel" was investigated by Kristina and Menik Ariani from Sriwijaya University, Palembang in collaboration with Amir Hamzah and Muhammad Subekti from the Center for Nuclear Reactor Technology and Safety, National Nuclear Energy Agency (BATAN), Tangerang Selatan. The management of spent fuel is an issue of safety for Indonesia in the phase of designing RDE. Several studies regarding spent fuel are limited by geometrical characteristics and number of nuclides library. Therefore, different methodologies utilizing MCNPX2.6.0 were applied to get better information for further research. In this study, a single fuel pebble containing UO_2 was burned using 5 cycles of multi-pass loading scheme for 1080 days to obtain the same energy as RDE's core, which is about 79.90 GWd/MTU. The calculation results in the nuclides composition of the spent fuel after 1080 days of burning and 5 years of cooling containing 241 nuclides, which consist of 21 actinides and 220 nonactinides.

"The Radioactivity Estimation of the Irradiated 13 MeV Cyclotron's Concrete Shield" was studied by Isdandy Rezki Febrianto, Puradwi Ismu Wahyono and Suharni from the Center for Accelerator Science and Technology, National Nuclear Energy Agency (BATAN), Yogyakarta. The Center for Accelerator Science and Technology (PSTA) planned to install K500 concrete shield in its 13 MeV cyclotron facility (DECY-13). However, fast neutrons that are generated by this cyclotron could activate materials of the concrete. It may harm the radiation workers. In this work, we conducted simulations using ORIGEN2 and PHITS computer code to estimate the formed radioactivity and the neutron flux distribution in the DECY-13 cyclotron's concrete shield. Based on the simulation, the induced radioactivity is 2.3478×10^9 Bq, while its gamma dose rate is 22.09 μSv/m^{2}h. The formed radioactivity is high; but it appears from the short half-life isotopes such as Th-233, Ho-166, Al-28, Mn-56 and Si-31. Its activity will diminish quickly after the cyclotron is off. Hence, it will be safe for radiation workers.

"Dose Estimation of the BNCT Water Phantom Based on MCNPX Computer Code Simulation" was explored by Amanda Dhyan Purna Ramadhani and Susilo from the Mathematics and Natural Science Faculty of the State University of Semarang, Semarang in collaboration with Irfan Nurfatthan from the

Department of Nuclear Engineering, Universitas Gadjah Mada, Yogyakarta and Yohannes Sardjono, Widarto, Gede Sutresna Wijaya and Isman Mulyadi Triatmoko from the Center for Accelerator Science and Technology, National Nuclear Energy Agency (BATAN), Yogyakarta. Cancer is a malignant tumor that destroys healthy cells. Cancer treatment can be done by several methods, one of which is BNCT. BNCT uses ^{10}B target which is injected into the human body, then it is irradiated with thermal or epithermal neutrons. Nuclear reaction will occur between boron and neutrons, producing alpha particle and lithium-7. The dose is estimated by how much boron and neutron should be given to the patient as a sum of number of boron, number of neutrons, number of protons, and number of gamma in the reaction of the boron and neutron. In this study, the reaction is simulated using Monte Carlo N Particle-X computer code. A water phantom was used to represent the human torso, as 75% of human body consists of water.

"Quantification of Aluminium Contents in Cooked Foodstuffs from Three Region in Java using Neutron Activation Analysis" was investigated by Ahmad Hasan As'ari, Saeful Yusuf and Alfian from the Center for Science and Technology of Advanced Materials, National Nuclear Energy Agency (BATAN), Tangerang Selatan. Aluminum is widely available in nature and the third most abundant element on earth. Improper intake of aluminum can increase toxicity and correlate with Alzheimer's disease. One source of aluminum comes from food. In this study, aluminum content in foodstuffs was analyzed using neutron activation analysis. Various foodstuffs were purchased from markets in three regions in Java, namely Bangkalan (East Java), Magelang (Central Java), and Cianjur (West Java) and cooked at a temperature above 80°C until the ready-to-eat condition. The cooked samples were freeze-dried and irradiated in the G.A. Siwabessy research reactor with neutron flux of $5x10^{13}$ neutrons.m^2.s^{-1}. Post-irradiation samples were analyzed using gamma spectrometry. The results show that the aluminum contents in each foodstuff from one region have a strong correlation with other regions (Pearson correlation coefficient $r>0.9$, $P<0.001$), indicating that the distribution of aluminum content does not differ from one region to another.

On behalf of Chief Editor of Tri Dasa Mega, I would like to thanks to all Editors, Reviewers, Managements, Authors, and Readers for your endless supports.

Editor in Chief