Neutron transfer in reaction ^{18}O + ^{181}Ta with formation of neutron-rich oxygen isotopes

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Abstract. The transfer reactions occurring in low-energy collisions of heavy ions are currently considered as the most promising method for the production of new heavy neutron-rich nuclei that cannot be obtained via other reaction mechanisms. We measured production cross sections for the ^{19,20,21}O isotopes in the reaction ^{18}O + ^{181}Ta at the beam energy 10 MeV/A. Measurements were performed on the high resolution magnetic spectrometer MAVR and U400 cyclotron, FLNR, JINR. The cross sections were obtained by integrating momentum distributions of isotopes. As a rule, the yields of different isotopes in deep inelastic processes are well described using the reaction Q value taking into account pairing corrections ($Q_{\rm gg}$ systematics) [1, 2]. However, this approach does not take into account particular reaction mechanisms. To overcome this problem, numerical solution of the time-dependent Schrödinger equation [3, 4] for external neutrons of the target nucleus, codes FRESCO [5] and NRV DWBA [6] were used for calculations of the cross sections for formation of the above isotopes. It was shown that the reaction ^{18}O + ^{181}Ta may be used for production of neutron-rich oxygen isotopes.

References

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[5] FRESCO code. http://www.fresco.org.uk/.

[6] NRV DWBA code. http://nrv.jinr.ru/nrv/webnrv/transferJS/.