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Analysis of the rolled cotton cloth fixed on the outer surface of the International Space Station using neutron activation analysis and complementary techniques

As part of the space experiment “Test”, a roll of cotton cloth fixed on the outer surface of the International Space Station for more than 10 years was delivered to the Earth in September 2019. The elemental composition of two fragments of the cloth, contaminated and clean, was determined using instrumental neutron activation analysis at the IBR-2 reactor. Along with 19 elements (Mg, Al, Cl, Ca, Ti, Cr, Mn, Fe, Co, Ni, Zn, Rb, Sr, Ag, Sb, Ba, Sm) determined on both fragments of the cloth, additional 20 elements (Na, Si, Sc, Cu, As, Se, Br, Mo, Zr, Cd, I, La, Ce, Eu, Ta, W, Re, Ir, Th, and U) were determined only on the contaminated fragment. The morphology of the rolled cotton cloth was characterized using Scanning Electron Microscopy. Gama and liquid beta spectroscopy were applied to measure the radioactivity of the cloth fragments. Possible sources of the determined chemical elements deposited on the cloth were discussed.

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