Production and Decay of 269-110

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Abstract:

In an experiment carried out to identify element 110, we have observed an alpha-decay chain, that can be unambiguously assigned to 269-110. In a series of preexperiments the excitation functions of the fusion reactions 50-Ti+208-Pb->258-104* and 58-Fe+208-Pb->266-108* were measured with high precision in order to get the optimum projectile energies for the production of these heavy elements. The cross-section maxima of the 1n evaporation channels were observed at excitation energies of 15.6 MeV and 13.4 MeV, respectively. These data result in an optimum excitation energy of 12.3 MeV of the compound nucleus for the production of 269-110 in the reaction 62-Ni+208-Pb->269-110+1n. In irradiations at the corresponding beam energy of 311 MeV we have observed a decay chain of 4 subsequent alpha decays. This can be assigned to the isotope with the mass number 269 of the element 110 on the basis of delayed &alpha.-&alpha. coincidences. The accurately measured decay data of the daughter isotopes of the elements 108 to 102, obtained in the previous experiments, were used. The isotope 269-110 decays with a half-life of (270 +1300 -120) micro seconds by emission of (11.132+-0.020) MeV alpha particles. The production cross-section is (3.3 +6.2 -2.7) pb.