Abstract Submitted
for the TSF21 Meeting of
The American Physical Society

The Identification of Contaminants by Time Evolution in 99Mo Gamma-Decay Spectrum[1] NOLAN TENPAS, Texas Lutheran University, MARCIA RODRIGUES, ALDO BONASERA, Texas AM University — In efforts to differentiate emitted γ-rays with similar emission energies in the analysis of γ-decay spectra from the 99Mo production, an automated program was created. The 99Mo production is part of the novel approach to producing medical isotopes, using inverse kinematics, successfully implemented at the Cyclotron Institute, Texas A&M University. The 99Mo was produced using an accelerated 100Mo beam impinging on a 4He gas cell-target. An 27Al catcher foil was used to collect the 99Mo nuclei, as well as other coproduced nuclides. After irradiation, the γ decays spectra of the foil was measured using HPGe detectors. The photopeak associated with the highest γ-ray intensity of 99Mo, located at Eγ =140.5 keV, was not resolved, due to contributions of γ decays from multiple nuclides. The total activity at Eγ =140.5 keV can be described as a combination of 99Mo (t1/2=65.94 h; Iγ =89.43%), 99mTc (t1/2=6.01 h; Iγ =89.0%), and 90Nb (t1/2=14.60 h; Iγ =66.8%). The new analysis program was used to plot the activities as a function of time, for the 140.5 keV photopeak while considering the activities obtained from other photopeaks associated with 99Mo (Eγ =181 keV) and 90Nb (Eγ =1129 keV). Using the known decay constants of each produced nuclide, the contribution of each nuclide was determined. The activity as a function of time was fitted and contributions from 99mTc, 99Mo, and 90Nb were determined.

[1]This work funded by NSF (PHY-1659847 andPHY-2051072) and Department of Energy (DE-FG02-93ER40773).

Toni Sauncy
Texas Lutheran University

Date submitted: 24 Sep 2021 Electronic form version 1.4