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Comparison of eight possible ⁹⁹-molybdenum production routes

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The present paper addresses eight possible routes of producing ⁹⁹Mo, and discusses both yield and ⁹⁹Mo specific activities (SA) in the context of future anticipated worldwide demand. The dimensions of the targets are modelled by considering both the limits set by cooling and those by inside-target radiation attenuation characteristics. Energy deposition profiles are modelled by MCNP6, the reaction probabilities are taken from TALYS/TENDL and JANIS codes, and both are used in calculating produced ⁹⁹Mo.

The results suggest that U neutron-fission may remain one of the most relevant and efficient means of producing ⁹⁹Mo, but that new developments may surface, such as ADSR or AHR production modes. Accelerator-based ⁹⁹Mo production is discussed as asking for developments in both the cooling of targets and new concepts in post-EOB upgrading of ⁹⁹Mo SA, and/or new concepts for ⁹⁹Mo/^{99m}Tc-generators, the latter possibly in both volumes (mass) and ⁹⁹Mo capacities.

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