P-299 Preliminary studies of modified CINTICHEM ^{99}Mo production process at IPEN/CNEN-SP: Precipitation step

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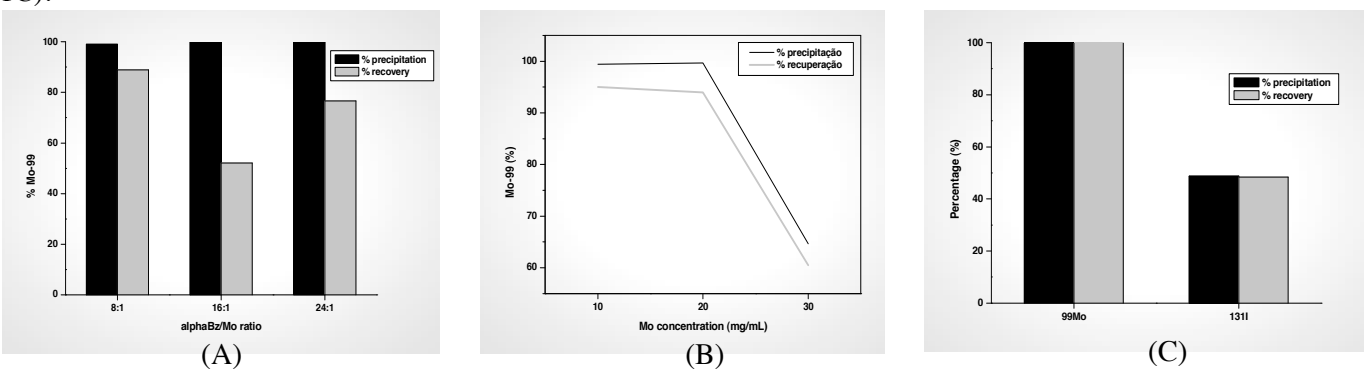
Objectives: The aim of this work is to describe the preliminary results of the precipitation step of the modified CINTICHEM ^{99}Mo production process using LEU targets.
Methods: Based on published protocols[(1)], a mimetic of the acid dissolution process of LEU foils was performed in acidic media using 2 mL of 1mol.L^{-1} HNO_3, 2% α-benzoine oxime (α-Bz) as precipitant agent and (0.1 mol.L^{-1})NaOH /1%H_2O_2 as dissolver solution. Moreover, 0.5 mL of a Mo carrier solution (MoO_3 10-30 mg/mL) and 2.5% $KMnO_4$ solution were added to the reaction in order to simulate both the macroscopic precipitation of ^{99}Mo and LEU foils dissolution, respectively. The following parameters were evaluated: the αBz/Mo ratio, the Mo carrier content and the presence of the impurity ^{131}I. The filtration was carried out using a glass frit filtration unit. Samples were taken before the precipitation of ^{99}Mo, from the filtrate, precipitate washing and dissolution. The precipitation and recovery yields of ^{99}Mo were measured by γ-ray spectroscopy using a HPGe detector.
Results: High yields of ^{99}Mo precipitation and recovery (98.72% e 95.27%, respectively) were reached under the initial conditions. As noted in figure 1A, ^{99}Mo precipitation is above 95% even at the highest αBz/Mo ratio evaluated (24:1). Differences among recovery rates were largely dependent on the characteristics of the precipitates. A sharp decrease of both ^{99}Mo precipitation and recovery rates can be observed for the highest amount of Mo carrier studied (Fig. 1B), which corroborates with the reaction stoichiometry. Around 40% of ^{131}I co-precipitation was observed and no interference was noticed on either the ^{99}Mo precipitation or recovery rates (Fig. 1C).



(A) (B) (C)

Figure 1. Evaluation of ^{99}Mo precipitation with α-Bz as function of (A) α-Bz/Mo ratio (B) Mo carrier concentration and (C) ^{131}I as impurity.**Under optimized conditions: 6% α-Bz; boiling (0.8 mol/L^{-1})NaOH /1%H_2O_2; 5 mg of Mo carrier (from 10 mg/mL solution) in cases A and C. Volume of dissolution (10-12 mL) for all cases.*

Conclusions: The results presented here agree with the prior ones published in the literature. Future experiments include a statistical planning in order to better evaluate the optimal ^{99}Mo precipitation parameters for further application in a commercial scale plant .
Research Support: The authors wish to thank IAEA for the Brazilian participation in the CRP: T1 2018 and also to CNPq for granting the fellowships for this project.
References: VANDEGRIFT, G. F. et al. Converting Targets and Processes for Fission-Product ^{99}Mo From High- to Low-Enriched Uranium. Chapter for IAEA TECDOC.v. 1, p. 1-47, 1997