

P-311 Studies on the separation of Ge and Ga with inorganic materials for the preparation of $^{68}\text{Ge}/^{68}\text{Ga}$ generatorsBrambilla, Tânia P.¹, Osso Jr., João A.¹

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Objectives: A project for developing a home made ^{68}Ge - ^{68}Ga generator is under way at IPEN-CNEN/SP. The objective of this work is to show the initial results of this project, related to the behavior of Ge and Ga in adsorbers such as calcinated acid and basic Al_2O_3 , HZO (hydrous zirconium oxide), TiO_2 and microspheres of Zr (Zr mic).

Methods: Glass columns with a diameter of 12 mm were used for the experiments with Al_2O_3 , HZO, TiO_2 while a thinner (6 mm) column was used when the adsorber was Zr mic. The columns were previously conditioned with 0.1 mol.L^{-1} HCl. The columns were loaded with $^{67/68}\text{GaCl}_3$ solution (7.4 to 55.5 MBq/ mL) or with a Ge solution ($100 \mu\text{g Ge/mL}$) in a proper pH. The columns were further eluted with 10 mL of 0.1 mol.L^{-1} HCl. For the experiments with Zr mic, the loading solution was heated with the mic before loading the column. The samples containing $^{67/68}\text{Ga}$ were analysed using a dose calibrator CRC-15R from Capintec and the samples containing Ge were evaluated by the Optical Emission Spectrometry using Inductively Coupled Plasma (ICP-OES). The ICP-OES equipment used was a Varian Vista-MPX from Varian and calibration curves for Ge were constructed in the range of 0.2 to $1.0 \mu\text{g.mL}^{-1}$. The variables studied were the pH of the conditioning, loading and eluting solutions (1.5 and 4.0) and the mass of Ge (50-1000 μg). The solutions were percolated using a constant flow (1.4 mL/min.) for the experiments with microspheres and vacuum for the other materials.

Results: Table 1 shows the best results of the behavior of Ge and Ga in the different adsorbers and in several experimental conditions.

Table 1. The best results of the studies with Ge and Ga in five different adsorbers

Adsorber	pH Conditioning	pH Loading	pH Eluting	(% Ge) adsorbed	(% Ga) eluted
Calcinated acid Al_2O_3	1.5	4.0	1.5	80.4	94.1
Basic Al_2O_3	1.5	4.0	1.5	98.2	97.7
HZO	1.5	4.0	1.5	98.2	90.5
TiO_2	1.5	4.0	1.5	98.8	~100
Zr mic	-	1.5	1.5	96.6	99.0

Conclusions: Keeping in mind the generator principle, the best results for the retention of Ge and elution of Ga were achieved with TiO_2 and basic Al_2O_3 loaded with pH 4 and eluted with pH 1.5. The use of Zr mic is very promising as well.

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References: Mirzadeh, (1996), Journal of Radioanalytical and Nuclear Chemistry, 202, 7-102