

# Separation of Sc and Ti using cation exchange resin

L. N. M. Braguin<sup>1,2</sup>, G. S. Pó<sup>2</sup>, I. R. Souza Jr.<sup>2</sup> and P. S. C. Silva<sup>2</sup>

<sup>1</sup> [lilianninoska@gmail.com](mailto:lilianninoska@gmail.com), <sup>1,2</sup> Instituto de Pesquisas Energéticas e Nucleares IPEN-CNEN, São Paulo, SP, Brazil

## Introduction

The most incident cancers in Brazil are: Non-melanoma skin: 31.3 %; Breast: 10.5 %; Prostate: 10.2 %; Colorectal : 6.5 %; Lung: 4.6 %; Stomach cancer: 3.1 % [1]. The early diagnosis and treatment can be achieved with the assistance of theranostic radionuclides. Radionuclides of scandium are interesting candidates for radiotheragnostic. <sup>47</sup>Sc has excellent nuclear properties, 3.35 days of half-life, β- = 162 keV, suitable for targeted therapy in small tumors, and γ = 159 keV, suitable for imaging [2].

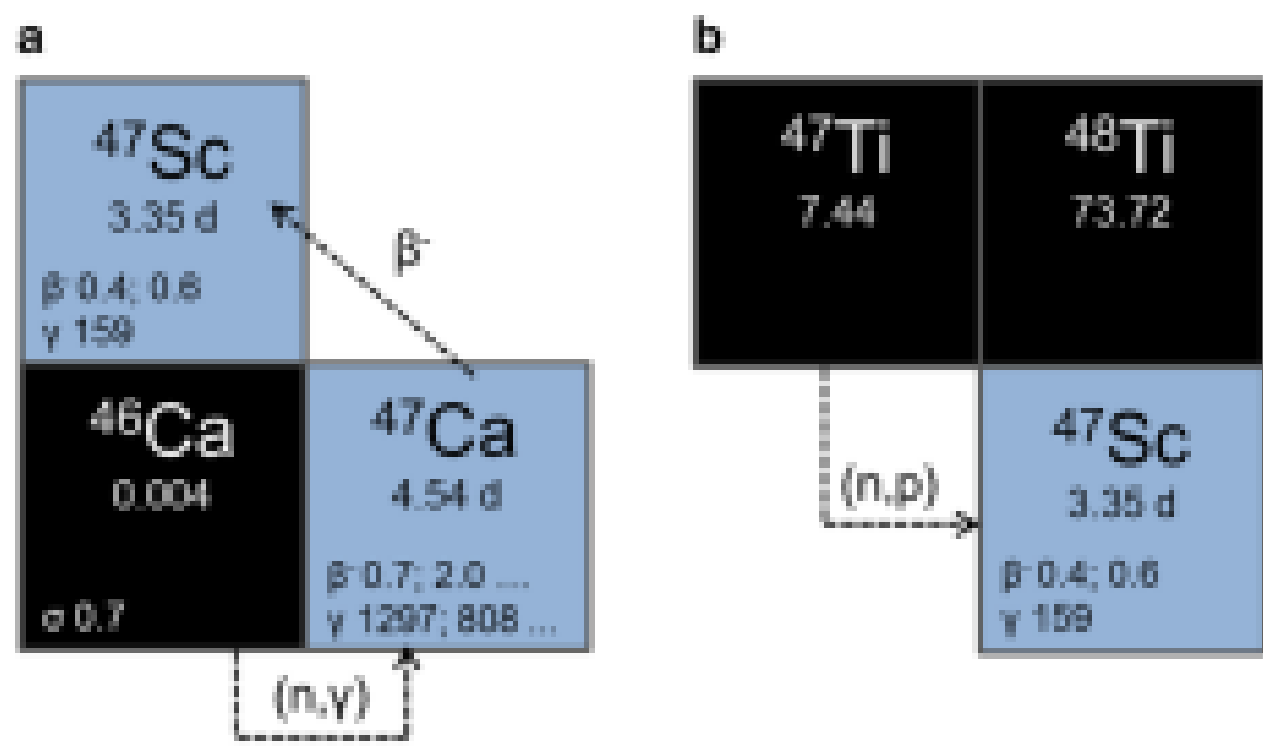


Figure 1: <sup>47</sup>Sc can be produced by nuclear reactions <sup>47</sup>Ti(n,p) <sup>47</sup>Sc, <sup>46</sup>Ca(n, γ) <sup>47</sup>Ca and <sup>47</sup>Ca(β-) <sup>47</sup>Sc.

## Objective

To verify the feasibility of separating Ti and Sc using DOWEX 50 W-X8 resin and determined by using INAA.

## Methodology

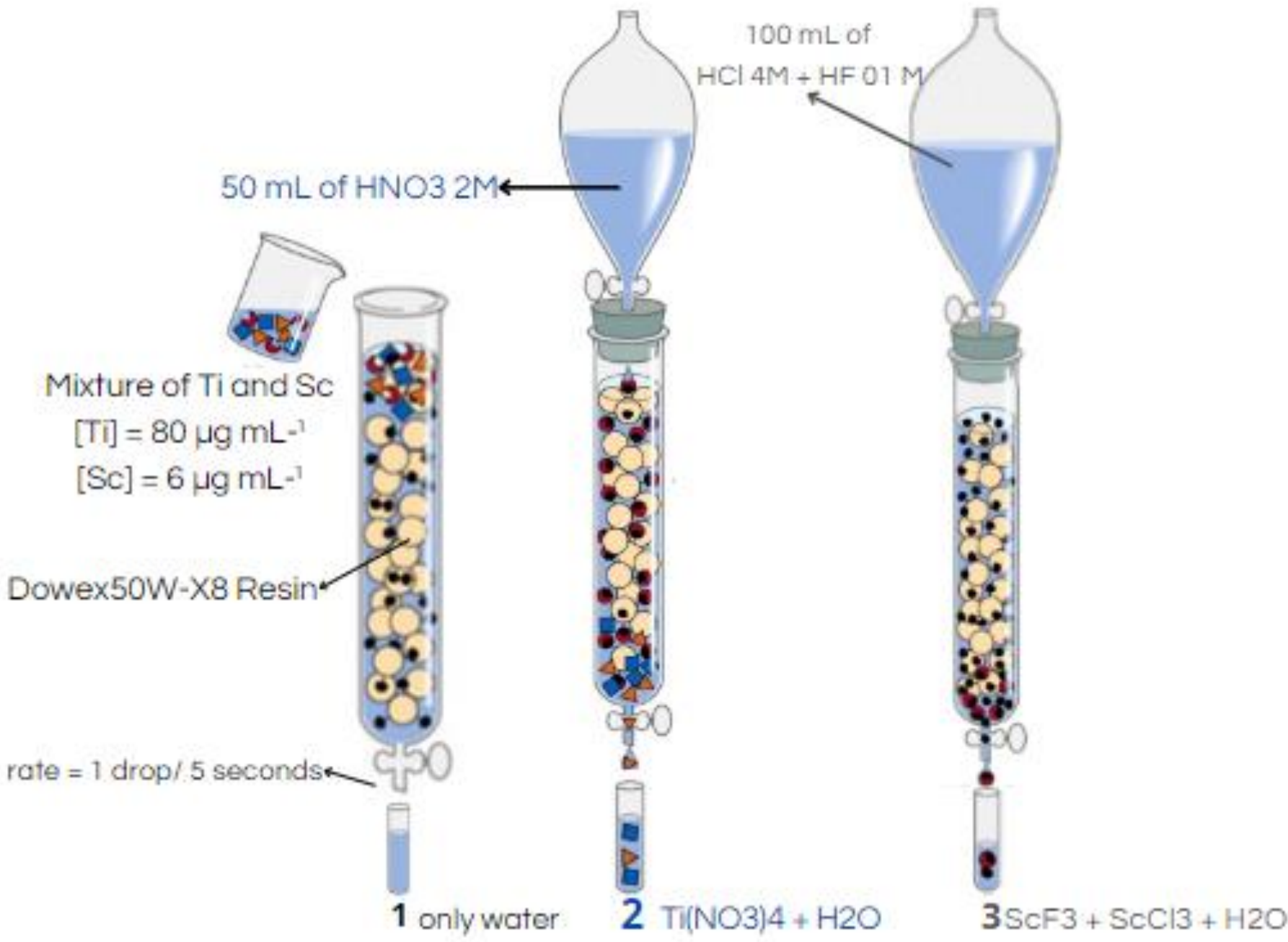
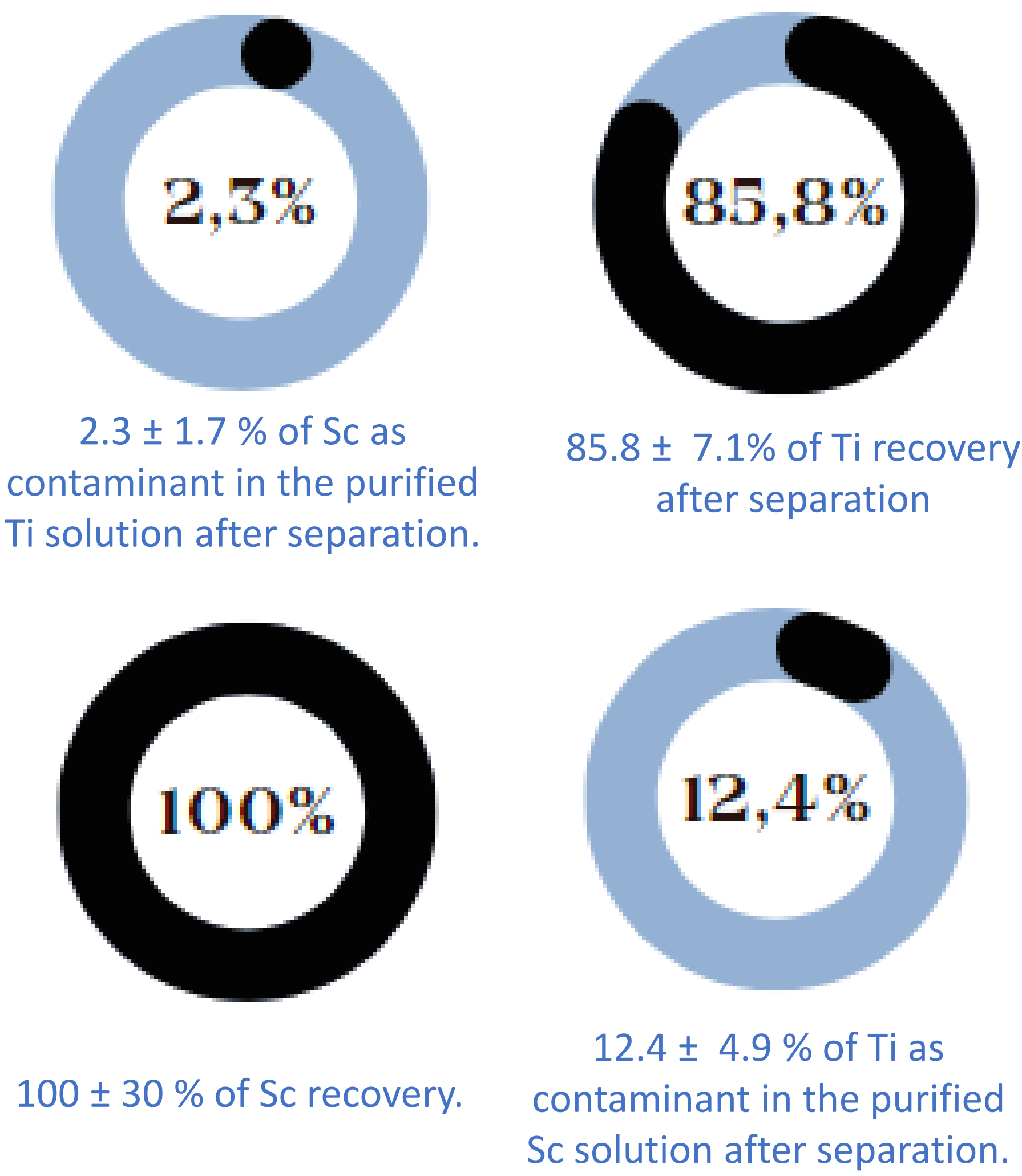


Figure 2: Representative figure of the separation procedure of Ti and Sc. Figure adapted from [3].

- Irradiation (2 min); $\phi th=1.9\times10^{12}$  n cm<sup>-2</sup> s<sup>-1</sup> for Ti determination.
- Irradiation (8 h);  $\phi th=4.5\times10^{12}$  n cm<sup>-2</sup> s<sup>-1</sup> for Sc determination.
- Gamma spectrometry measurment.

## Results

In this work, Separation efficiency over 90 %



## Conclusions

Separation procedure using DOWEX 50W-X8 resin was effective for Ti and Sc separation.

## References

[1]<https://bvsmis.saude.gov.br/inca-lanca-a-estimativa-2023-incidencia-de-cancer-no-brasil/>.  
[2] Jafari et al. Appl Radiat Isot. pp. 152:145–55, (2019).  
[3] <https://edisciplinas.usp.br/pluginfile.php/>.

## Acknowledgements

