Development of radiochemical method for separation of ^{231}Pa

Introduction

✤ ^{231}Pa, daughter product of naturally occurring ^{235}U **(0.34 µg kg^{-1})**

✤ ^{231}Pa produced in Thorium fuel cycle by (n,2n) reaction of ^{232}Th **(artificial)**

✤ The richest Indian sources of ^{231}Pa are the

(a) Plant process streams of the uranium mill of Jaduguda

(b) Monazite processing plant, IRE, Aluva (Siliceous cake)

Difficulty in direct determination by Gamma spectrometry

(i) very low concentration of ^{231}Pa, (ii) very low abundance (yield) of gamma rays,
(iii) long half-life ($t_{1/2}$ = 32,760y), (iv) severe spectral interference and high background
from daughter products of Th and U

Preconcentration and estimation of ^{231}Pa

✤ Specific preconcentration of ^{231}Pa on MnO_2 via insitu precipitation .

✤ Determination of ^{231}Pa using gamma spectrometry.

✤ **Concentration of ^{231}Pa in siliceous cake: (6.4 ± 0.33) µg kg^{-1}**

✤ **Advantages: Single step complete fusion, Yield: 80-85 %**