Claims

1. A method for the quantification of ^{227}Ac in a ^{223}Ra composition, said method comprising:

(i) passing said ^{223}Ra composition through a first solid phase extraction column A, wherein said column A comprises a thorium specific resin;

(ii) passing the eluate of column A through a second solid phase extraction column B, wherein said column B comprises an actinium specific resin; and

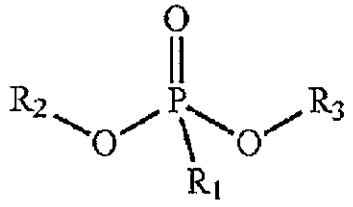
(iii) recovering the ^{227}Ac absorbed onto the resin in column B and determining the amount thereof.

2. A method as claimed in claim 1, wherein the thorium specific resin comprises a phosphonate extractant.

3. A method as claimed in claim 2, wherein the phosphonate extractant is an alkyl phosphonate extractant.

4. A method as claimed in claim 1, wherein the thorium specific resin comprises a dialkyl alkyl phosphonate extractant of Formula I:

(I)

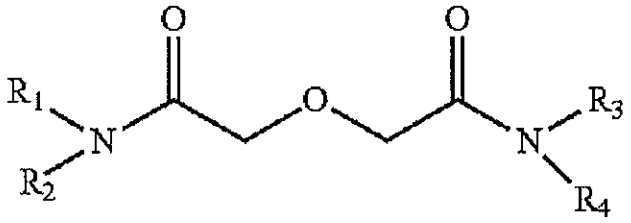


wherein each of R_1-R_3 is independently a C_3-C_8 straight or branched chain alkyl group.

5. A method as claimed in claim 4, wherein the dialkyl alkyl phosphonate extractant is a dipentyl pentylphosphonate extractant.

6. A method as claimed in claim 1, wherein the actinium specific resin comprises a diglycolamide extractant.

7. A method as claimed in claim 1, wherein the actinium specific resin comprises a tetra-alkyl diglycolamide extractant of Formula II:



(II)

wherein R_1-R_4 are independently C_3-C_{12} straight or branched chain alkyl groups.

8. A method as claimed in claim 7, wherein the tetra-alkyl diglycolamide extractant is a N,N,N',N'-tetra-n-octyldiglycolamide (DGA) extractant.

9. A method as claimed in claim 1, wherein column A and column B are arranged in series.

10. A method as claimed in claim 1, wherein the eluent used in both columns A and B comprises aqueous nitric acid.

11. A method as claimed in claim 1, wherein recovery of the ^{227}Ac in step (iii) is achieved by washing column B with an aqueous acid.

12. A method as claimed in claim 11, wherein the washing volume of the aqueous acid is 16 to 400 times the volume of column B.

13. A method as claimed in claim 12, wherein the washing volume of the aqueous acid is 40 to 200 times the volume of column B.

14. A method as claimed in claim 1, wherein the determination in step (iii) is achieved by γ-spectrometry via in-growth and detection of the daughter ^{227}Th.

15. A method as claimed in claim **1**, said method comprising:

(i) Adding a volume of a ^{223}Ra composition corresponding to a known activity of ^{223}Ra to an equal volume of nitric acid;

(ii) Transferring the sample from step (i) to the input of a first solid phase extraction column A comprising a thorium specific resin arranged in series with a second solid phase extraction column B comprising an actinium specific resin;

(iii) Passing said sample through both columns A and B;

(iv) Washing both columns with nitric acid in an amount of 20-100 times the combined volumes of the two columns;

(v) Disconnecting column A from column B;

(vi) Washing column B with nitric acid in an amount of 40-200 times its volume;

(vii) Washing column B with nitric acid in an amount of 40-200 times its volume at a concentration less than that used in step (vi); and

(viii) Determining the amount of ^{227}Ac present in the eluate from column B obtained in step (vii).

16. A method as claimed in claim **15**, wherein the determination in step (viii) is achieved by γ-spectrometry via in-growth and detection of the daughter ^{227}Th.

17. A method as claimed in claim **15**, wherein the nitric acid in steps (iv) and (vi) is 4 mol/L nitric acid.

18. A method as claimed in claim **15**, wherein the nitric acid in step (vii) is 0.05 mol/L nitric acid.