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(54) **Separation Device for Radioisotope Tl-201**

(57) The invention relates to a device for rapidly obtaining a solution of Pb(lead)-201 from a solution of a solid target material of Tl(thallium)-203. The solution of Pb-201 is then processed through degeneration and an ion exchange to obtain radioisotope Tl-201.

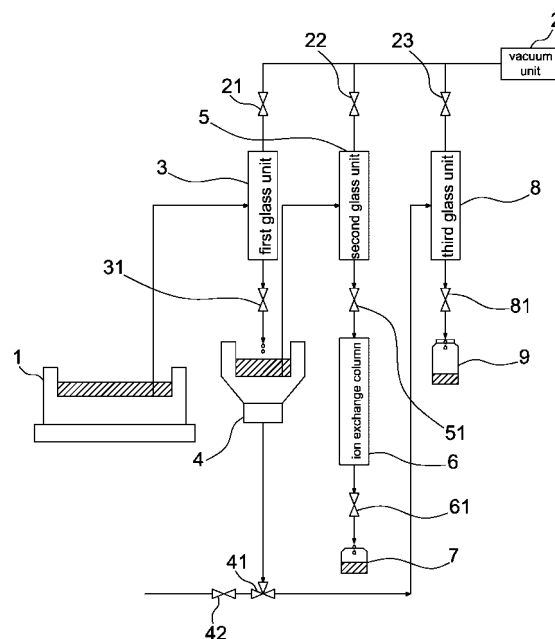


FIG.2

Description

Field of the invention

[0001] The present invention relates to a separation device. More particularly, the invention relates to fast separating out a Pb-201 solution to be processed through degeneration and an ion exchange for obtaining Tl-201 radioisotope.

Description of the Related Art

[0002] Tl-201 thallos chloride ($^{201}\text{TlCl}_2$) can be absorbed by and gathered at a heart muscle. Therefore, Tl-201 can be used in a myocardial image for diagnosing heart disease. It can also be applied in other medical diagnoses, like a tumor image. Hence, Tl-201 is one of the most commonly used radioisotopes in the field of nuclear medicine.

[0003] Generally, to produce Tl-201, as revealed in "Production of Tl-201 and Pb-203 via Proton Induced Nuclear Reaction on Natural Thallium," by Qaim S. M., Weinreich R. and Ollig H., International Journal of Applied Radiation and Isotopes, 30 (1979) pp. 85-95, Tl-201 is directly washed out. But directly washed out Tl-201 quite often contains impurities so that its purity is not good. Hence, the prior art does not fulfill users' requests on actual use.

Summary of the invention

[0004] The object of the present invention is to fast separate a Pb-201 solution from a solution of a solid target material of Tl-203 to be processed through degeneration and an ion exchange for obtaining radioisotope Tl-201.

[0005] This object is achieved by a separation device for radioisotope Tl-201 according to claim 1.

[0006] The present invention is a separation device for radioisotope Tl-201, comprising a dissolving unit; a vacuum unit connecting to a first control valve, a second control valve and a third control valve; a first glass unit connecting to a fourth control valve at an end and the first control valve at another end; a sedimentation unit connecting to a three way control valve; a second glass unit connecting to a fifth control valve at an end and the second control valve at another end; an ion exchange column connecting to a sixth control valve at an end and the fifth control valve at another end; a Pb(lead)-201 collection bottle; a third glass unit connecting to a seventh control valve at an end and the third control valve at another end; and a Tl(thallium)-203 collection bottle, where the three way control valve is connected with an eighth control valve. Accordingly, a novel separation device of radioisotope Tl-201 is obtained.

Brief descriptions of the drawings

[0007] The present invention will be better understood from the following detailed description of the preferred embodiment according to the present invention, taken in conjunction with the accompanying drawings, in which

FIG 1 is the view showing the structure of the preferred embodiment according to the present invention; and

FIG 2 is the view showing the state of use of the preferred embodiment.

Description of a preferred embodiment

[0008] As shown in fig. 1, the separation device for radioisotope Tl-201 comprises a dissolving unit 1; a vacuum unit 2 connecting to a first control valve 21, a second control valve 22 and a third control valve 23; a first glass unit 3 connecting to a fourth control valve 31 at an end and the first control valve 21 at another end; a sedimentation unit 4 connecting to a three way control valve 41; a second glass unit 5 connecting to a fifth control valve 51 at an end and the second control valve 22 at another end; an ion exchange column 6 connecting to a sixth control valve 61 at an end and the fifth control valve 51 at another end; a Pb(lead)-201 collection bottle 7; a third glass unit 8 connecting to a seventh control valve 81 at an end and the third control valve 23 at another end; and a Tl(thallium)-203 collection bottle 9, where the three way control valve 41 is connected with an eighth control valve 42. Thus, a novel separation device for radioisotope Tl-201 is obtained to fast separate out Pb-201.

[0009] As shown in fig. 2, a solution of a solid target material of Tl-203 is separated to obtain a Pb-201 solution and the Pb-201 solution is processed through degeneration and an ion exchange to obtain a Tl-201 radioisotope.

[0010] A solid target material of Tl-203 having Pb-201 is deposited in a dissolving unit 1, where a 1.6N nitric acid, ferric ions and water for injection are added to dissolve the solid target material of Tl-203 into a solution.

[0011] A first control valve 21 is opened to suck the solution of Tl-203 having Pb-201 by a vacuum unit 2 into a first glass unit 3. The first control valve 21 is shut and ammonia is added to be mixed together. A fourth control valve 31 is opened to drop the solution of Tl-203 having Pb-201, which is mixed with ammonia, into a sedimentation unit 4 to be added with water so that a solution of Tl-203 and a solution of Pb-201 is separated.

[0012] A second control valve 22 is opened to suck the Pb-201 solution by the vacuum unit 2 from the sedimentation unit 4 into a second glass unit 5 to be added with an 8N hydrochloric acid for mixing together. A fifth control valve 51 is opened to drop the solution of Pb-201 into an ion exchange column 6 for ion exchange with resin to filter out iron from the solution of Pb-201. A sixth control valve 61 is opened to drop a pure solution of Pb-201 into

a Pb-201 collection bottle 7.

[0013] Then a three way control valve 41 and a third control valve 23, which are connected with the sedimentation unit 4, are opened to suck the T1-203 solution by the vacuum unit 2 from the sedimentation unit 4 into a third glass unit 8. The third control valve 23 is shut and the seventh control valve 81 is opened to drop the solution of Tl-203 into a TL-203 collection bottle.

[0014] Then the solution of Pb-201 in the Pb-201 collection bottle 7 is processed through a degeneration to obtain a solution of T1-201 from the solution of Pb-201. In the end, an ion exchange is processed to obtain a T1-201 radioisotope. Therein, the three way control valve 41 is connected with an eighth control valve 42 to control the input of nitrogen gas.

[0015] To sum up, the present invention is a separation device for radioisotope T1-201, where a Pb-201 solution is fast separated from a solution of a solid target material of T1-203 and processed through degeneration and an ion exchange for obtaining radioisotope T1-201.

[0016] The preferred embodiment herein disclosed is not intended to unnecessarily limit the scope of the invention. Therefore, simple modifications or variations belonging to the equivalent of the scope of the claims and the instructions disclosed herein for a patent are all within the scope of the present invention.

- a third glass unit (8), said third glass unit being connected with a seventh control valve (81) at an end of said third glass unit, said third glass unit being connected with said third control valve at another end of said third glass unit; and
- a Tl(thallium)-203 (9) collection bottle.

2. The device according to claim 1, wherein said three way control valve (41) is connected with an eighth control valve (42).

Claims

1. A separation device for radioisotope T1-201, comprising:

- a dissolving unit (1);
- a vacuum unit (2), said vacuum unit being connected with a first control valve (21), a second control valve (22) and a third control valve (23);
- a first glass unit (3), said first glass unit being connected with a fourth control valve (31) at an end of said first glass unit, said first glass unit being connected with said first control valve at another end of said first glass unit;
- a sedimentation unit (4), said sedimentation unit being connected with a three way control valve (41);
- a second glass unit (5), said second glass unit being connected with a fifth control valve (51) at an end of said second glass unit, said second glass unit being connected with said second control valve at another end of said second glass unit;
- an ion exchange column (6), said ion exchange column being connected with a sixth control valve (61) at an end of said ion exchange column, said ion exchange column being connected with said fifth control valve at another end of said ion exchange column;
- a Pb(lead)-201 (7) collection bottle;

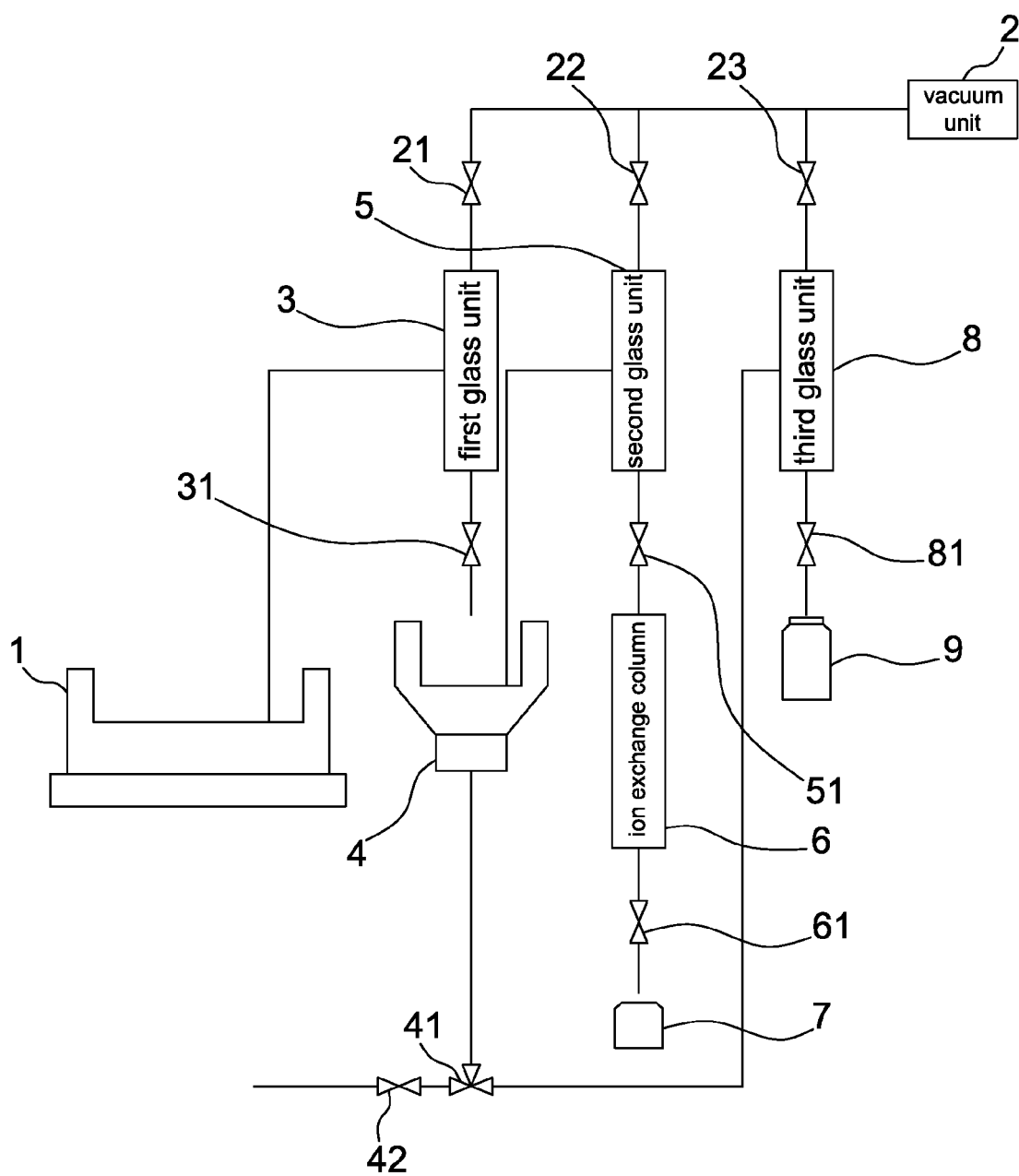


FIG.1

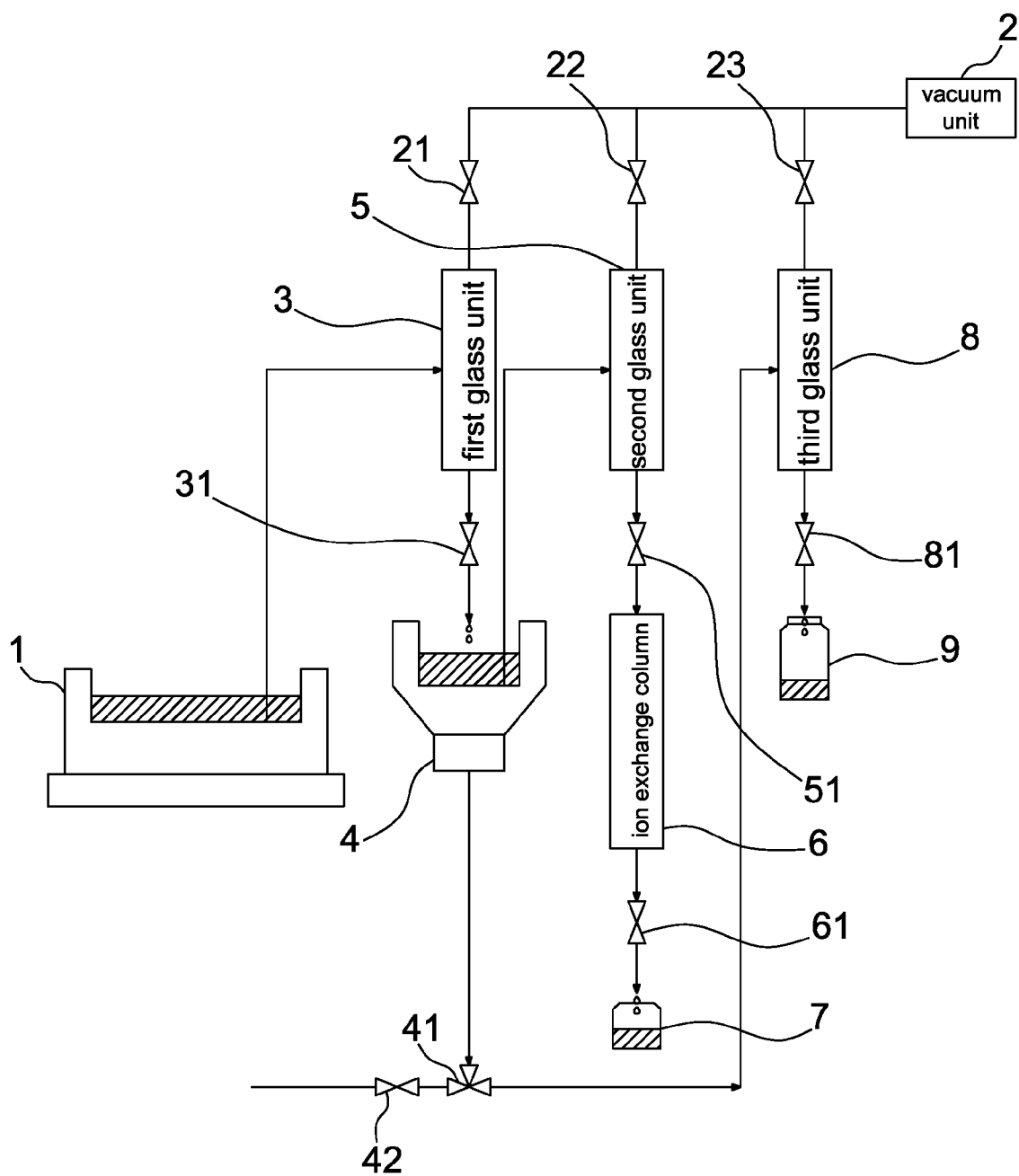


FIG.2



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EUROPEAN SEARCH REPORT

Application Number
EP 06 12 2962

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2003/127395 A1 (BOND ANDREW H [US] ET AL) 10 July 2003 (2003-07-10) * paragraph [0037] * * paragraph [0039] * * paragraph [0061] - paragraph [0076] * * figure 3 *	1	INV. G21G4/00
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 March 2007	Examiner Capostagno, Eros
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

3
EPO FORM 1503 03/82 (P04C01)



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EUROPEAN SEARCH REPORT

Application Number
EP 06 12 2962

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		19 March 2007	Capostagno, Eros
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

3
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 12 2962

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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19-03-2007

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REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Non-patent literature cited in the description

- **QAIM S. M. ; WEINREICH R. ; OLLIG H.** Production of Tl-201 and Pb-203 via Proton Induced Nuclear Reaction on Natural Thallium. *International Journal of Applied Radiation and Isotopes*, 1979, vol. 30, 85-95
[0003]