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REPORT OF INVENTION

Use of Fluosilicate for the Precipitation of Plutonium Fluoride

AUTHOR

Ray L. Beede

Horace H. Hopkins, Jr.

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1st REVIEW-DATE: 6/28/82

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By

ATOMIC PRODUCTS DIVISION
GENERAL ELECTRIC COMPANY
RICHLAND, WASHINGTON

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REPORT OF INVENTION

A.E.C. CASE NO.

G. E. CASE NO.

HWIR-672

TO:

H. C. Pae
M. K. Cain

I: ATTACHED HERETO IS A DESCRIPTION OF WHAT MAY BE AN INVENTION IN:

Use of fluosilicate in homogeneous precipitation for the preparation of crystalline plutonium fluorides.

II: THE NAME, TITLE OR POSITION, WORKS LOCATION, AND PERMANENT ADDRESS OF THE INVENTOR(S) IS:

1. Ray L. Beede, Engineer, 234-5 Development, Engineering Dept. 234-5 Bldg. 200-W
2. Horace H. Hopkins, Jr., Head - 234-5 Development, Engineering Dept. 234-5 Bldg., 200 West

III: EVIDENCE AS TO WHEN AND WHERE THE INVENTION WAS MADE CAN BE FOUND IN THE FOLLOWING LISTED WRITTEN OR PICTORIAL MATERIAL (NOTEBOOK, FILE REPORTS OR DRAWINGS, ETC.):

1. HW-39751 H "Sep. Tech. Monthly Report October 1955" (Sec.) p Fc-17.
2. HWN-930 personal notebook (Secret) of Ray L. Beede. p 82.
3. HW-5452-T personal notebook (Secret) of Horace H. Hopkins, Jr. p 141.

IV: THE APPROXIMATE DATE OF THE FIRST ENTRY IN SAID WRITTEN OR PICTORIAL MATERIAL DESCRIBING OR SHOWING SAID INVENTION IS:

October 28, 1955.

V: PERSONS WHO COULD TESTIFY AS TO WHEN AND WHERE THE INVENTION WAS MADE INCLUDE THE FOLLOWING:

R. C. Smith

W. S. Figg

SIGNED (SUPERVISOR)

R. C. Smith

DATE

1-19-56

DEPARTMENT

ENGINEERING

NOTE: SUGGESTIONS FOR PREPARING THE INVENTION DESCRIPTION ARE CONTAINED ON THE REVERSE SIDE OF FORM

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-2-

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January 19, 1956

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|-------------------------------|------------------------|
| 1. - 7. M. K. Cain | 11. H. H. Hopkins, Jr. |
| 8. O. F. Hill | 12. 300 File |
| 9. R. B. Richards | 13. Yellow File |
| 10. R. L. Beede | |

USE OF FLUOSILICATE FOR THE PRECIPITATION OF PLUTONIUM FLUORIDE

Fluosilicate in the form of fluosilicic acid solution or solutions of fluosilicate salts, hydrolyzes in acid solution to an equilibrium mixture containing small concentrations of silicic acid and hydrofluoric acid. This reaction provides a means of slowly generating fluoride ion homogeneously in solution. Plutonium ions, quadrivalent (or trivalent) react with fluoride to form stable, insoluble compounds. This reaction proceeds slowly and homogeneously in a fluosilicate solution with the result that the precipitate grows slowly and is highly crystalline in character.

Such a precipitate is readily filtered and washed, in contrast to the behavior of fluoride prepared by the direct addition of hydrofluoric acid to a plutonium nitrate solution. Thus this invention has direct process significance.

In the event some crystalline fluosilicate is formed, it should be possible to convert this material to a fluoride by the addition of excess hydrofluoric acid.

A typical homogeneous precipitation can be carried out at room temperature with a solution 40 g/l plutonium(IV) nitrate and 1.5 M HNO_3 . Fluosilicic acid is added as a 31 per cent solution to provide one mole of fluosilicate per mole plutonium. A crystalline plutonium fluoride precipitate becomes evident after approximately 20 minutes. After one hour, 48 per cent hydrofluoric acid can be added to provide four moles of fluoride per mole plutonium. This addition completes the precipitation and converts the silicic acid to fluosilicic acid. The crystalline precipitate can be filtered immediately.

Read and understood by me, this
11 day of February, 1956

Invented by:

Ray L. Beede 2-1-56
 Ray L. Beede, Engineer Date
 234-5 Development
 Separations Technology Section
 ENGINEERING DEPARTMENT

Horace H. Hopkins, Jr. 2-1-56
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