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A TABULATION OF THE ISOTOPIC COUNTING CORRECTION FACTORS
AND DECAY SCHEMES

By

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RADIOLOGICAL CHEMICAL ANALYSIS OPERATION

HANFORD LABORATORIES

Hanford Atomic Products Operation

General Electric Co.

UNCLASSIFIEDABSTRACT

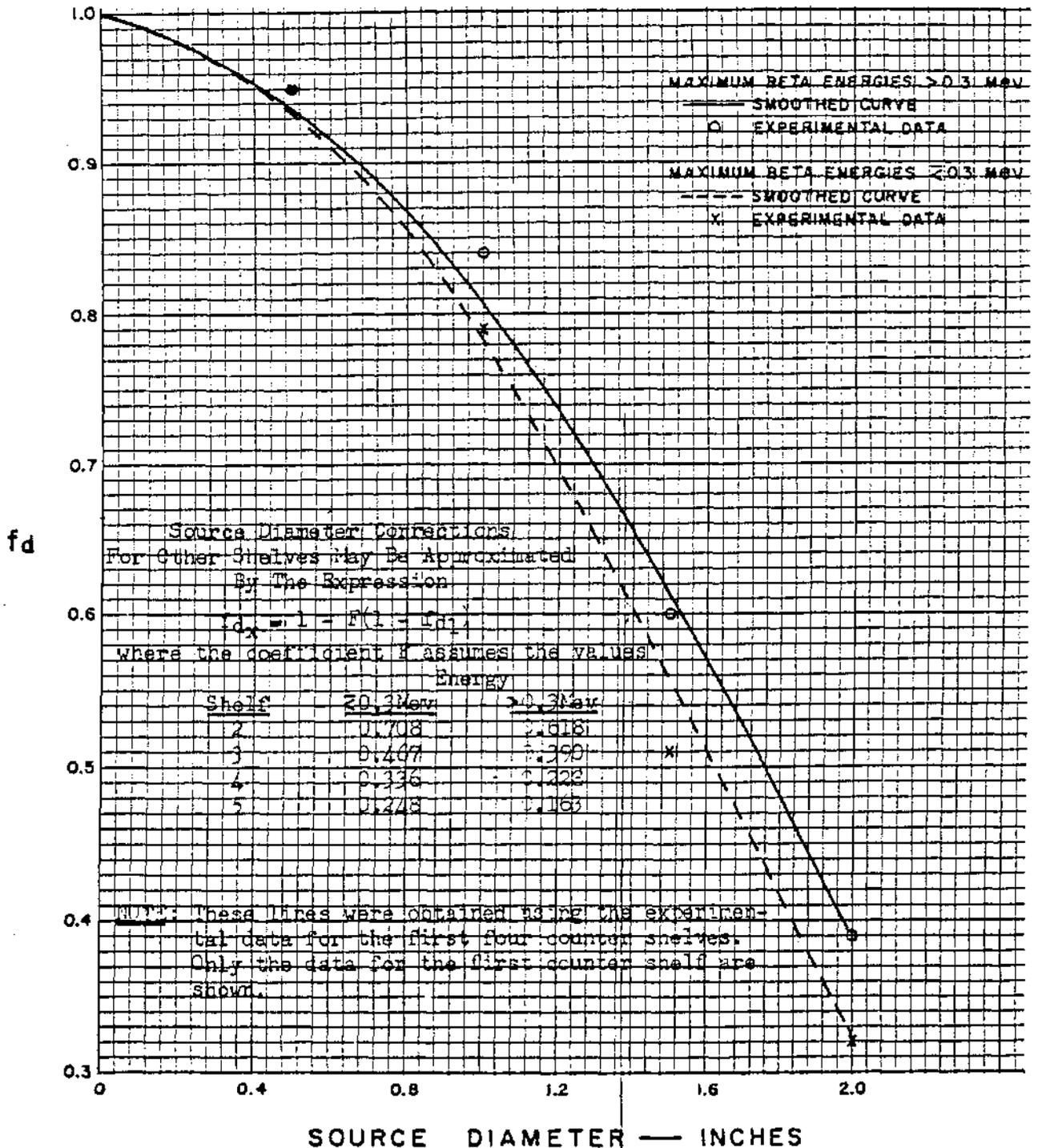
This report serves the two-fold purpose of presenting a tabulation of the correction factors used in determining the absolute activity of various isotopes and serving as a guide for all groups within the Radiological Chemical Analysis Operation. The results reported were selected as the most valid after careful scrutinization of all available data and are specific to the measuring methods and equipment employed within the Operation.

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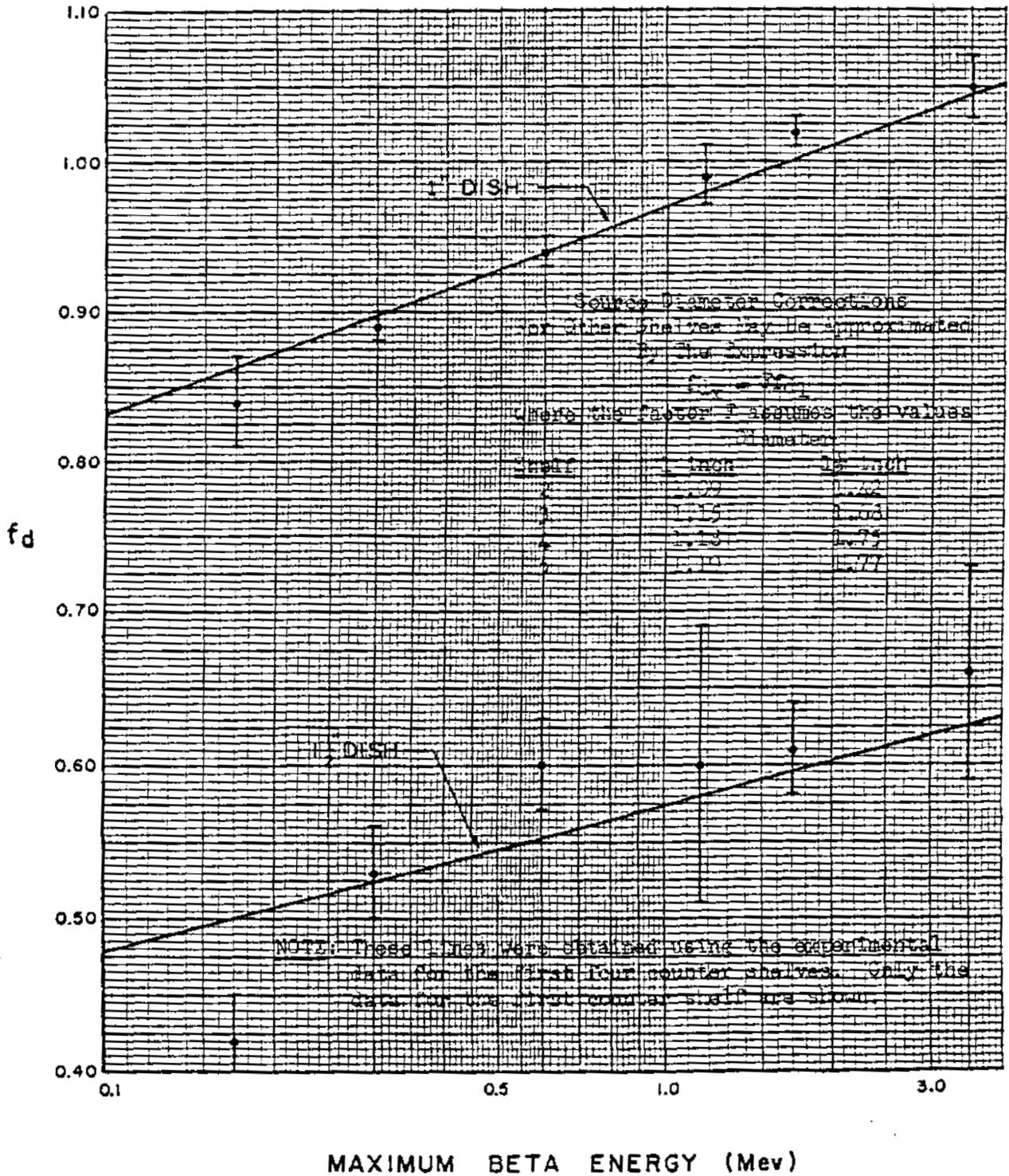
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FIGURE - 1
FIRST SHELF SOURCE DIAMETER CORRECTIONS
(f_d) FOR FLAT CIRCULAR SOURCE MOUNTING



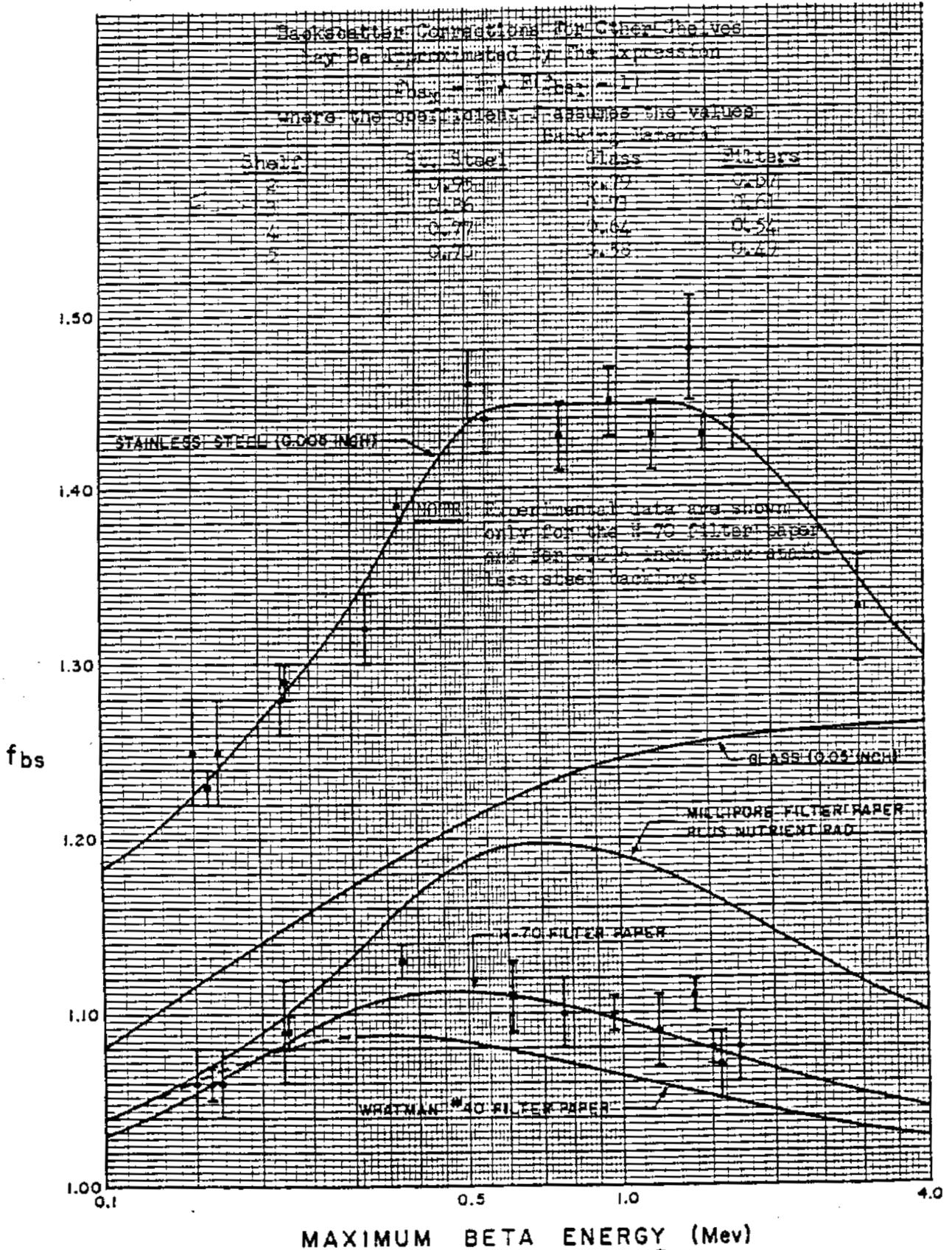
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FIGURE - 2
 FIRST SHELF SOURCE DIAMETER CORRECTIONS
 (f_d) FOR STAINLESS STEEL DISHES



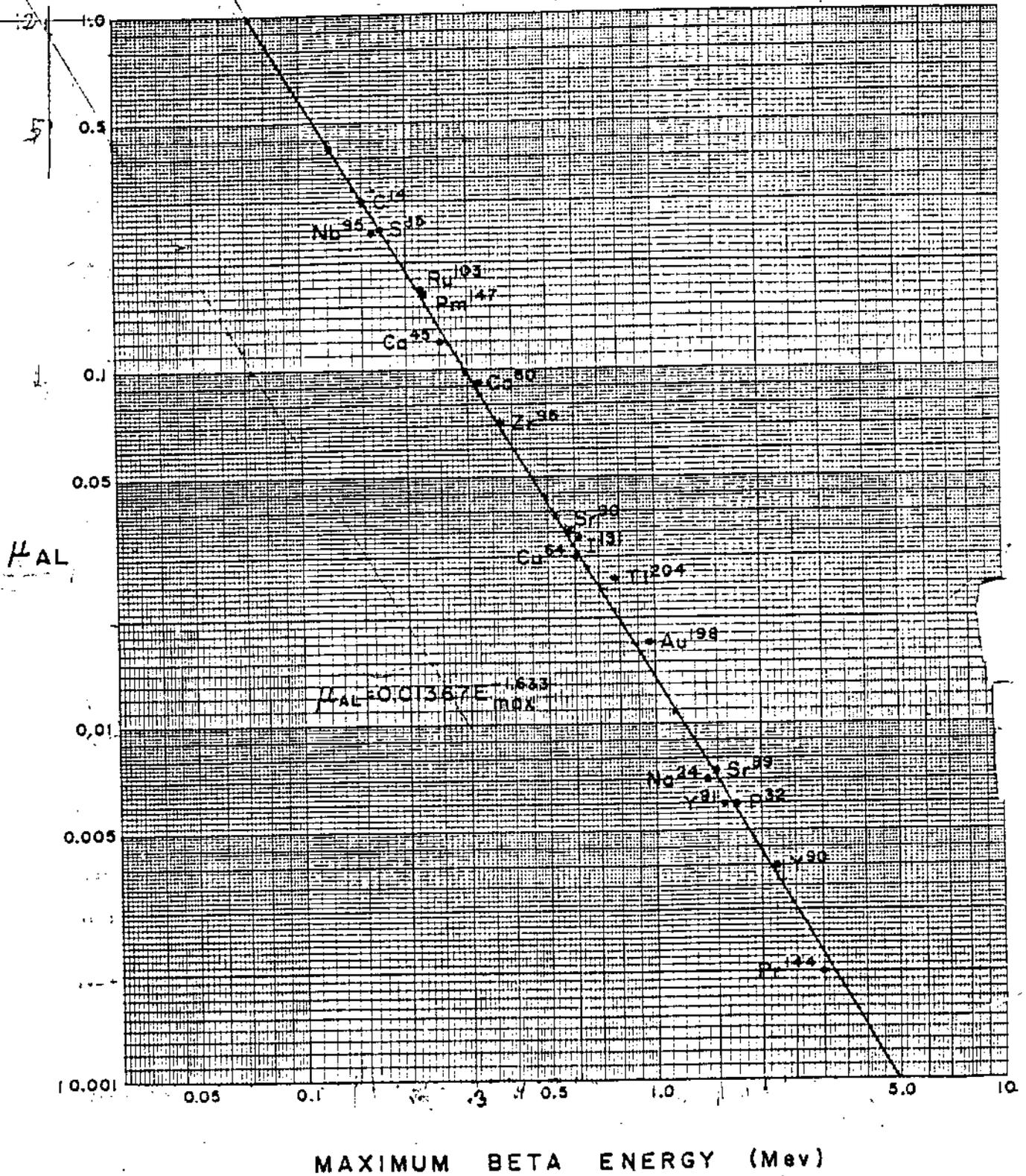
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FIGURE - 3
 FIRST SHELF BACKSCATTER CORRECTIONS
 (f_{bs}) FOR STANDARD BACKING MATERIALS



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FIGURE - 4
MASS ABSORPTION COEFFICIENT
AS A FUNCTION OF MAXIMUM ENERGY



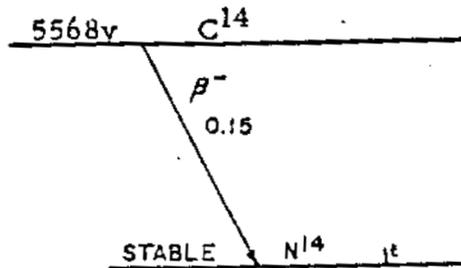
μ_{AL}

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-7- HW-18250-APP
ISOTOPE Carbon¹⁴

METHOD Distillation

YIELD 100% = 32.8 mg. (10mg. CO₃)
 (As BaCO₃)



$\mu_{Ai} = 0.303$ $\mu_{Air} =$ *new Tube*

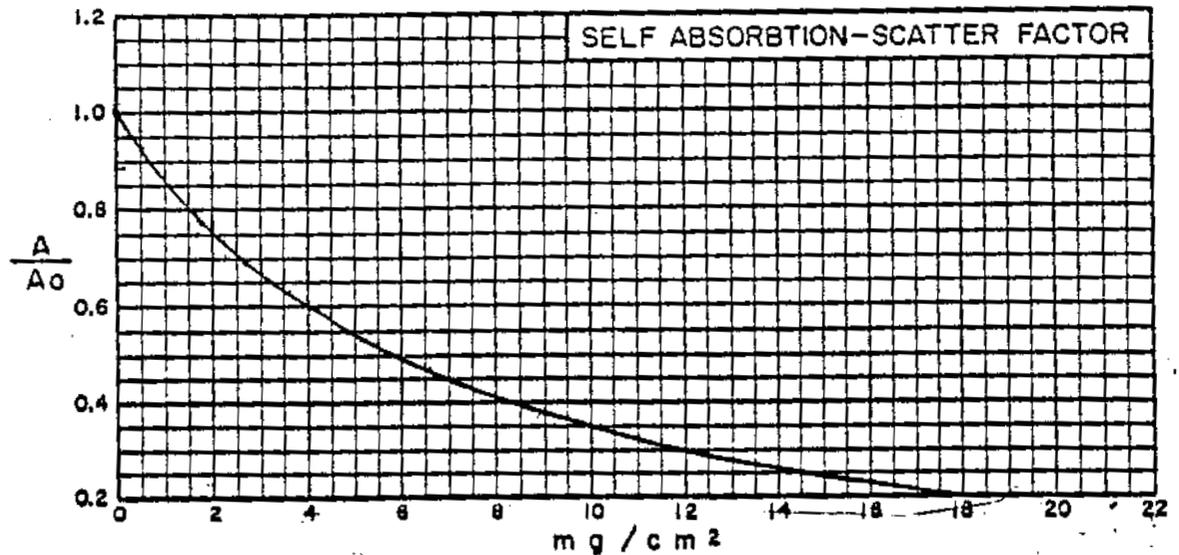
SHELF	AIR B MICA WINDOW FACTORS
1	0.34 (.59)
2	0.19 (.44)
3	0.11 (.36)

SOURCE SPREAD DIAMETER FACTORS *4.68*

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.8 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.86	0.44 <i>0.54</i>	0.78	0.61	0.50
SHELF 2	0.94	0.63 <i>0.68</i>	0.84	0.72	0.65
SHELF 3	0.99	0.74	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.22	1.22	1.12	1.09	1.06
SHELF 2	1.21	1.21	1.09	1.06	1.04
SHELF 3	1.19	1.19	1.09	1.05	1.04



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(A+M.W.)(\text{Yield})} = \mu C/\text{unit}$

Remarks: C¹⁴ as BaCO₃ on 1 1/2" Dish 1st shelf

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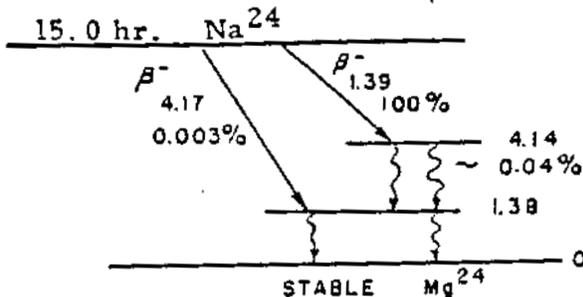
ISOTOPE Sodium²⁴

$D_{1/2} = 63.29 \text{ hr}$

METHOD Group Elimination

YIELD 37.0mg = 100% (10mg Na)
(As NaNO₃)

$\mu_{Al} = 0.0079$ $\mu_{Air} =$



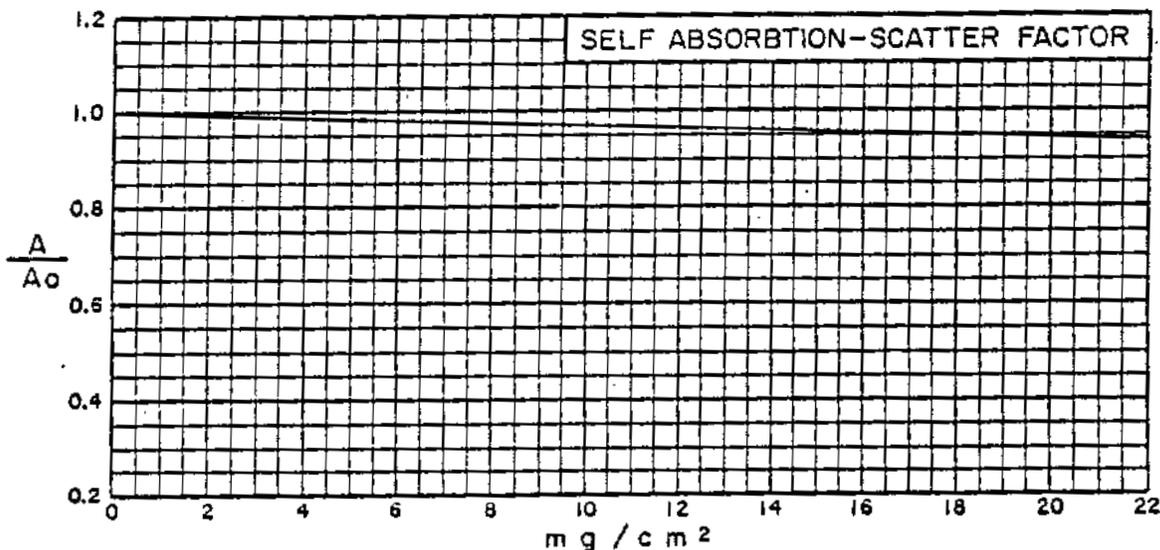
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.94

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.99	0.59	0.81	0.66	0.56
SHELF 2	1.08	0.84	0.88	0.79	0.73
SHELF 3	1.14	0.99	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.42	1.42	1.26	1.17	1.08
SHELF 2	1.39	1.39	1.21	1.11	1.05
SHELF 3	1.36	1.36	1.18	1.10	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{b.s.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu\text{C/unit}$

Remarks: Na²⁴ in NaNO₃ on 1" dishes

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-9- HW-13250-TPT
 ISOTOPE Phosphorus³²

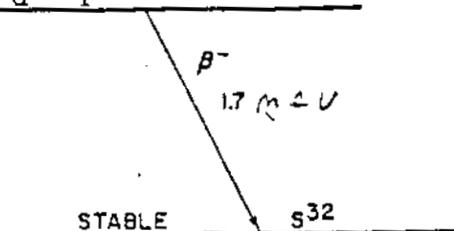
METHOD Phosphomolybdate

YIELD 98.8 mg=100% (2.5 mg PO₄³⁻)

(As (NH₄)₃ (PMo₁₂O₄₀))

$\mu_{Al} = 0.0058$ $\mu_{Air} =$ _____

14.3 d P³²



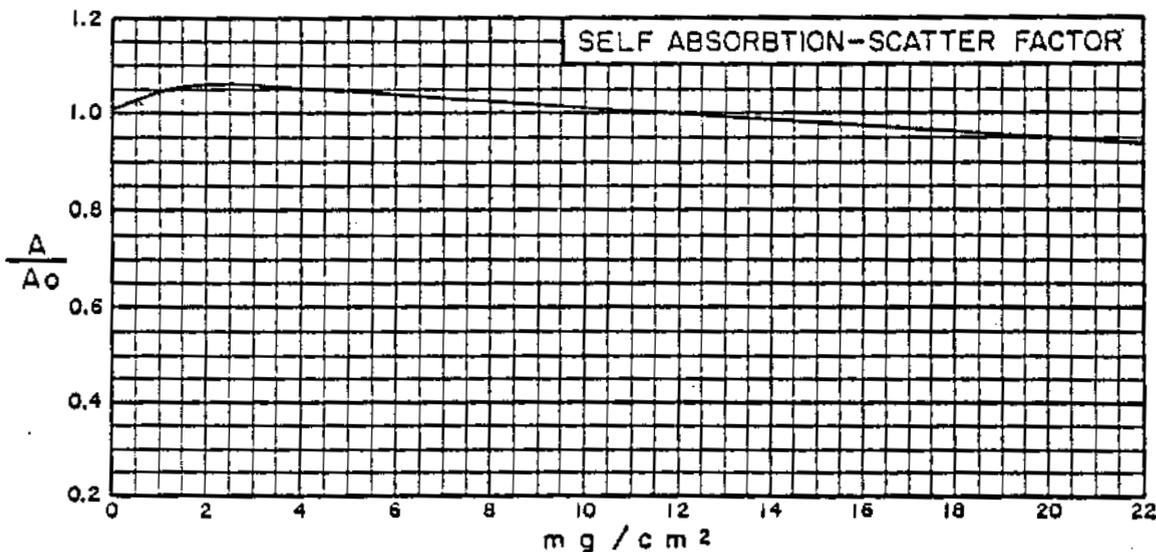
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.97
3	0.96

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	1.00	0.60	0.81	0.66	0.56
SHELF 2	1.09	0.85	0.88	0.79	0.73
SHELF 3	1.15	1.01	0.93	0.87	0.84

BACK-SCATTER FACTORS

SHELF 1	1.43	1.43	1.26	1.16	1.07
SHELF 2	1.41	1.41	1.21	1.11	1.05
SHELF 3	1.37	1.37	1.18	1.10	1.04



CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A+MW.})(\text{Yield})} = \mu\text{C/unit}$

Remarks: P³² in Ammonium Molybdiphosphate on 1" st. stl. dishes (1st sh.)

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ISOTOPE Sulphur³⁵

METHOD Barium Sulphate

YIELD 24.3 mg=100% (10 mg-SO₄)
(As BaSO₄)

87.1 d.

S³⁵

$\mu_{Al} = 0.25$

$\mu_{Air} =$

new test

β^-
0.168

STABLE

Cl³⁵

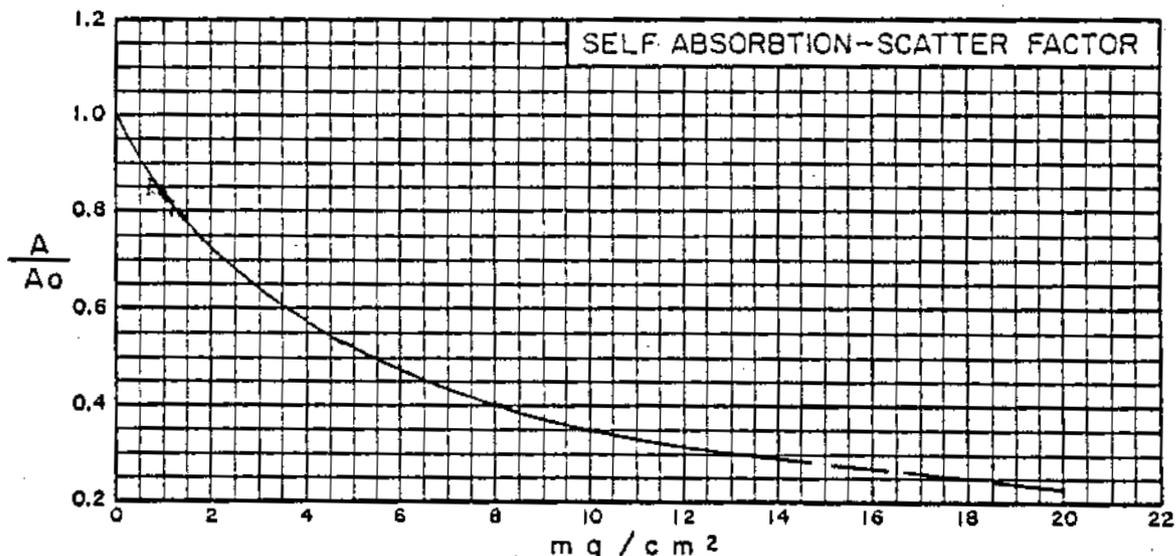
SHELF	AIR & MICA WINDOW FACTORS
1	0.40 (1.5)
2	0.25
3	0.16

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.86	0.50	0.78	0.61	0.50
SHELF 2	0.94	0.71	0.84	0.72	0.65
SHELF 3	0.99	0.84	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.24	1.24	1.13	1.07	1.06
SHELF 2	1.23	1.23	1.10	1.05	1.04
SHELF 3	1.20	1.20	1.09	1.04	1.04



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(A+MW.)(\text{Yield})} = \mu C/\text{unit}$

Remarks: S³⁵ as BaSO₄ on 1 1/2" dishes

-11-
ISOTOPE Potassium⁴⁰

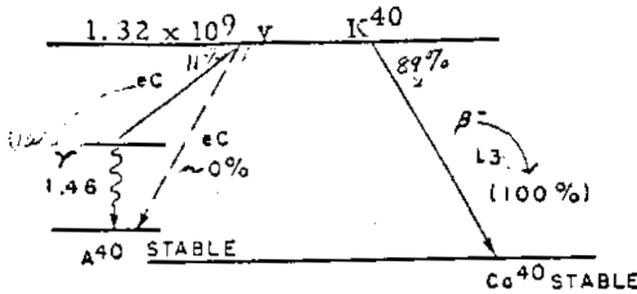
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METHOD Perchlorate

YIELD 70.9 mg=100%

(As KClO₄)

$\mu_{Al} = 0.009$ $\mu_{Air} =$



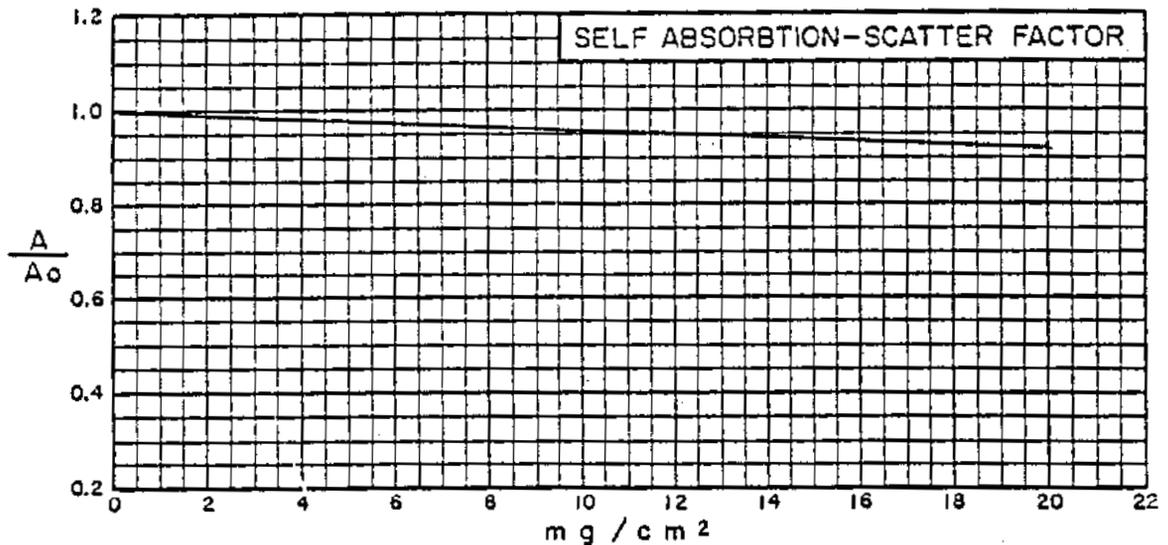
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.95
3	0.94

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.99	0.58	0.81	0.66	0.56
SHELF 2	1.08	0.82	0.88	0.79	0.73
SHELF 3	1.14	0.97	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.45	1.45	1.25	1.18	1.08
SHELF 2	1.43	1.43	1.20	1.12	1.05
SHELF 3	1.39	1.39	1.18	1.11	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{b.s.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu\text{C/unit}$

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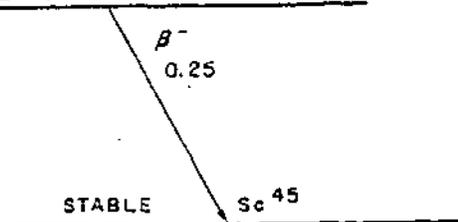
ISOTOPE Calcium⁴⁵

METHOD Calcium Oxalate

YIELD 36.5 mg=100% (10 mg Ca)
(As CaC₂O₄)

152 d. Ca⁴⁵

$\mu_{Air} = 0.13$ $\mu_{Air} =$



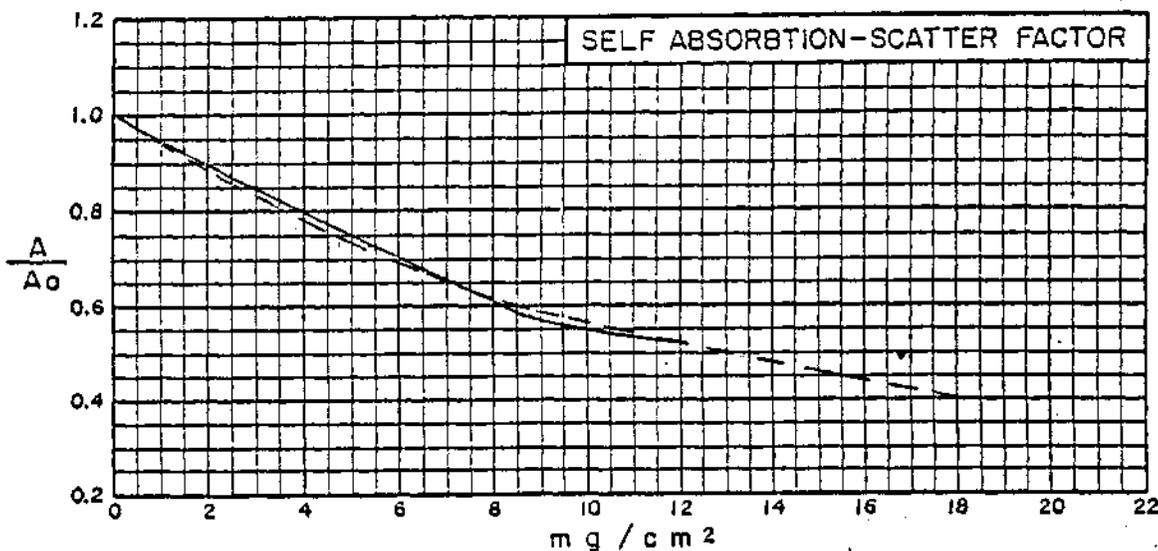
SHELF	AIR B MICA WINDOW FACTORS
1	0.62 (78)
2	0.49
3	0.38

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.89	0.52	0.78	0.61	0.50
SHELF 2	0.97	0.74	0.84	0.72	0.65
SHELF 3	1.02	0.87	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.30	1.30	1.16	1.11	1.09
SHELF 2	1.29	1.29	1.13	1.07	1.06
SHELF 3	1.26	1.26	1.11	1.07	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^8) (S.S.) (bs.) (S.S.A.) (A+MW.) (Yield)} = \mu C / \text{unit}$

Remarks: Ca⁴⁵ as CaC₂O₄ in 1 1/2" dishes

$$--- = \frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$$

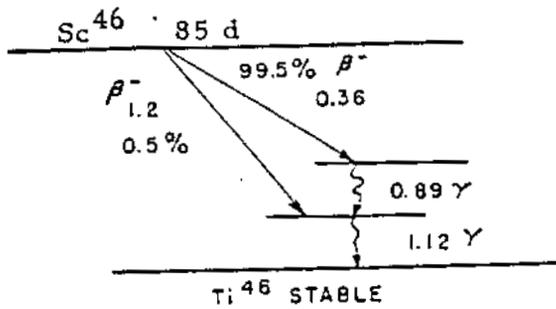
ISOTOPE Scandium⁴⁶

METHOD Scandium Fluoride

YIELD 61.3 mg=100%

(As Sc₂O₃)

$\mu_{Al} = 0.072$ $\mu_{Air} =$ _____



SHELF | AIR & MICA WINDOW FACTORS

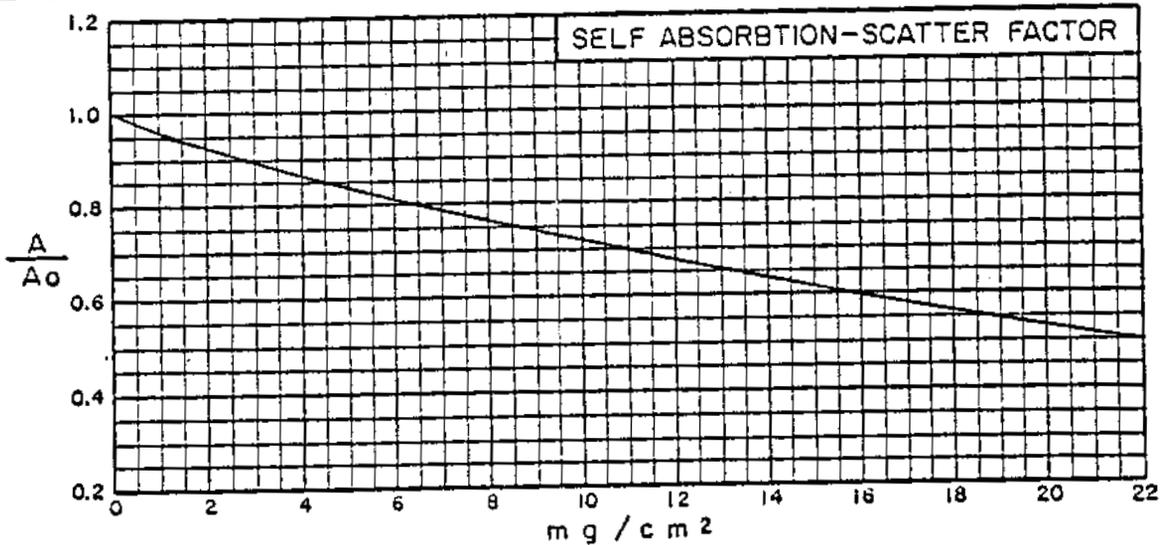
1	0.77
2	0.67
3	0.59

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.91	0.53	0.81	0.66	0.56
SHELF 2	0.99	0.75	0.88	0.79	0.73
SHELF 3	1.05	0.89	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.37	1.37	1.19	1.16	1.11
SHELF 2	1.35	1.35	1.15	1.11	1.07
SHELF 3	1.32	1.32	1.13	1.10	1.07



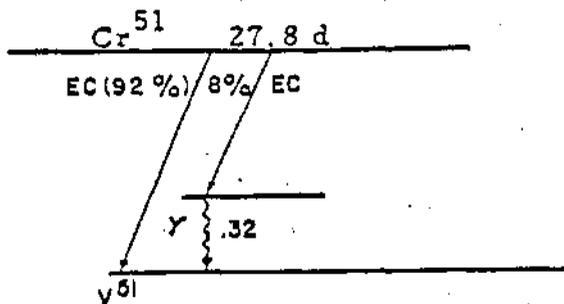
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{bs.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu C / \text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1 - e^{-\mu x}}{\mu x}$

ISOTOPE Chromium⁵¹

METHOD _____

YIELD _____



$\mu_{Al} =$ _____ $\mu_{Air} =$ _____

SHELF | AIR & MICA WINDOW FACTORS

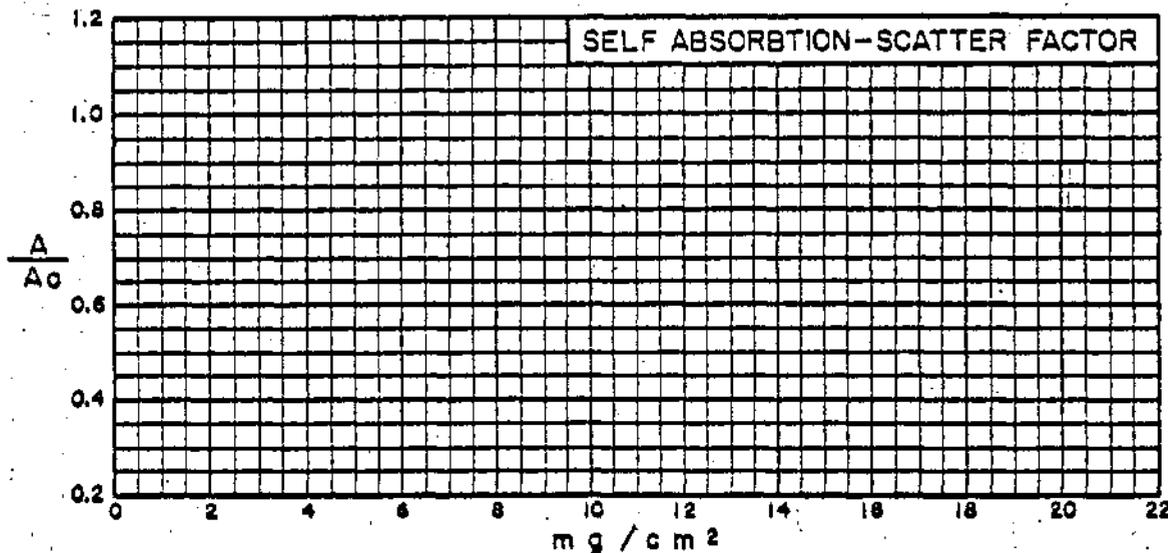
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 6.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1					
SHELF 2					
SHELF 3					

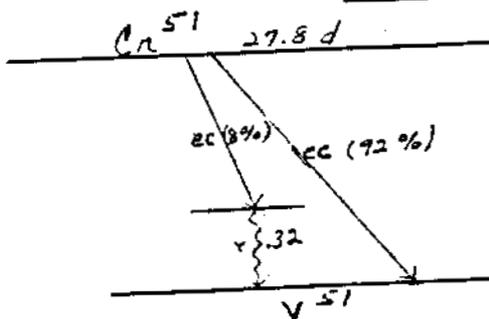
BACK-SCATTER FACTORS

SHELF 1					
SHELF 2					
SHELF 3					



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^9) (S.S.) (bs.) (S.S.A.) (A+M.W.) (Yield)} = \mu C/\text{unit}$

Chromium - 51

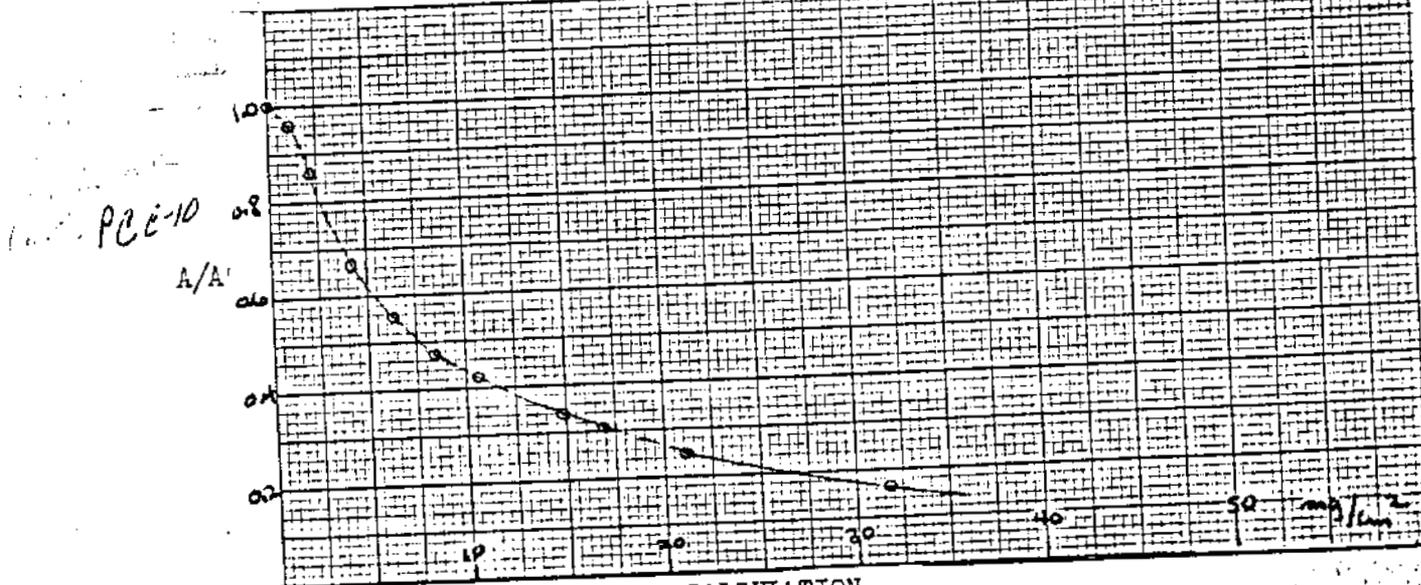


Shelf	Air & Mica Window Abs.
1	
2	
3	
4	
5	

Shelf	SOURCE SPREAD			
	1" dish	1 1/2" dish	1 1/2" Filter	1.38" millipore
L60 1	.79	.51	.51	.66
B60 2	.84	.68	.68	.78
3				
4				
5				

Shelf	BACKSCATTER			
	1" dish	1 1/2" dish	1 1/2" Filter	1.38" millipore
1	1.20*	1.20*	1.05*	1.05*
2	1.20*	1.20*	1.05*	1.65*
3				
4				
5				

SELF ABSORPTION - SCATTER



CALCULATION

$$\frac{(C/M) \text{ (Volume Factor)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{SS}) (\text{bs}) (\text{SSA}) (\text{A\&W}) (\text{Yield})} = \text{uc/unit}$$

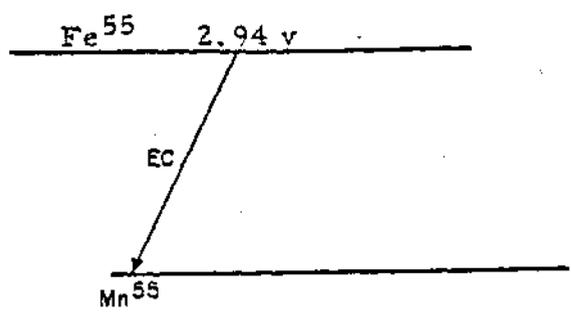
COMMON METHOD

* Interpreted
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ISOTOPE Iron⁵⁵

METHOD _____

YIELD _____



$\mu_{Al} =$ _____ $\mu_{Air} =$ _____

SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1					
SHELF 2					
SHELF 3					

BACK-SCATTER FACTORS _____

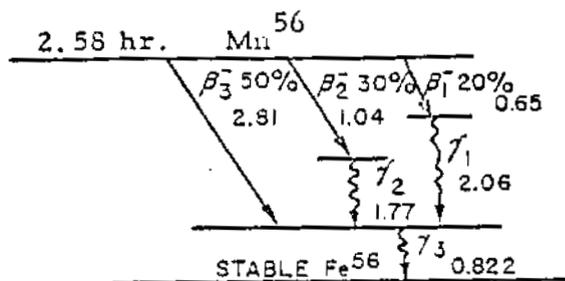
ISOTOPE Manganese⁵⁶

METHOD Manganese Dioxide

YIELD 31.7 mg=100%

(As MnO₂)

$\mu_{Al} = 0.010$ $\mu_{Air} =$



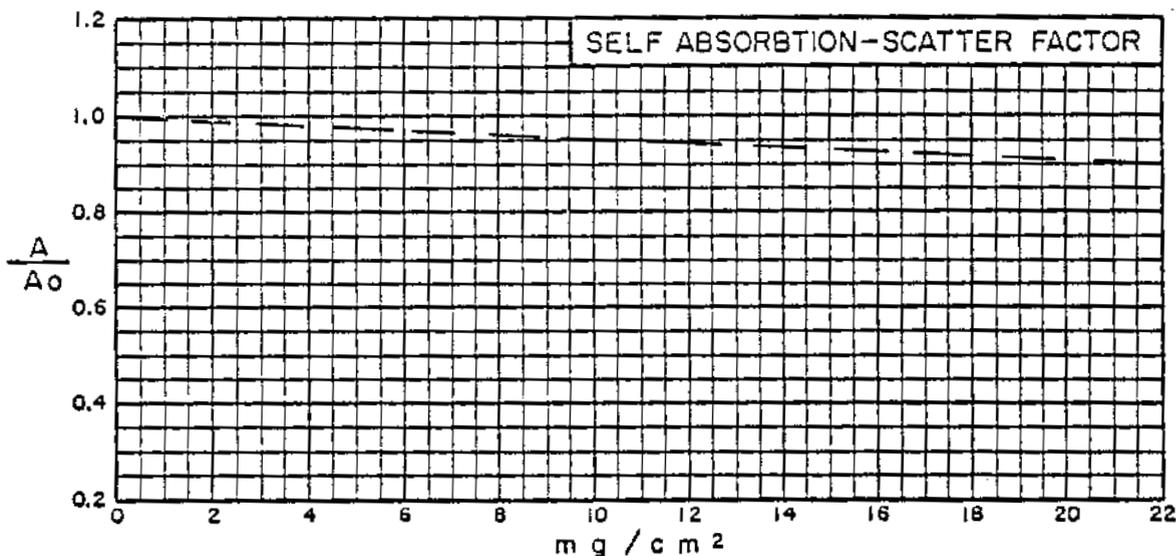
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.94
3	0.93

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.99	0.59	0.81	0.66	0.56
SHELF 2	1.08	0.84	0.88	0.79	0.73
SHELF 3	1.14	0.99	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.41	1.41	1.25	1.16	1.08
SHELF 2	1.39	1.39	1.20	1.11	1.05
SHELF 3	1.35	1.35	1.18	1.10	1.05



CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(A+M.W.)(\text{Yield})} = \mu\text{C/unit}$

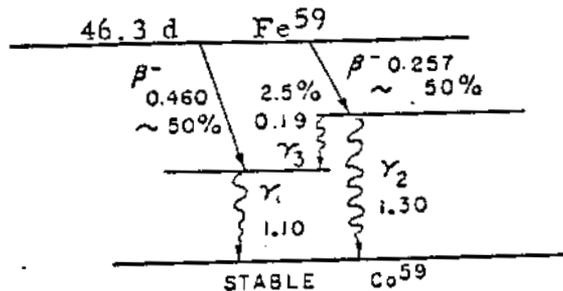
Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE ⁵⁹Iron

METHOD Ether Extraction

YIELD 28.6 mg = 100 %
(As Fe₂O₃)

$\mu_{Al} = 0.085$ $\mu_{Air} =$



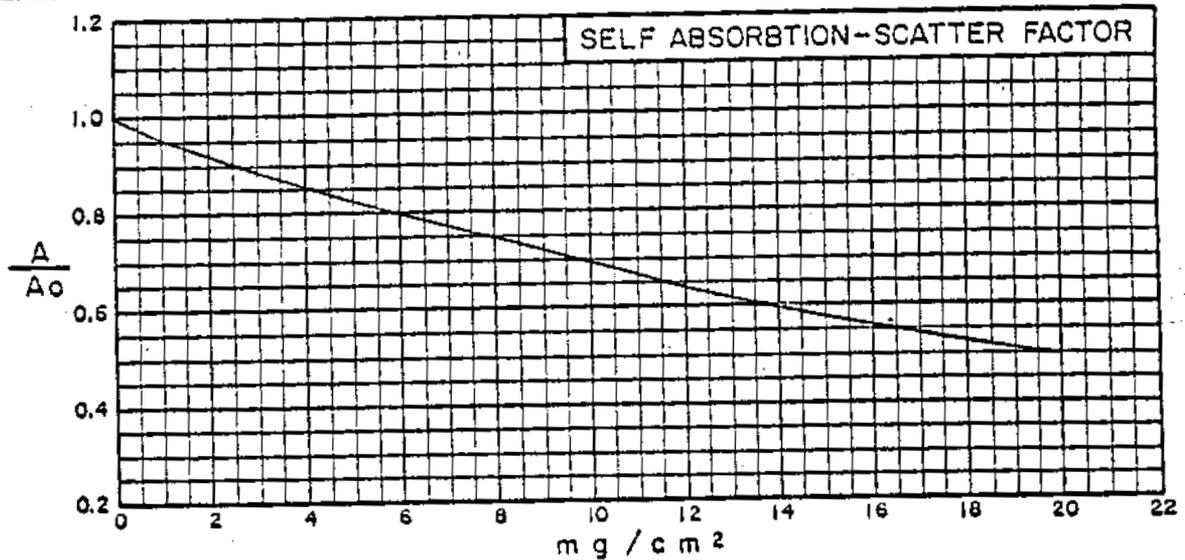
SHELF	AIR B MICA WINDOW FACTORS
1	0.74
2	0.63
3	0.55

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.91	0.53	0.80	0.64	0.53
SHELF 2	0.99	0.75	0.86	0.76	0.69
SHELF 3	1.05	0.89	0.92	0.85	0.80

BACK-SCATTER FACTORS

SHELF 1	1.37	1.37	1.19	1.15	1.12
SHELF 2	1.35	1.35	1.15	1.10	1.08
SHELF 3	1.32	1.32	1.13	1.09	1.07



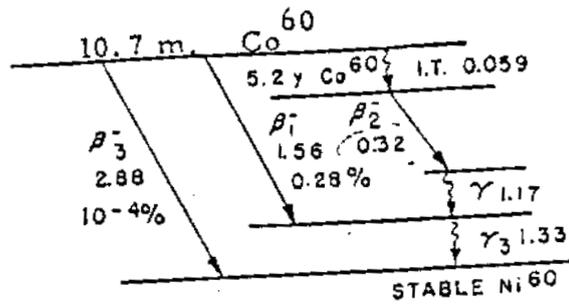
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{bs.}) (\text{S.S.A.}) (\text{A+M.W.}) (\text{Yield})} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Cobalt⁶⁰

METHOD* Potassium Cobaltinitrite

YIELD 80.2 mg = 100%
 (As K₃ CO (NO₂)₆ • H₂O)
 $\mu_{Air} = 0.088$ $\mu_{Air} = 0.06$



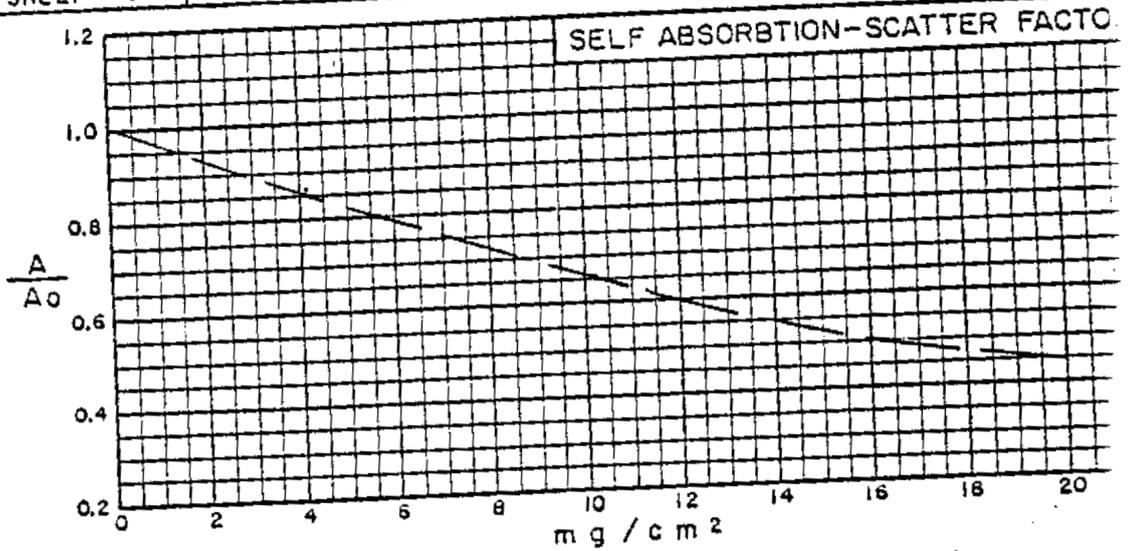
SHELF	AIR & MICA WINDOW FACTORS
1	0.73 (.77)
2	0.62
3	0.52

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.90	0.53	0.81	0.66	0.56
SHELF 2	0.98	0.75	0.88	0.79	0.73
SHELF 3	1.04	0.89	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.35	1.35	1.18	1.14	1.11
SHELF 2	1.33	1.33	1.14	1.09	1.07
SHELF 3	1.30	1.30	1.13	1.09	1.07



CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(S.S.)(bs.)(S.S.A.)(A+M.W.)(\text{Yield})} = \mu$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

*Additional Method
 Gamma Spectrometer

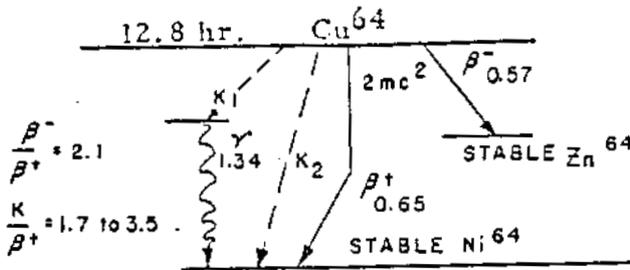
ISOTOPE Copper⁶⁴

METHOD Cuprous Thiocyanate

YIELD 38.2 mg. = 100%

(As Cu SCN)

$\mu_{Al} = 0.032$ $\mu_{Air} =$ _____



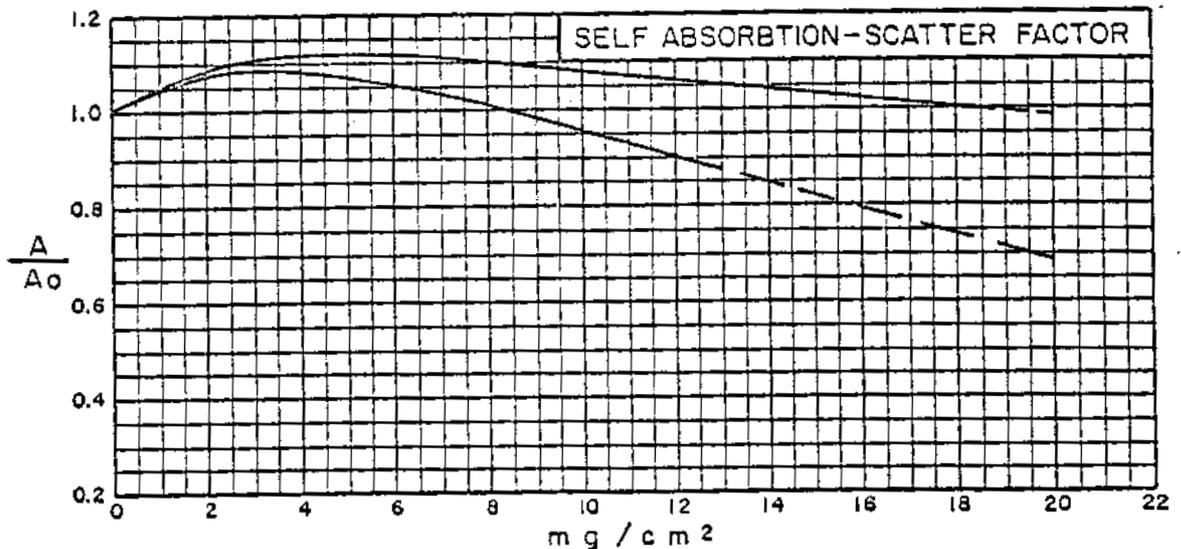
SHELF	AIR & MICA WINDOW FACTORS
1	0.89
2	0.84
3	0.79

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.93	0.55	0.81	0.66	0.56
SHELF 2	1.01	0.78	0.88	0.79	0.73
SHELF 3	1.07	0.92	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.45	1.45	1.22	1.19	1.11
SHELF 2	1.43	1.43	1.17	1.13	1.07
SHELF 3	1.39	1.39	1.16	1.12	1.07



CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu\text{C/unit}$

Form: Electroplated Cu on 2.27 cm.² St. Stl.

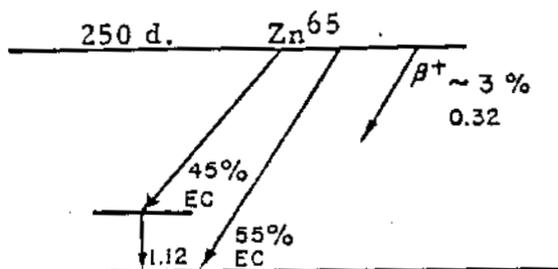
Remarks: Upper curve 1st shelf

Lower curve 2nd shelf

ISOTOPE Zinc⁶⁵

METHOD * Zinc Sulfide

YIELD 29.8 mg = 100%
(As ZnS)



μ_{Al} = 0.088 μ_{Air} = _____

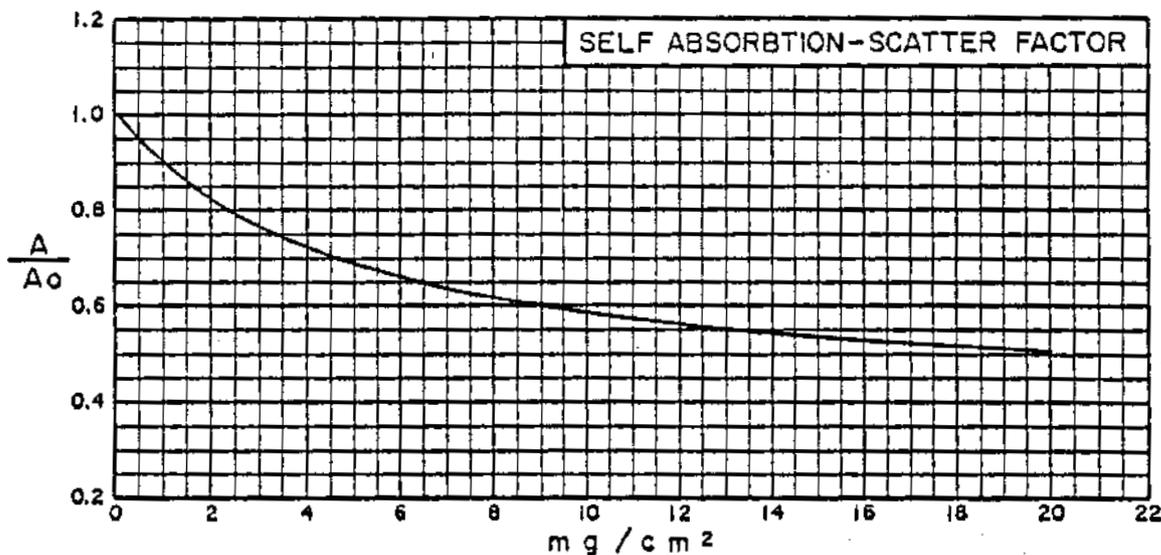
SHELF	AIR & MICA WINDOW FACTORS
1	0.73
2	0.62
3	0.52

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.90	0.53	0.81	0.66	0.56
SHELF 2	0.98	0.75	0.88	0.79	0.73
SHELF 3	1.04	0.89	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.35	1.35	1.18	1.14	1.11
SHELF 2	1.33	1.33	1.14	1.09	1.07
SHELF 3	1.30	1.30	1.13	1.09	1.07



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(A+M.W.)(\text{Yield})} = \mu\text{C/unit}$

Remarks: Zn⁶⁵ in ZnS on 1" dish - 1st shelf

* Additional Method
Gamma Spectrometer

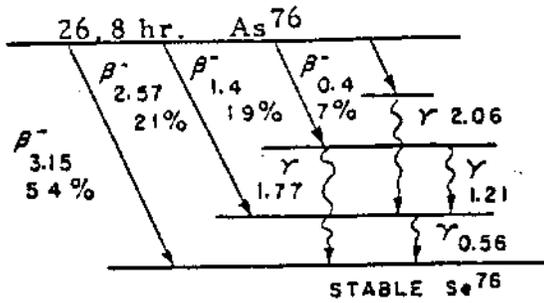
ISOTOPE Arsenic 76

METHOD Arsenic Sulfide

YIELD 32.8 mg. = 100%

(As As₂S₃)

$\mu_{Air} = 0.007$ $\mu_{Air} =$ _____



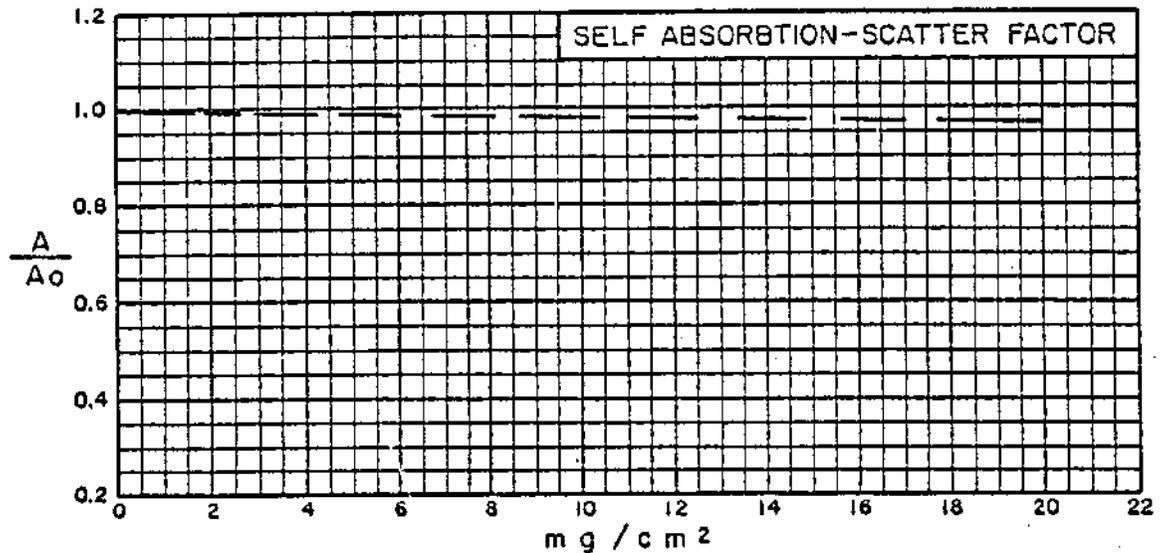
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	1.03	0.61	0.81	0.66	0.56
SHELF 2	1.12	0.87	0.88	0.79	0.73
SHELF 3	1.18	1.02	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.38	1.38	1.27	1.14	1.07
SHELF 2	1.36	1.36	1.21	1.09	1.05
SHELF 3	1.33	1.33	1.19	1.09	1.04



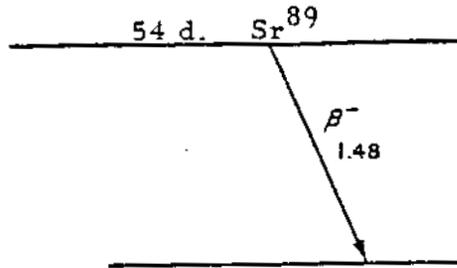
CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^9)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(A+MW)(\text{Yield})} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Strontium⁸⁹

METHOD Fuming Nitric Acid

YIELD ^{35.7} 44.2 mg = 100%
(As SrC₂O₄)



$\mu_{Al} = 0.0072$ $\mu_{Air} =$

SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.95

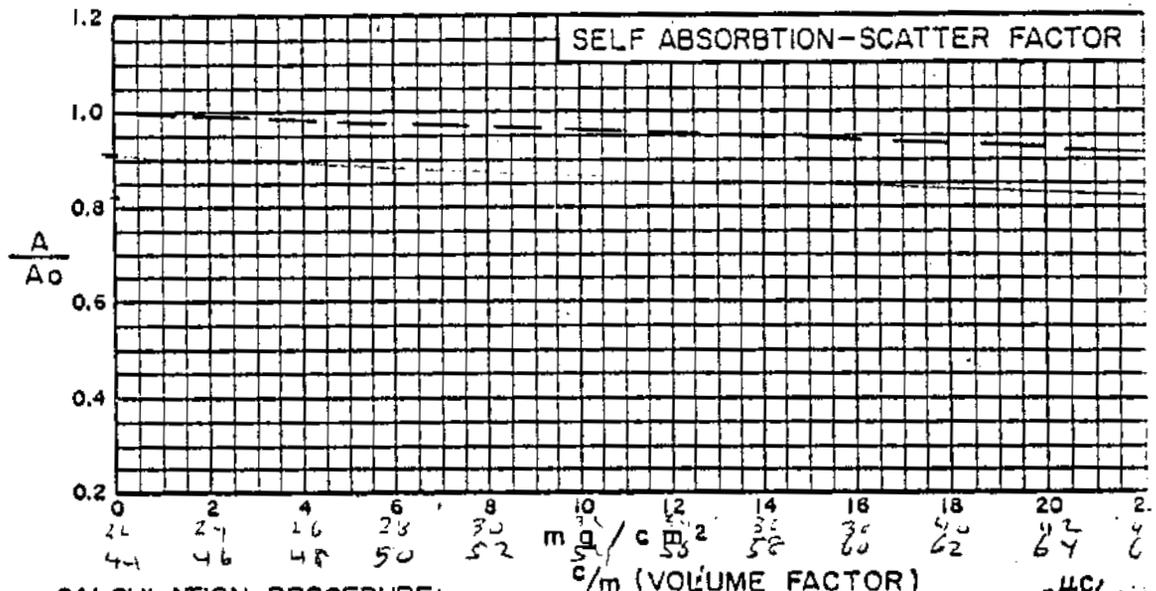
3.111

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.99	0.59	0.81	0.66	0.56
SHELF 2	1.08	0.84	0.88	0.79	0.73
SHELF 3	1.14	0.99	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.26	1.17	1.08
SHELF 2	1.42	1.42	1.21	1.11	1.05
SHELF 3	1.38	1.38	1.18	1.10	1.05



CALCULATION PROCEDURE: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$
 (Geo.) (2.2 x 10¹⁰) (S.S.) (bs.) (S.S.A.) (A+M.W.) (Yield) = $\mu C / \text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Strontium⁹⁰

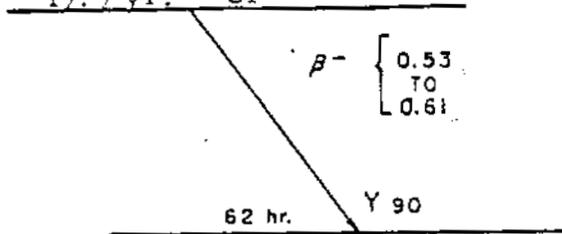
METHOD Fuming Nitric Acid

23.7 mg. = 100% substance
 YIELD 44.2 mg. = 100%
 (As SrC₂O₄)

19.9 yr. Sr⁹⁰

$\mu_{Air} = 0.034$ $\mu_{Air} =$

3,654



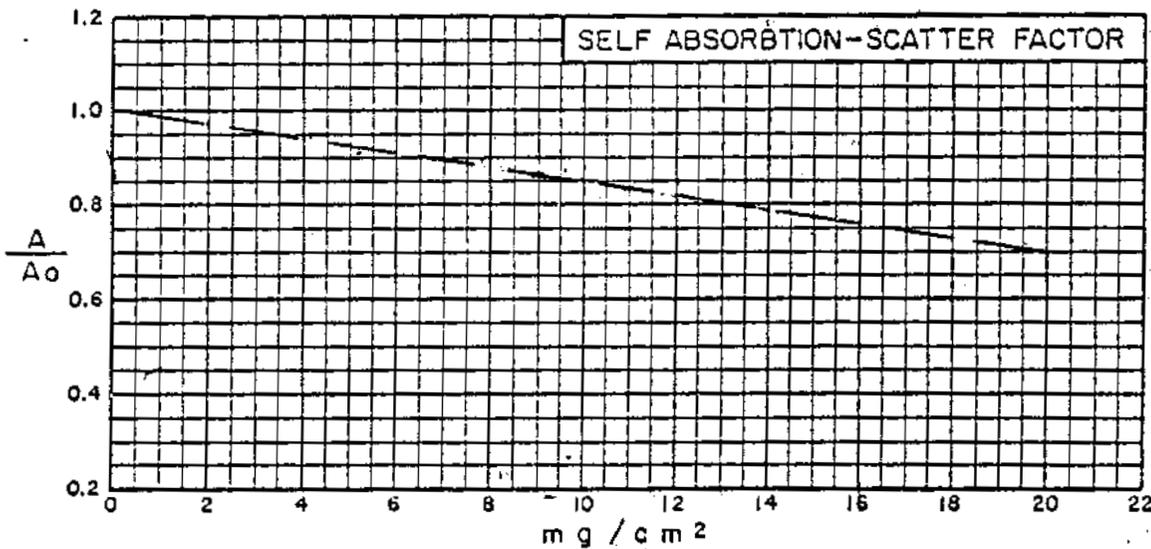
SHELF	AIR & MICA WINDOW FACTORS
1	0.88 0.96
2	0.83 0.89
3	0.78 0.84

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.94	0.55	0.81	0.66	0.56
SHELF 2	1.02	0.78	0.88	0.79	0.73
SHELF 3	1.08	0.92	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.45	1.45	1.22	1.19	1.11
SHELF 2	1.43	1.43	1.17	1.13	1.07
SHELF 3	1.39	1.39	1.16	1.12	1.07



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo)(2.2 \times 10^6)(S.S.)(bs.)(S.S.A)(A+M.W.)(Yield)} = \mu C/unit$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

Time $\mu_{air} = 0.034$ shelf #2
 2/4/53 K11A sl #65

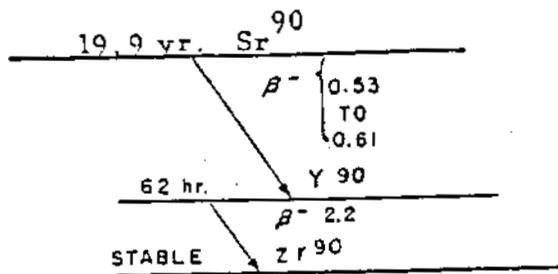
ISOTOPE Strontium⁹⁰ - Yttrium⁹⁰

METHOD Fuming Nitric Acid

YIELD 44.2 mg. = 100%

(As Sr C₂ O₄)

$\mu_{Al} = 0.019$ $\mu_{Air} =$



3.28

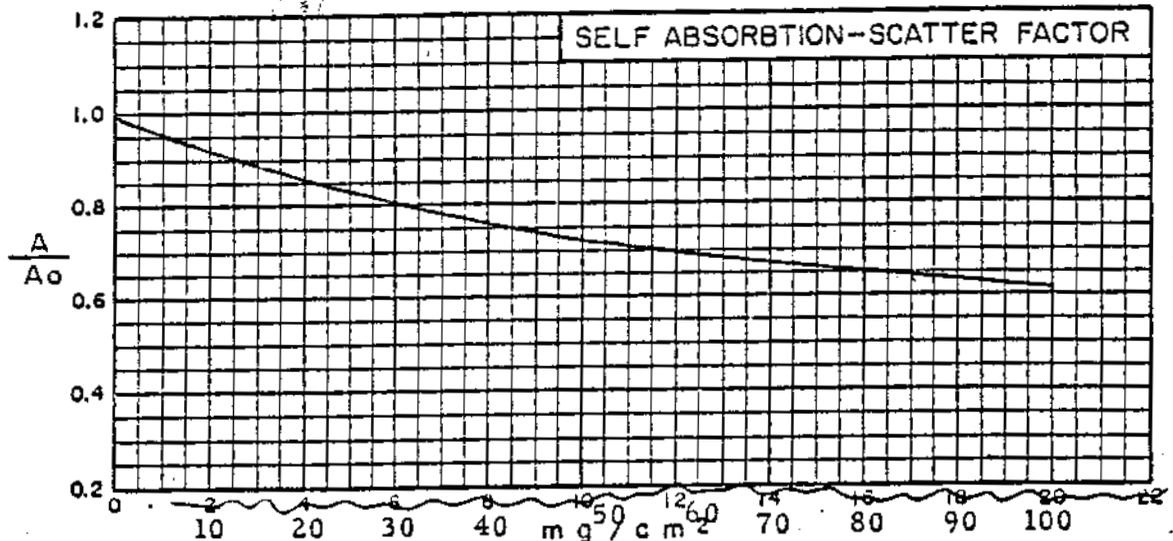
SHELF	AIR & MICA WINDOW FACTORS
1	0.94 (.96)
2	0.90 (.92)
3	0.87 (.91)
4	.85

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.98	0.58	0.81	0.66	0.56
SHELF 2	1.07	0.83	0.88	0.79	0.73
SHELF 3	1.13	0.97	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.43	1.43	1.24	1.17	1.09
SHELF 2	1.41	1.41	1.19	1.11	1.06
SHELF 3	1.37	1.37	1.17	1.11	1.06



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo)(2.2 \times 10^9)(S.S.)(bs.)(S.S.A.)(A+M.W.)(Yield)} = \mu C/\text{unit}$

Remarks: Sr⁹⁰ - Y⁹⁰ in river water salts on 1" dish - 1st shelf

*out of spec
100% yield, act*

*C/m
(1.43 x 10⁶)(S.S.A.)(Y)*

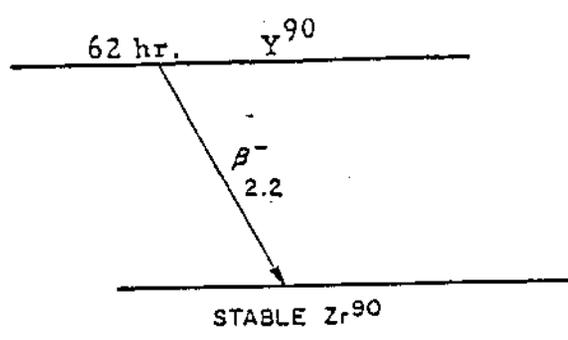
ISOTOPE Yttrium⁹⁰

METHOD Yttrium Fluoride

YIELD $\frac{25.4 \text{ mg}}{50.8 \text{ mg}} = 100\%$
(As Y_2O_3)

$\mu_{Al} = 0.0038$ $\mu_{Air} =$

3.033



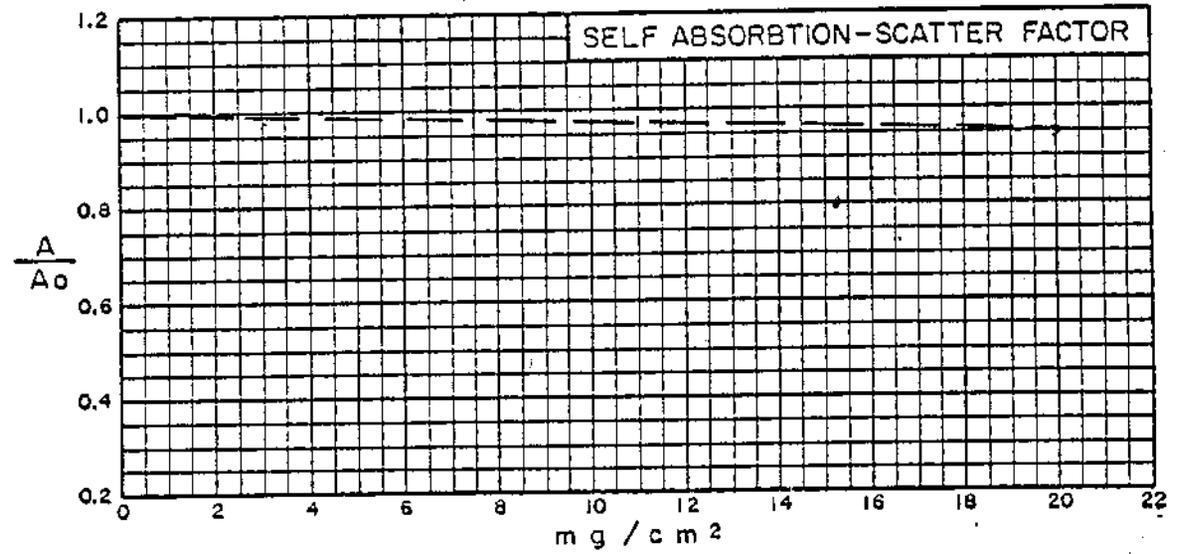
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.98
3	0.97

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	1.02	0.61	0.81	0.66	0.56
SHELF 2	1.11	0.87	0.88	0.79	0.73
SHELF 3	1.17	1.02	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.40	1.40	1.26	1.14	1.06
SHELF 2	1.38	1.38	1.21	1.09	1.04
SHELF 3	1.34	1.34	1.18	1.09	1.04



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(A+M.W.)(\text{Yield})} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

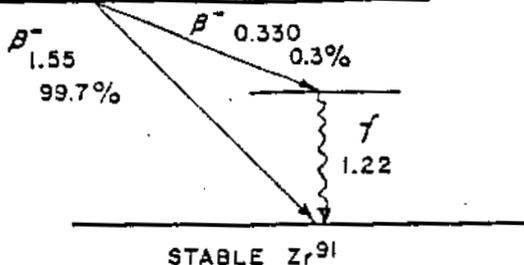
ISOTOPE Yttrium⁹¹

METHOD Yttrium Fluoride

YIELD $\frac{2.54 \text{ mg}}{50.8 \text{ mg}} = 100\%$
(As Y₂O₃)

Y⁹¹ 58.5 ± 1.0 day

$\mu_{\text{Al}} = 0.0067$ $\mu_{\text{Air}} =$



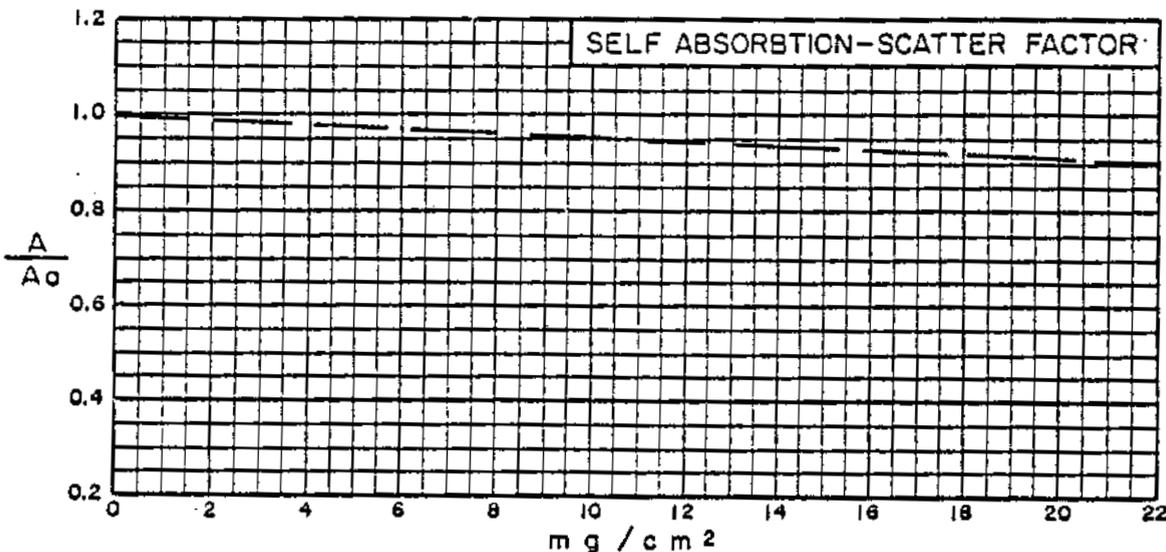
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	1.07	0.64	0.81	0.66	0.56
SHELF 2	1.17	0.91	0.88	0.79	0.73
SHELF 3	1.23	1.08	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.26	1.16	1.09
SHELF 2	1.42	1.42	1.21	1.11	1.06
SHELF 3	1.38	1.38	1.18	1.10	1.05



CALCULATION PROCEDURE: $\frac{\text{c/m (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^{10})(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A+MW.})(\text{Yield})} = \mu\text{C/unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Zirconium⁹⁵

METHOD* Barium Fluozirconate

YIELD 27.0 mg = 100%
(As ZrO₂)

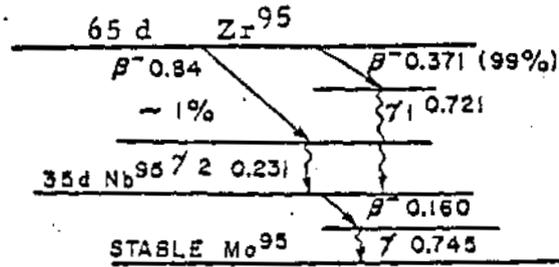
.95

$\mu_{\Delta 1} = \frac{8.072}{217}$ $\mu_{Alr} =$

ISOTOPE Zirconium⁹⁵ - Niobium⁹⁵

METHOD Spike - Direct Plate

YIELD



$\mu_{Al} = 0.15$ $\mu_{Air} =$

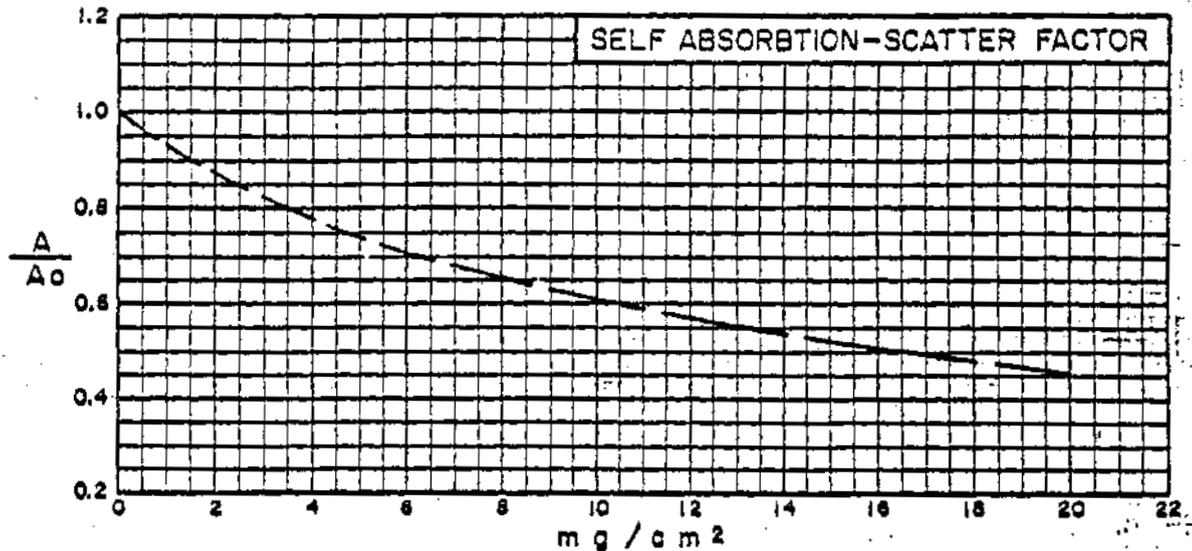
SHELF	AIR & MICA WINDOW FACTORS
1	0.58
2	0.46
3	0.37

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.89	0.52	0.80	0.64	0.53
SHELF 2	0.97	0.73	0.86	0.76	0.69
SHELF 3	1.02	0.87	0.92	0.85	0.80

BACK-SCATTER FACTORS

SHELF 1	1.30	1.30	1.16	1.12	1.08
SHELF 2	1.29	1.29	1.12	1.08	1.06
SHELF 3	1.27	1.27	1.11	1.07	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^9) (\text{S.S.}) (\text{b.s.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu C / \text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Niobium⁹⁵

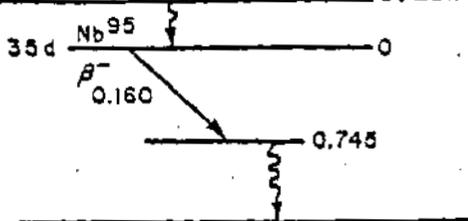
METHOD Niobic Oxide

YIELD 28.6 mg = 100%

(As Nb₂O₅)

Nb^{95m} 90hr 0.231

$\mu_{Al} = 0.27$ $\mu_{Air} =$



STABLE Mo⁹⁵

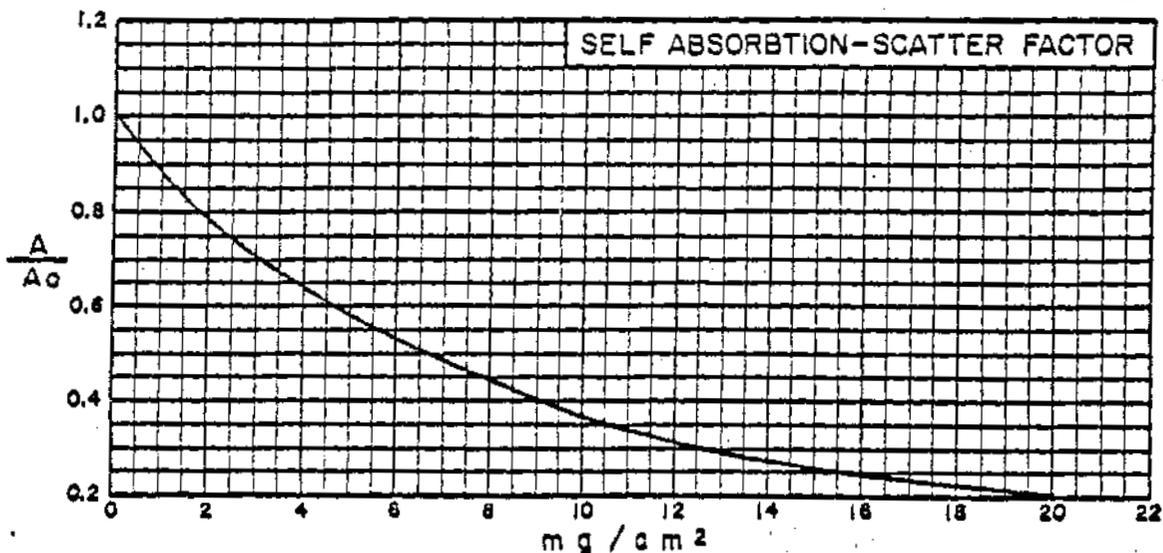
SHELF	AIR & MICA WINDOW FACTORS
1	0.38
2	0.23
3	0.14

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.86	0.50	0.78	0.61	0.50
SHELF 2	0.94	0.71	0.84	0.72	0.65
SHELF 3	0.99	0.84	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.23	1.23	1.12	1.07	1.06
SHELF 2	1.22	1.22	1.09	1.05	1.04
SHELF 3	1.20	1.20	1.09	1.04	1.04



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (b.s.) (S.S.A.) (A+M.W.) (Yield)} = \mu C / \text{unit}$

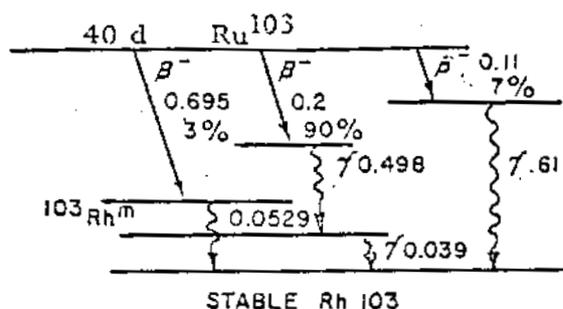
0008576

ISOTOPE Ruthenium 103

METHOD* Distillation

YIELD 100% = 28.0 mg.
(As RuO₂ standardized)

$\mu_{Al} = 0.195$ $\mu_{Air} =$



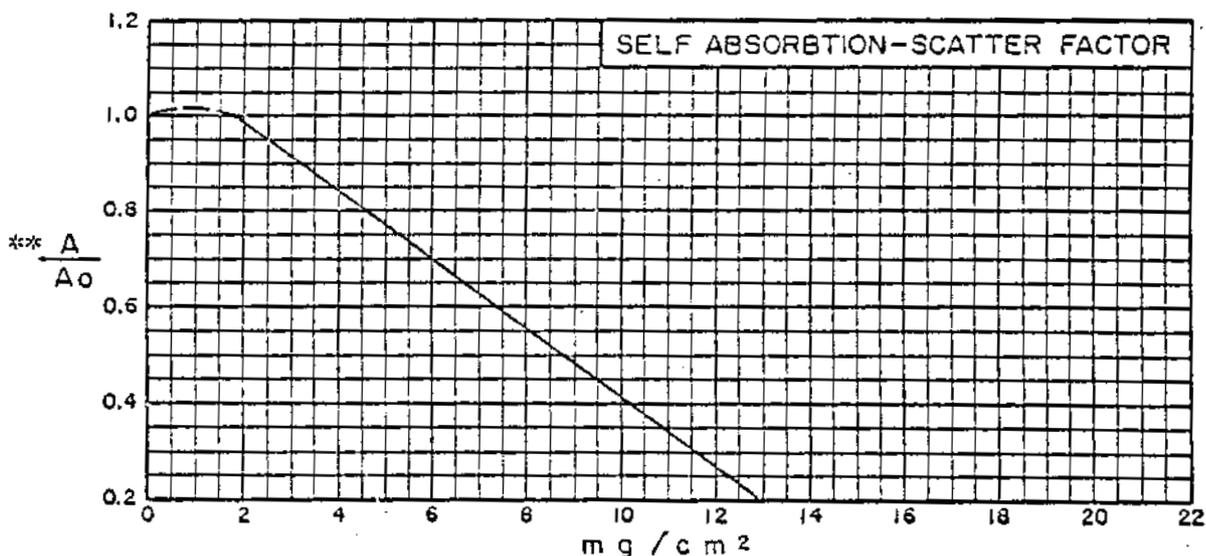
SHELF	AIR B MICA WINDOW FACTORS
1	0.50
2	0.35
3	0.25

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.87	0.51	0.78	0.61	0.50
SHELF 2	0.95	0.72	0.84	0.72	0.65
SHELF 3	1.00	0.86	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.27	1.27	1.14	1.09	1.07
SHELF 2	1.26	1.26	1.11	1.06	1.05
SHELF 3	1.23	1.23	1.10	1.05	1.04



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A} + \text{M.W.})(\text{Yield})} = \mu\text{C/unit}$

* Additional Methods

Reduction
Carrier-free (CCl₄)

Mounting

1" S S dish
1" S S dish

Yield

100% = 20 mg.
100%

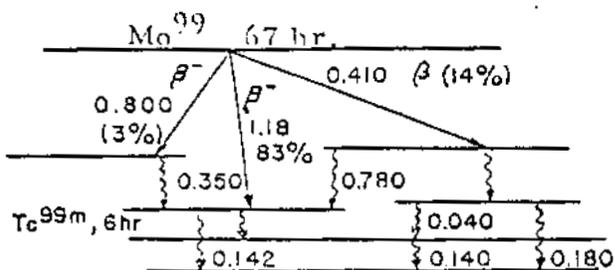
** Remarks: Ru¹⁰³ as RuO(OH)₂ on std. 1" dishes (4.5 CM²) on shelf one.

ISOTOPE Molybdenum⁹⁹

METHOD α - Benzoinoxime

YIELD 30.0 mα = 100%
(As MoO₃)

μ_{Al} = _____ μ_{Air} = _____



SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.91
3	0.88

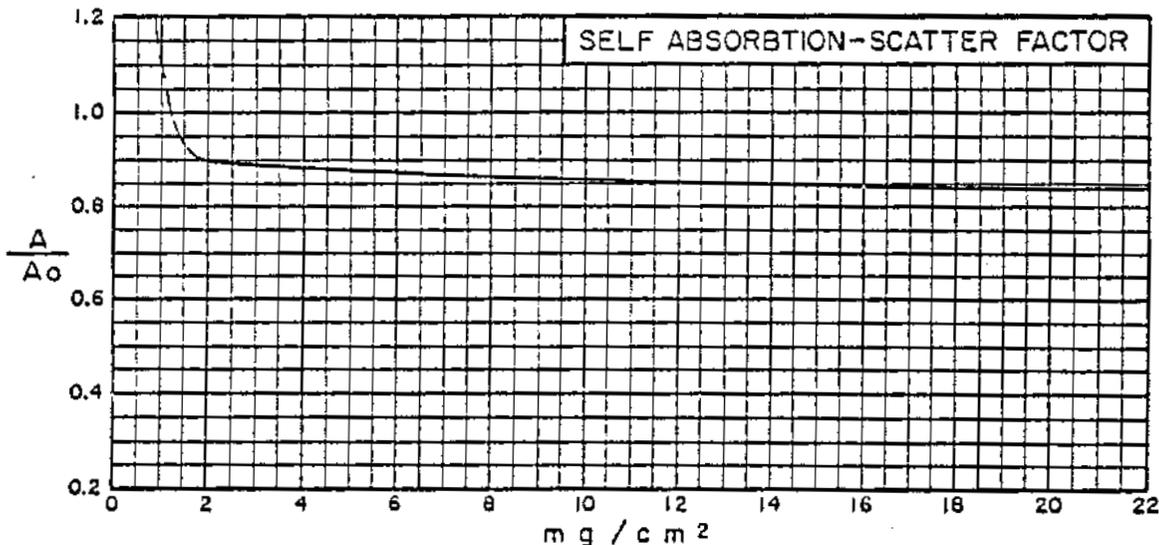
Tc⁹⁹ 2.1 x 10⁵ yr

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.97	0.57	0.81	0.66	0.56
SHELF 2	1.06	0.81	0.88	0.79	0.73
SHELF 3	1.12	0.96	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.24	1.18	1.09
SHELF 2	1.42	1.42	1.19	1.12	1.06
SHELF 3	1.38	1.38	1.17	1.11	1.05



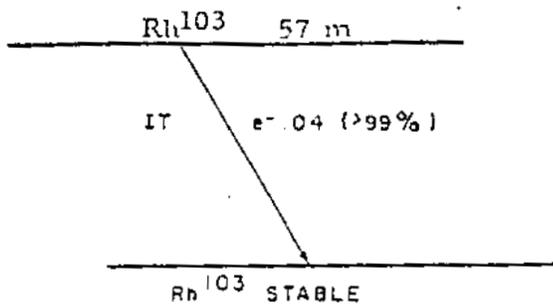
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A} + \text{M.W.})(\text{Yield})} = \mu\text{C/unit}$

Remarks: Mo O₃ on 1" dishes

ISOTOPE Rhodium 103

METHOD _____

YIELD _____



$\mu_{Al} =$ _____ $\mu_{Air} =$ _____

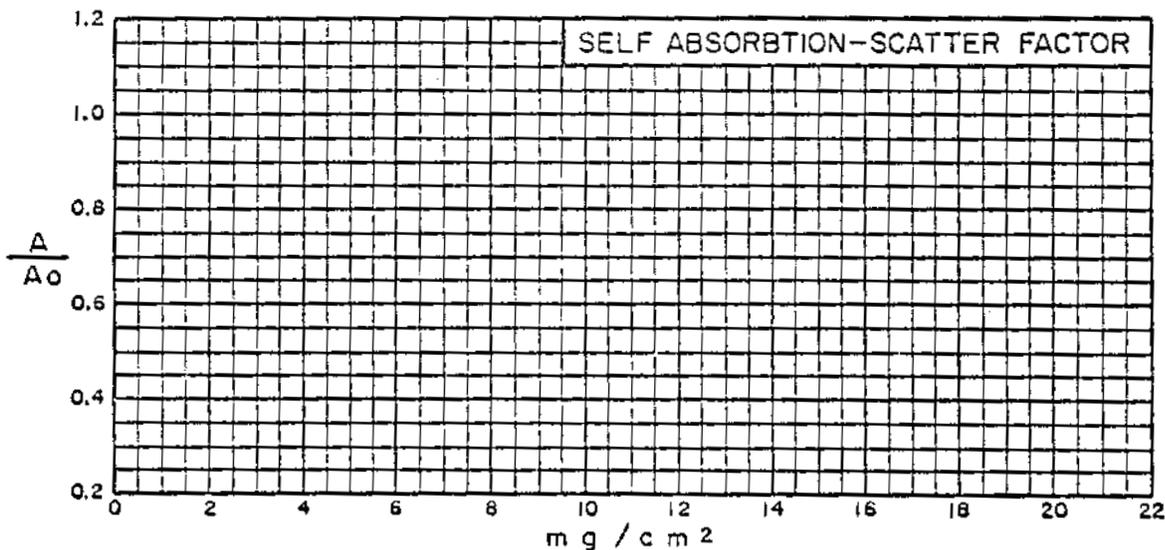
SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1					
SHELF 2					
SHELF 3					

BACK-SCATTER FACTORS

SHELF 1				
SHELF 2				
SHELF 3				



CALCULATION PROCEDURE:
$$\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^9) (\text{S.S.}) (\text{bs.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu\text{C/unit}$$

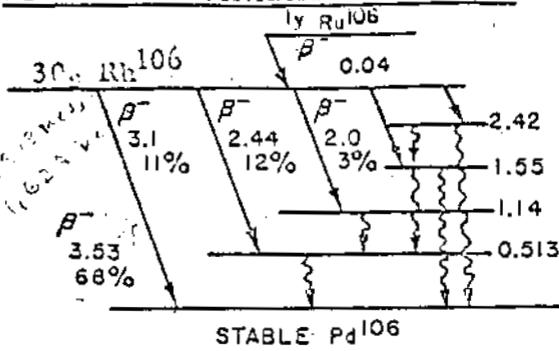
0008579

ISOTOPE Rhodium¹⁰⁶ (Ruthenium¹⁰⁶)

METHOD: Distillation

YIELD 28.0 mg = 100%
(As RuO₂ standardized)

$\mu_{Air} = 0.002$ $\mu_{Air} =$ _____



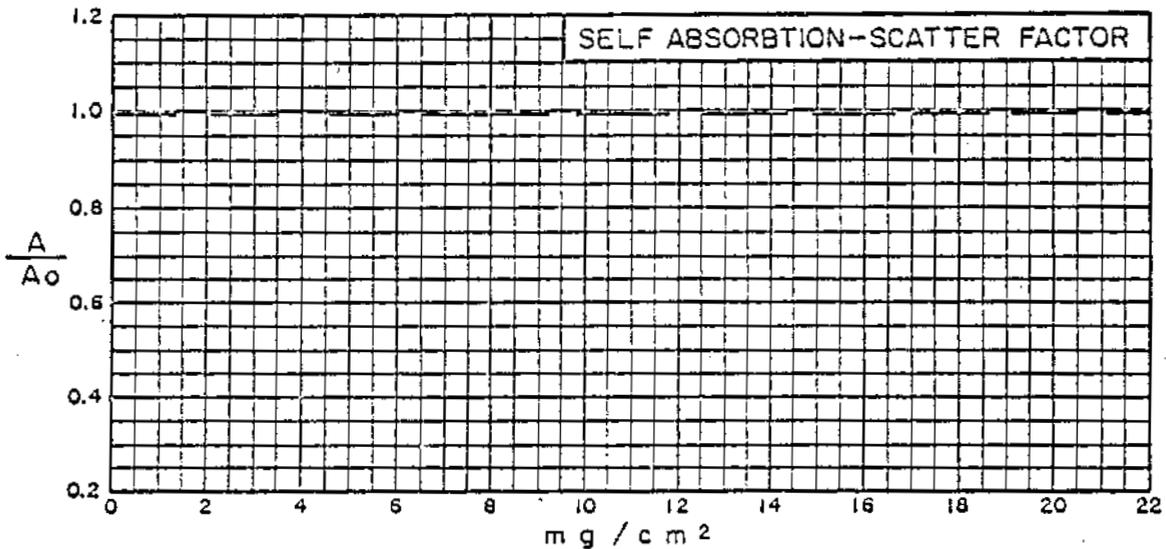
SHELF	AIR B MICA WINDOW FACTORS
1	0.99
2	0.99
3	0.99

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.98	0.59	0.81	0.66	0.56
SHELF 2	1.07	0.84	0.88	0.79	0.73
SHELF 3	1.13	0.99	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.33	1.33	1.26	1.12	1.08
SHELF 2	1.31	1.31	1.21	1.08	1.05
SHELF 3	1.28	1.28	1.18	1.07	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A}+\text{M.W.})(\text{Yield})} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

* Additional Methods

Reduction

Carrier-free (CCl₄)

Mounting

1" S S dish

1" S S dish

Yield

100% = 20 mg.

100%

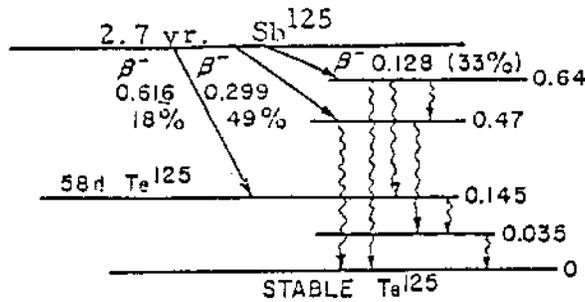
ISOTOPE Antimony¹²⁵

METHOD Antimony Sulfide

YIELD 27.9 mg = 100%

(As Sb₂S₃)

$\mu_{Al} = 0.15$ $\mu_{Air} =$



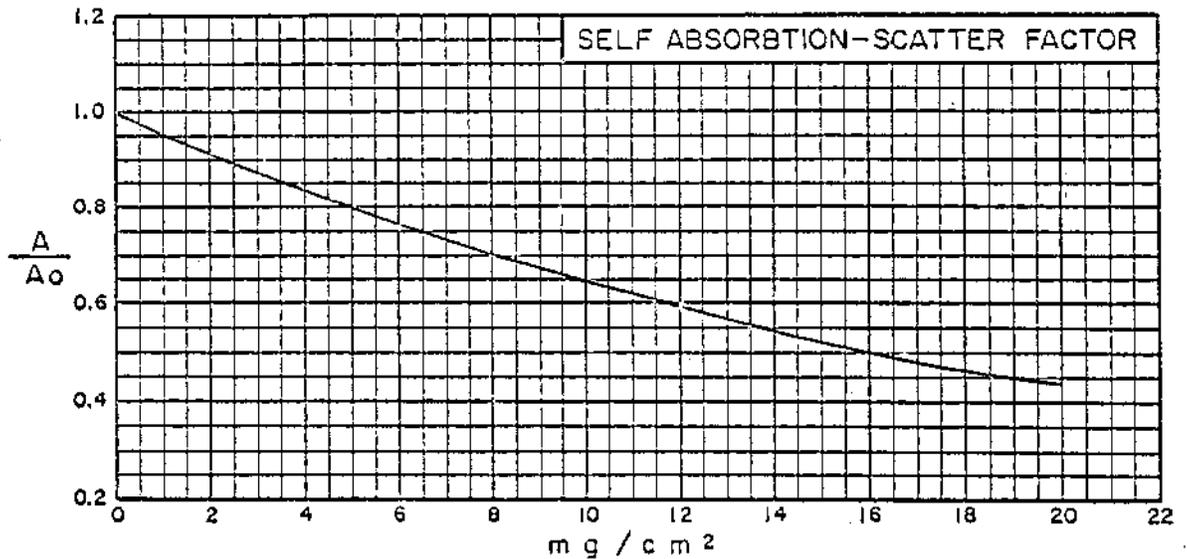
SHELF	AIR B MICA WINDOW FACTORS
1	0.53
2	0.48
3	0.40

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.89	0.52	0.79	0.62	0.51
SHELF 2	0.97	0.74	0.85	0.73	0.66
SHELF 3	1.02	0.87	0.91	0.83	0.82

BACK-SCATTER FACTORS

SHELF 1	1.31	1.31	1.16	1.12	1.08
SHELF 2	1.29	1.29	1.13	1.08	1.05
SHELF 3	1.27	1.27	1.11	1.07	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (bs.) (S.S.A.) (A+M.W.) (Yield)} = \mu C/unit$

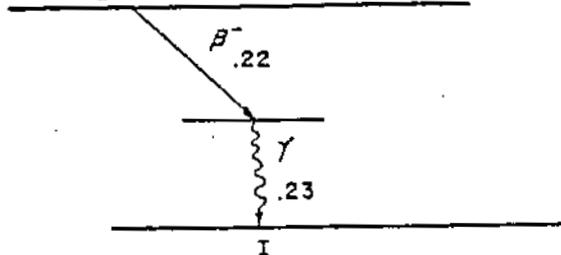
ISOTOPE Tellurium¹³²

METHOD SO₂ - Reduction

YIELD 20.0 mg = 100%
(As TeO)

Te¹³² 77 hr.

$\mu_{Al} = 0.16$ $\mu_{Air} =$



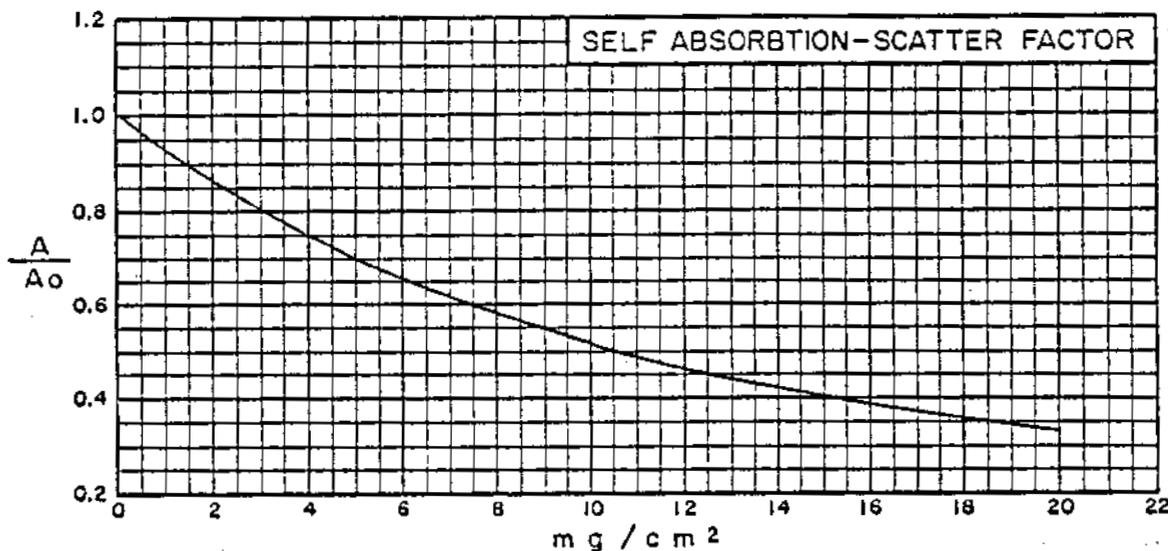
SHELF	AIR & MICA WINDOW FACTORS
1	0.56
2	0.42
3	0.31

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.88	0.51	0.78	0.61	0.50
SHELF 2	0.96	0.72	0.84	0.72	0.65
SHELF 3	1.01	0.86	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.28	1.28	1.15	1.10	1.06
SHELF 2	1.27	1.27	1.12	1.07	1.04
SHELF 3	1.24	1.24	1.11	1.06	1.04

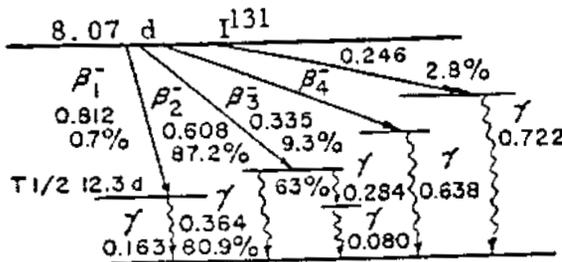


CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^9)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A} + \text{M.W.})(\text{Yield})} = \mu C/\text{unit}$

METHOD Silver Iodide

YIELD 42.3 mg = 100%
(As AgI standardized)

$\mu_{Al} = 0.039$ $\mu_{Air} =$



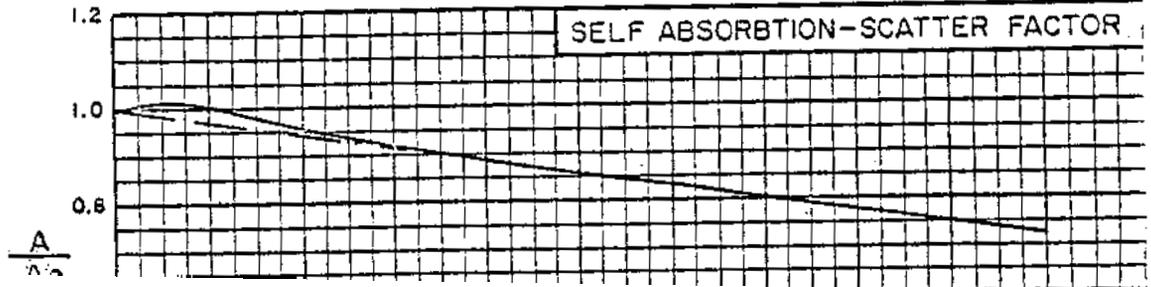
SHELF	AIR & MICA WINDOW FACTORS
1	0.87
2	0.82
3	0.76

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.94	0.55	0.81	0.66	0.56
SHELF 2	1.02	0.78	0.88	0.79	0.73
SHELF 3	1.08	0.92	0.93	0.87	0.83

BACK-SCATTER FACTORS

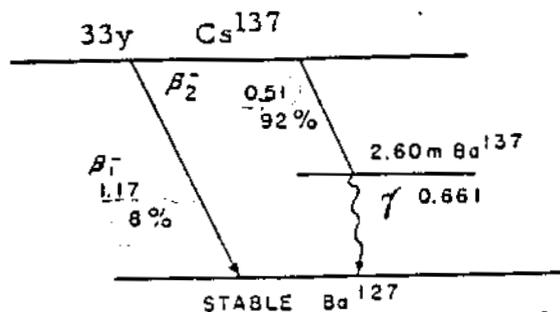
SHELF 1	1.44	1.44	1.21	1.11	1.11
SHELF 2	1.42	1.42	1.17	1.07	1.07
SHELF 3	1.38	1.38	1.15	1.07	1.07



ISOTOPE Cesium¹³⁷

METHOD* Cesium Silicowolframate

YIELD 100 mg = 100%
(As Cs₈SiW₁₂O₄₂ standard)



$\mu_{Al} = 0.039$ $\mu_{Air} =$

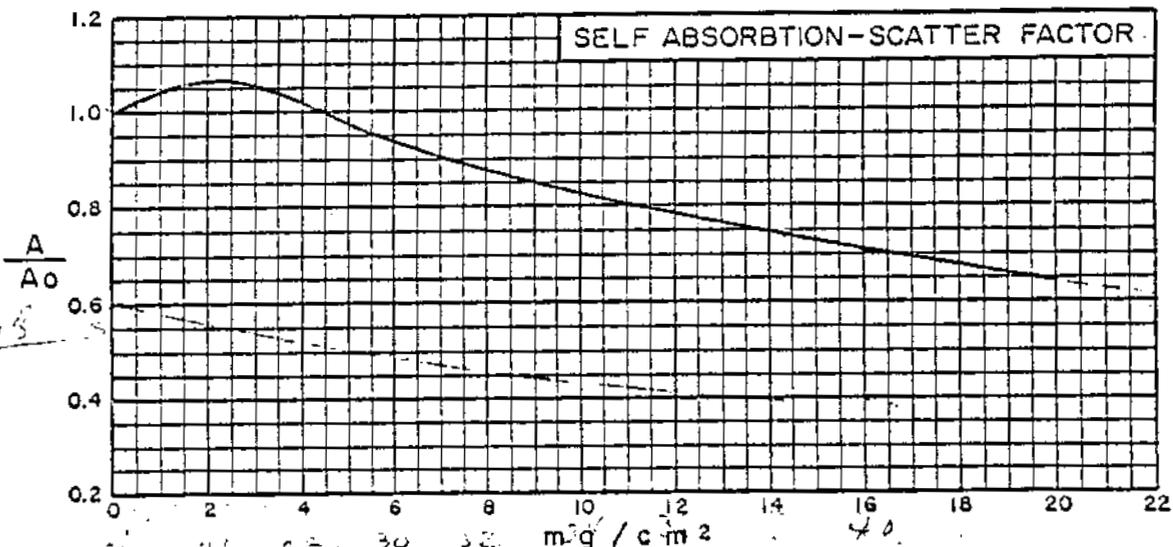
SHELF	AIR & MICA WINDOW FACTORS
1	0.87
2	0.81
3	0.75

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.93	0.52	0.81	0.66	0.56
SHELF 2	1.01	0.74	0.88	0.79	0.73
SHELF 3	1.07	0.87	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.21	1.19	1.11
SHELF 2	1.42	1.42	1.17	1.13	1.07
SHELF 3	1.38	1.38	1.15	1.12	1.07



CALCULATION PROCEDURE: $\frac{C}{m}$ (VOLUME FACTOR)
 $(Geo)(2.2 \times 10^9)(S.S.)(bs.)(S.S.A.)(A+M.W.)(Yield) = \mu C/unit$

Remarks: Cs¹³⁷ as Cesium Silicowolframate on one inch dishes (shelf 1)

* Additional Method Chloroplatinic Acid Mounting 1" S S dish Yield 50.7 mg = 100%

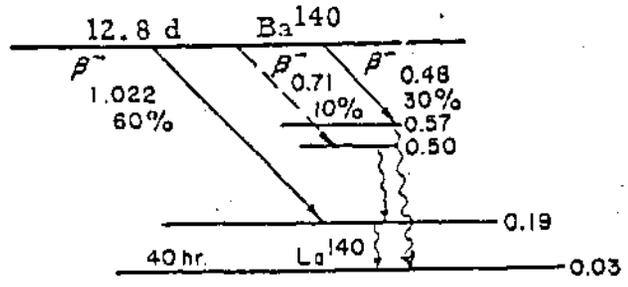
$(1.69 \times 10^5)(S.S.A.)(V)(V)$

METHOD Barium Chromate

YIELD 36.8 mg = 100%

(As BaCrO₄)

$\mu_{Al} = 0.023$ $\mu_{Air} =$



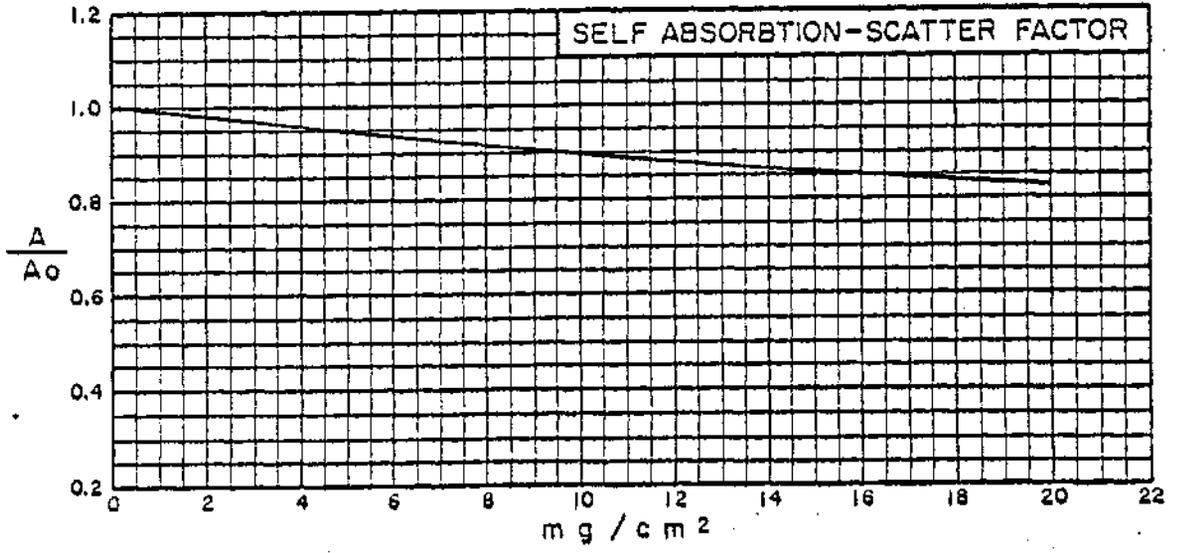
SHELF	AIR & MICA WINDOW FACTORS
1	0.92
2	0.88
3	0.84

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.96	0.56	0.81	0.66	0.56
SHELF 2	1.05	0.80	0.88	0.79	0.73
SHELF 3	1.10	0.94	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.24	1.19	1.10
SHELF 2	1.42	1.42	1.19	1.13	1.07
SHELF 3	1.38	1.38	1.17	1.12	1.06



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu C/\text{unit}$

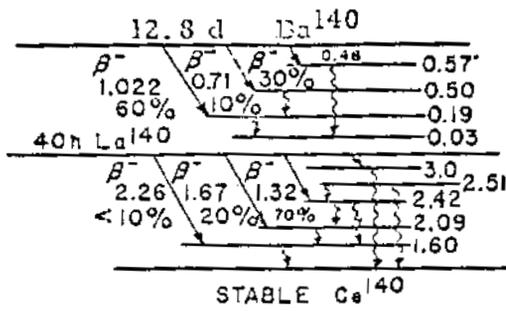
ISOTOPE Barium¹⁴⁰ Lanthanum¹⁴⁰

METHOD Barium Chromate

YIELD 36.8 mg = 100%

(As Ba Cr O₄)

$\mu_{Al} = 0.014$ $\mu_{Air} =$



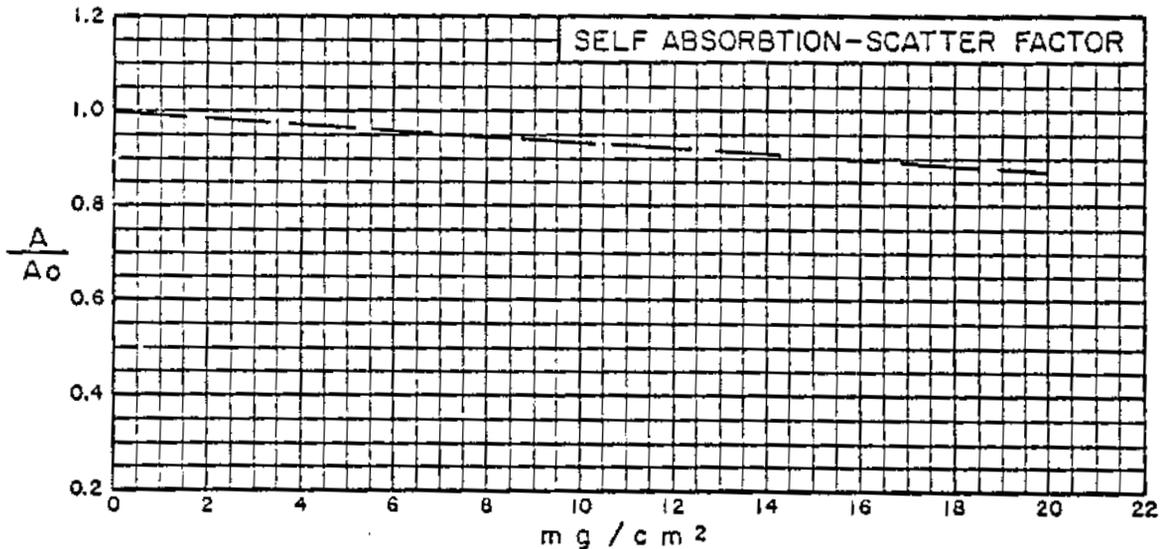
SHELF	AIR & MICA WINDOW FACTORS
1	0.95
2	0.92
3	0.89

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.98	0.58	0.81	0.66	0.56
SHELF 2	1.07	0.82	0.88	0.79	0.73
SHELF 3	1.13	0.97	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.24	1.18	1.09
SHELF 2	1.42	1.42	1.19	1.12	1.06
SHELF 3	1.38	1.38	1.17	1.11	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A} + \text{M.W.})(\text{Yield})} = \mu C/\text{unit}$

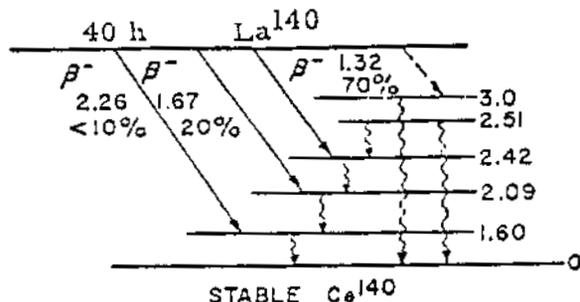
Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

METHOD Lanthanum Fluoride

YIELD 24.6 mg = 100%

(As La₂O₃)

$\mu_{Al} = 0.008$ $\mu_{Air} =$



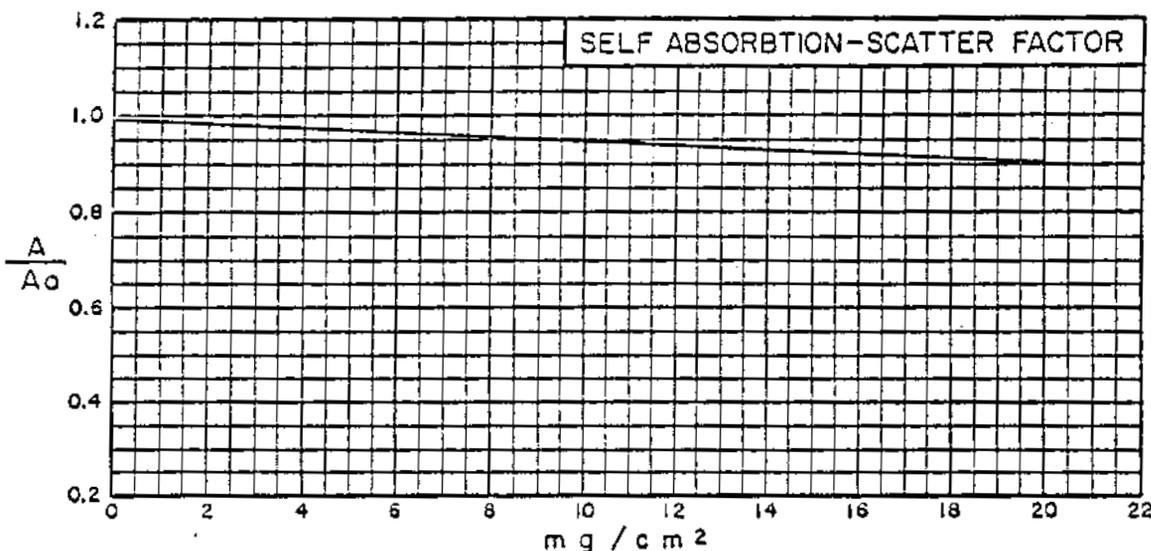
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	1.00	0.59	0.81	0.66	0.56
SHELF 2	1.09	0.84	0.88	0.79	0.73
SHELF 3	1.15	0.99	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.44	1.44	1.25	1.17	1.08
SHELF 2	1.42	1.42	1.20	1.11	1.05
SHELF 3	1.38	1.38	1.18	1.10	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo)(2.2 \times 10^9)(S.S.)(bs.)(S.S.A)(A+M.W.)(Yield)} = \mu C/\text{unit}$

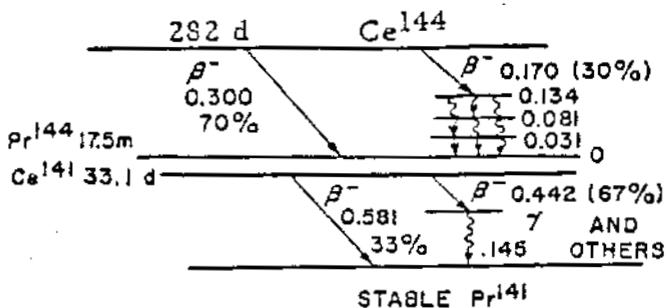
ISOTOPE Rare Earths*

METHOD Ceric Fluoride

YIELD 23.4 mg = 100%

(As Ce₂O₃)

$\mu_{Al} = 0.055$ $\mu_{Air} =$



SHELF	AIR & MICA WINDOW FACTORS
1	0.82
2	0.76
3	0.69

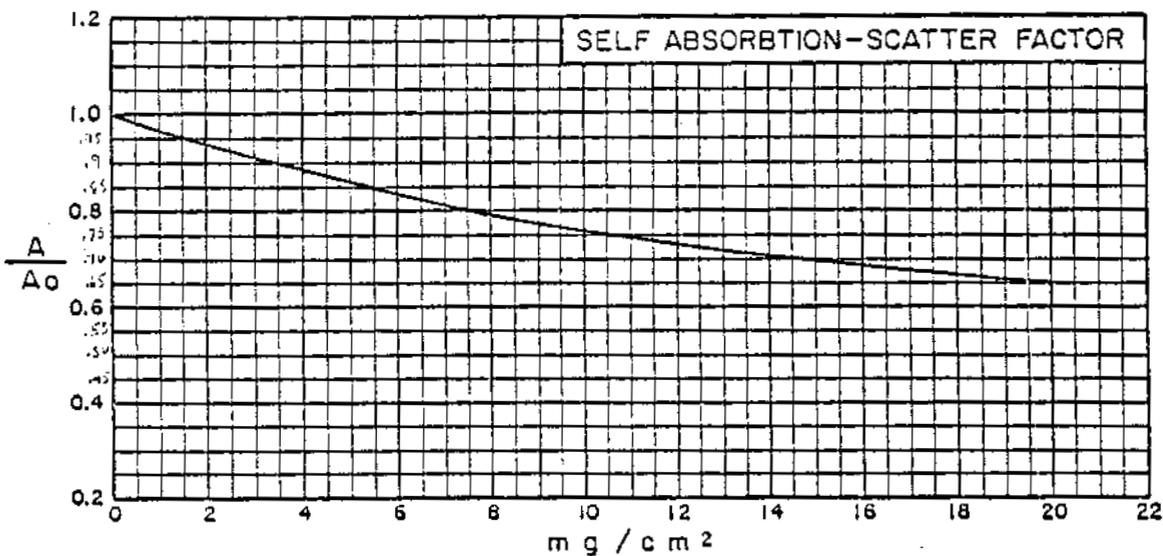
STABLE Pr¹⁴¹

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.95	0.56	0.81	0.64	0.54
SHELF 2	1.03	0.79	0.87	0.77	0.70
SHELF 3	1.09	0.94	0.92	0.85	0.81

BACK-SCATTER FACTORS

SHELF 1	1.36	1.36	1.21	1.14	1.08
SHELF 2	1.34	1.34	1.17	1.10	1.05
SHELF 3	1.31	1.31	1.15	1.09	1.05



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A} + \text{M.W.})(\text{Yield})} = \mu\text{C/unit}$

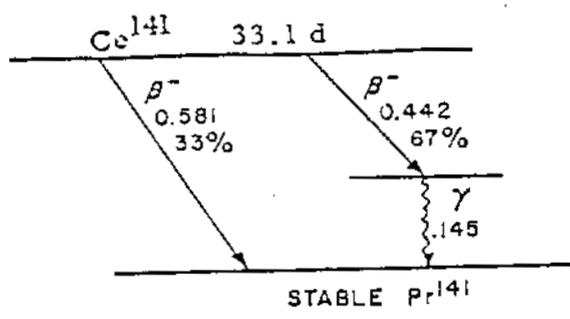
*Remarks: Assume 1/3 Ce¹⁴¹, 1/3 Ce¹⁴⁴, 1/3 Pr¹⁴⁴

ISOTOPE Cerium¹⁴¹

METHOD Cerium Fluoride

YIELD 23.4 mg = 100%
(As Ce₂O₃)

$\mu_{Al} = 0.045$ $\mu_{Air} =$



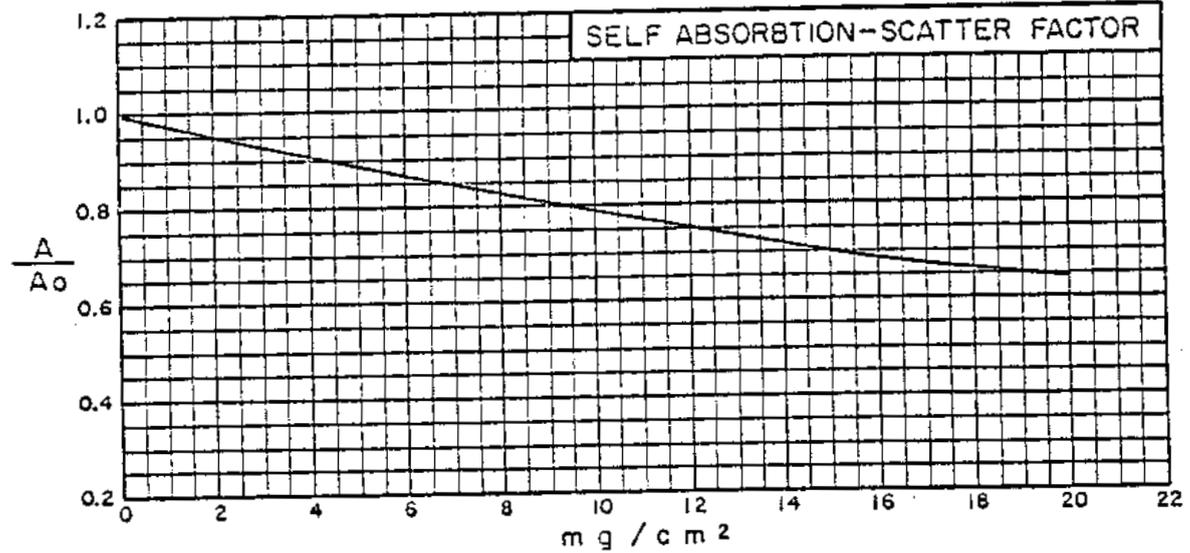
SHELF	AIR & MICA WINDOW FACTORS
1	0.85
2	0.79
3	0.71

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.93	0.54	0.81	0.66	0.56
SHELF 2	1.01	0.77	0.88	0.79	0.73
SHELF 3	1.07	0.91	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.43	1.43	1.22	1.19	1.11
SHELF 2	1.41	1.41	1.17	1.13	1.07
SHELF 3	1.37	1.37	1.16	1.12	1.07



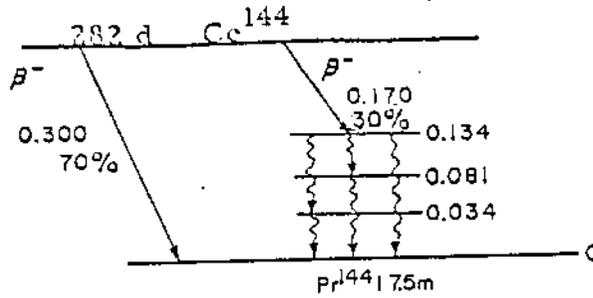
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(A+M.W.)(\text{Yield})} = \mu\text{C/unit}$

METHOD Cerium Fluoride

YIELD 23.4 mg = 100%

(As Ce2O3)

$\mu_{Ai} = 0.13$ $\mu_{Air} =$ _____



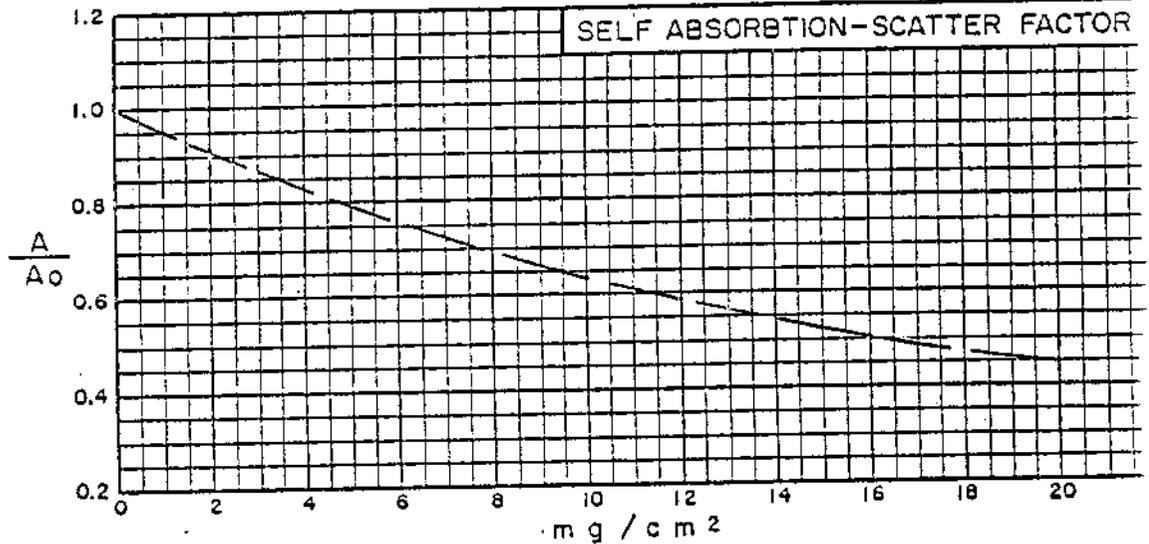
SHELF	AIR & MICA WINDOW FACTOR
1	0.62
2	0.49
3	0.39

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.89	0.51	0.73	0.61	0.50
SHELF 2	0.97	0.72	0.84	0.72	0.65
SHELF 3	1.02	0.86	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.30	1.30	1.16	1.12	1.09
SHELF 2	1.29	1.29	1.13	1.08	1.06
SHELF 3	1.26	1.26	1.11	1.07	1.05



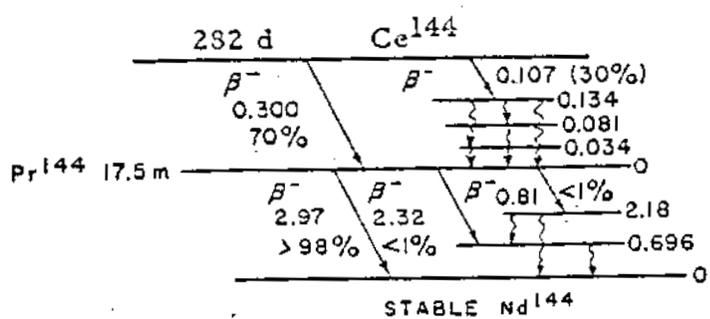
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(A+\text{M.W.})(\text{Yield})} = \mu C/\text{un}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Cerium¹⁴⁴ - Praseodymium¹⁴⁴

METHOD Ceric Flouride

YIELD 23.4 mg = 100%
(As Ce O₃)



$\mu_{Al} = 0.06$ $\mu_{Air} =$

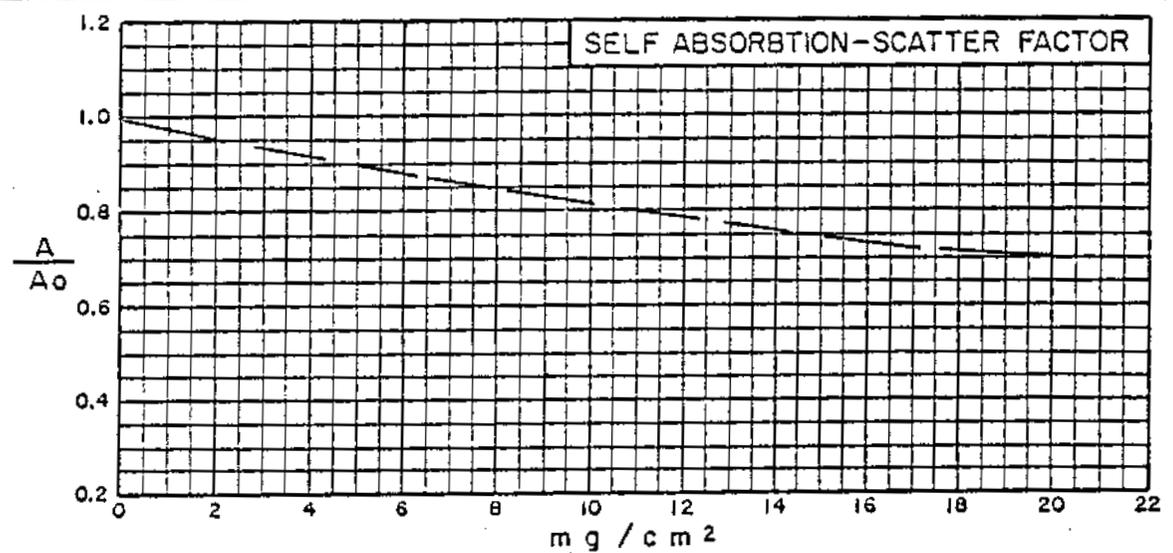
SHELF	AIR B MICA WINDOW FACTORS
1	0.80
2	0.74
3	0.69

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.96	0.56	0.80	0.64	0.53
SHELF 2	1.04	0.80	0.86	0.76	0.69
SHELF 3	1.10	0.95	0.92	0.85	0.80

BACK-SCATTER FACTORS

SHELF 1	1.33	1.33	1.21	1.12	1.07
SHELF 2	1.31	1.31	1.17	1.08	1.05
SHELF 3	1.28	1.28	1.15	1.07	1.04



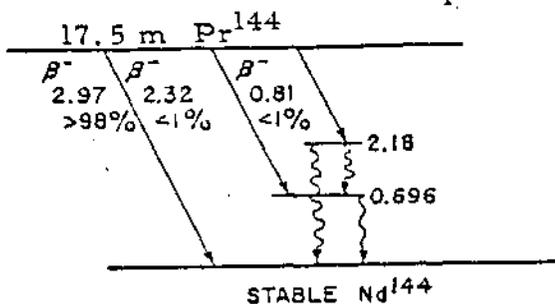
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A}+\text{M.W.})(\text{Yield})} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Praseodymium¹⁴⁴

METHOD Praseodymium - Cerium Separation

YIELD 50.8 mg = 100%
(As Nd₂(C₂O₄)₃ · 10 H₂O)
μ_{Al} = 0.0025 μ_{Air} =



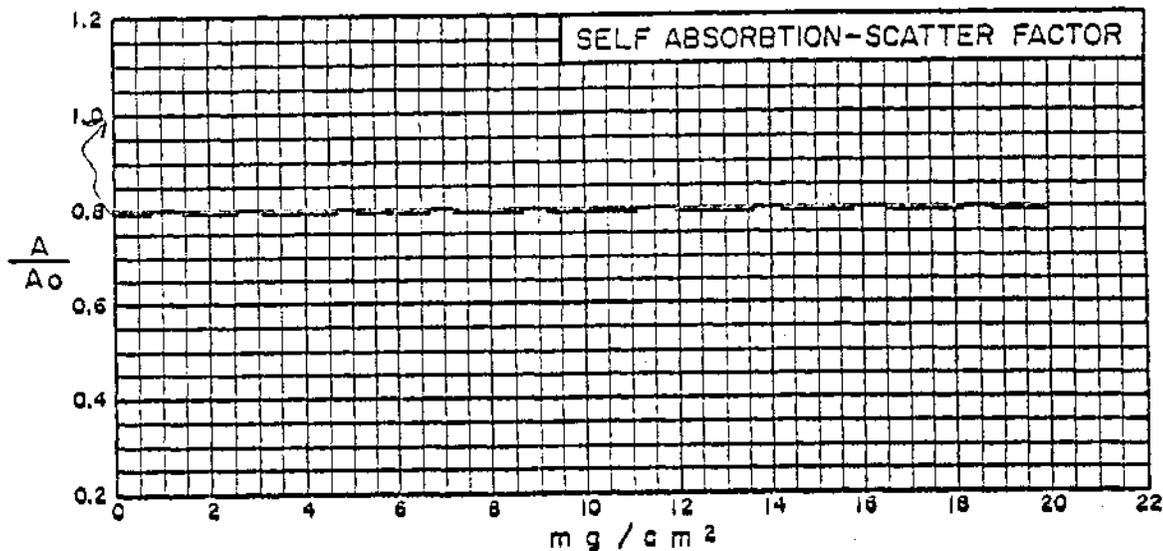
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.99
3	0.98

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	1.03	0.62	0.81	0.66	0.56
SHELF 2	1.12	0.88	0.88	0.79	0.73
SHELF 3	1.18	1.04	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.35	1.35	1.26	1.12	1.05
SHELF 2	1.33	1.33	1.21	1.08	1.03
SHELF 3	1.30	1.30	1.18	1.07	1.03



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^9) (S.S.) (bs.) (S.S.A.) (A+M.W.) (Yield)} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

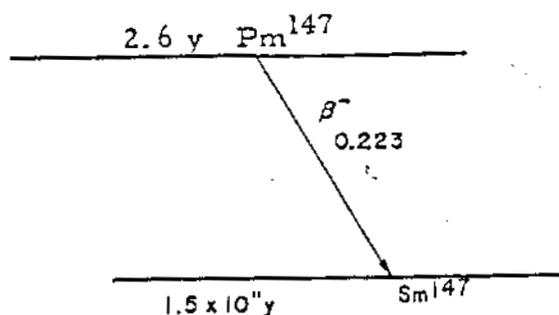
ISOTOPE Promethium¹⁴⁷

METHOD Promethium Fluoride

YIELD 50.8 mg = 100%

(As Nd₂(C₂O₄)₃·10 H₂O)

$\mu_{Al} = 0.158$; $\mu_{Air} =$ _____



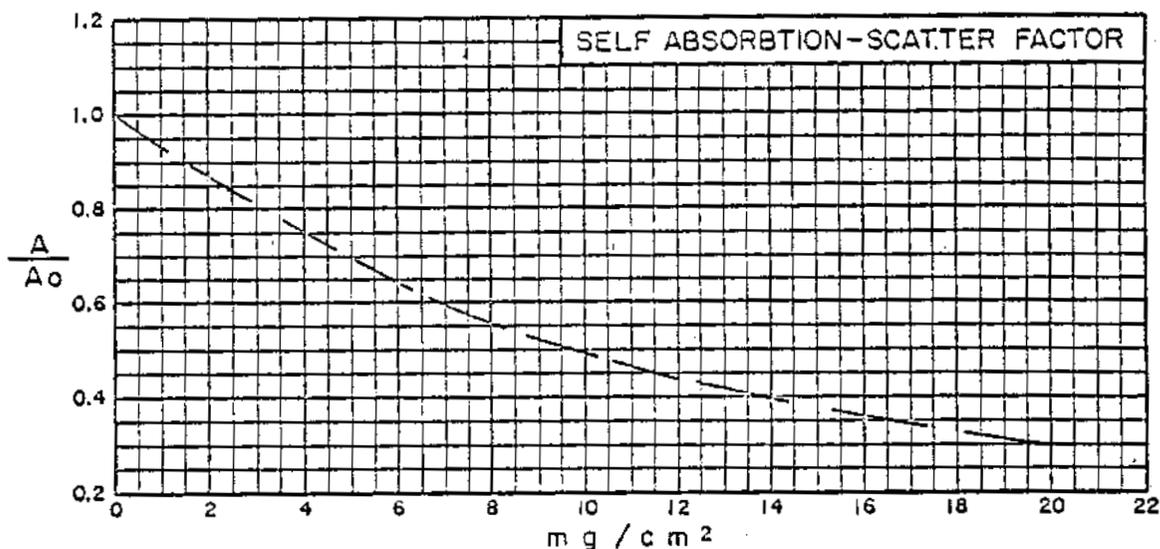
SHELF	AIR B MICA WINDOW FACTORS
1	0.57
2	0.42
3	0.31

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.88	0.51	0.78	0.61	0.50
SHELF 2	0.96	0.72	0.84	0.72	0.65
SHELF 3	1.01	0.86	0.90	0.82	0.77

BACK-SCATTER FACTORS

SHELF 1	1.28	1.28	1.15	1.10	1.08
SHELF 2	1.27	1.27	1.12	1.07	1.06
SHELF 3	1.24	1.24	1.11	1.06	1.05

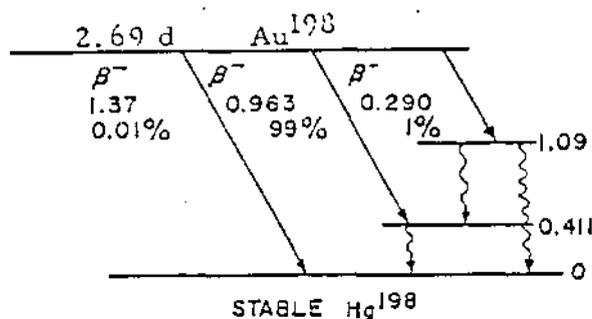


CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo)(2.2 \times 10^5)(S.S.)(b.s.)(S.S.A.)(A+M.W.)(Yield)} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

METHOD Ethyl Acetate Extraction

YIELD 5 mg = 100%
(As Au⁶)



$\mu_{Al} = 0.015$ $\mu_{Air} =$

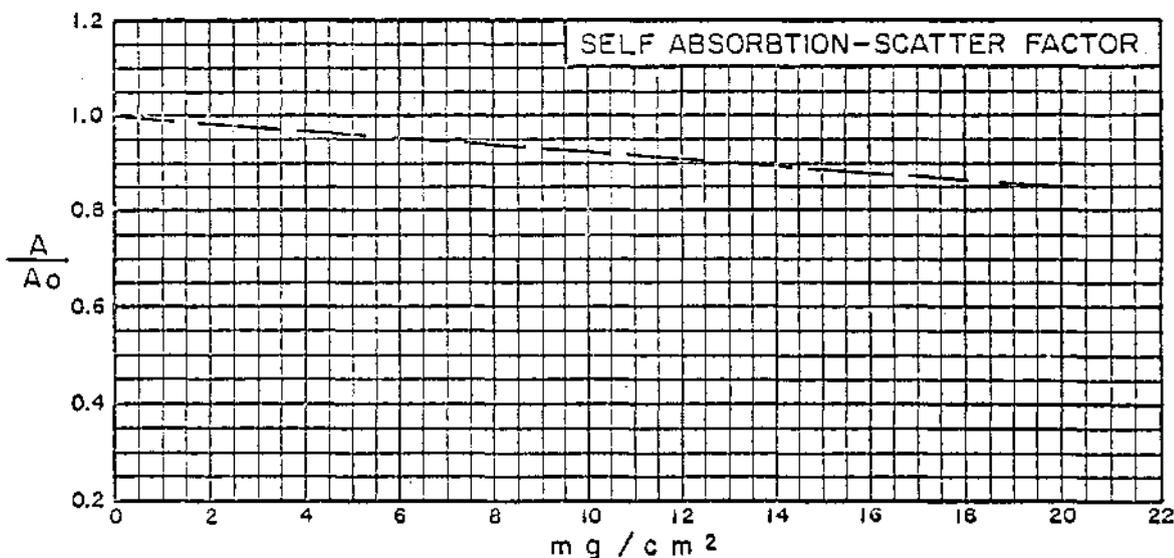
SHELF	AIR & MICA WINDOW FACTORS
1	0.95
2	0.92
3	0.89

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.97	0.57	0.81	0.66	0.56
SHELF 2	1.06	0.81	0.88	0.79	0.73
SHELF 3	1.12	0.96	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.45	1.45	1.24	1.19	1.10
SHELF 2	1.43	1.43	1.19	1.13	1.07
SHELF 3	1.39	1.39	1.17	1.12	1.06



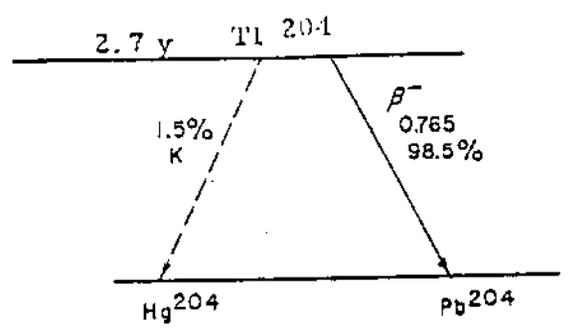
CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A} + \text{M.W.})(\text{Yield})} = \mu\text{C/unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Thallium 204

METHOD Spike - Direct Plate

YIELD _____



$\mu_{Al} = 0.0212$ $\mu_{Air} =$ 3600

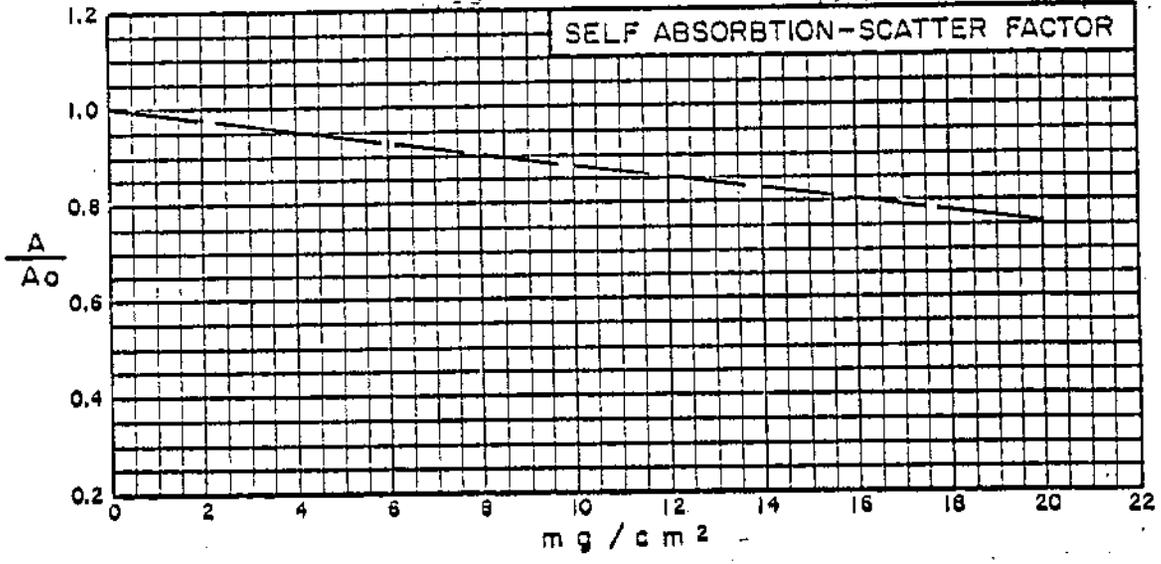
SHELF	AIR & MICA WINDOW FACTORS
1	0.93 (0.99)
2	0.89 (0.93)
3	0.85 (0.88)
4	0.81 (0.84)
5	0.76

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.95	0.56	0.81	0.66	0.56
SHELF 2	1.04	0.80	0.88	0.79	0.73
SHELF 3	1.09	0.94	0.93	0.87	0.83
<i>shelf</i> 4				0.95	.93

BACK-SCATTER FACTORS

SHELF 1	1.45	1.45	1.23	1.20	1.10
SHELF 2	1.43	1.43	1.18	1.13	1.07
SHELF 3	1.39	1.39	1.16	1.12	1.06



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (b.s.) (S.S.A.) (A+M.W.) (Yield)} = \mu C/\text{unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

Sheet 3 .0675
 5 .0149

0008595

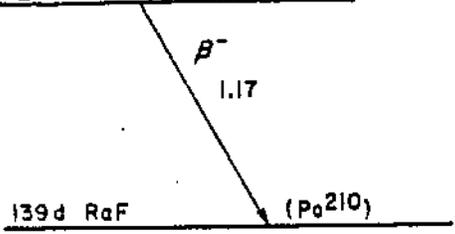
ISOTOPE Bismuth²¹⁰ (RaE)

METHOD Bismuth Sulfide

YIELD 49.2 mg = 100%
(As Bi₂O₃)

5 d RaE (Bi²¹⁰)

$\mu_{Al} = 0.011$ $\mu_{Air} =$



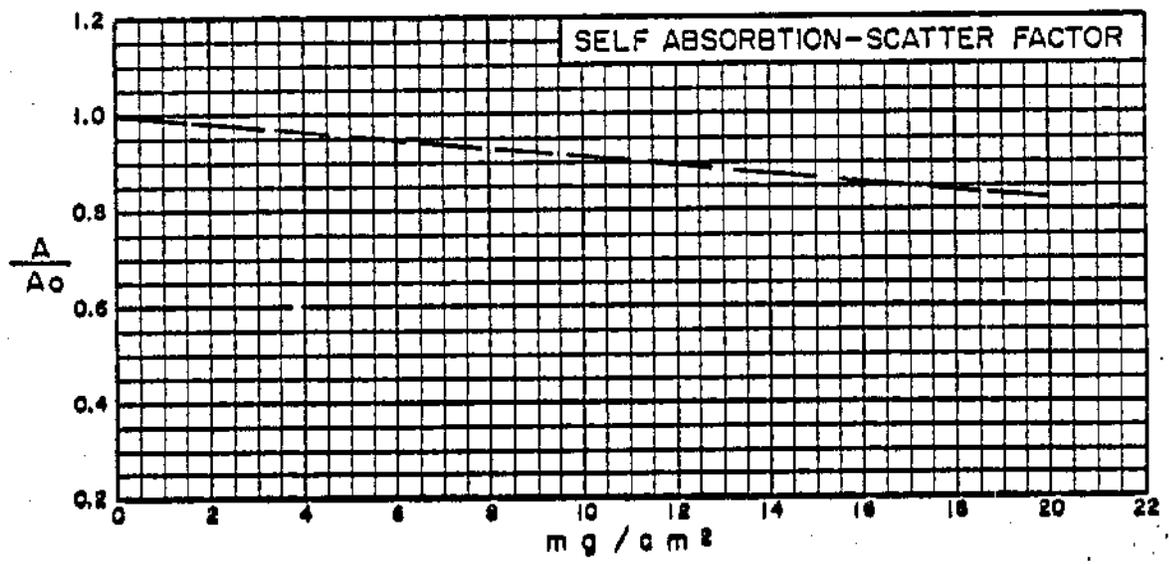
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.94
3	0.92

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 8.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.98	0.58	0.81	0.66	0.56
SHELF 2	1.08	0.82	0.88	0.79	0.73
SHELF 3	1.13	0.97	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.45	1.45	1.25	1.18	1.09
SHELF 2	1.43	1.43	1.20	1.12	1.06
SHELF 3	1.39	1.39	1.18	1.11	1.05



CALCULATION PROCEDURE: $\frac{\text{Geo.} \times (2.2 \times 10^6) \times (\text{S.S.}) \times (\text{bs.}) \times (\text{S.S.A.}) \times (\text{A} + \text{M.W.}) \times (\text{Yield})}{\text{mg (VOLUME FACTOR)}} = \mu\text{C/unit}$

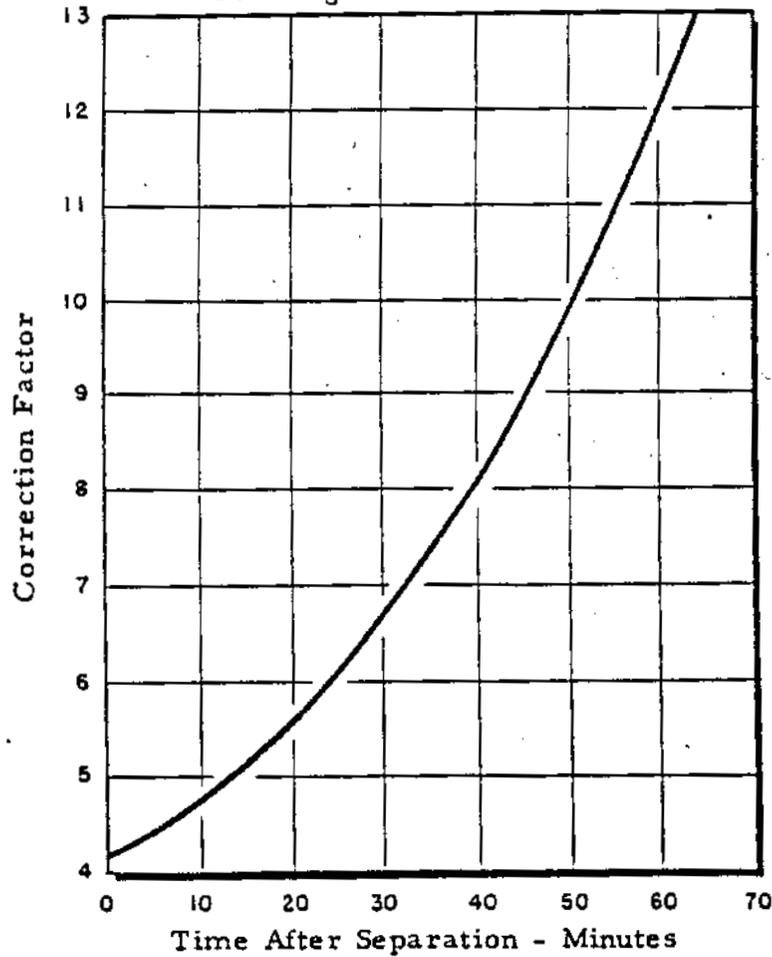
Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

RADON²²²

METHOD: Lead Sulfide

	Rn ²²²		3.825d
Po ²¹⁸ (RaA)	α	5.49	3.0 M
Pb ²¹⁴ (RaB)	α	6.0	26.8 M
Bi ²¹⁴ (RaC)	β	.65	19.7 M
Po ²¹⁴ (RaC')	α	5.5 (1%)	1.65 (99%) 154 μs
Tl ²¹⁰ (RaC'')			1.32m
Pb ²¹⁰ (RaD)	β	1.9	22Y

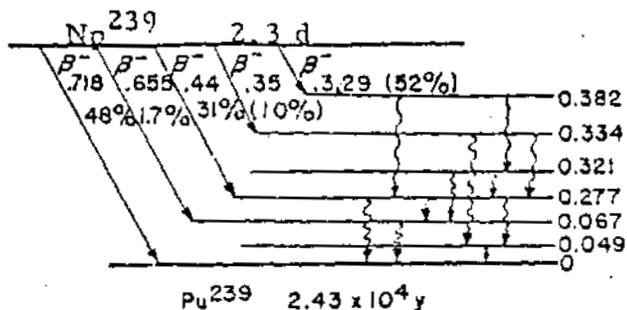
Radon Disintegration Rate From Counting Rate of RaB and RaC



ISOTOPE Neptunium ²³⁹

METHOD TTA Extraction

YIELD Carrier Free



$\mu_{Al} = 0.088$ $\mu_{Air} =$ _____

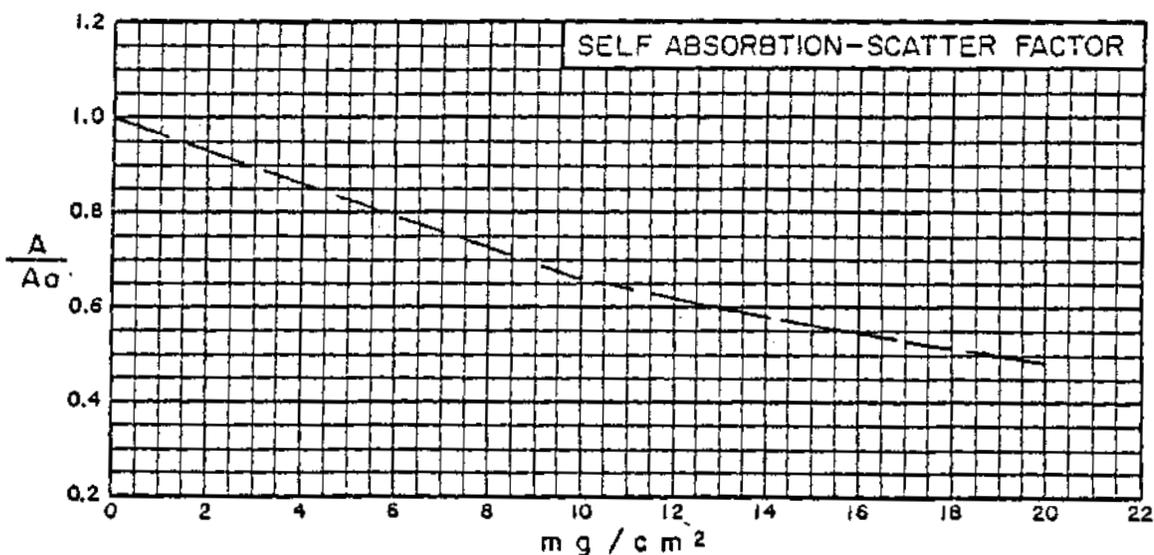
SHELF	AIR & MICA WINDOW FACTORS
1	0.73
2	0.62
3	0.52

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.90	0.53	0.81	0.66	0.56
SHELF 2	0.98	0.75	0.88	0.79	0.73
SHELF 3	1.04	0.89	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.34	1.34	1.18	1.14	1.11
SHELF 2	1.32	1.32	1.14	1.09	1.07
SHELF 3	1.29	1.29	1.13	1.09	1.07



CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A.})(\text{A+MW.})(\text{Yield})} = \mu\text{C/unit}$

Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

0008598

METHOD _____

YIELD _____

$\mu_{Al} =$ _____ $\mu_{Air} =$ _____

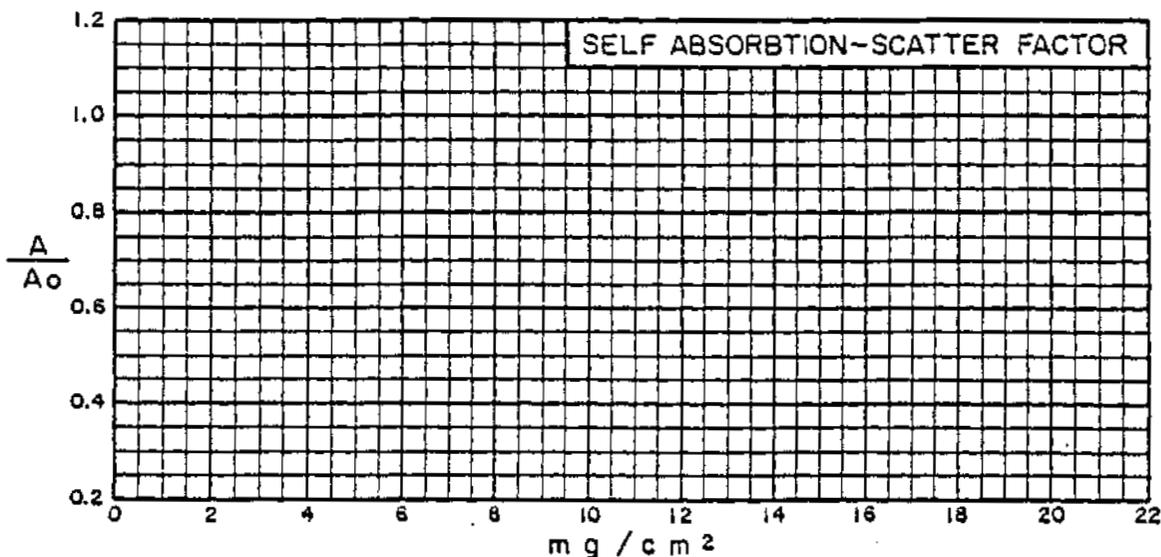
SHELF	AIR B MICA WINDOW FACTORS
1	_____
2	_____
3	_____

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm ²	1 1/2" S.S. DISH 10 cm ²	1" GLASS (FLAT) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1					
SHELF 2					
SHELF 3					

BACK-SCATTER FACTORS

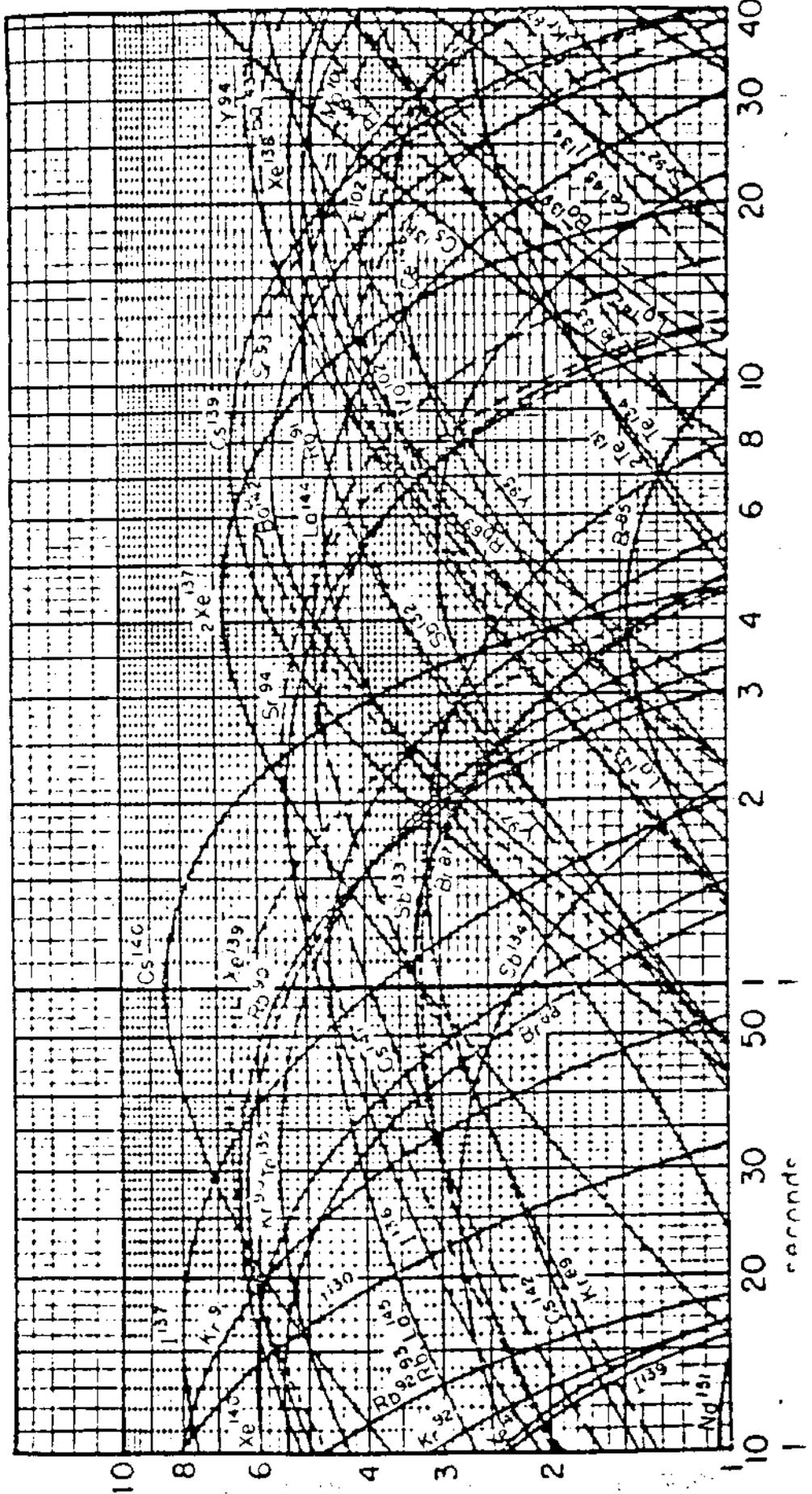
SHELF 1					
SHELF 2					
SHELF 3					



CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A})(\text{A+M.W.})(\text{Yield})} = \mu\text{C/unit}$

0008599

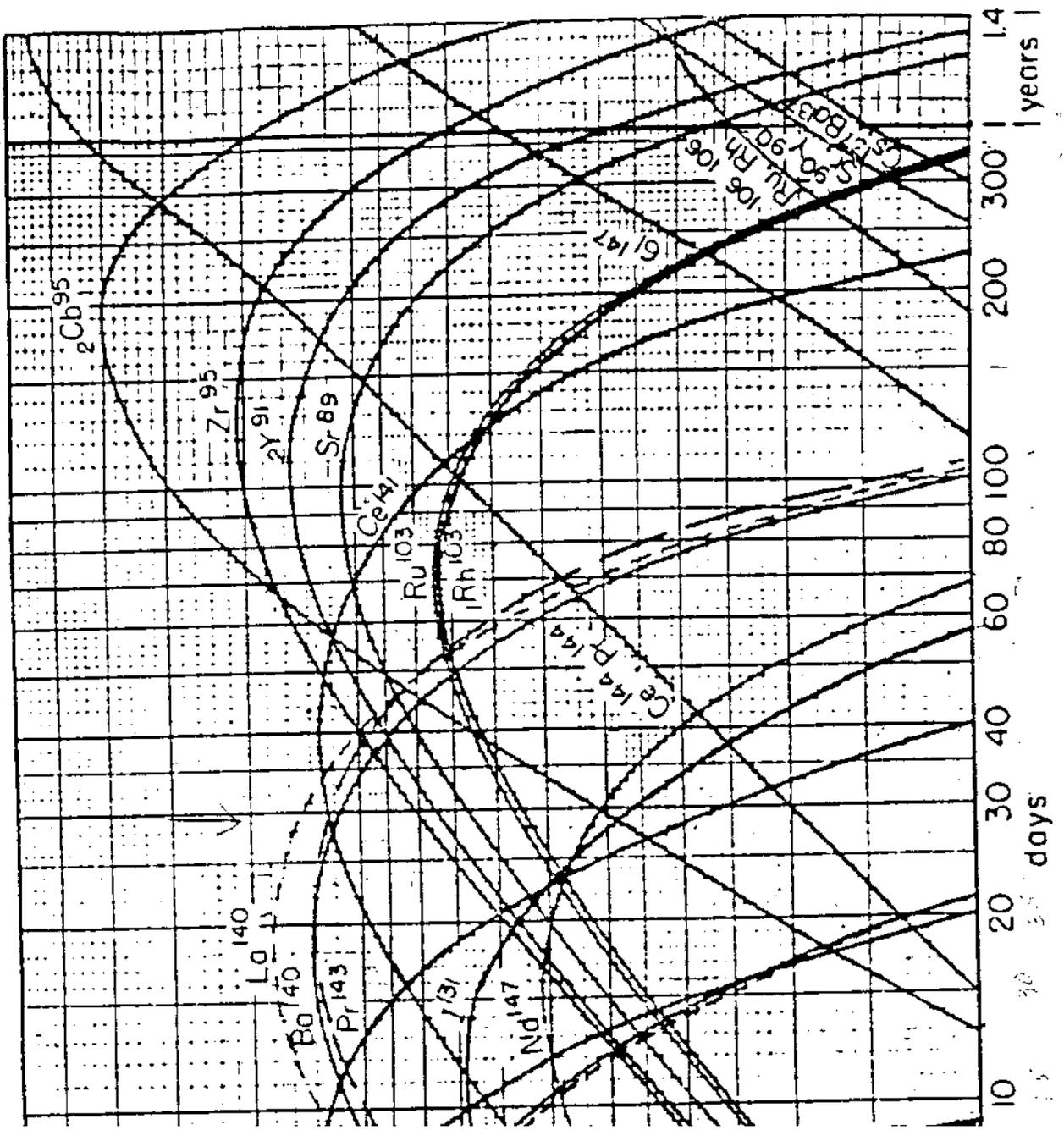
NUCLEONICS, Vol. 9, 1951
Relative activities of the nuclide products of simultaneous slow-neutron fission of U235.



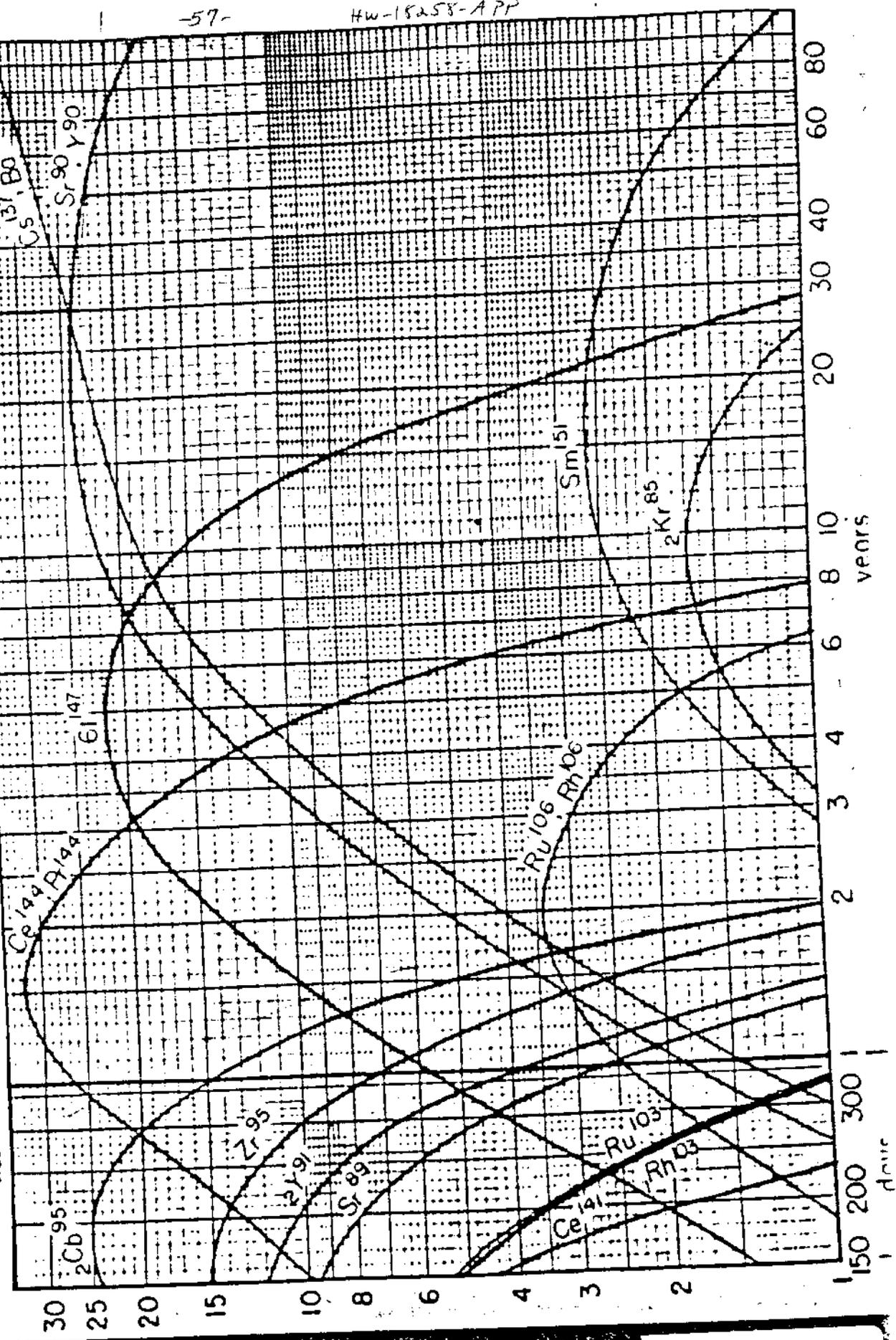
0008601

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951
f the nuclide products of simultaneous slow-neutron fission of U235.

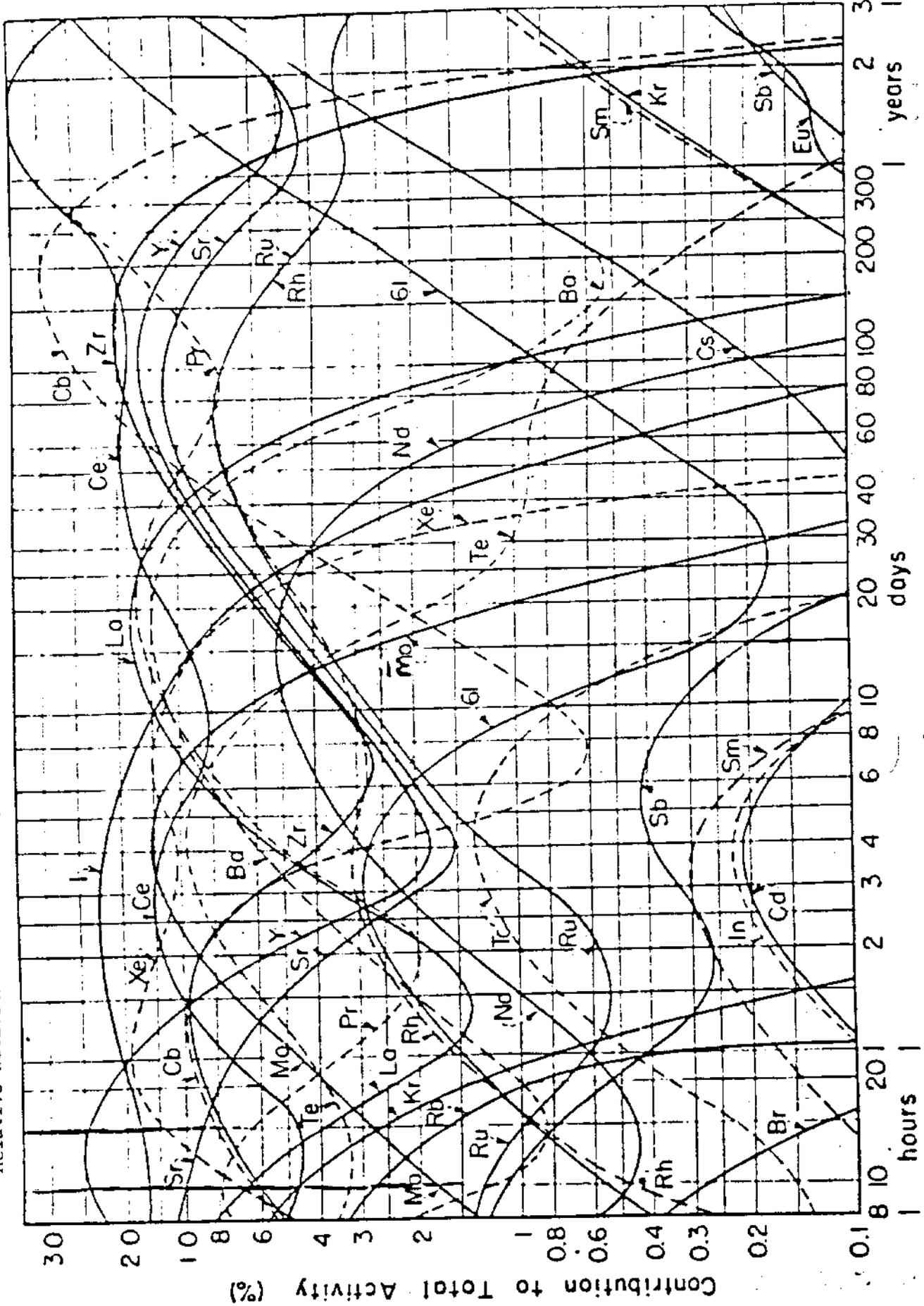


NUCLEONICS, Vol. 9, 1951
Relative activities of the nuclide products of simultaneous slow-neutron fission of U²³⁵.



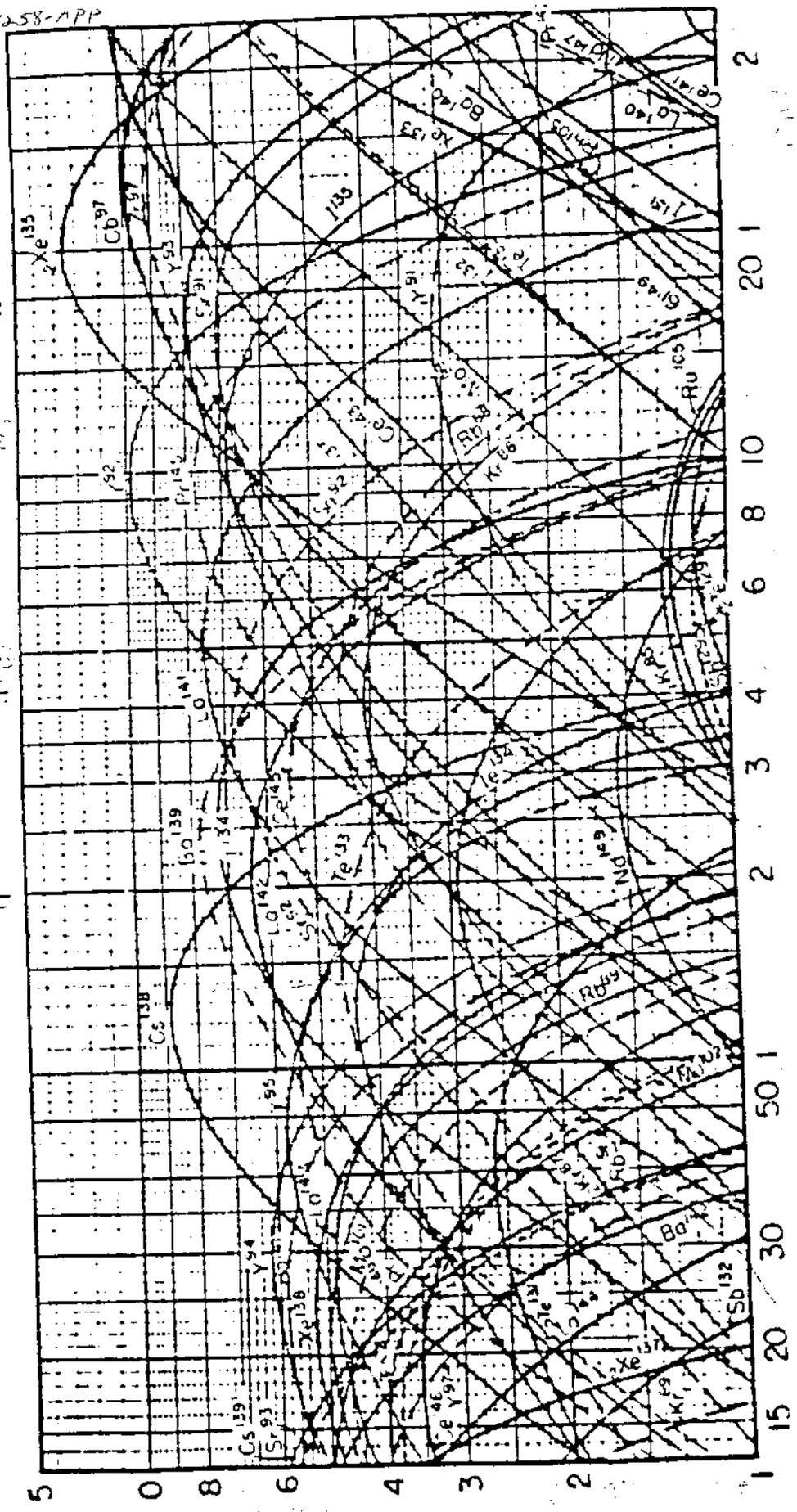
0008603

NUCLEONICS, Vol. 9, 1951
Relative activities of element products of simultaneous slow-neutron fission of U235.



4098000

NUCLEONICS, Vol. 9, 1951.
Relative activities of the nuclide products of simultaneous slow-neutron fission of U235.

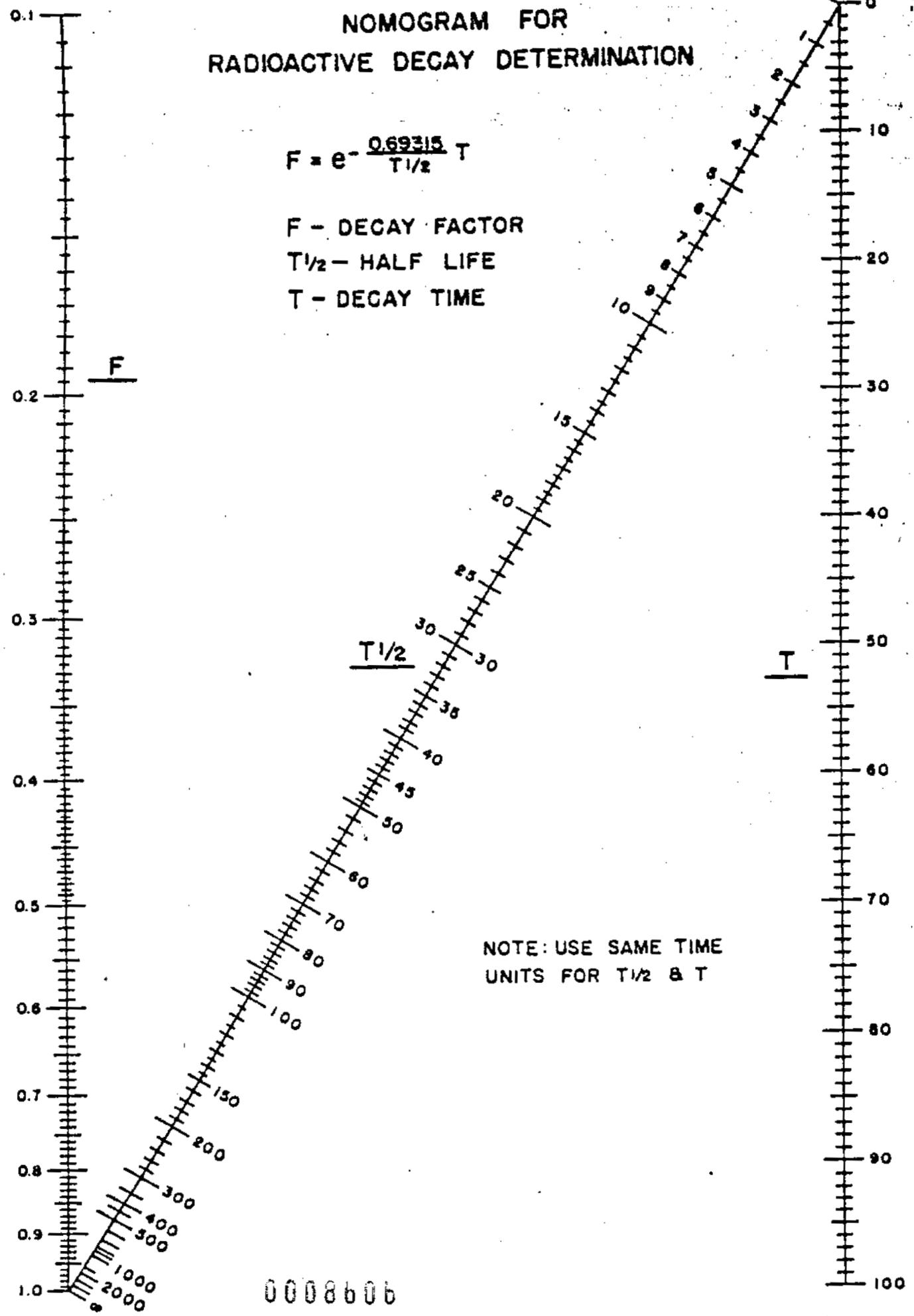


0008605

NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

$$F = e^{-\frac{0.69315}{T_{1/2}} T}$$

F - DECAY FACTOR
 T_{1/2} - HALF LIFE
 T - DECAY TIME



NOTE: USE SAME TIME
 UNITS FOR T_{1/2} & T

0008606

CALCULATION FACTORS FOR CONVERTING COUNTS/MINUTE

TO UNITS OF 10⁻⁶ uc/ml FOR GIVEN VOLUMES

(REACTOR EFFLUENT STUDIES 1-1-56)

ISOTOPE (19)	SHELF					VOL. (ml)	PREC. (mg/cm ²)
	1	2	3	4	5		
GROSS BETA	0.79	2.4	5.7	9.3	15.4	2	0
	1.59	4.82	11.4	19.6	30.8	1	0
RARE EARTHS AND YTTRIUM	0.031	0.094	0.22	0.374	0.58	50	7.85
	1.56	4.7	10.9	18.7	29.1	1	7.85
SILICON-31	0.015	0.045	0.103	0.177	0.274	100	10.0
	1.5	4.5	10.3	17.7	27.4	1	10.0
SODIUM-24	0.0145	0.044	0.102	0.174	0.27	100	7.13
	1.45	4.4	10.2	17.4	27	1	7.13
COPPER-64*	0.28	0.91	2.2	4.3	7.1	10	5.1
	2.8	9.1	22	43	71	1	5.1
ARSENIC-76	0.0144	0.043	0.099	0.167	0.257	100	8.15
	1.44	4.3	9.9	16.7	25.7	1	8.15
STRONTIUM (TOTAL)	0.0157	0.048	0.112	0.193	0.304	100	7.9
	1.57	4.8	11.2	19.3	30.4	1	7.9
MANGANESE-56	0.3	0.83	1.76	2.96	4.5	10	3.13
	3	8.3	17.6	29.6	45	1	3.13
BARIUM TOTAL	0.0146	0.043	0.099	0.165	0.254	100	7.4
	1.46	4.3	9.9	16.5	25.4	1	7.4
PHOSPHORUS-32	0.003	0.0091	0.0202	0.0334	0.0509	500	21.95
	1.5	4.55	10.1	16.7	25.4	1	21.95
IODINE (TOTAL)	0.0016	0.0049	0.0113	0.0193	0.03	1000	14.8
	1.6	4.9	11.3	19.3	30	1	14.8
NEPTUNIUM-239	0.095	0.324	0.860	1.68	3.04	25	0
	2.38	8.1	21.4	41.9	76	1	0
Ba ¹⁴⁰ / La ¹⁴⁰	0.001	0.0032	0.0074	0.0129	0.0205	1500	7.4
	1.5	4.7	11.1	19.4	30.7	1	7.4
Sr ⁸⁹ / Sr ⁹⁰	0.001	0.0032	0.0074	0.0126	0.0198	1500	7.9
	1.5	4.76	11.1	18.9	29.7	1	7.9
Y ⁹⁰ (Sr ⁹⁰)**	0.0021	0.0062	0.0134	0.0236	0.0364	1500	7.85
	3.15	9.35	20.9	35.5	54.5	1	7.85

* Multiply by 0.56 to get beta plus positron activity density exclusive of EC

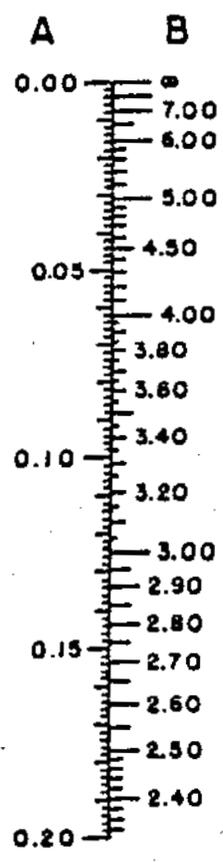
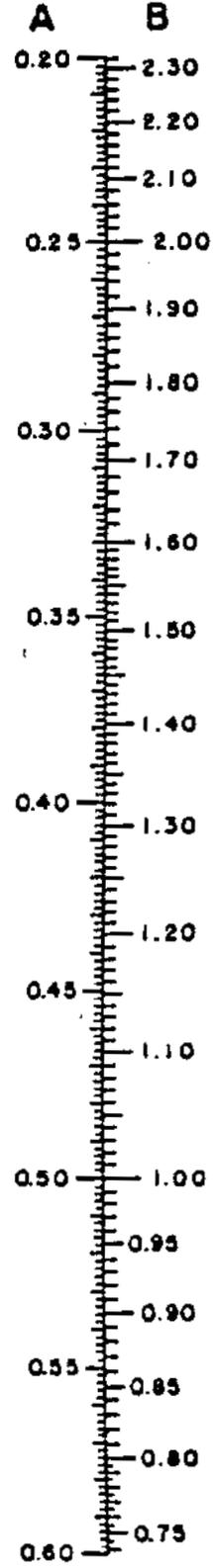
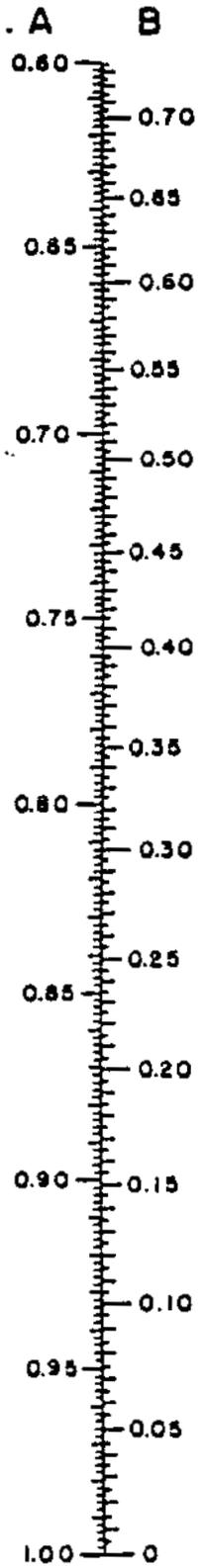
** Divide by 2.0 to get Y⁹⁰ exclusively. Factors given are for Sr⁹⁰ / Y⁹⁰

NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

$$A = e^{-0.69315B}$$

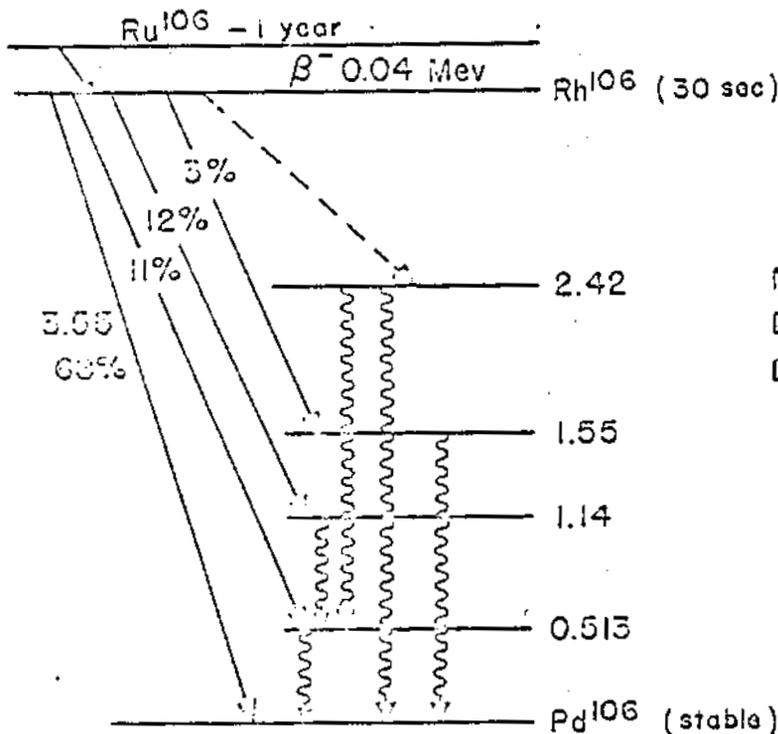
A - DECAY FACTOR

B - DECAY TIME ÷ HALF LIFE



DECAY SCHEME OF RUTHENIUM - RHODIUM ISOTOPES

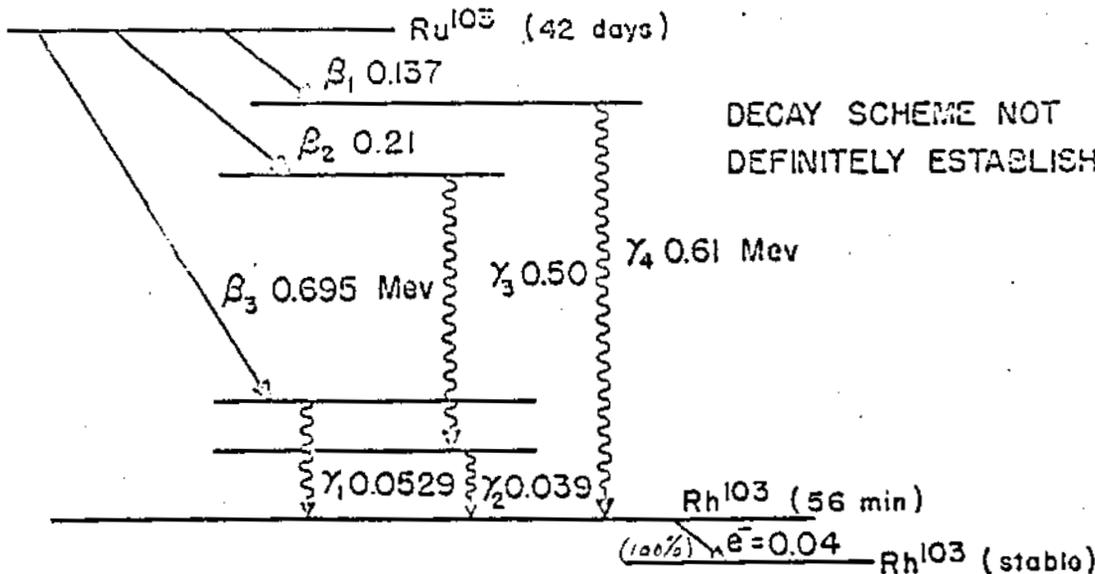
Ru¹⁰⁶ - Rh¹⁰⁶



MOST RECENT SCHEME.
DECAY SCHEME NOT
DEFINITELY ESTABLISHED.

REFERENCE: REVIEW MODERN PHYSICS VOL. 25 No. 2 pp. 469-651

Ru¹⁰³ - Rh¹⁰³

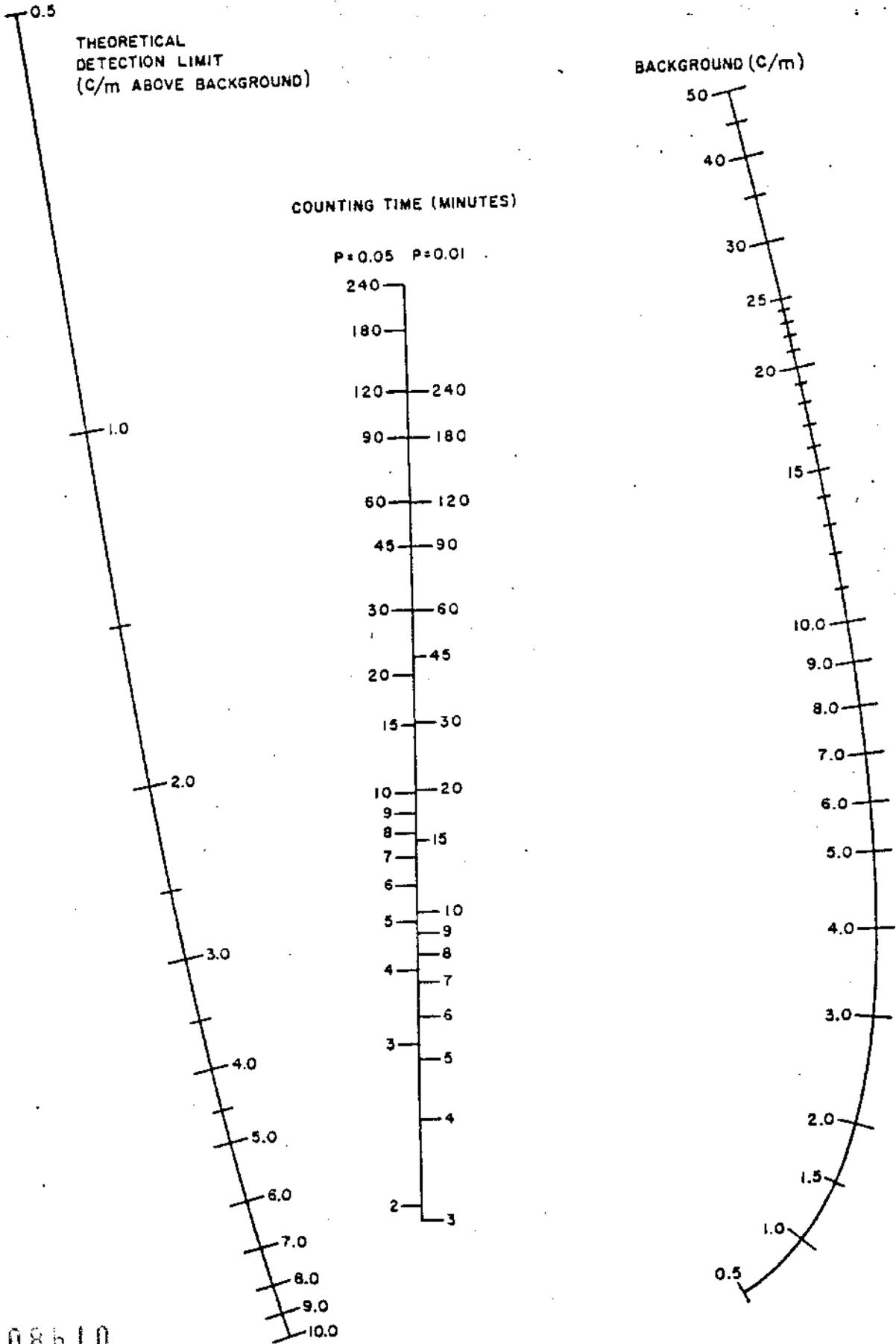


DECAY SCHEME NOT
DEFINITELY ESTABLISHED.

REFERENCE: PHYSICAL REVIEW MAY 15, 1952 VOL. 86, COPY 2.

6098000

THEORETICAL DETECTION LIMIT NOMOGRAM



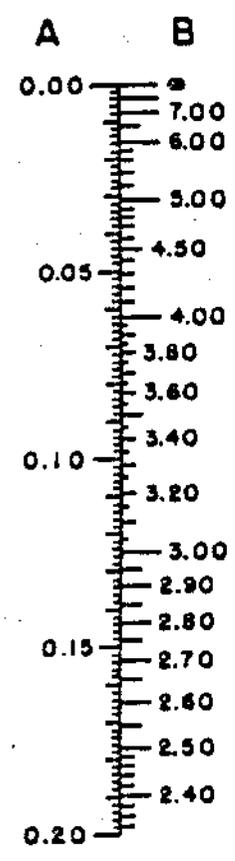
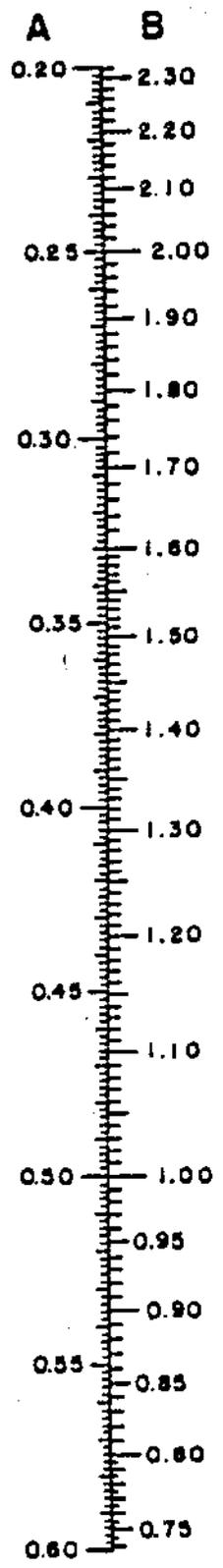
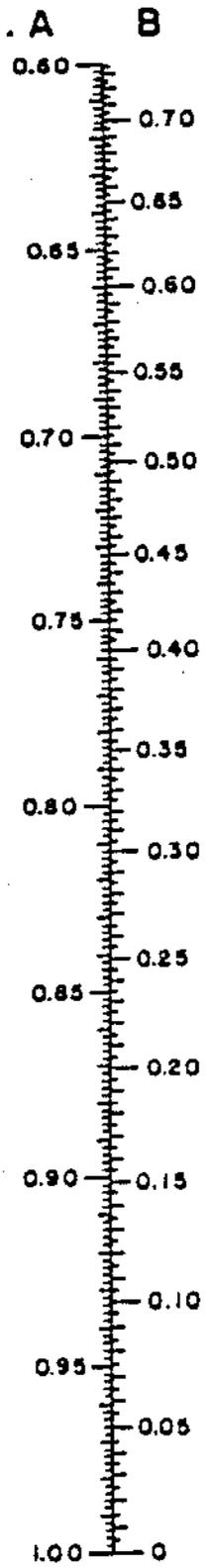
0008610

NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

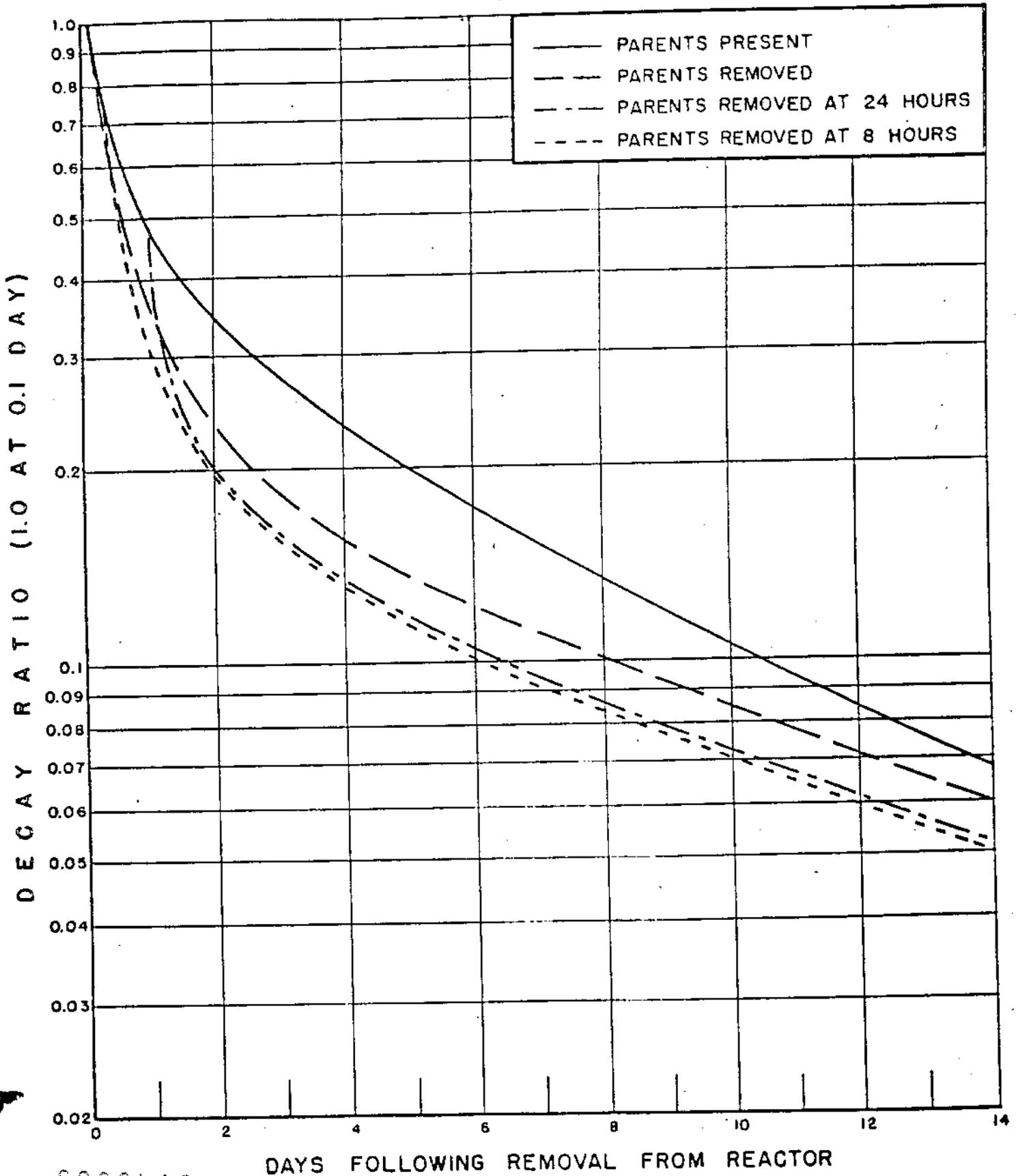
$$A = e^{-0.69315B}$$

A - DECAY FACTOR

B - DECAY TIME ÷ HALF LIFE

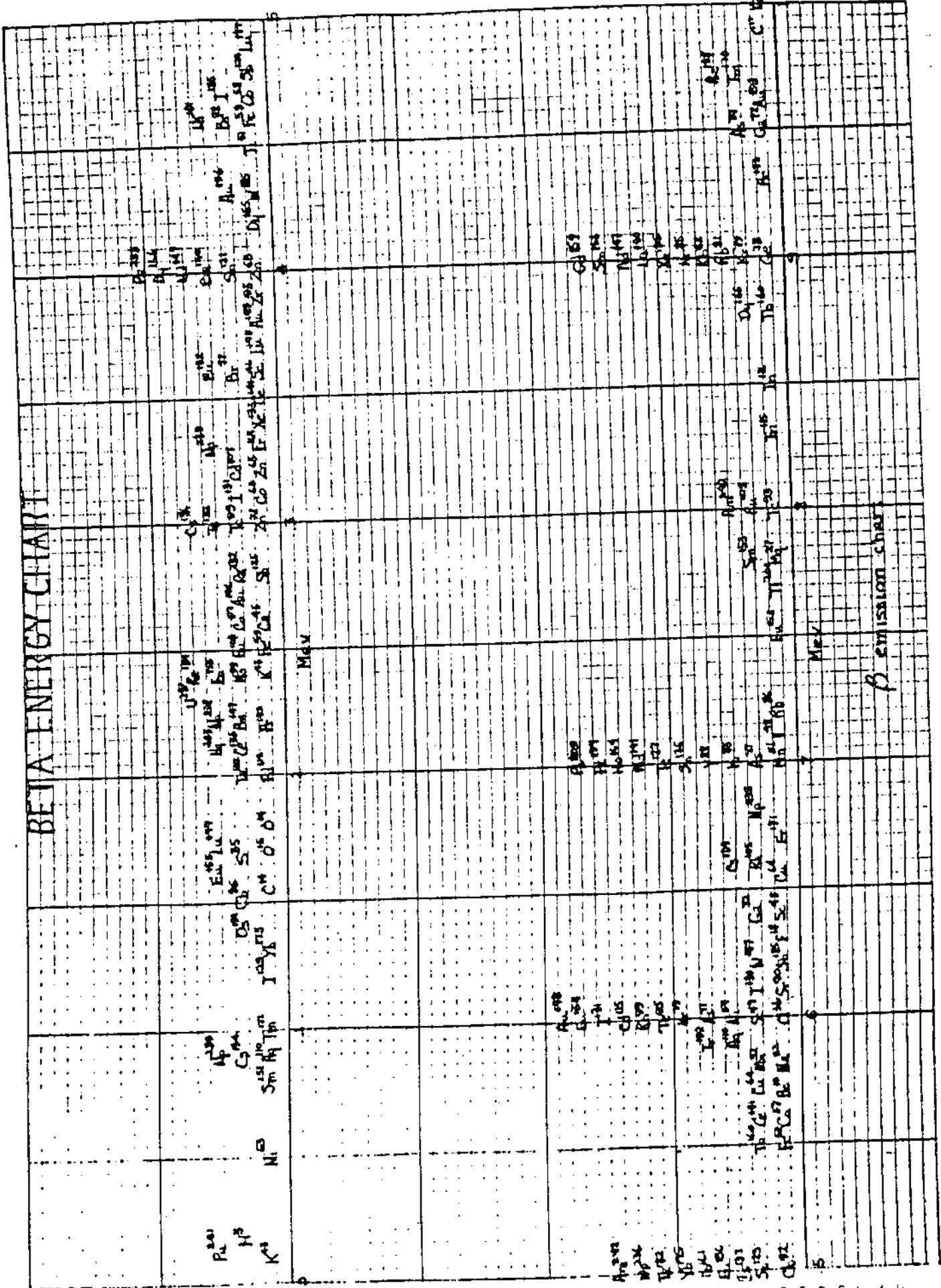


THEORETICAL GROSS IODINE FISSION PRODUCT DECAY (ALL ISOTOPES BUT I^{129} AT EQUILIBRIUM)



0008612

BETA ENERGY CHART



0000014

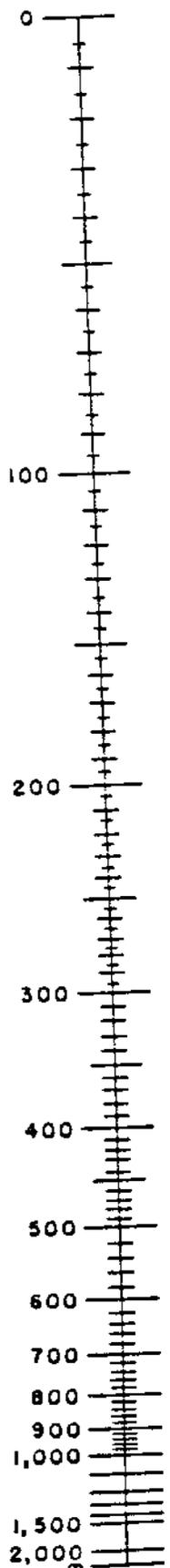
-70-

THEORETICAL RATIO $\frac{Ru^{103}}{Ru^{106}}$

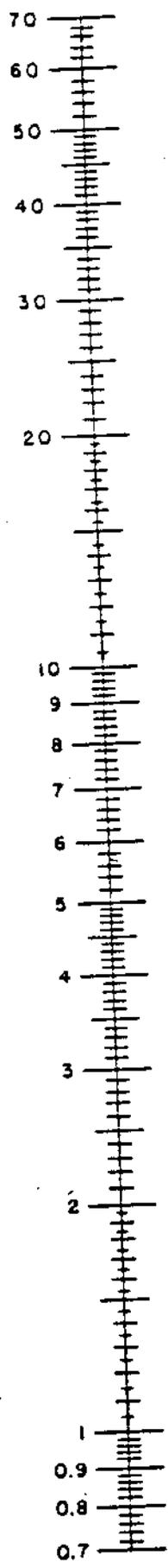
ACTIVITY

HW-15-21 APP

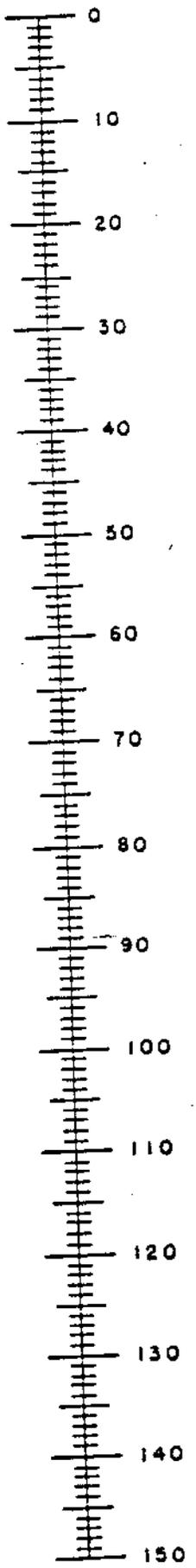
IRRADIATION TIME
— DAYS —



RATIO



DECAY TIME
— DAYS —



0008616

October 27, 1953

TO: R. S. Analytical Advisory Committee

FROM: L. C. Schwendiman

AREA OF ONE INCH AND ONE AND ONE-HALF INCH
STANDARD COUNTING DISHES

The actual area occupied by a precipitate when spread on a standard counting dish is a function of the amount of precipitate, surface tension effects, and drying conditions employed. For these reasons it is difficult, if not impossible, to accurately determine the surface density (mg/cm²) of residue on a counting dish. This is particularly true of the presently used "one-inch" counting dish which has a generous radius where the sides meet the bottom. The attached scale drawings of the cross section of the dishes and tables illustrate the degree to which the area is dependent upon the depth of material on the plate if it is assumed that the solid material can be placed on the dish with no "creeping" up the walls. A calculation of mg/cm² for precipitate of varying weight and specific gravity was made and these values appear in the tables. From these data it is easily seen that significant variation will occur even when surface tension effects are ignored.

A series of plates was prepared by transferring precipitated CaC₂O₄, AgCl, Al(OH)₃, and BaCO₃ prepared by precipitating 20 mg of the cation in each instance. The precipitates were slurried in the usual manner and dried under a lamp. The diameter of the circle to which the precipitate advanced was measured and the area calculated. In the case of AgCl and Al(OH)₃ this area would have little actual significance, since upon drying, the precipitate contracted and finally formed small heavy deposits with regions not covered by any precipitate. The CaC₂O₄ and BaCO₃ gave smooth, fairly uniform, symmetrical sources. The average measured area for these precipitates was 10 cm² for the 1-1/2" plates and 4.5 cm² for the one-inch plates. These areas are larger than the tabled values and reflect the

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extent to which a precipitate may creep into the radius at the bottom of the plate.

As pointed out in the first paragraph, however, it is to be expected that each precipitate will have its own drying characteristics, which in turn will be influenced by acid content, temperature and time of drying. For these reasons it is advised that in every possible case self absorption measurements be made using the plate size which will be used in the analytical determination of the isotope in question, and that the same conditions be maintained as will be used in the determination. It is further recommended that in presenting the self absorption data graphically that,

1. The abscissa be plotted as weight in mg on the plate which will be clearly identified as one-inch dish, 1-1/2 inch dish, or 1-1/2 inch filter paper, etc., or,
2. The abscissa be plotted as mg/cm², the plate description given, and the nominal plate area used to convert total weight to mg/cm² be clearly stated.

To insure uniformity in utilizing self absorption data obtained in a manner different from that in which it must be applied the following nominal areas will be used:

For one-inch dishes, 4.5 cm².

For 1-1/2 inch dishes, 10.0 cm²

For filter papers and discs use actual measured area of precipitate.

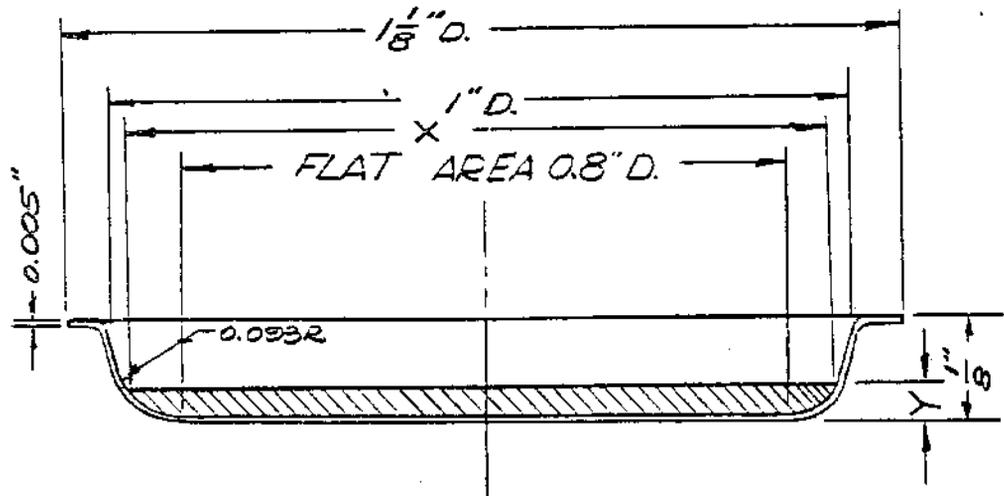
These areas will approach those actually achieved for weights of precipitates commonly employed, however, they must be used with recognition of limitations enumerated above.

L. C. Schwendiman
L. C. Schwendiman
Radiochemical Standards

LCS:R

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CROSS SECTION THROUGH STD. "ONE-INCH"
COUNTING DISH



"Y" (IN.)	"X" (IN.)	"A" AREA AT Y (CM ²)	PPT. SP. GR. = 1		PPT. SP. GR. = 3		PPT. SP. GR. = 5	
			WT.(MG) ON DISH	WT. A	WT.(MG) ON DISH	WT. A	WT.(MG) ON DISH	WT. A
0	0.800	3.24	0.00	0.00	0.000	0.000	0.00	0.00
0.001	0.827	3.46	8.78	2.54	26.34	7.62	43.90	12.70
0.002	0.838	3.57	17.85	5.00	53.55	15.00	89.25	25.00
0.005	0.860	3.75	46.42	12.37	139.3	37.11	232.1	61.85
0.010	0.884	3.96	95.44	24.10	286.3	72.30	477.2	120.5
0.020	0.915	4.24	199.6	47.07	598.8	141.2	998.0	235.3
0.030	0.936	4.44	309.8	69.77	929.4	209.3	1549	348.9
0.040	0.953	4.59	424.3	92.44	1273	277.3	2121	462.2
0.050	0.965	4.71	542.4	115.1	1627	345.	2712	575.5

SP. GR. BaCO₃ = 4.29

Lo₂O₃ = 6.51

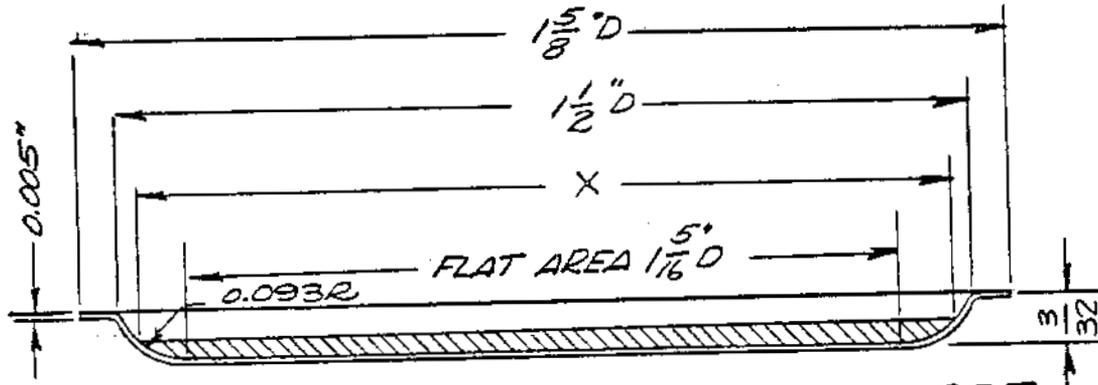
AgCl = 5.56

CsClO₄ = 3.32

MnO₂ = 5.03

CeF₃ = 5.8

CROSS SECTION THROUGH
STD. "1 1/2" INCH COUNTING DISH.



"Y" (IN.)	"X" (IN.)	AREA AT "Y" (CM ²)	PPT. SP.GR. = 1.		PPT. SP.GR. = 3.		PPT. SP.GR. = 5.	
			WT.(MG) ON DISH	WT A	WT.(MG) ON DISH	WT A	WT.(MG) ON DISH	WT A
000	1.312	8.72	—	—	—	—	—	—
0.001	1.339	9.07	23.0	254	69.0	7.62	115	12.70
0.002	1.350	9.23	46.4	5.03	139.2	15.09	232	25.15
0.005	1.372	9.54	117.6	12.33	352.8	36.99	588	61.65
0.010	1.396	9.87	240.8	24.40	722.4	73.20	1204	122.0
0.020	1.427	10.30	492.1	48.16	1488	144.8	2480	240.8
0.030	1.448	10.62	761.8	71.73				
0.040	1.465	10.86	1035	95.30				
0.050	1.477	11.03						