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A TABULATION OF THE ISOTOPIC COUNTING CORRECTION FACTORS
AND DECAY SCHEMES

By

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D. M. Polinsky

November 16, 1956

REPOSITORY POL
COLLECTION I-131 Atmosphere
BOX No. N/A
FOLDER N/A

RADIOLOGICAL CHEMICAL ANALYSIS OPERATION
HANFORD LABORATORIES

Hanford Atomic Products Operation
General Electric Co.

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ABSTRACT

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

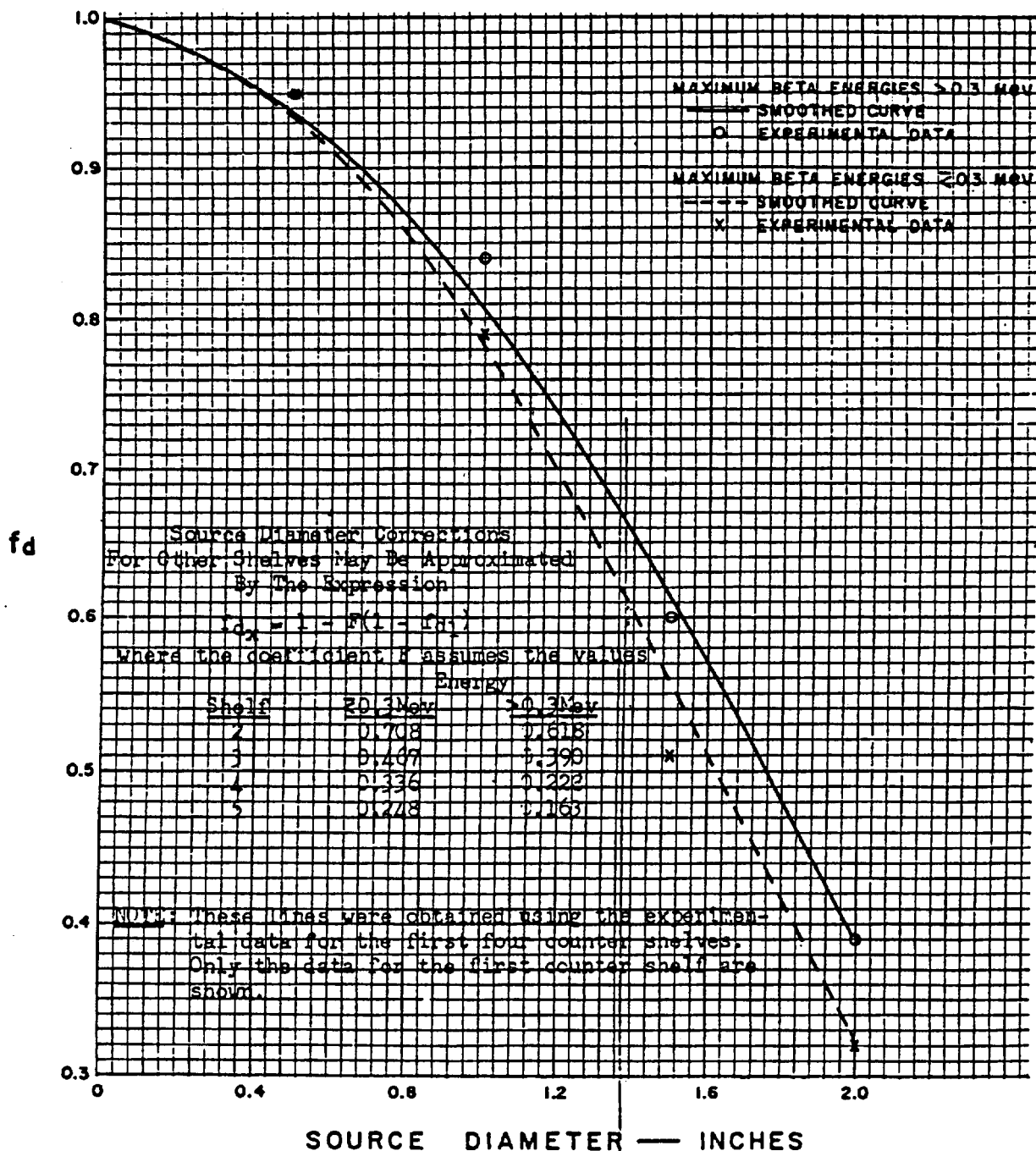


FIGURE - 3
FIRST SHELF BACKSCATTER CORRECTIONS
(f_{bs}) FOR STANDARD BACKING MATERIALS

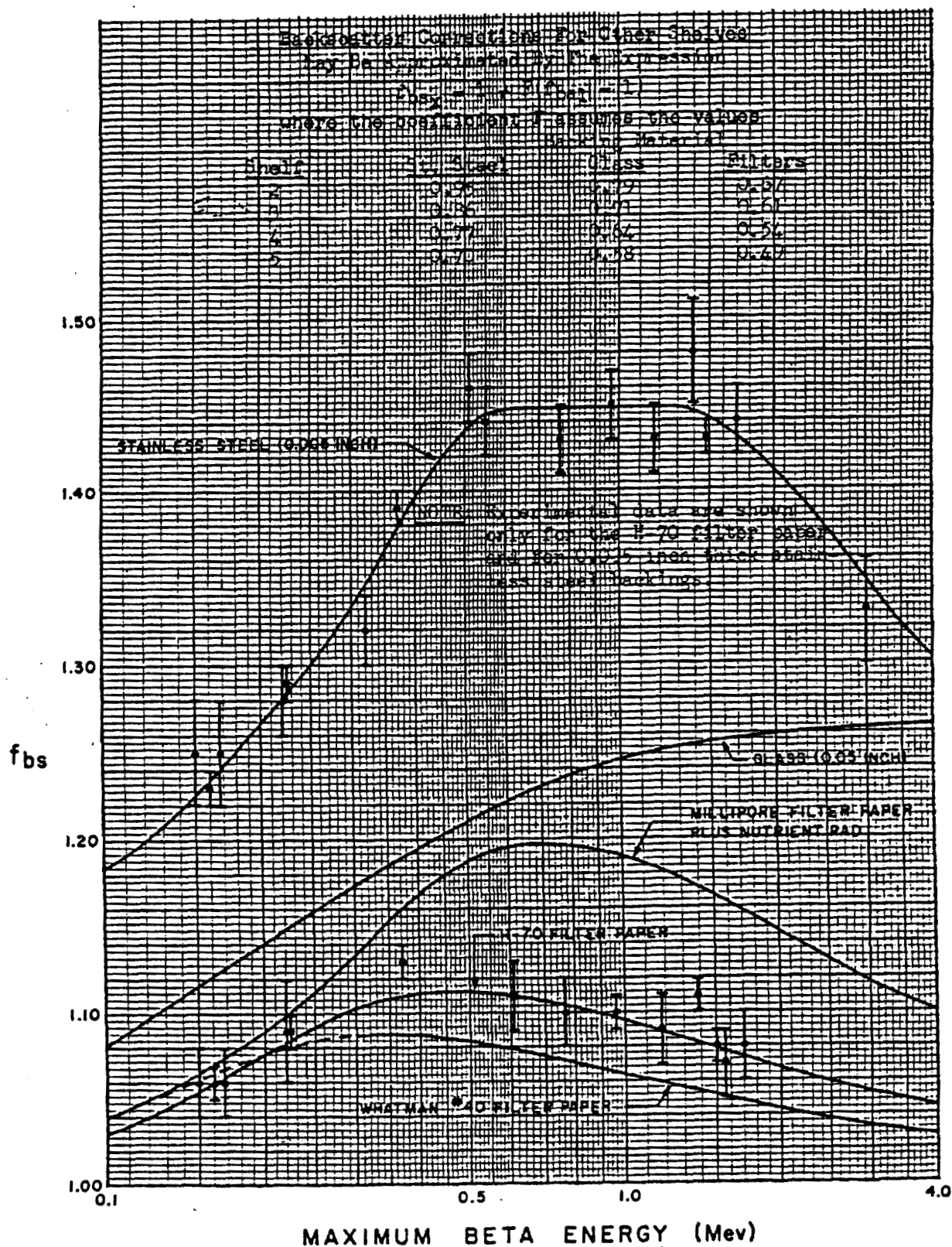
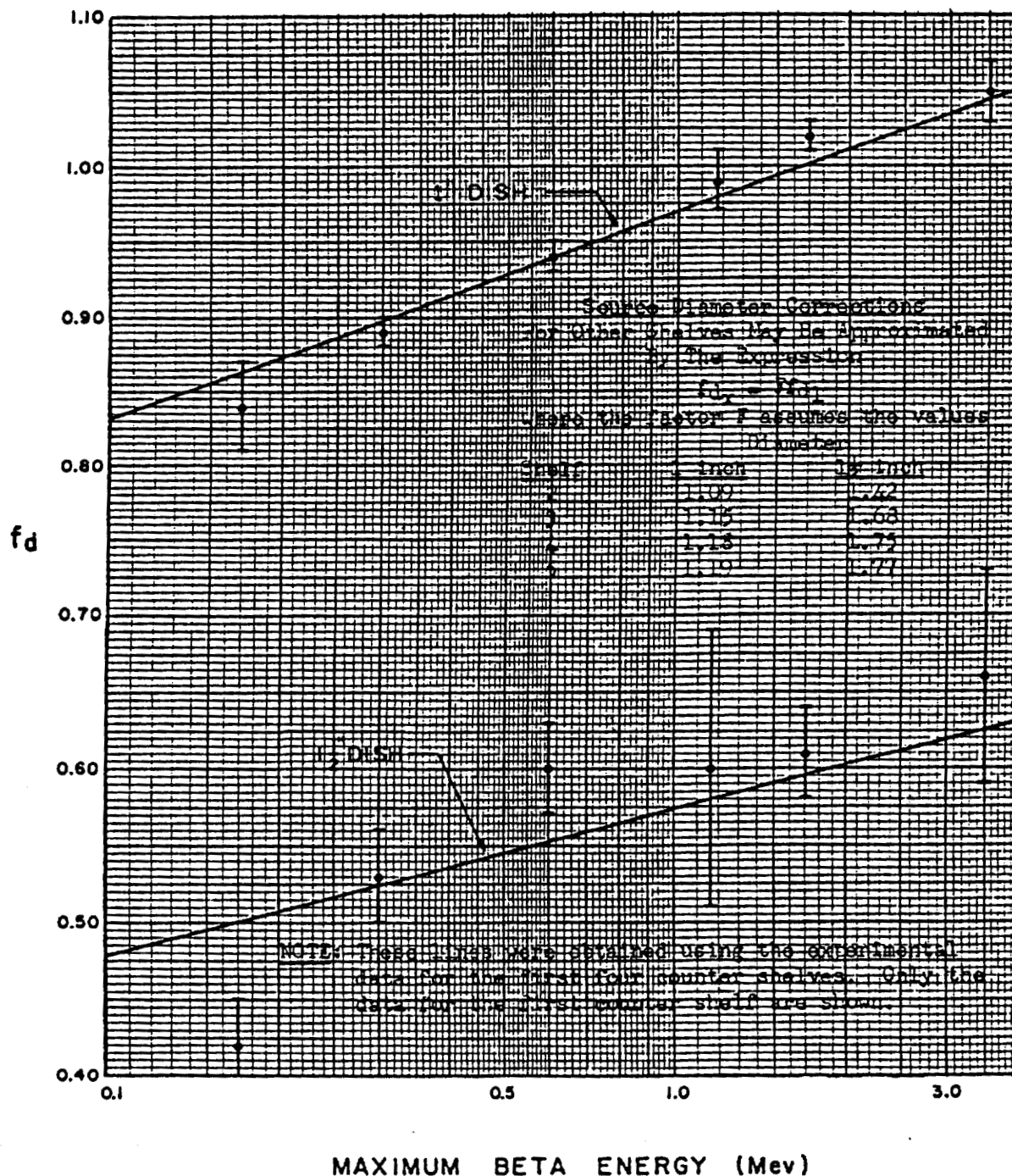


FIGURE-2
FIRST SHELF SOURCE DIAMETER CORRECTIONS
(f_d) FOR STAINLESS STEEL DISHES

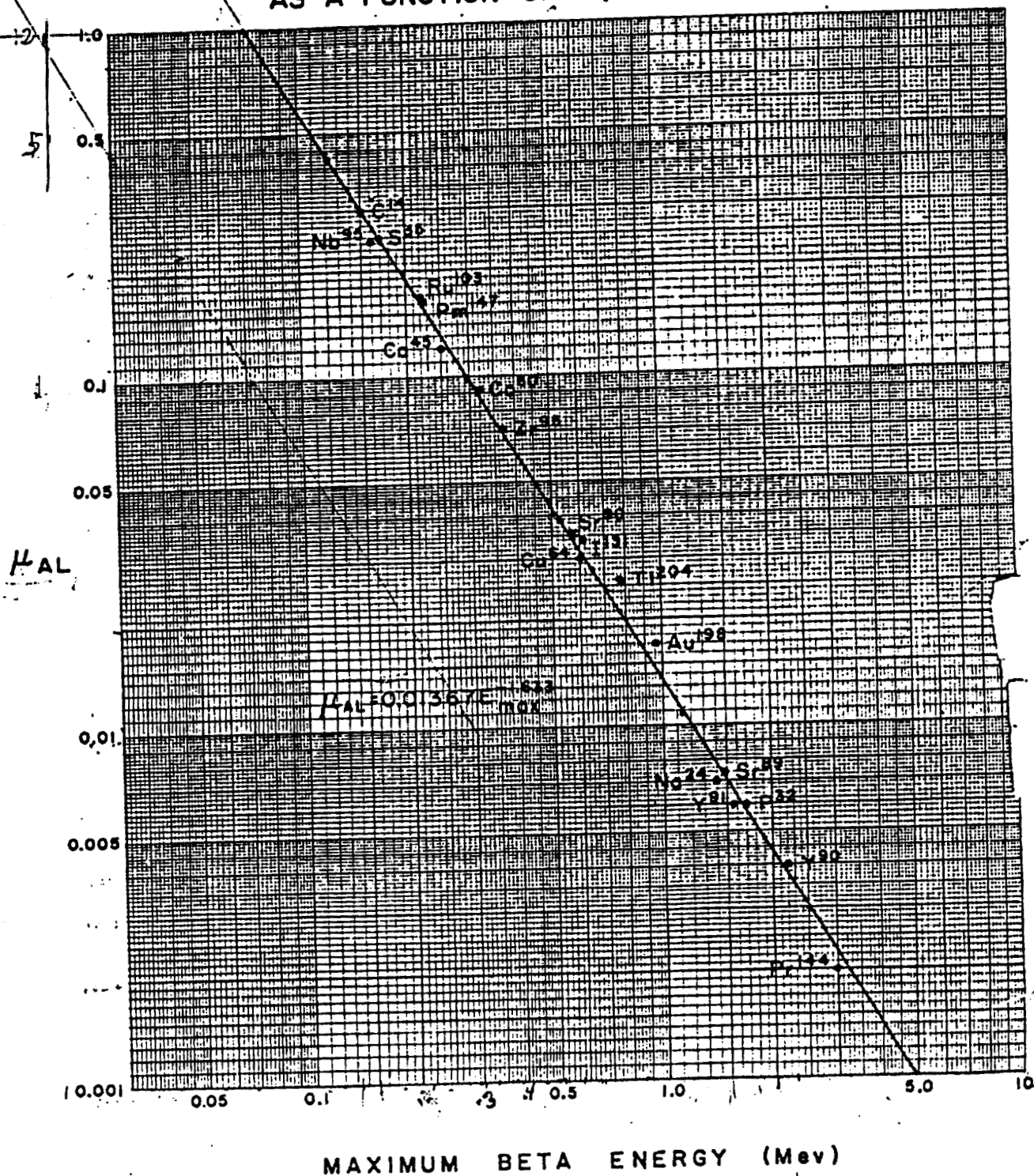


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FIGURE - 4
MASS ABSORPTION COEFFICIENT
AS A FUNCTION OF MAXIMUM ENERGY



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ASG-OS RICHLAND, WASH.

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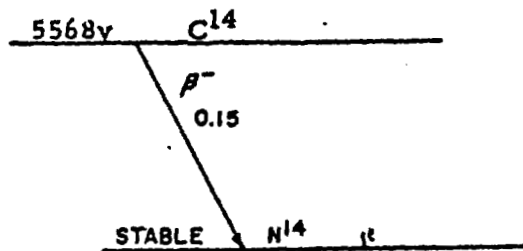
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ISOTOPE Carbon¹⁴

METHOD Distillation

YIELD 100% = 32.8 mg. (10mg. CO₃²⁻)
(As BaCO₃)



μ_{Al} = 0.303 μ_{Air} = *new Tube*

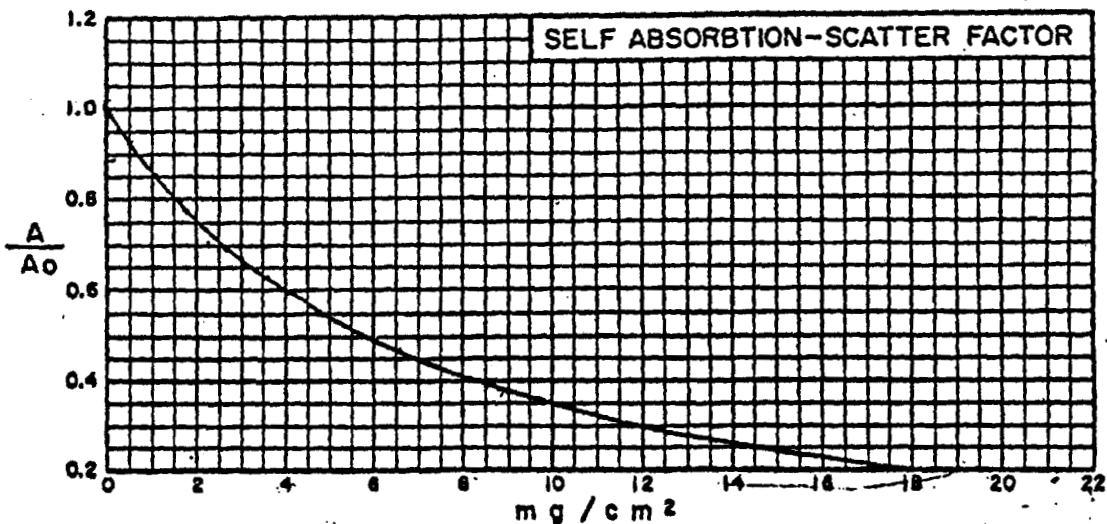
SHELF	AIR & MICA WINDOW FACTORS
1	0.34 (.59)
2	0.19 (.44)
3	0.11 (.36)

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	138" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1	0.86	0.44	0.78	0.61	0.50
SHELF 2	0.94	0.68	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: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo)(2.2 \times 10^5)(S.S.)(b.s.)(S.S.A)(A+M.W.)(Yield)} = \mu C/\text{unit}$

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

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ISOTOPE Sodium²⁴

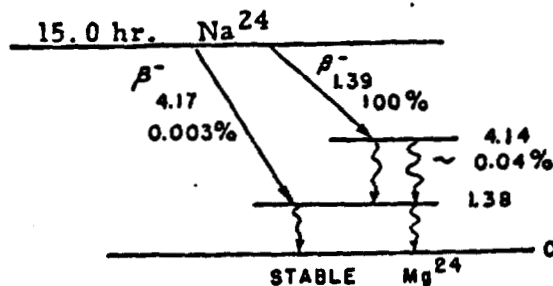
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$D_1 = 63.29 \text{ mg/cm}^2$

METHOD Group Elimination

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

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



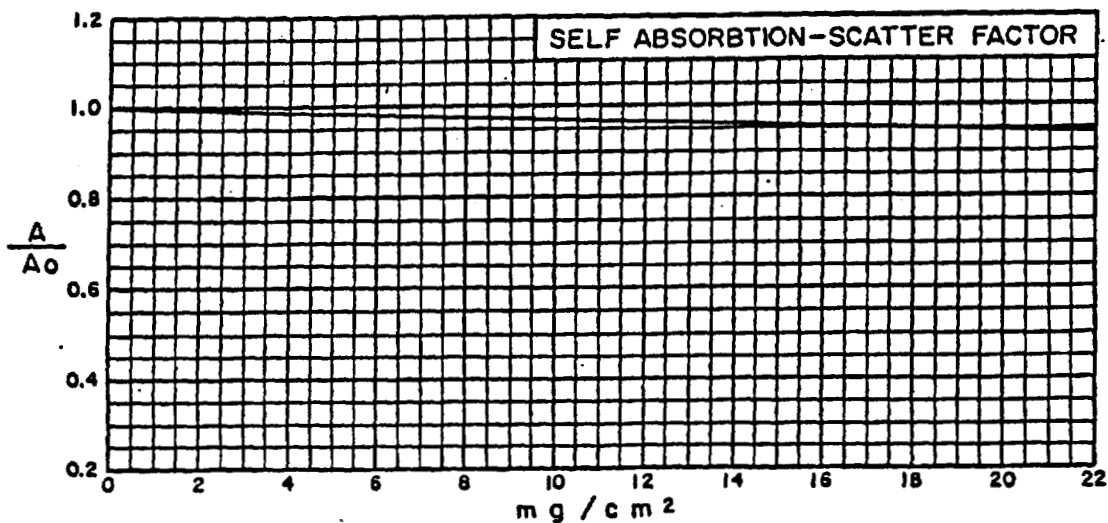
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.94

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

Remarks: Na²⁴ in NaNO₃ on 1" dishes

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ISOTOPE Phosphorus³²

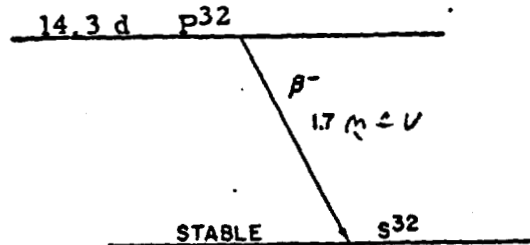
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METHOD Phosphomolybdate

YIELD 98.8 mg=100% (2.5 mg PO₄⁼)

(As (NH₄)₃ (PMo₁₂O₄₀))

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



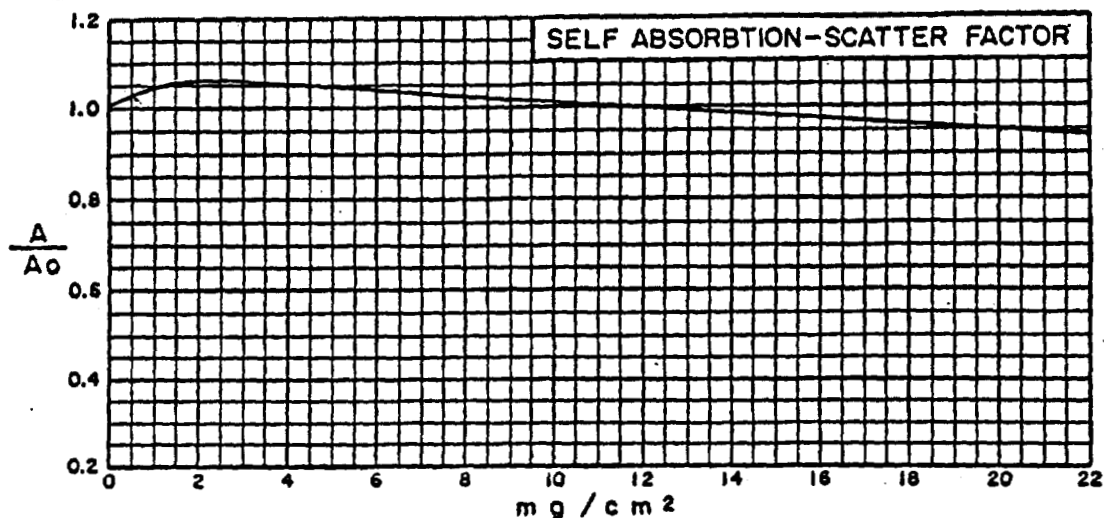
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.97
3	0.96

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

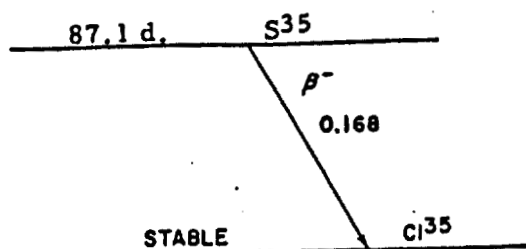
Remarks: P³² in Ammonium Molybdiphosphate on 1" st. stl. dishes
(1st sh.)

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ISOTOPE Sulphur³⁵

METHOD Barium Sulphate

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



μ_{Al} = 0.25 μ_{Air} =

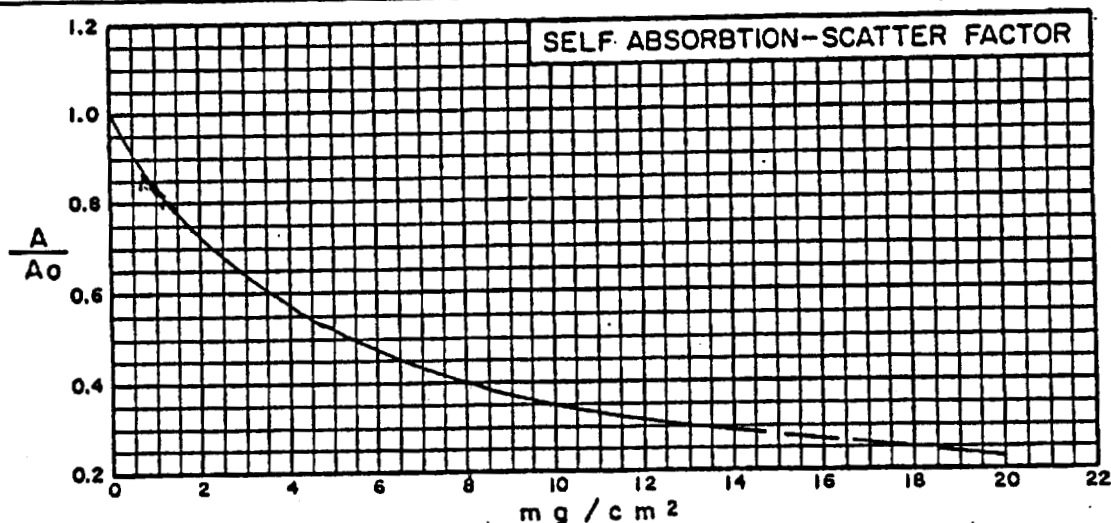
SHELF	AIR & MICA WINDOW FACTORS
1	0.40 (0.65)
2	0.25
3	0.16

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

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

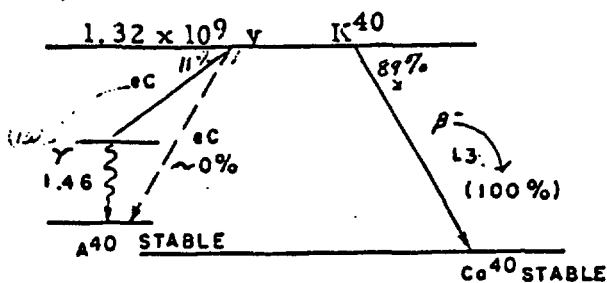
ISOTOPE Potassium⁴⁰

METHOD Perchlorate

YIELD 70.9 mg=100%

(As KClO₄)

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



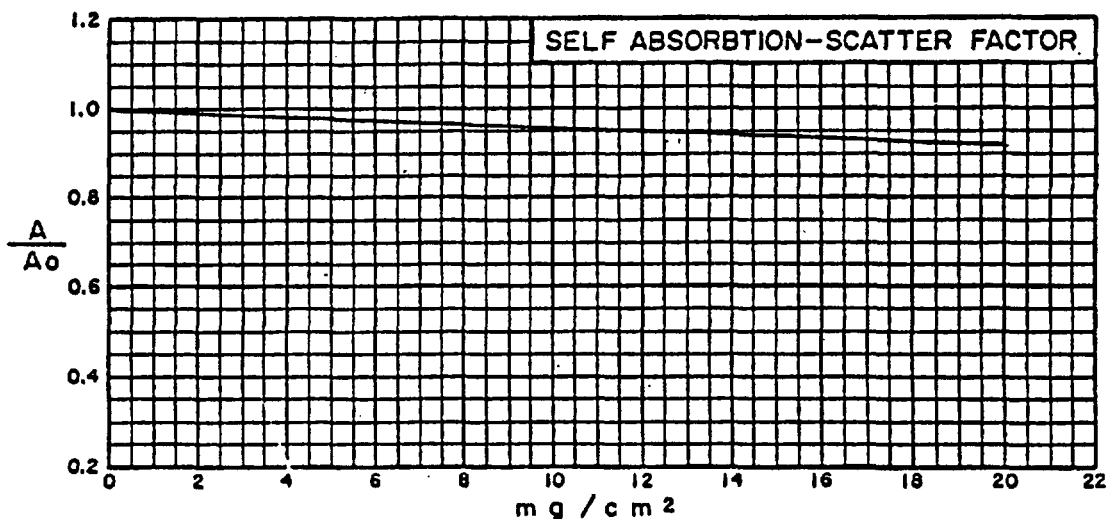
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.95
3	0.94

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



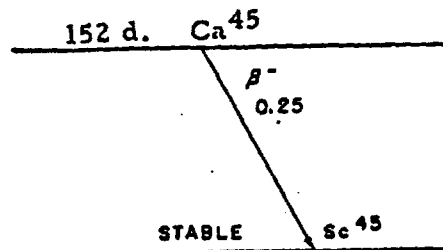
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{b.s.}) (\text{S.S.A.}) (A \cdot M.W.) (\text{Yield})} = \mu C / \text{unit}$

ISOTOPE Calcium⁴⁵

METHOD Calcium Oxalate

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

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



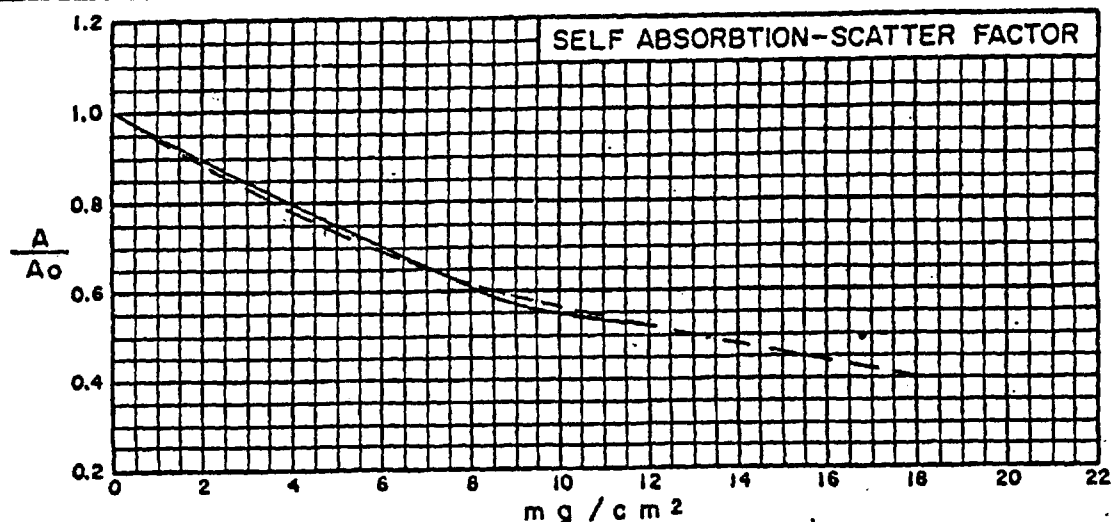
SHELF	AIR & MICA WINDOW FACTORS
1	0.62(78)
2	0.49
3	0.38

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

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

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

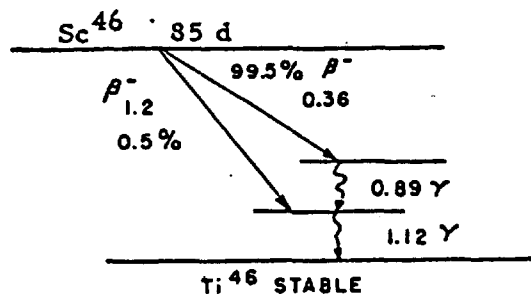
ISOTOPE Scandium⁴⁶

METHOD Scandium Fluoride

YIELD 61.3 mg=100%

(As Sc₂O₃)

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



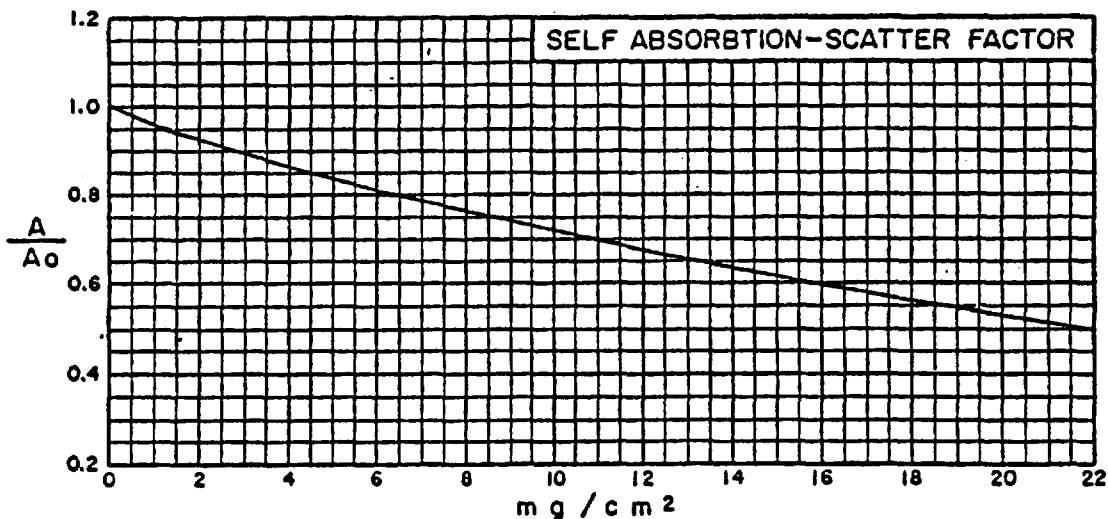
SHELF	AIR & MICA WINDOW FACTORS
1	0.77
2	0.67
3	0.59

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



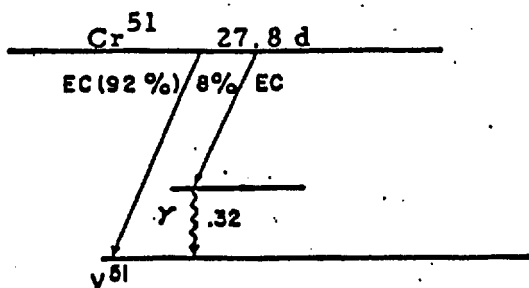
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (b.s.) (S.S.A.) (A+M.W.) (Yield)} = \mu C/\text{unit}$

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

ISOTOPE Chromium⁵¹

METHOD _____

YIELD _____



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

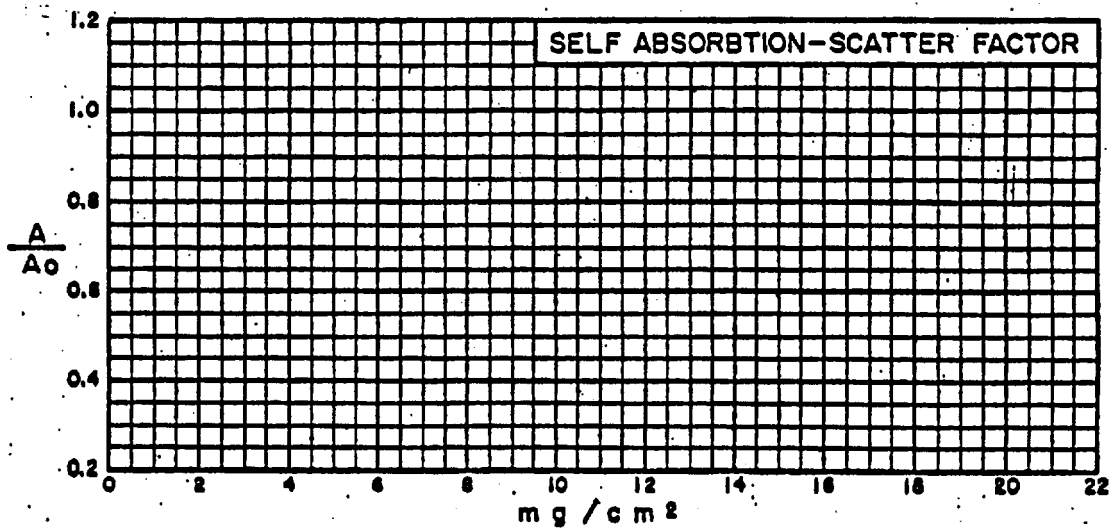
SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

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) 5.0 cm ²	1.38" MILLIPORE 9.6 cm ²	1 1/2" FILTER 13 cm ²
SHELF 1					
SHELF 2					
SHELF 3					

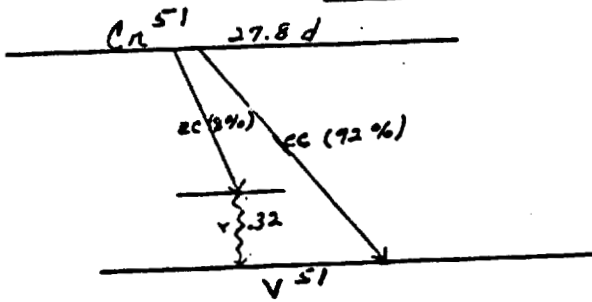
BACK-SCATTER FACTORS

SHELF 1					
SHELF 2					
SHELF 3					



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

Chromium-51

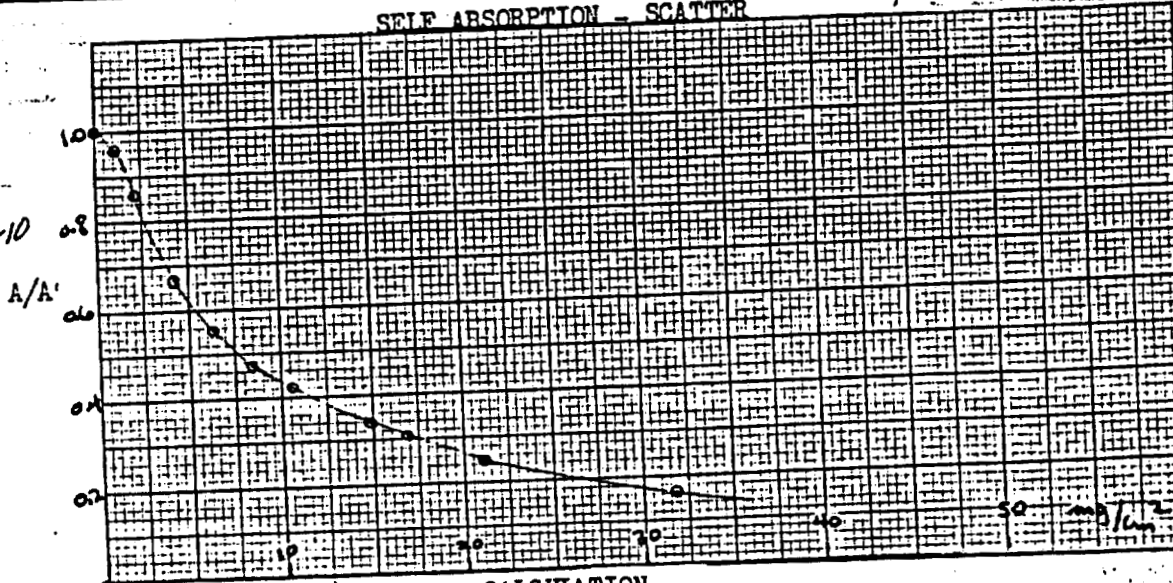


Shelf	Air & Mica Window Abs.
1	
2	
3	
4	
5	

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

BACKSCATTER				
1	1.20 *	1.20 *	1.05 *	1.05 *
2	1.20 *	1.20 *	1.05 *	1.05 *
3				
4				
5				

SELF ABSORPTION - SCATTER



CALCULATION

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

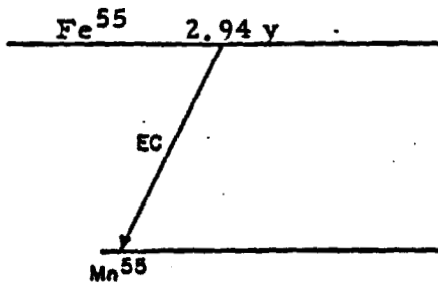
COMMON METHOD

* Interpreted

ISOTOPE Iron⁵⁵

METHOD _____

YIELD _____



μ_{Al} = _____ μ_{Alr} = _____

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

SOURCE SPREAD DIAMETER FACTORS

MOUNTING	1" S.S. DISH	1 1/2" S.S. DISH	1" GLASS (FLAT)	138" MILLIPORE	1 1/2" FILTER
NEGATIVE AREA	4.5 cm ²	10 cm ²	6.0 cm ²	2.6 cm ²	13 cm ²

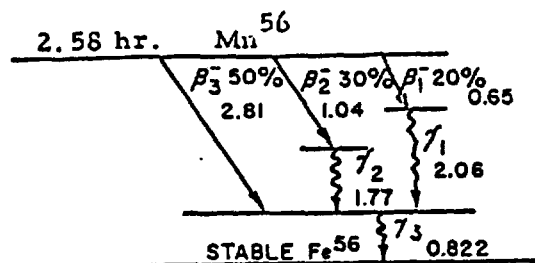
ISOTOPE Manganese⁵⁶

METHOD Manganese Dioxide

YIELD 31.7 mg=100%

(As MnO₂)

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



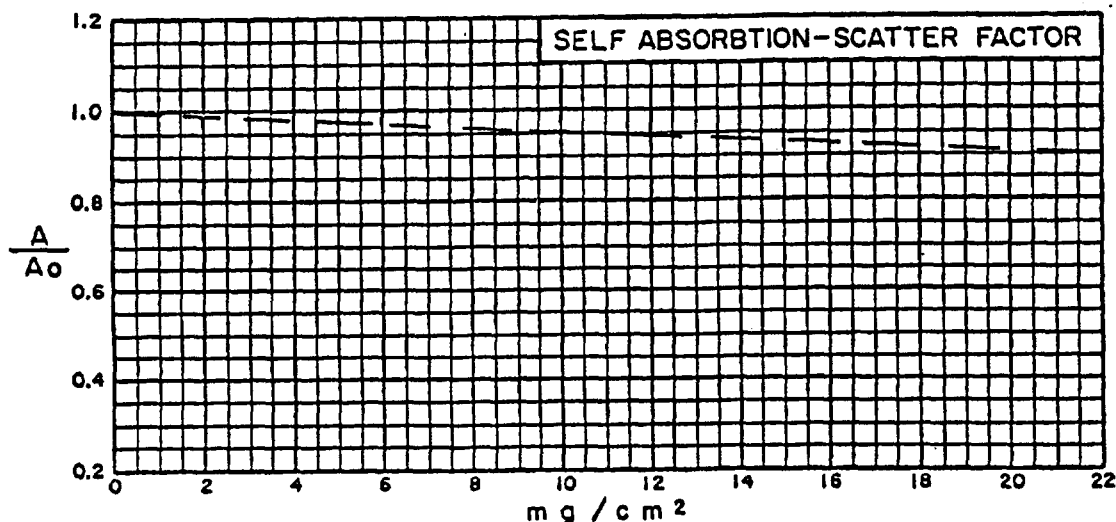
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.94
3	0.93

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	138" 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



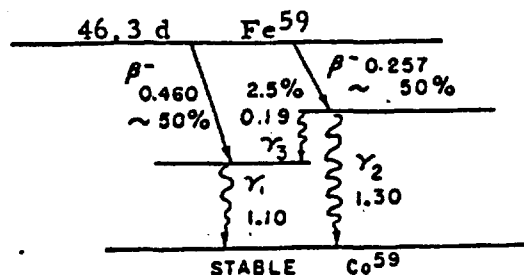
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (bs.) (S.S.A.) (A+M.W.) (Yield)} = \mu C/\text{unit}$

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

METHOD Ether Extraction

YIELD 28.6 mg = 100 %
(As Fe₂O₃)

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



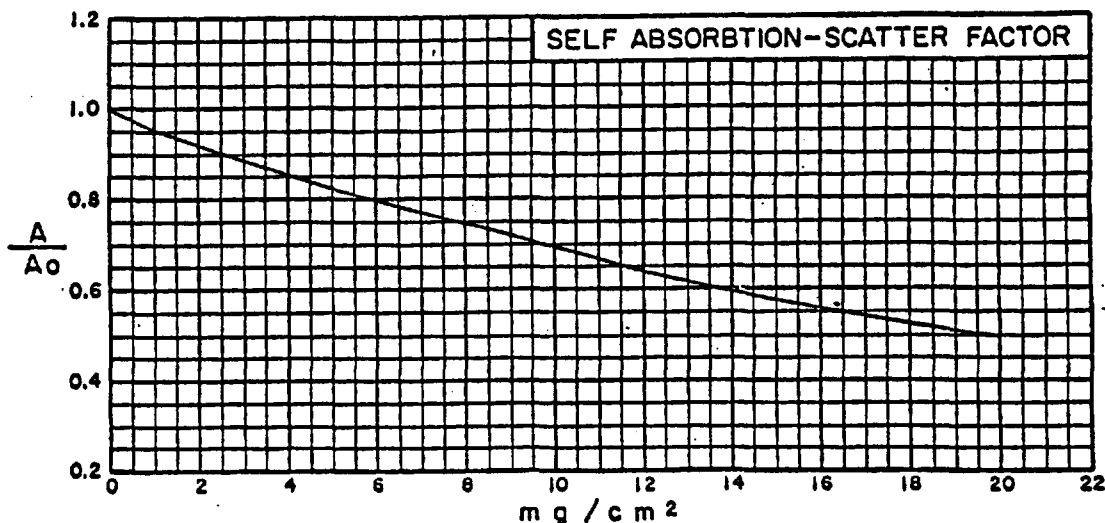
SHELF	AIR & MICA WINDOW FACTORS
1	0.74
2	0.63
3	0.55

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

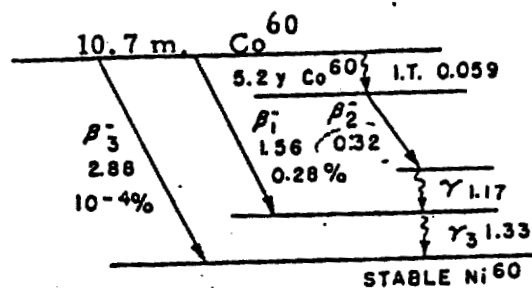


CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A})(A+M.W.)(\text{Yield})} = \mu C/\text{unit}$

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

ISOTOPE Cobalt⁶⁰METHOD² Potassium Cobaltinitrite

YIELD 80.2 mg = 100%

(As K₃ Co (NO₂)₆ • H₂O) $\mu_{Al} = 0.088$ $\mu_{Air} = 0.06$ 

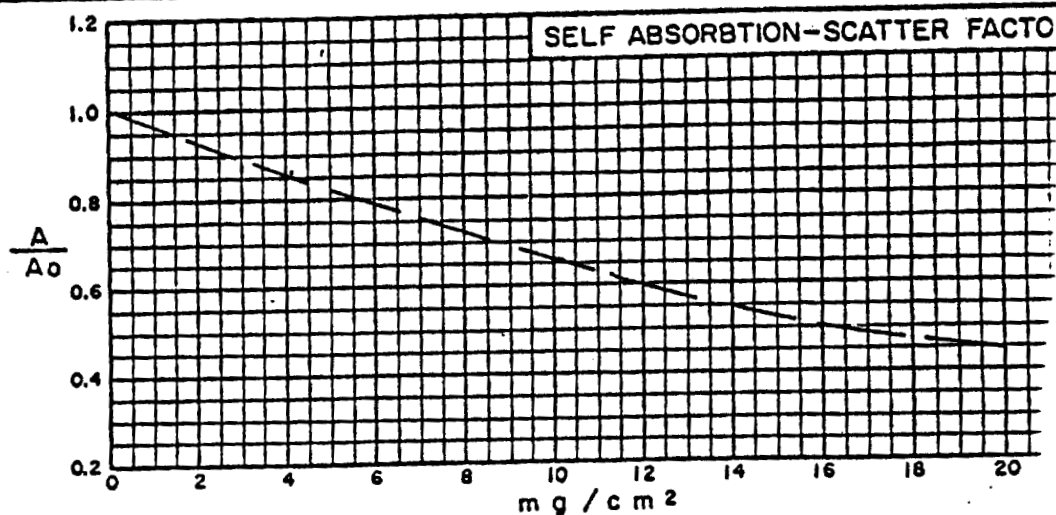
SHELF	AIR & MICA WINDOW FACTORS
1	0.73 (.77)
2	0.62
3	0.52

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: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (3.9) (bs.) (S.S.A.) (A \cdot M.W.) (Yield)} = \mu$

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

*Additional Method

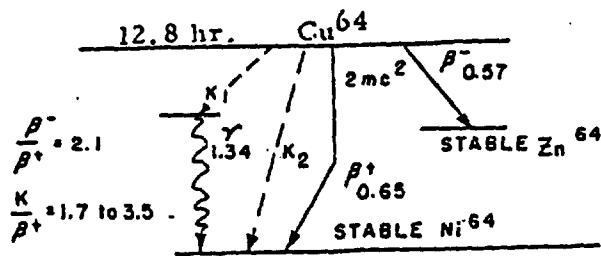
Gamma Spectrometer

ISOTOPE Copper⁶⁴

METHOD Cuprous Thiocyanate

YIELD 38.2 mg. = 100%

(As Cu SCN)

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

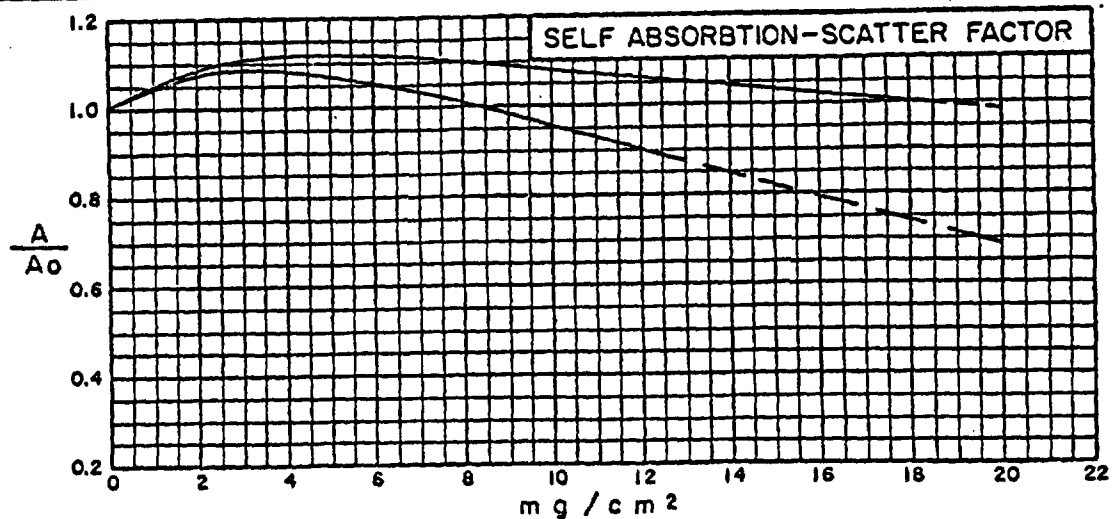
SHELF	AIR B MICA WINDOW FACTORS
1	0.89
2	0.84
3	0.79

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

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

Remarks: Upper curve 1st shelf

Lower curve 2nd shelf

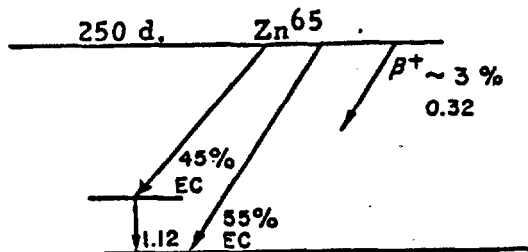
ISOTOPE Zinc⁶⁵

METHOD * Zinc Sulfide

YIELD 29.8 mg = 100%

(As ZnS)

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



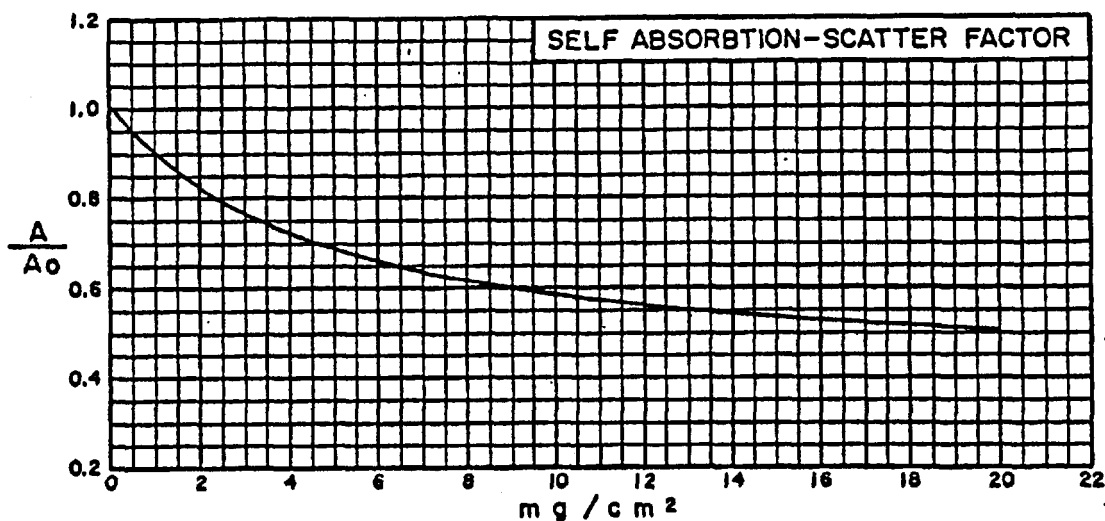
SHELF	AIR & MICA WINDOW FACTORS
1	0.73
2	0.62
3	0.52

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

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

* Additional Method
Gamma Spectrometer

ISOTOPE Arsenic⁷⁶

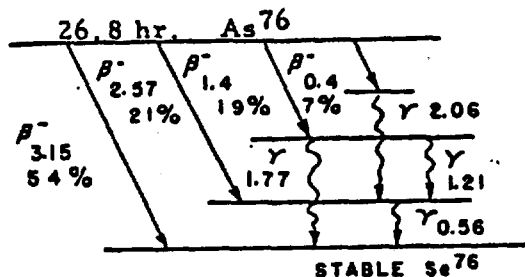
METHOD Arsenic Sulfide

YIELD 32.8 mg. = 100%

(As As₂S₃)

$\mu_{Al} = 0.007$

$\mu_{Air} =$



SHELF AIR & MICA WINDOW FACTORS

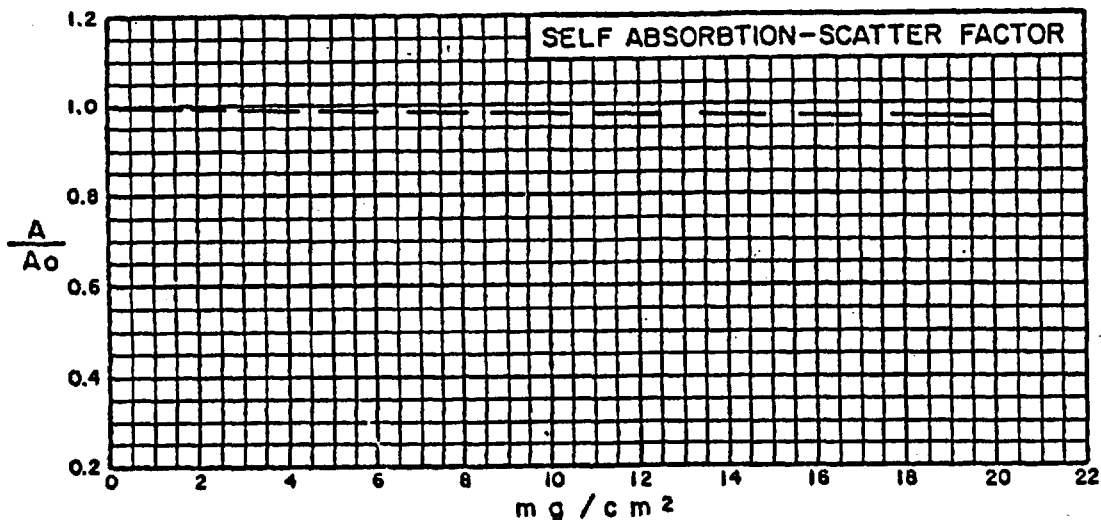
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.96
3	0.95

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

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

ISOTOPE Strontium⁸⁹

METHOD Fuming Nitric Acid

YIELD ^{33.7}44.2 mg = 100%
(As SrC₂O₄)

54 d. Sr⁸⁹

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

β^-
1.48

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

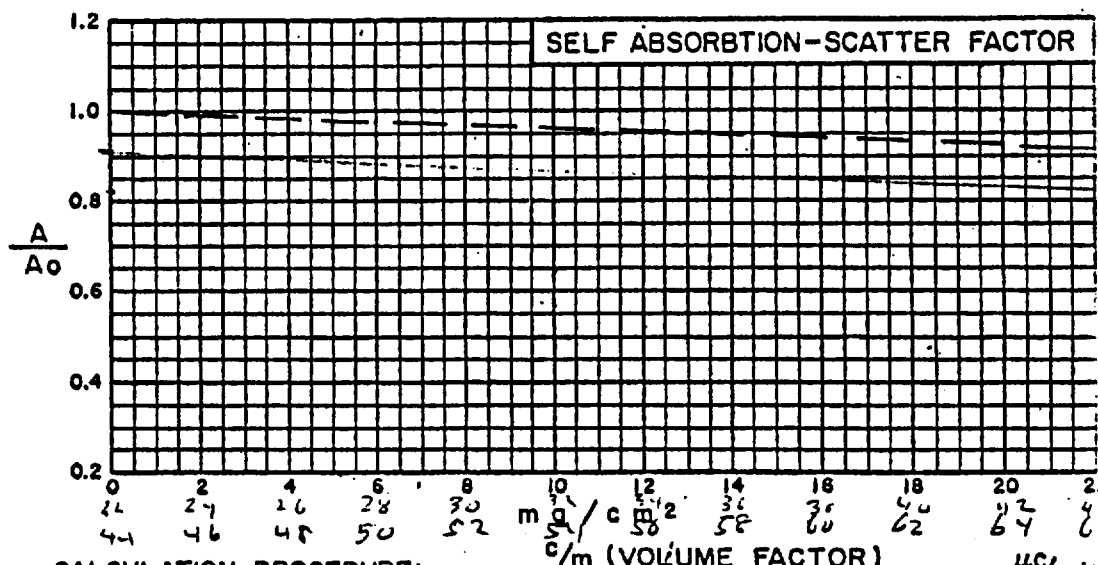
STABLE Y⁸⁹

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	138" 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: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$
 $(Geo.) (2.2 \times 10^6) (S.S.) (bs.) (S.S.A.) (A + M.W.) (Yield)$

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

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As SrCO_3

2 ml ...

4 ml ... = 67.4

ISOTOPE Strontium⁹⁰

METHOD Fuming Nitric Acid

33.7 mg. = 100% Barium
 YIELD 44.2 mg. = 100%
 (As SrC_2O_4)

 $\mu_{\text{Al}} = 0.034$ $\mu_{\text{Air}} =$ 19.9 yr. Sr^{90}
 $\beta^- \left\{ \begin{array}{l} 0.53 \\ \text{TO} \\ 0.61 \end{array} \right.$
62 hr. Y^{90}

SHELF | AIR & MICA WINDOW FACTORS

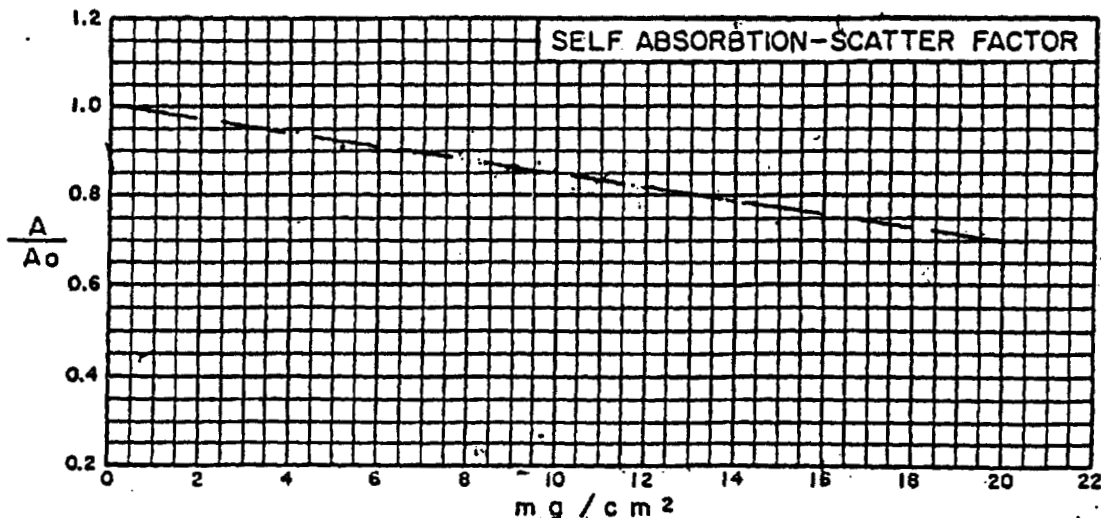
SHELF	AIR & MICA WINDOW FACTORS
1	0.88 0.96
2	0.83 0.89
3	0.78 0.84

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	138" 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 1.40	1.45	1.22	1.19	1.11
SHELF 2	1.43 1.42	1.43	1.17	1.13	1.07
SHELF 3	1.39 1.38	1.39	1.16	1.12	1.07



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

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

$T_{mJ} \text{ Geo} = 1339 \text{ shelf} \times 2$
 2/4/83 K111 sl 65

1083799

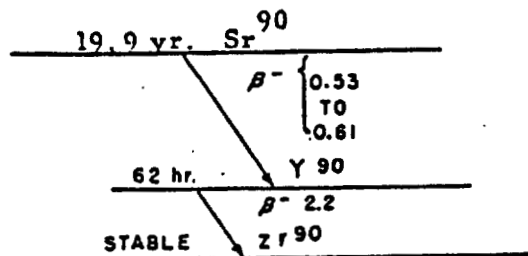
ISOTOPE Strontium⁹⁰ - Yttrium⁹⁰

METHOD Fuming Nitric Acid

YIELD 44.2 mg. = 100%

(As Sr C₂ O₄)

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



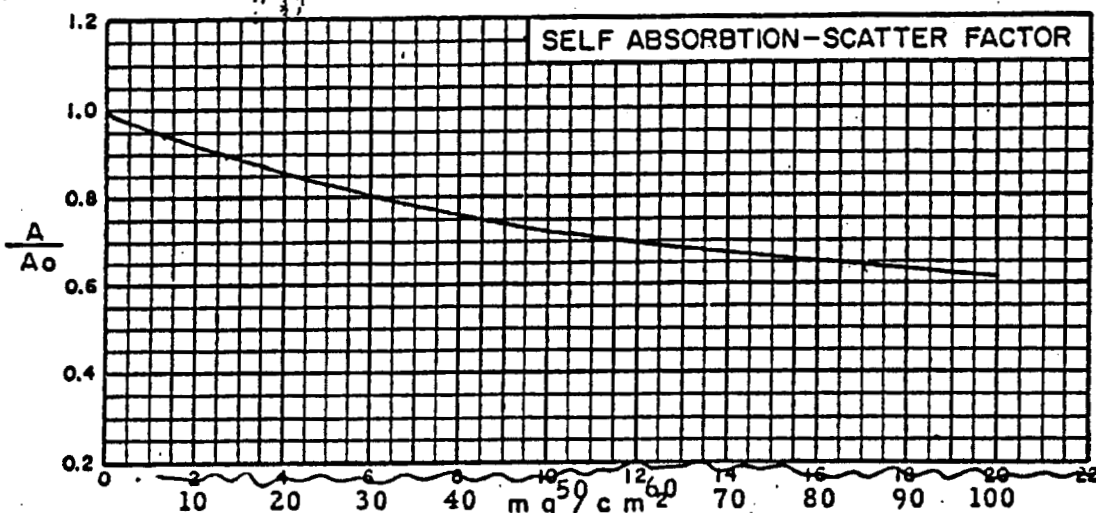
SHELF	AIR & MICA WINDOW FACTORS
1	0.94 (.96)
2	0.90 (.92)
3	0.87 (.89)
4	(.85)

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

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

wt of ppt
100% yield/wt.

$\frac{C/m}{(1.43 \times 10^6)(S.S.A)(Y)}$

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ISOTOPE Yttrium⁹⁰

METHOD Yttrium Fluoride

YIELD $\frac{25.4 \text{ mg}}{50.8 \text{ mg}} = 100\%$

(As Y_2O_3)

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

62 hr. Y^{90}

β^-
2.2

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

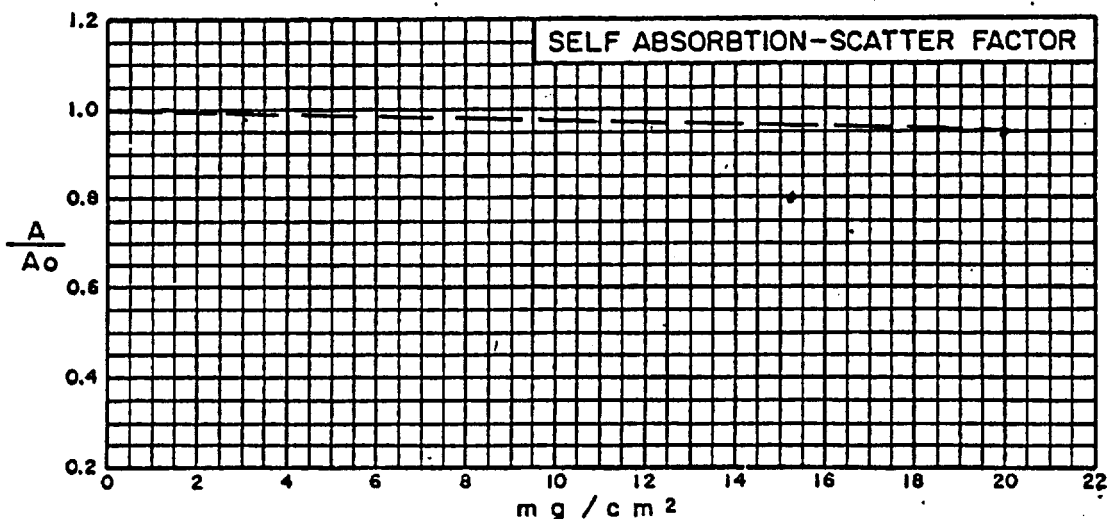
STABLE Zr^{90}

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

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

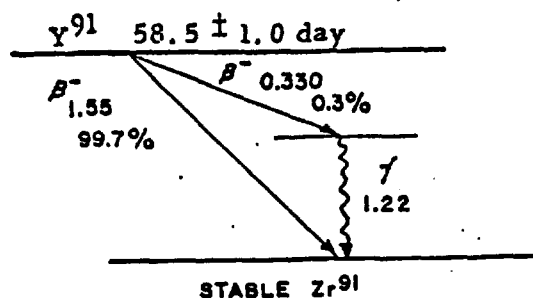
1083801

- 27 -
ISOTOPE Yttrium⁹¹

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METHOD Yttrium Fluoride

YIELD $\frac{2.4 \text{ mg}}{50.8 \text{ mg}} = 100\%$
(As Y_2O_3)
 $\mu_{\text{Al}} = 0.0067$ $\mu_{\text{Air}} =$



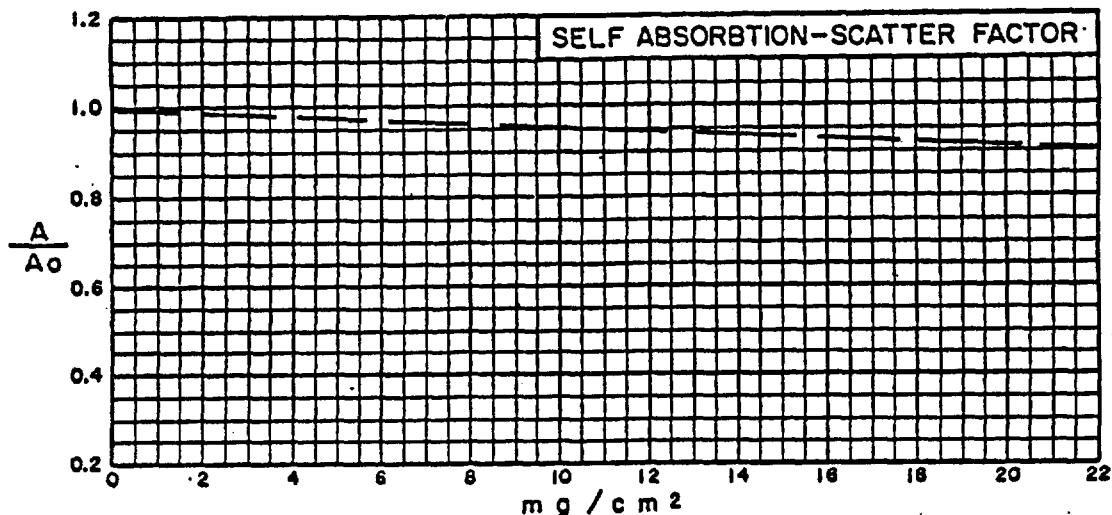
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.96
3	0.95

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

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

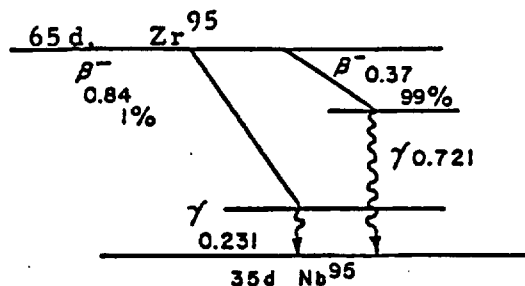
1083802

ISOTOPE Zirconium⁹⁵

METHOD* Barium Fluozirconate

YIELD 27.0 mg = 100%
(As ZrO₂)

$\mu_{Al} = \frac{8.072}{2.17}$ $\mu_{Air} =$



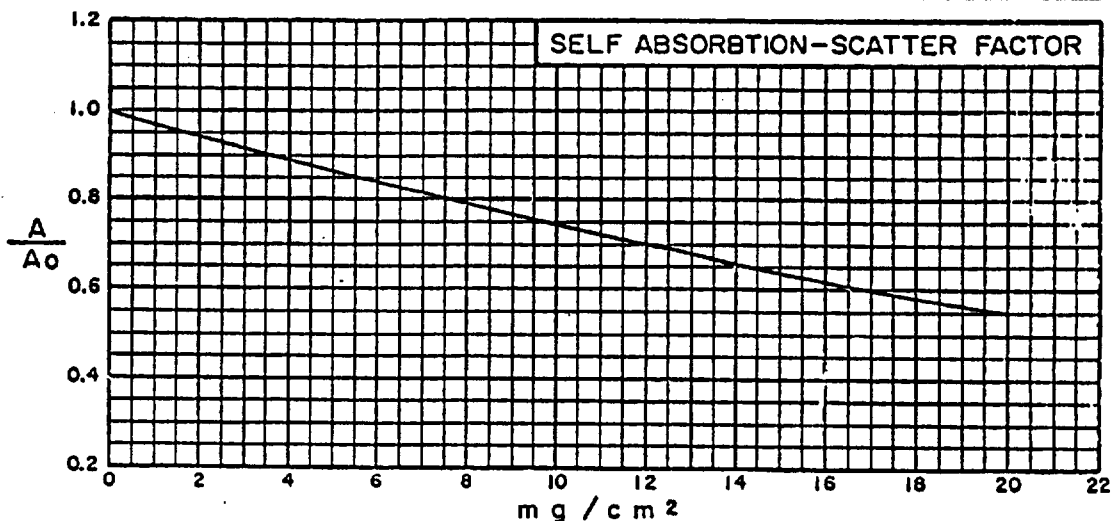
SHELF	AIR & MICA WINDOW FACTORS
1	0.78
2	0.69
3	0.60

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	1.38	1.38	1.19	1.16	1.10
SHELF 2	1.36	1.36	1.15	1.11	1.07
SHELF 3	1.33	1.33	1.13	1.10	1.06



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

*Additional Methods
Zirconium Phenylarsonate

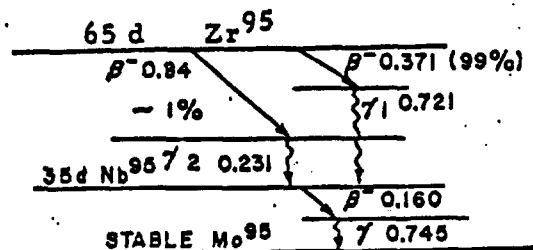
Mounting
1" S S - dish

Yield
~ 90 mg = 100%

ISOTOPE Zirconium⁹⁵ - Niobium⁹⁵

METHOD Spike - Direct Plate

YIELD



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

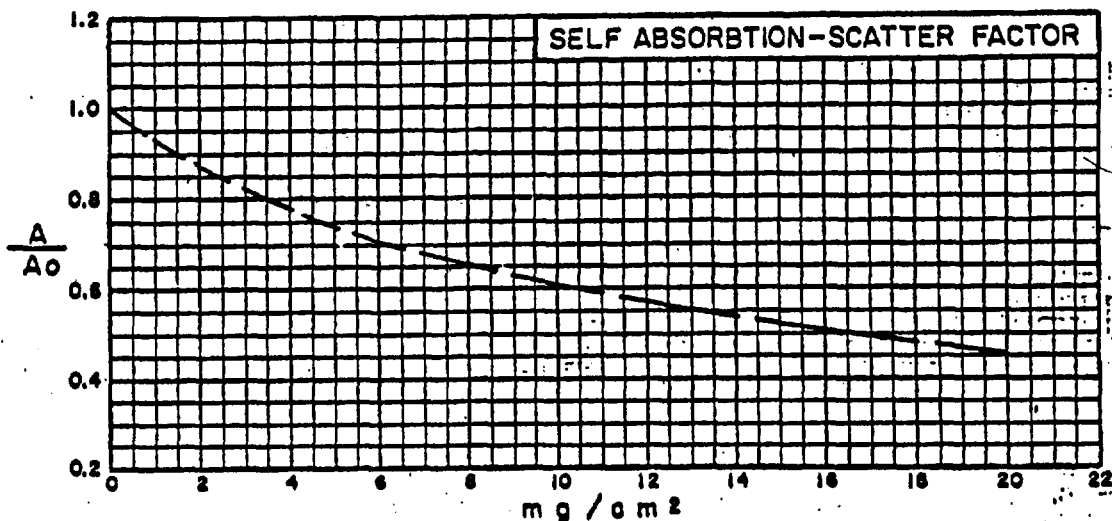
SHELF	AIR & MICA WINDOW FACTORS
1	0.58
2	0.46
3	0.37

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) 6.0 cm ²	1.38" MILLIPORE 9.8 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: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (b.s.) (S.S.A) (A + M.W.) (Yield)} = \mu C / unit$

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

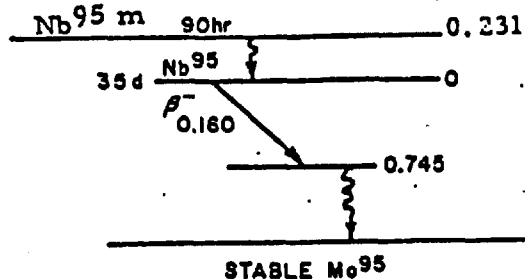
ISOTOPE Niobium⁹⁵

METHOD Niobic Oxide

YIELD 28.6 mg = 100%

(As Nb₂O₅)

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



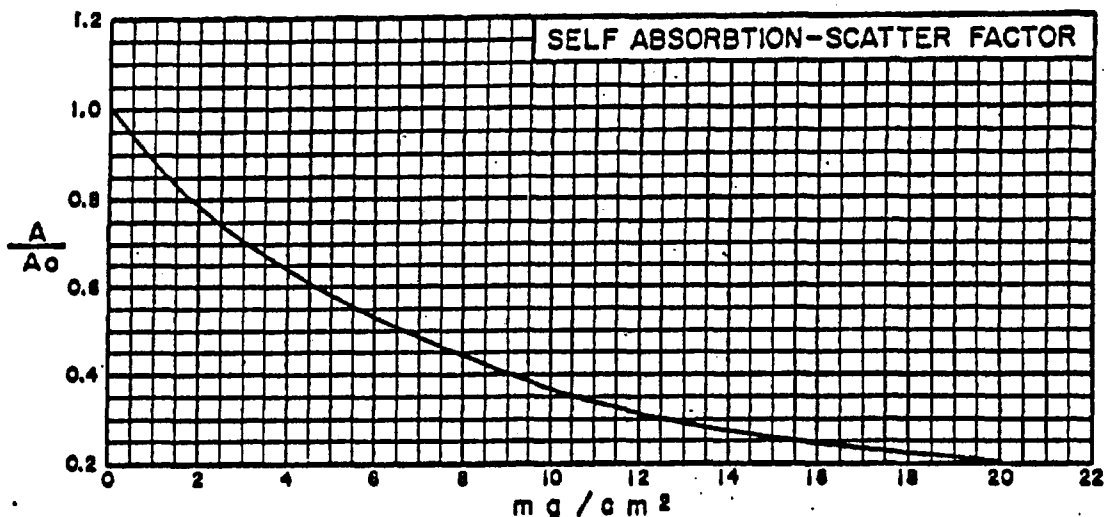
SHELF	AIR & MICA WINDOW FACTORS
1	0.38
2	0.23
3	0.14

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) 8.0 cm ²	138" 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



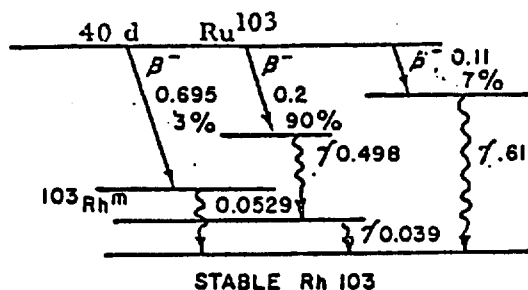
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^4) (S.S.) (bs.) (S.S.A.) (A \cdot M.W.) (Yield)} = \mu C / \text{unit}$

METHOD* Distillation

YIELD 100% = 28.0 mg.

(As RuO₂ standardized)

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



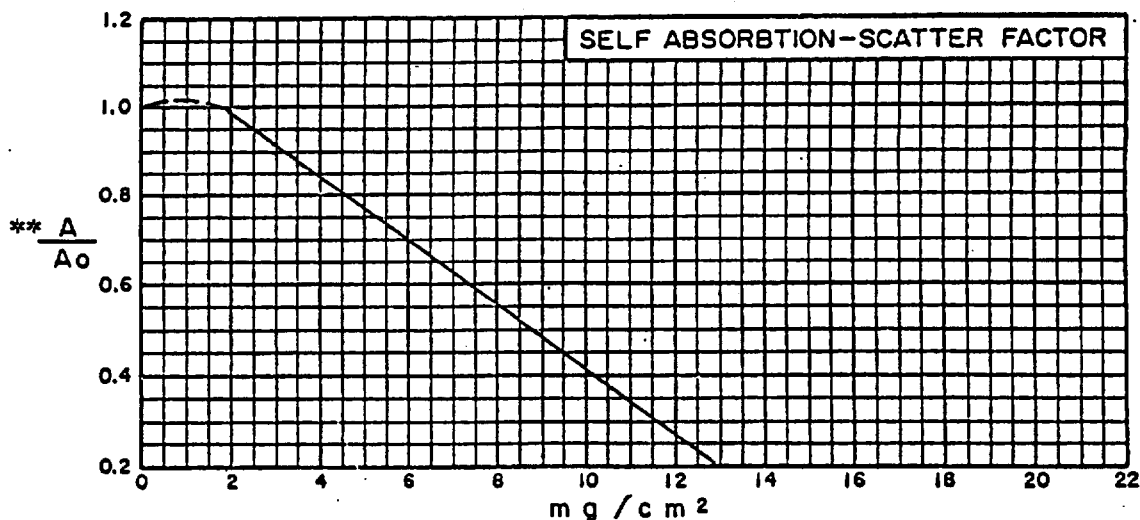
SHELF	AIR & MICA WINDOW FACTORS
1	0.50
2	0.35
3	0.25

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

* Additional Methods

Reduction

Carrier-free (CCl₄)

Mounting

1" S S dish

1" S S dish

Yield

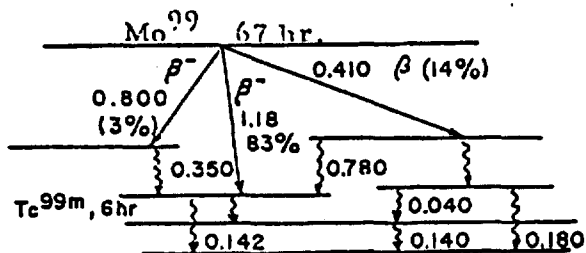
100% = 20 mg.

100%

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

ISOTOPE Molybdenum⁹⁹METHOD α -Benzoinoxime

YIELD 30.0 mg = 100%

(As MoO₃) $\mu_{Al} =$ _____ $\mu_{Air} =$ _____

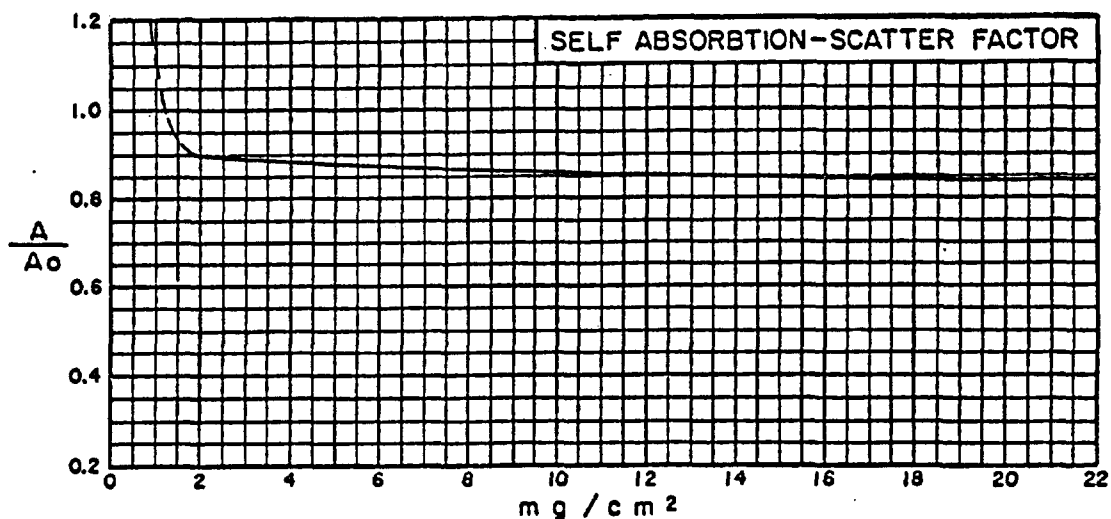
SHELF	AIR & MICA WINDOW FACTORS
1	0.76
2	0.91
3	0.88

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

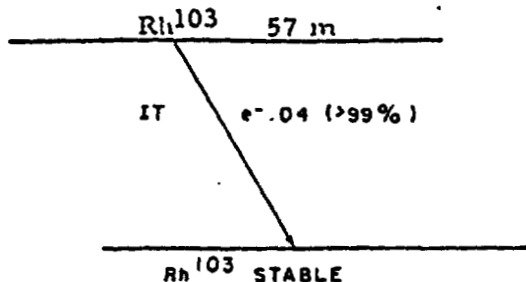


CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{bs.})(\text{S.S.A})(A+M.W.)(\text{Yield})} = \mu^C/\text{unit}$

Remarks: Mo O₃ on 1" dishes

METHOD _____

YIELD _____



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

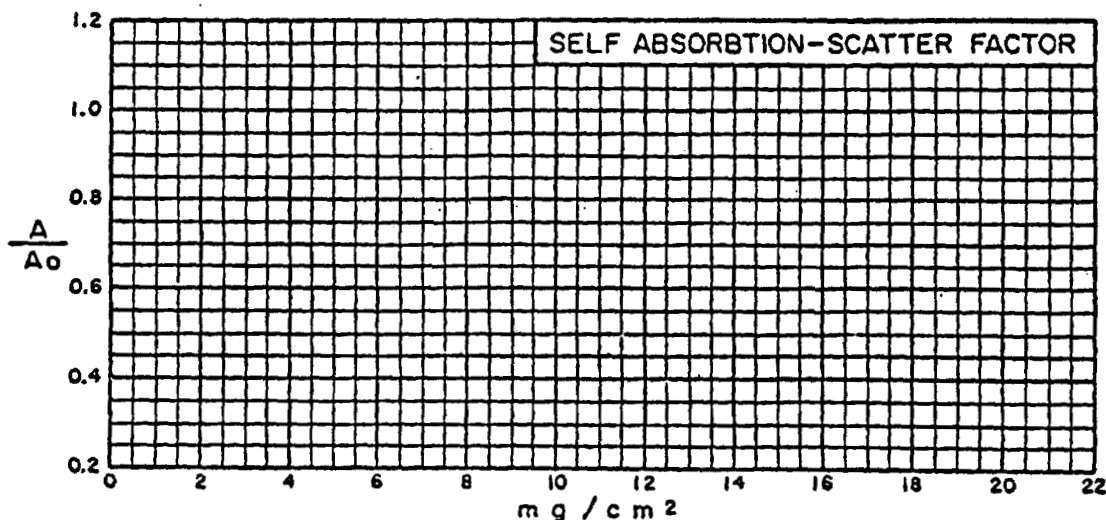
SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

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					

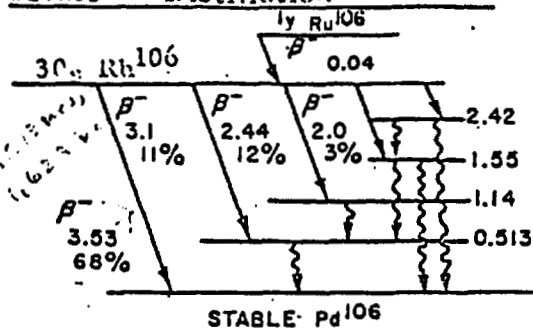


CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(A + \text{M.W.})(\text{Yield})} = \mu C/\text{unit}$

ISOTOPE Rhodium¹⁰⁶ (Ruthenium¹⁰⁶)

METHOD# Distillation

YIELD 28.0 mg = 100%

(As RuO₂ standardized) $\mu_{Al} = 0.002$ $\mu_{Air} =$ 

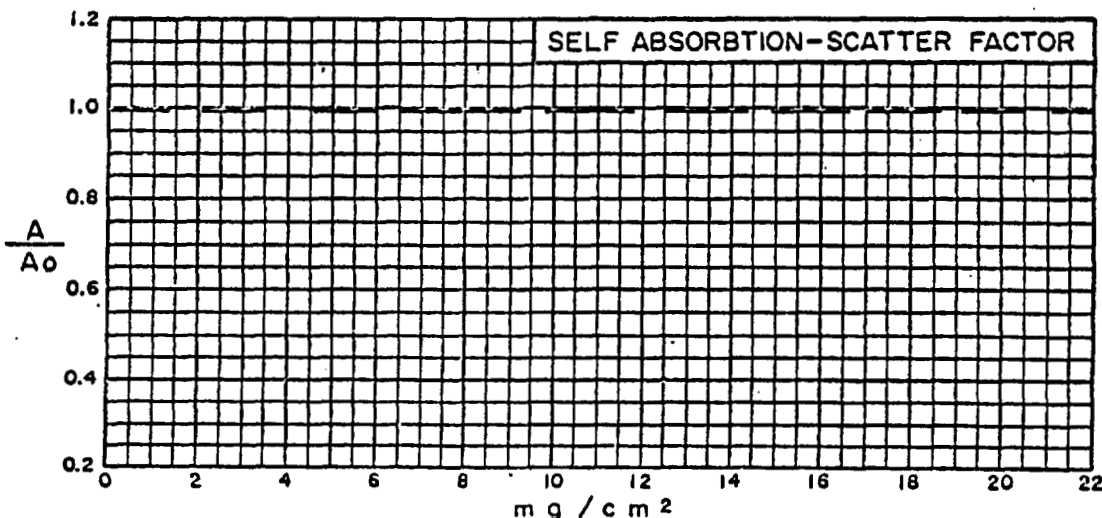
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.99
3	0.99

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

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

* Additional Methods

Reduction

Carrier-free (CCl₄)

Mounting

1" S S dish

1" S S dish

Yield

100% = 20 mg.

100%

1083809

ISOTOPE Antimony¹²⁵

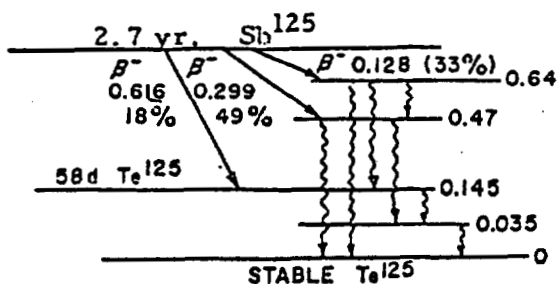
METHOD Antimony Sulfide

YIELD 27.9 mg = 100%

(As Sb₂S₃)

$\mu_{Al} = 0.15$

$\mu_{Air} =$



SHELF AIR & MICA WINDOW FACTORS

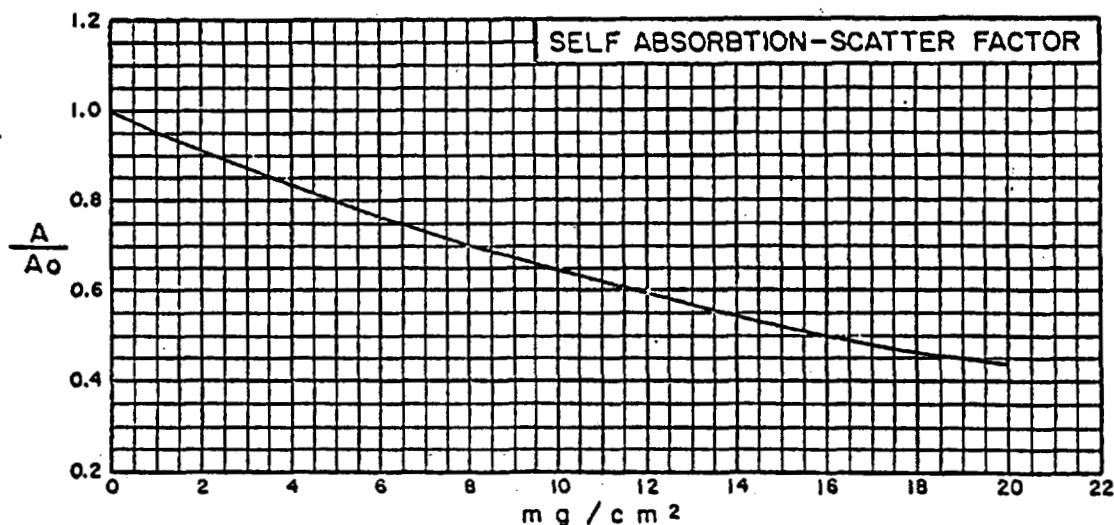
SHELF	AIR & MICA WINDOW FACTORS
1	0.50
2	0.48
3	0.40

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	2	3	4	5
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

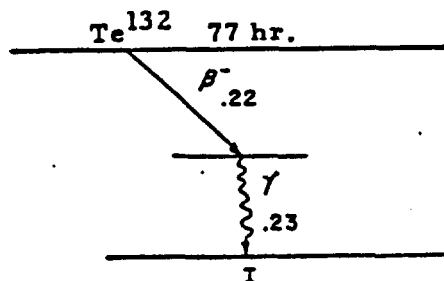


CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{bs.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu C / \text{unit}$

ISOTOPE Tellurium¹³²

METHOD SO₂ - Reduction

YIELD 20.0 mg = 100%
(As TeO)



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

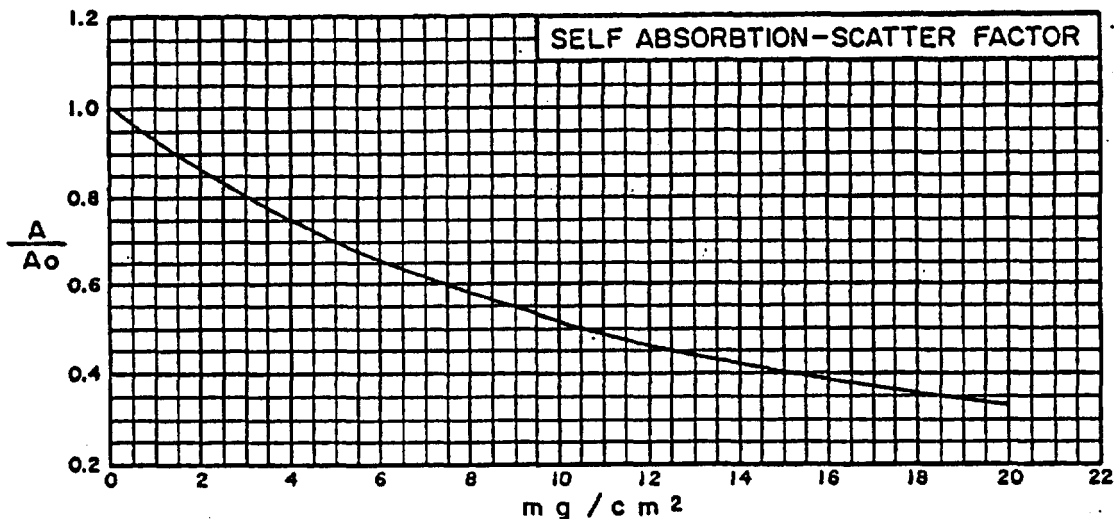
SHELF	AIR & MICA WINDOW FACTORS
1	0.56
2	0.42
3	0.31

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

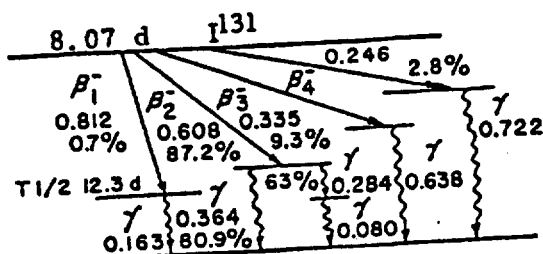
HW-18258-APP

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ISOTOPE

Iodine ¹³¹I120.9 = 20 Pd I₂ (230 mg) = 0.017 mg

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			1.15	1.07	1.07

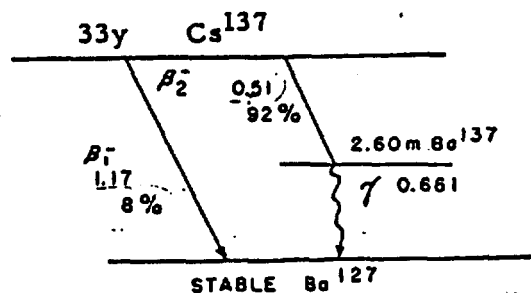
ISOTOPE Cesium¹³⁷

METHOD* Cesium Silicowolframate

YIELD 100 mg = 100%

(As Cs₈SiW₁₂O₄₂ standard)

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



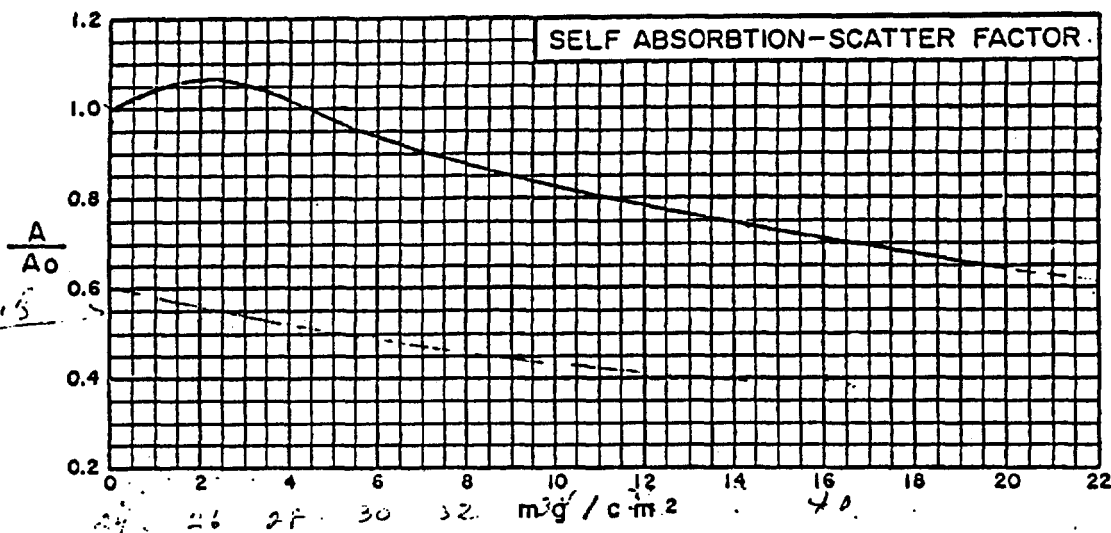
SHELF	AIR & MICA WINDOW FACTORS
1	0.87
2	0.81
3	0.75

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

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

* Additional Method
Chloroplatinic Acid

Mounting
1" S S dish

Yield
50.7 mg = 100%

$$\frac{c/m}{(1.569 \times 10^6) (\text{S.S.A.}) (Y) (V)}$$

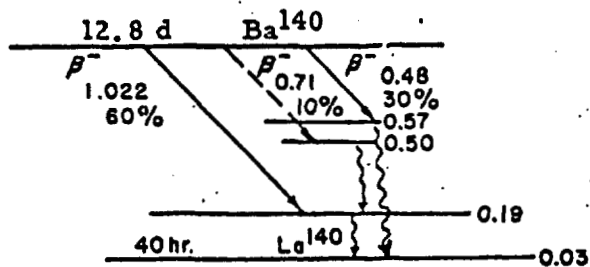
-39-

ISOTOPE Barium¹⁴⁰

HW-18258-APP

METHOD Barium Chromate

YIELD 36.8 mg = 100%

(As BaCrO₄) $\mu_{Al} = 0.023$ $\mu_{Air} =$ 

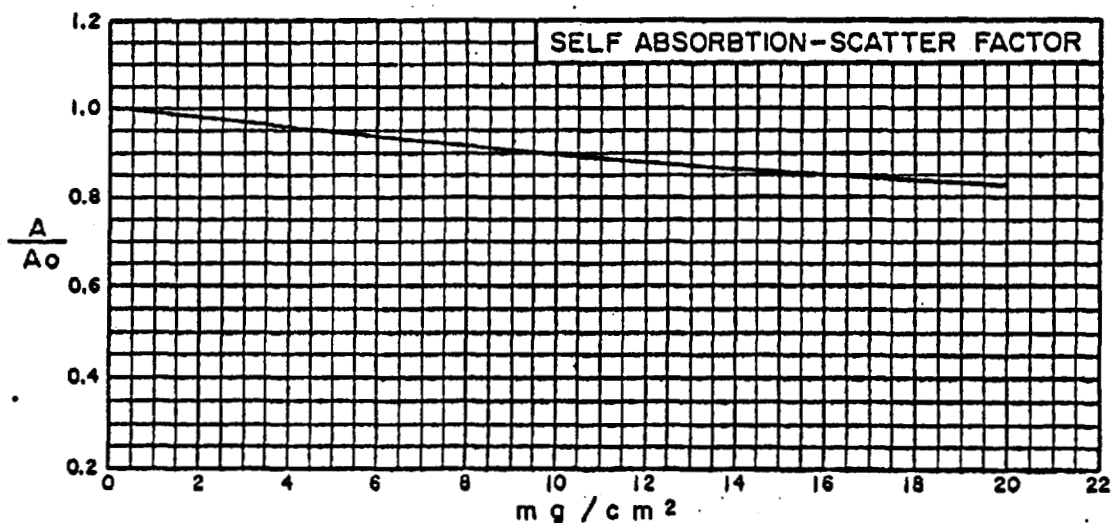
SHELF	AIR & MICA WINDOW FACTORS
1	0.92
2	0.88
3	0.84

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

1083814

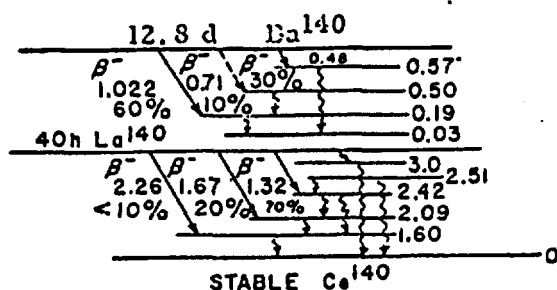
-40-

ISOTOPE Barium¹⁴⁰ Lanthanum¹⁴⁰

HW-18258-API

METHOD Barium Chromate

YIELD 36.8 mg = 100%

(As Ba CrO₄) $\mu_{Al} = 0.014$ $\mu_{Air} =$ 

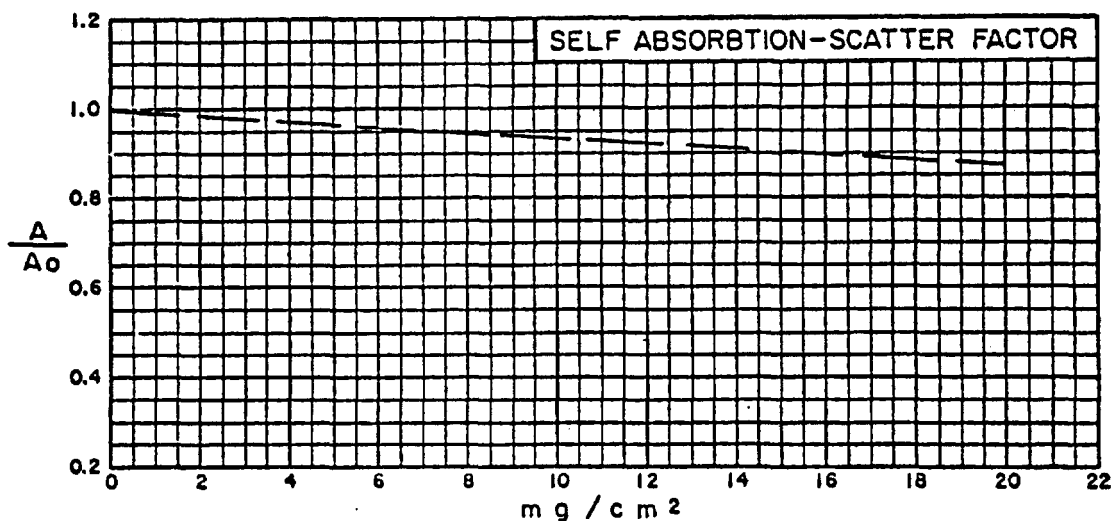
SHELF	AIR & MICA WINDOW FACTORS
1	0.95
2	0.92
3	0.89

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

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

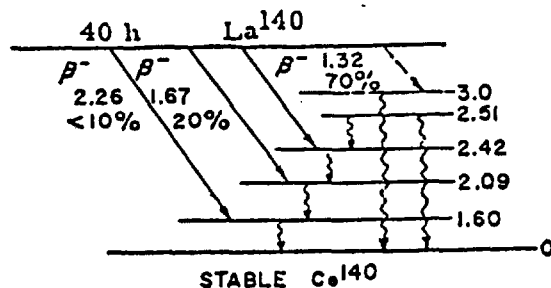
1083815

METHOD Lanthanum Fluoride

YIELD 24.6 mg = 100%

(As La_2O_3)

$\mu_{\text{Al}} = 0.008$ $\mu_{\text{Alr}} =$



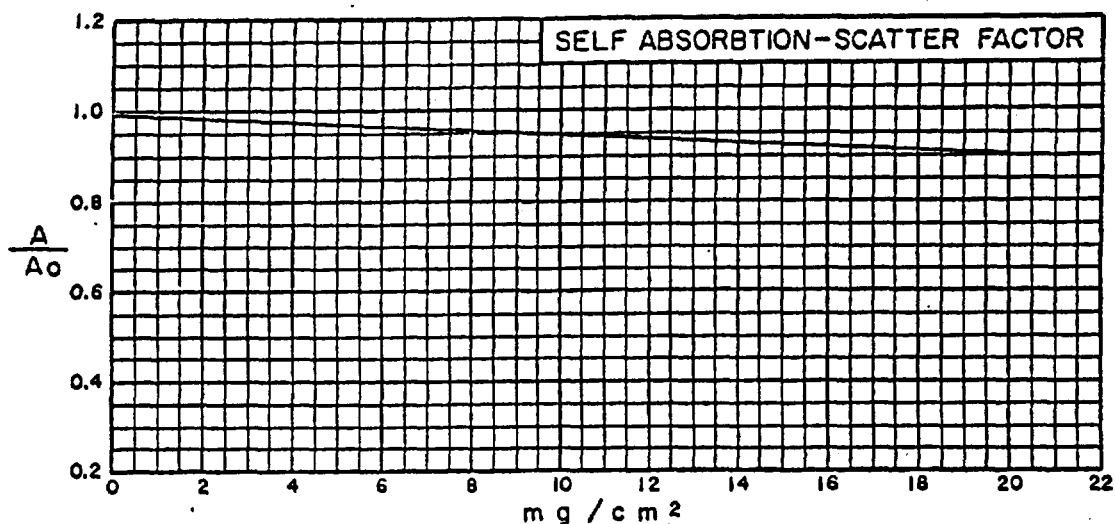
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.95

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

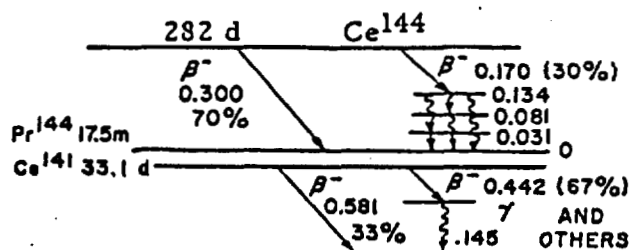
ISOTOPE Rare Earths*

METHOD Ceric Fluoride

YIELD 23.4 mg = 100%

(As Ce_2O_3)

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



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

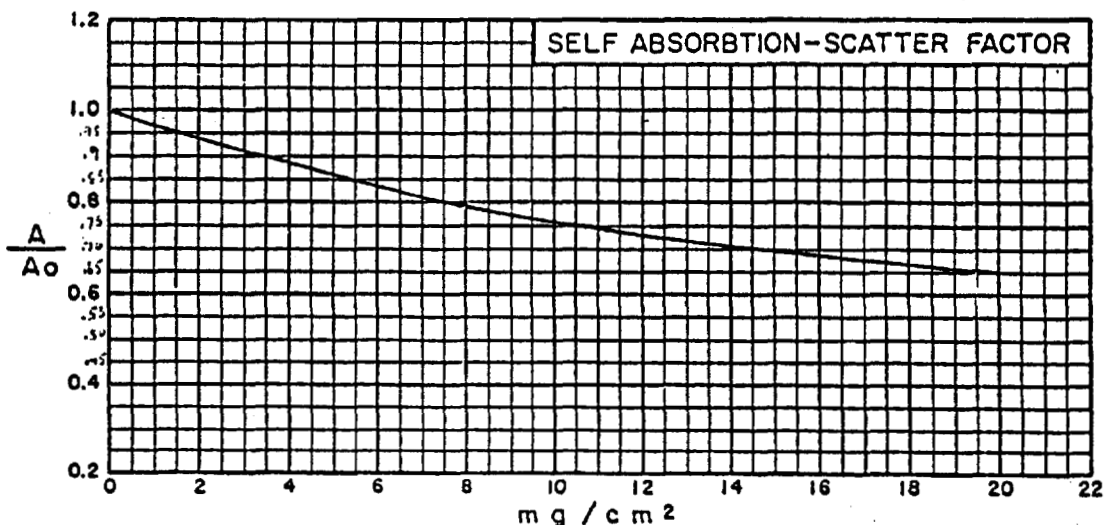
STABLE Pr^{141}

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

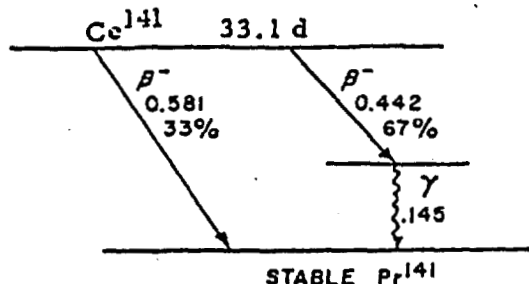
*Remarks: Assume 1/3 Ce^{141} , 1/3 Ce^{144} , 1/3 Pr^{144}

ISOTOPE Cerium¹⁴¹

METHOD Cerium Fluoride

YIELD 23.4 mg = 100%
(As Ce₂O₃)

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



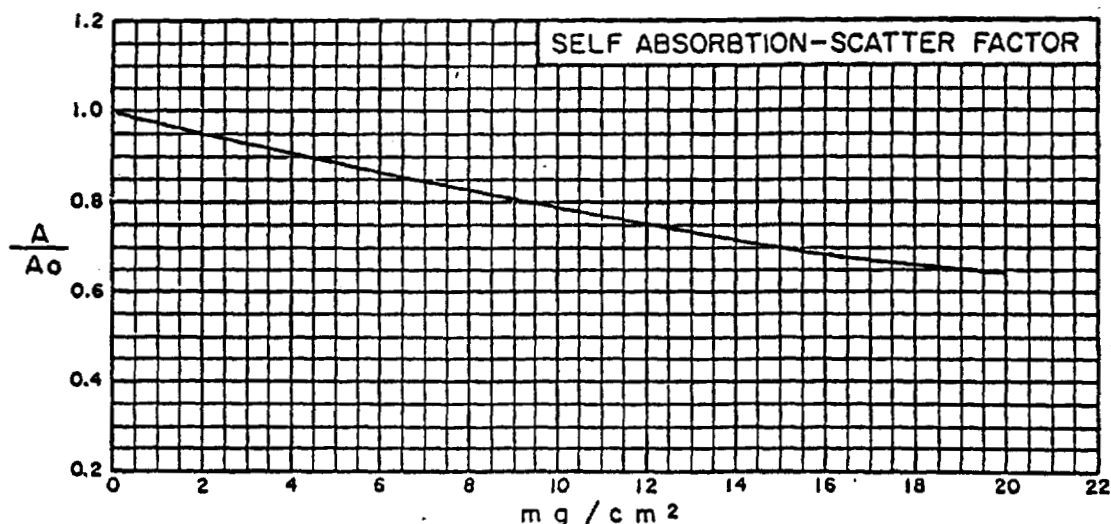
SHELF	AIR & MICA WINDOW FACTORS
1	0.85
2	0.79
3	0.71

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

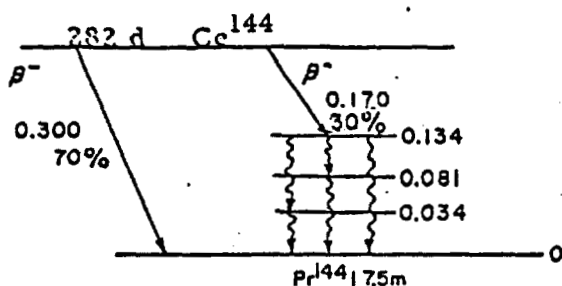
BACK-SCATTER FACTORS

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

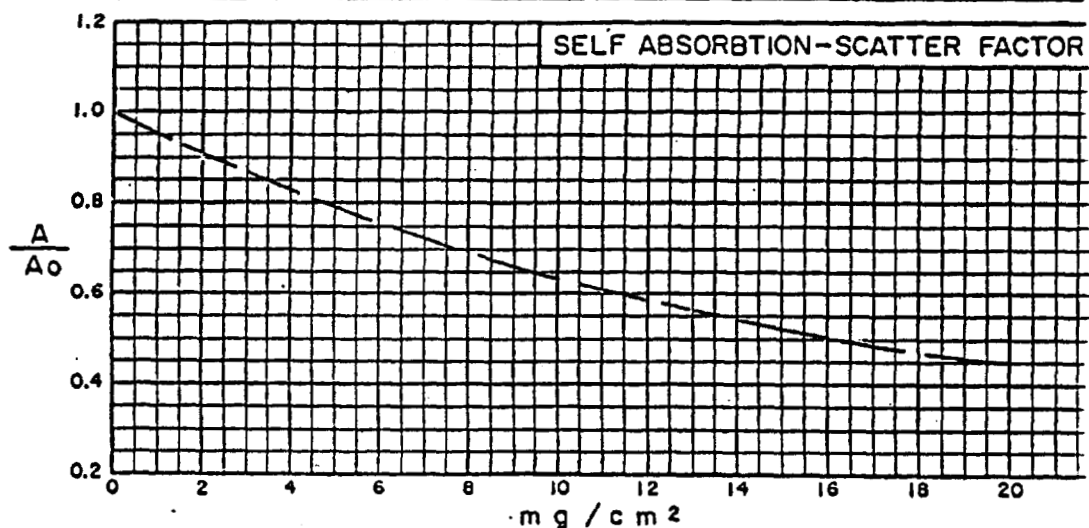
YIELD $23.4 \text{ mg} = 100\%$
(As Ce_2O_3)

$$\mu_{Al} = 0.13 \quad \mu_{Alr} = \quad . \quad .$$


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

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

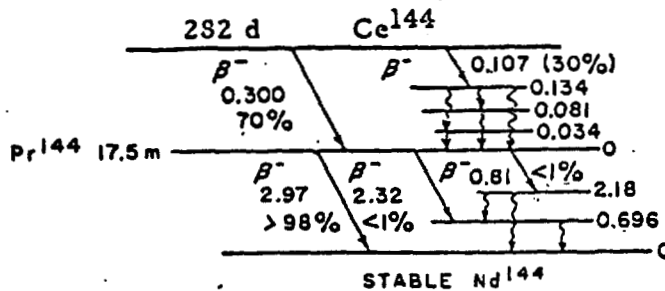


CALCULATION PROCEDURE: $\frac{C_m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^6) (\text{S.S.}) (\text{b.s.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu\text{C/un}$

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 & MICA WINDOW FACTORS

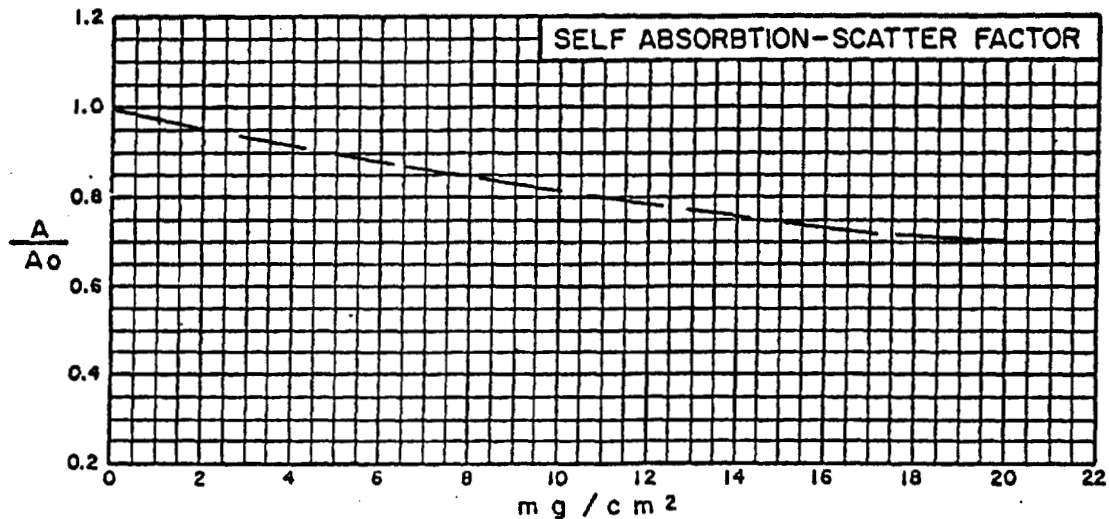
SHELF	AIR & MICA WINDOW FACTORS
1	0.80
2	0.74
3	0.69

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	2	3	4	5
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: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(A + \text{M.W.})(\text{Yield})} = \mu C/\text{unit}$

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

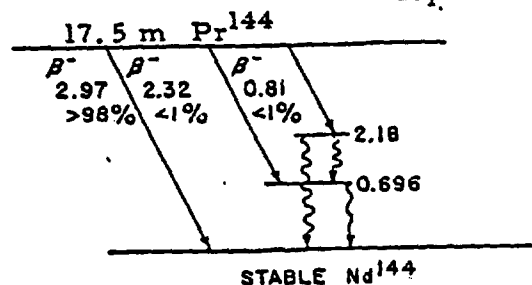
ISOTOPE Praseodymium¹⁴⁴

METHOD Praseodymium - Cerium Separation

YIELD 50.8 mg = 100%

(As $\text{Nd}_2(\text{C}_2\text{O}_4)_3 \cdot 10 \text{H}_2\text{O}$)

$\mu_{\text{Al}} = 0.0025$ $\mu_{\text{Air}} =$



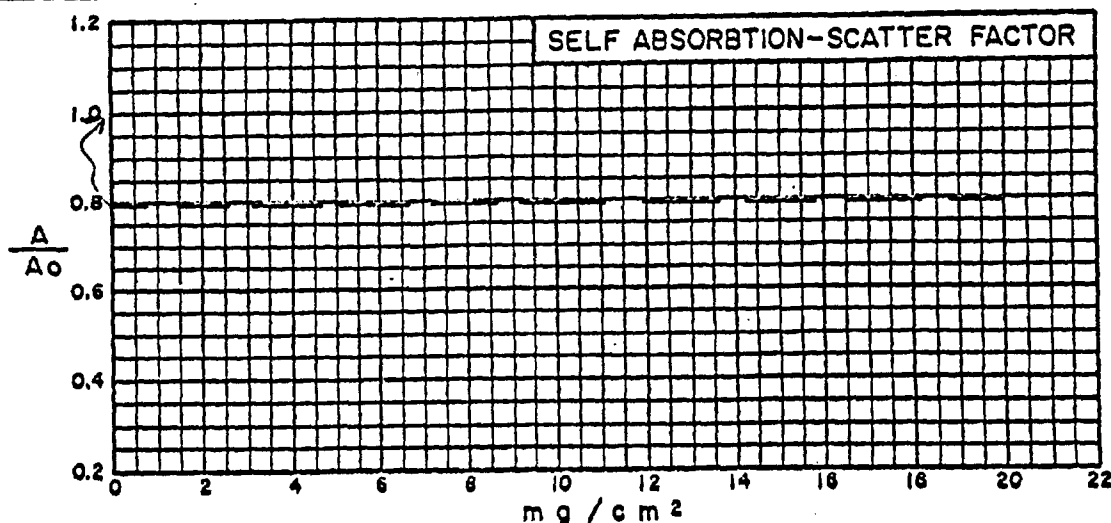
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.99
3	0.98

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

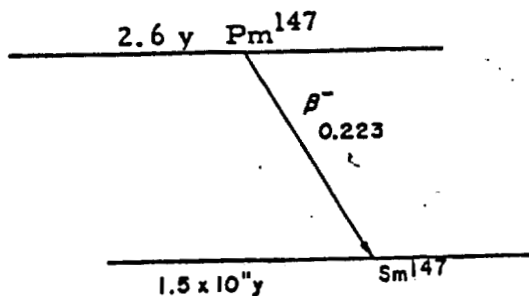
Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Promethium¹⁴⁷

METHOD Promethium Fluoride

YIELD 50.8 mg = 100%
(As Nd₂(C₂O₄)₃·10 H₂O)

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



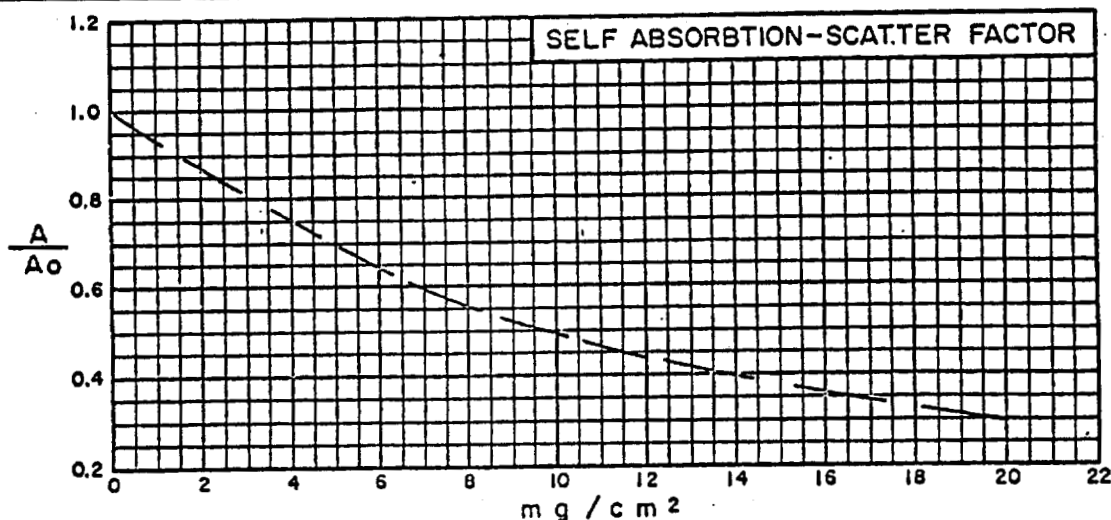
SHELF	AIR & MICA WINDOW FACTORS
1	0.57
2	0.42
3	0.31

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

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

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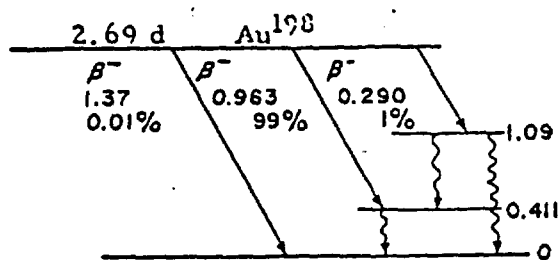
ISOTOPE

Gold¹⁹⁸

HW-18258-APP

METHOD Ethyl Acetate Extraction

YIELD 5 mg = 100%

(As Au¹⁹⁸) $\mu_{\text{Al}} = 0.015$ $\mu_{\text{Air}} =$ STABLE Hg¹⁹⁸

SHELF | AIR & MICA WINDOW FACTORS

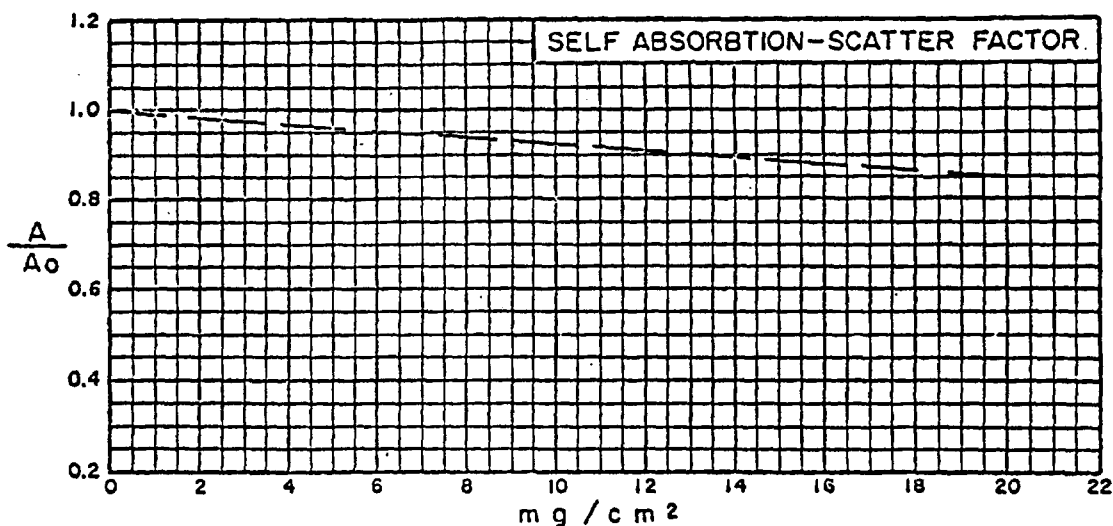
SHELF	AIR & MICA WINDOW FACTORS
1	0.95
2	0.92
3	0.89

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

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

1083823

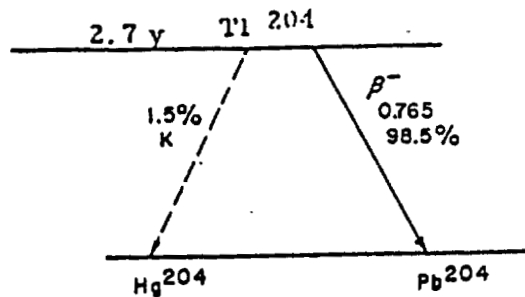
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HW-18258-APP

ISOTOPE Thallium 204

METHOD Spike - Direct Plate

YIELD



$\mu_{Al} = 0.0212$ $\mu_{Air} = 360$

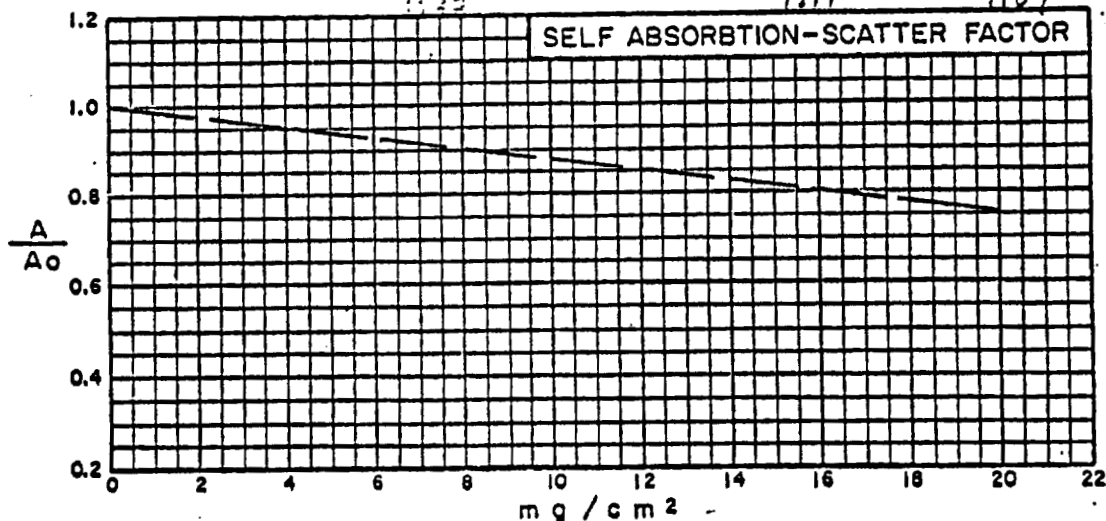
SHELF	AIR & MICA WINDOW FACTORS
1	0.93 (0.97)
2	0.89 (0.93)
3	0.85 (0.88)
4	0.81 (0.84)
5	0.76

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
SHELF 4				0.95	0.93

BACK-SCATTER FACTORS

SHELF	1.45	1.45	1.23	1.20	1.10
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: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (bs.) (S.S.A.) (A \cdot M.W.) (Yield)} = \mu C/\text{unit}$

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

shelf 3 .0675
5 .0149

1083824

ISOTOPE Bismuth²¹⁰ (RaE)

METHOD Bismuth Sulfide

YIELD 49.2 mg = 100%

(As Bi₂O₃) $\mu_{Al} = 0.011$ $\mu_{Alr} =$ 5 d RaE (Bi²¹⁰) β^-
1.17

139d RaF

(Po²¹⁰)

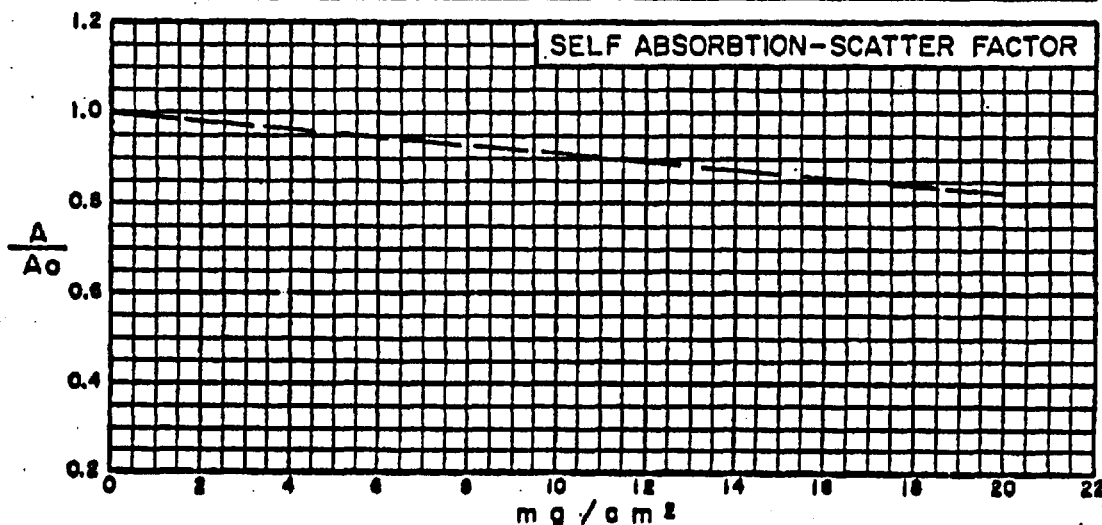
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.94
3	0.92

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) 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	1.08	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: $\frac{C/m \text{ (VOLUME FACTOR)}}{(\text{Geo.}) (2.2 \times 10^3) (\text{S.S.}) (\text{b.s.}) (\text{S.S.A.}) (A + \text{M.W.}) (\text{Yield})} = \mu\text{C/unit}$

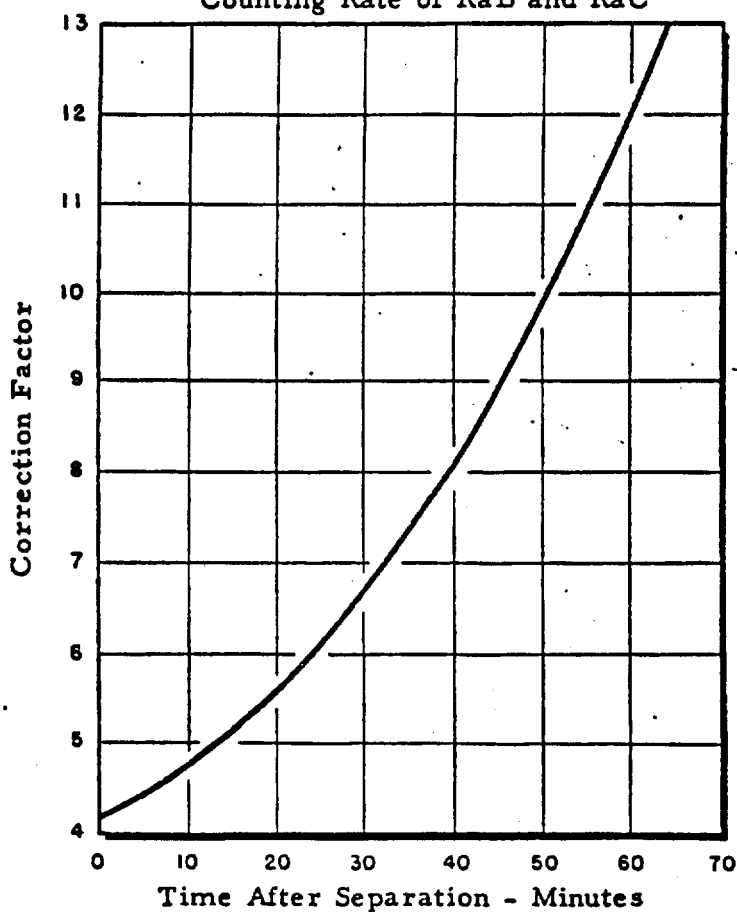
Remarks: $\frac{A}{A_0} = \frac{1}{\mu x} (1 - e^{-\mu x})$

RADON²²²

METHOD: Lead Sulfide

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

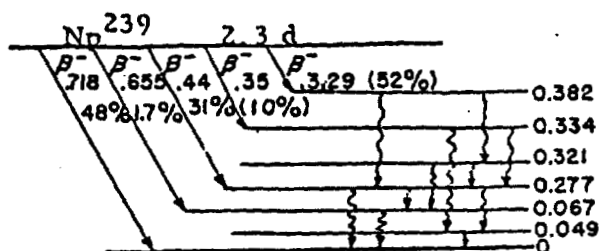
Radon Disintegration Rate From
Counting Rate of RaB and RaC



ISOTOPE Neptunium²³⁹

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

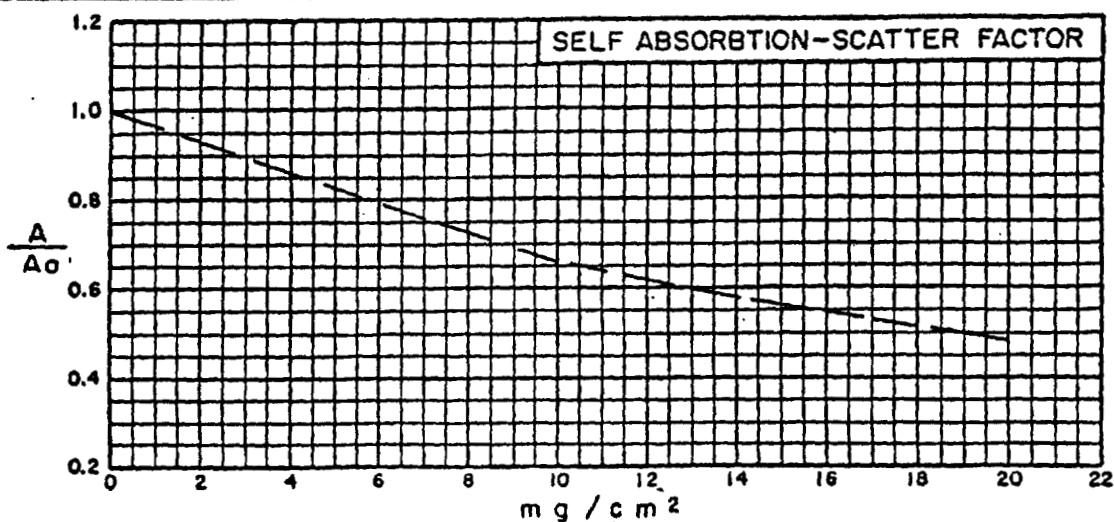
Pu^{239} 2.43×10^4 y

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

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

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ISOTOPE URANIUM

HW-18258-APP

METHOD _____

YIELD _____

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

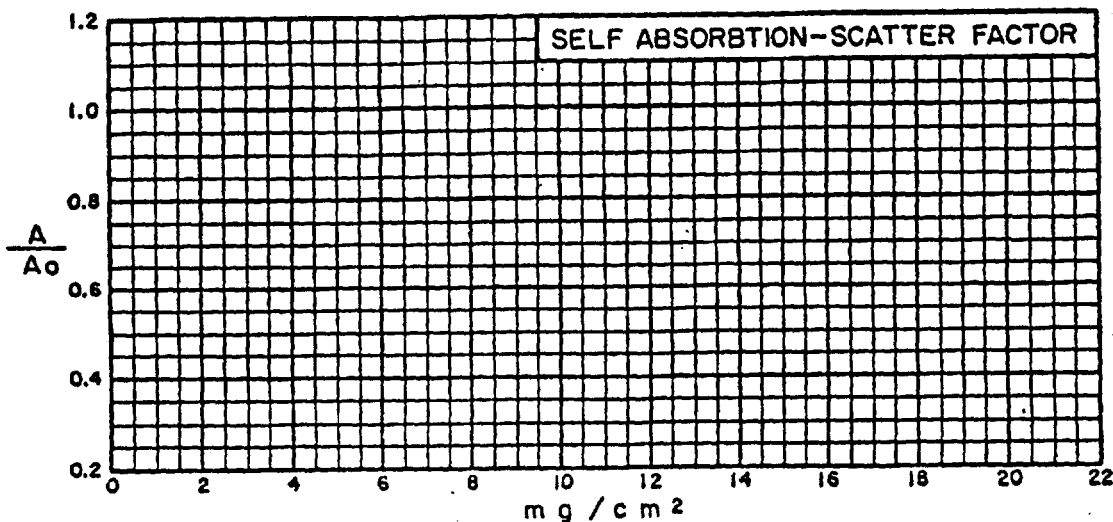
SHELF	AIR & MICA WINDOW FACTORS
1	_____
2	_____
3	_____

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

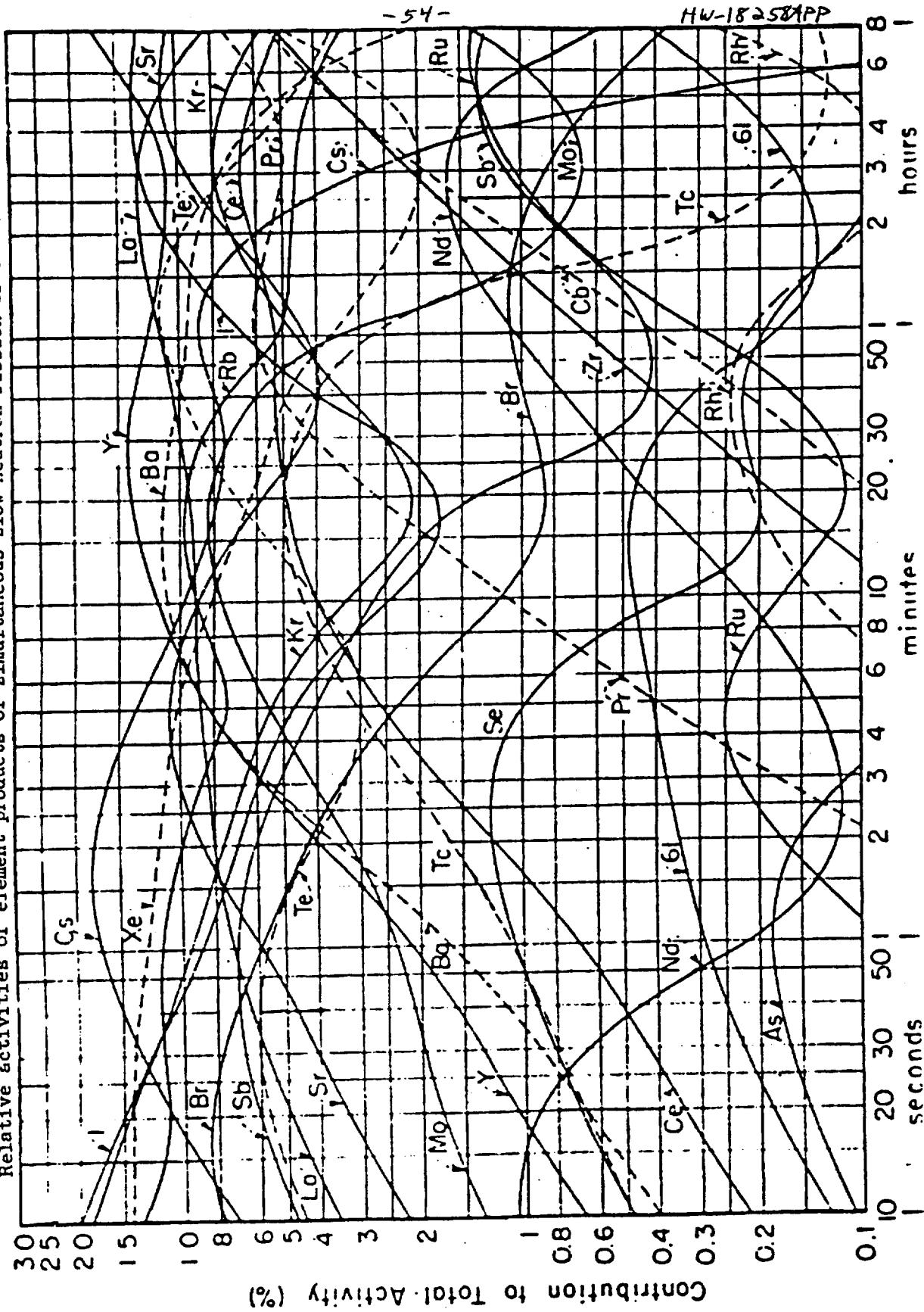
SHELF 1					
SHELF 2					
SHELF 3					



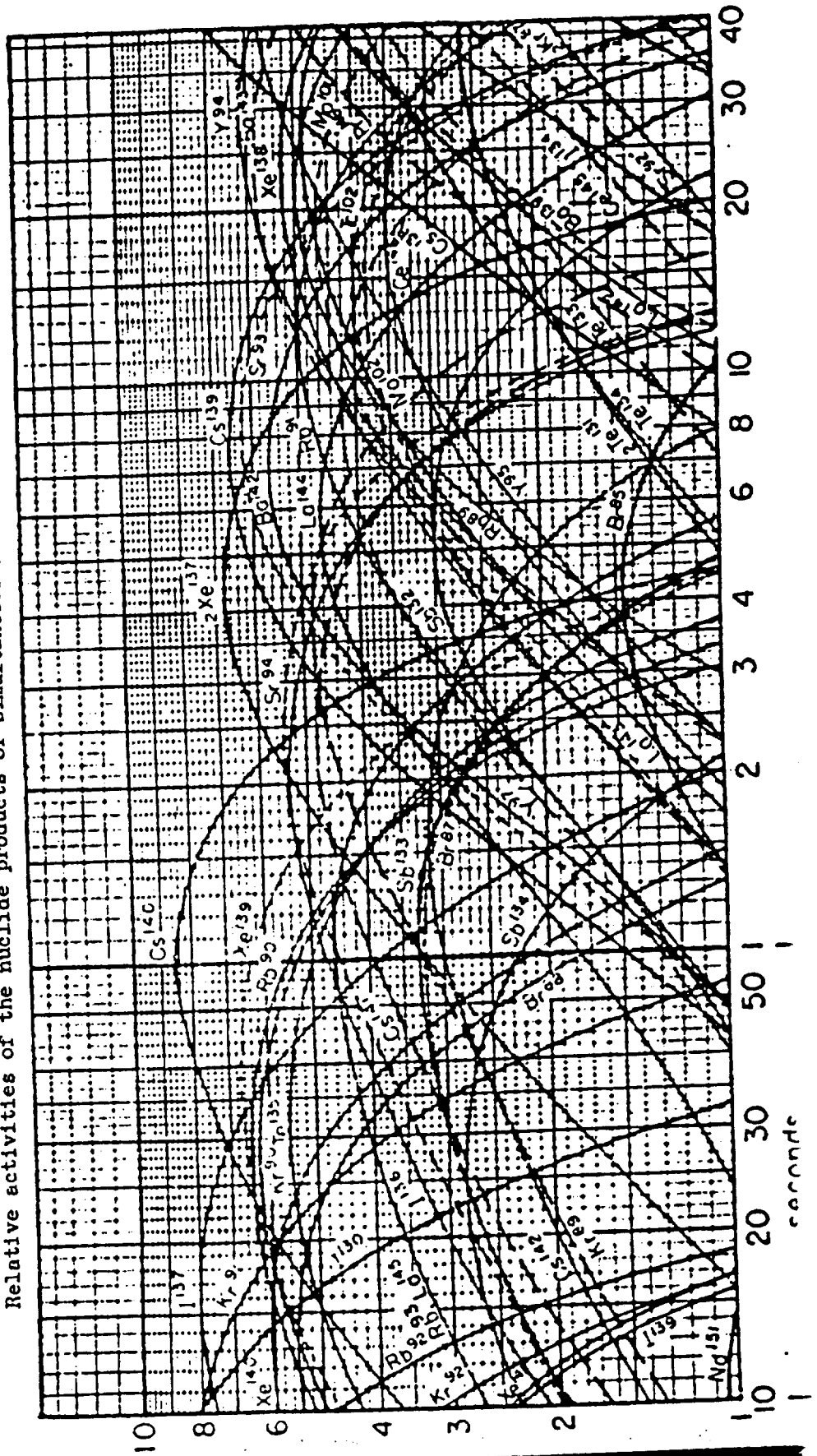
CALCULATION PROCEDURE: $\frac{C/m \text{ (VOLUME FACTOR)}}{(Geo.) (2.2 \times 10^6) (S.S.) (bs.) (S.S.A.) (A+M.W.) (Yield)} = \mu^C/\text{unit}$

1083828

NUCLEONICS, Vol. 9, 1951

Relative activities of element products of simultaneous slow-neutron fission of U²³⁵.

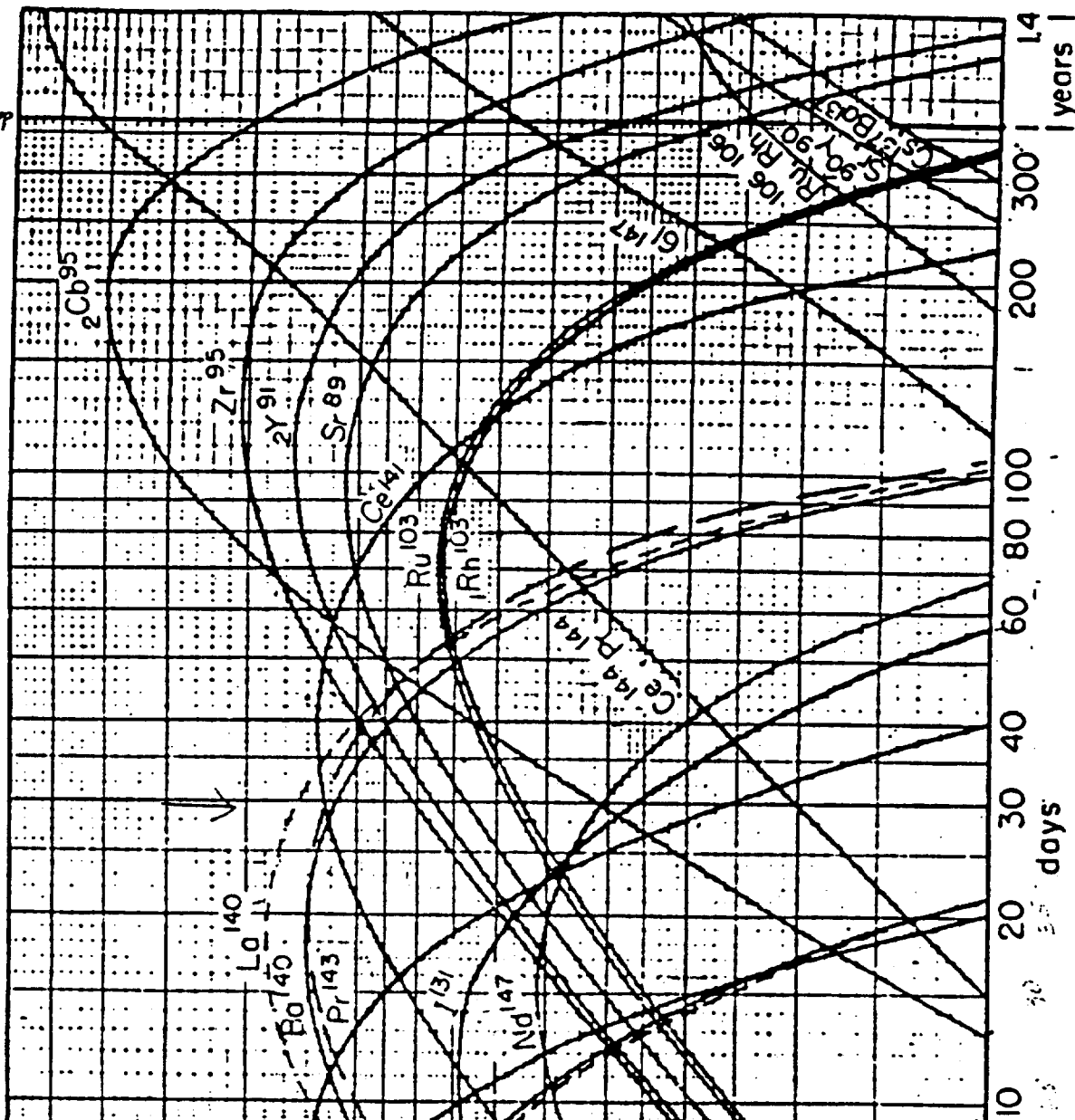
NUCLEONICS, Vol. 9, 1951
Relative activities of the nuclide products of simultaneous slow-neutron fission of U²³⁵.



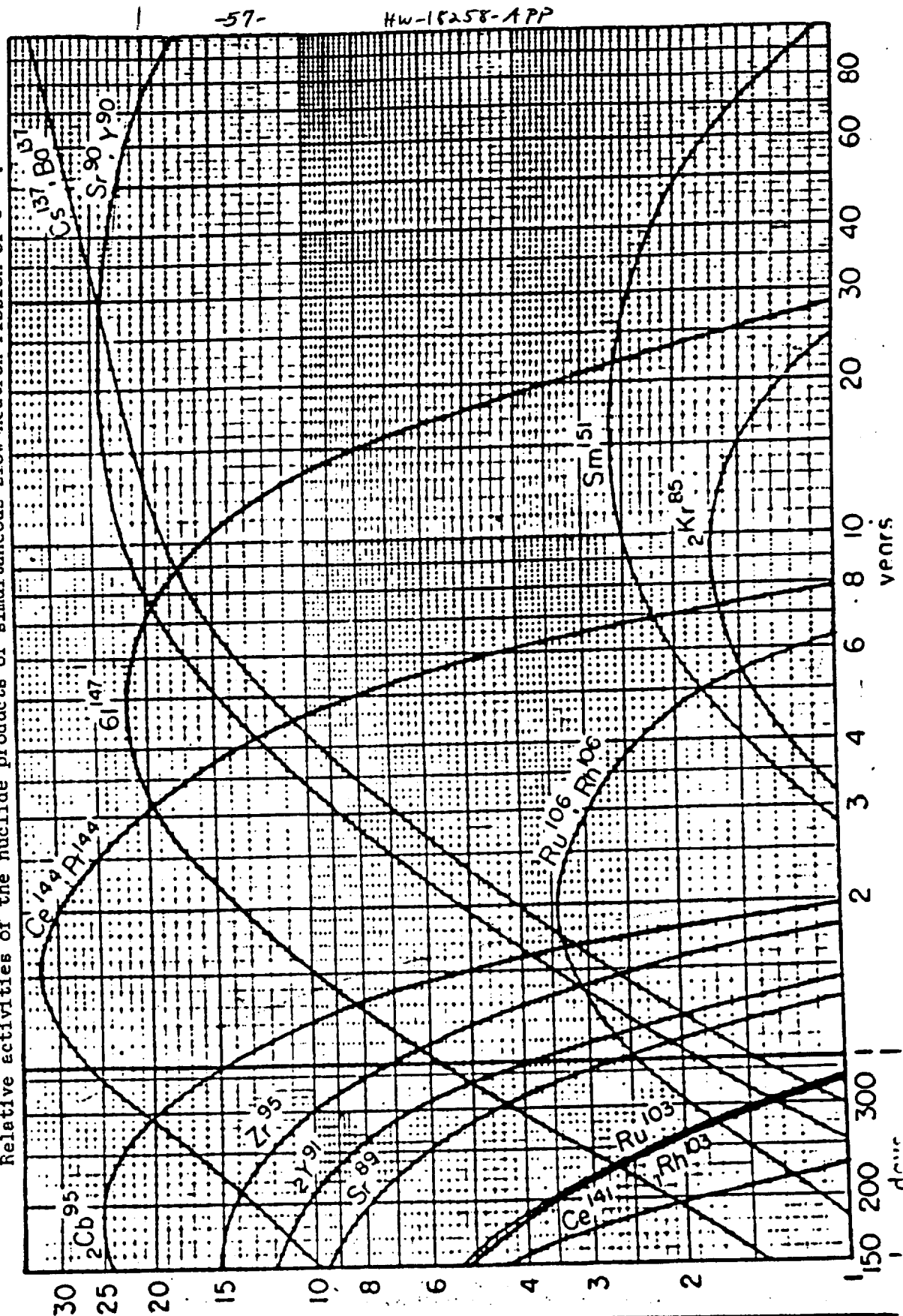
HW-18251-APP

1951

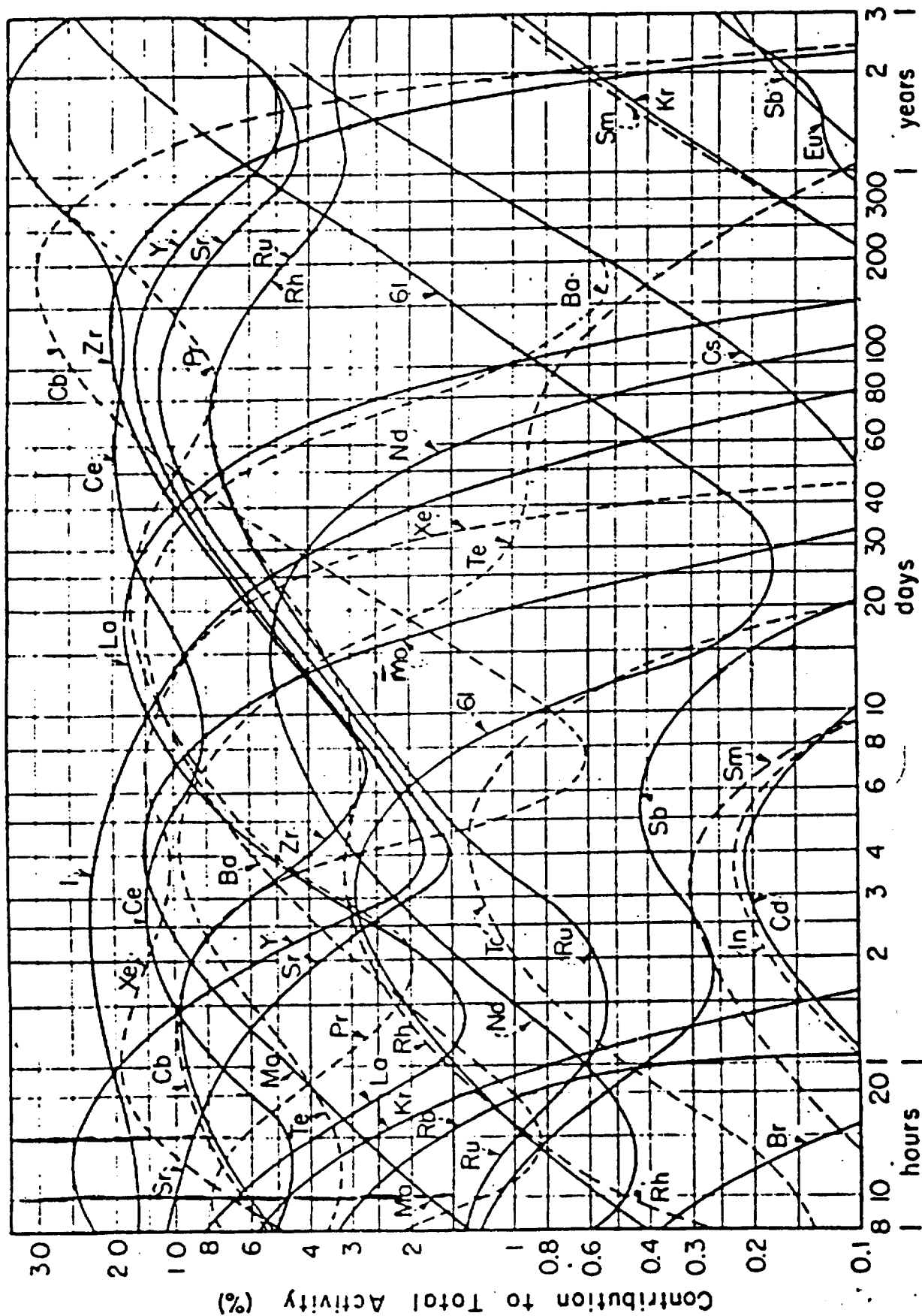
of the nuclide products of simultaneous slow-neutron fission of U235.



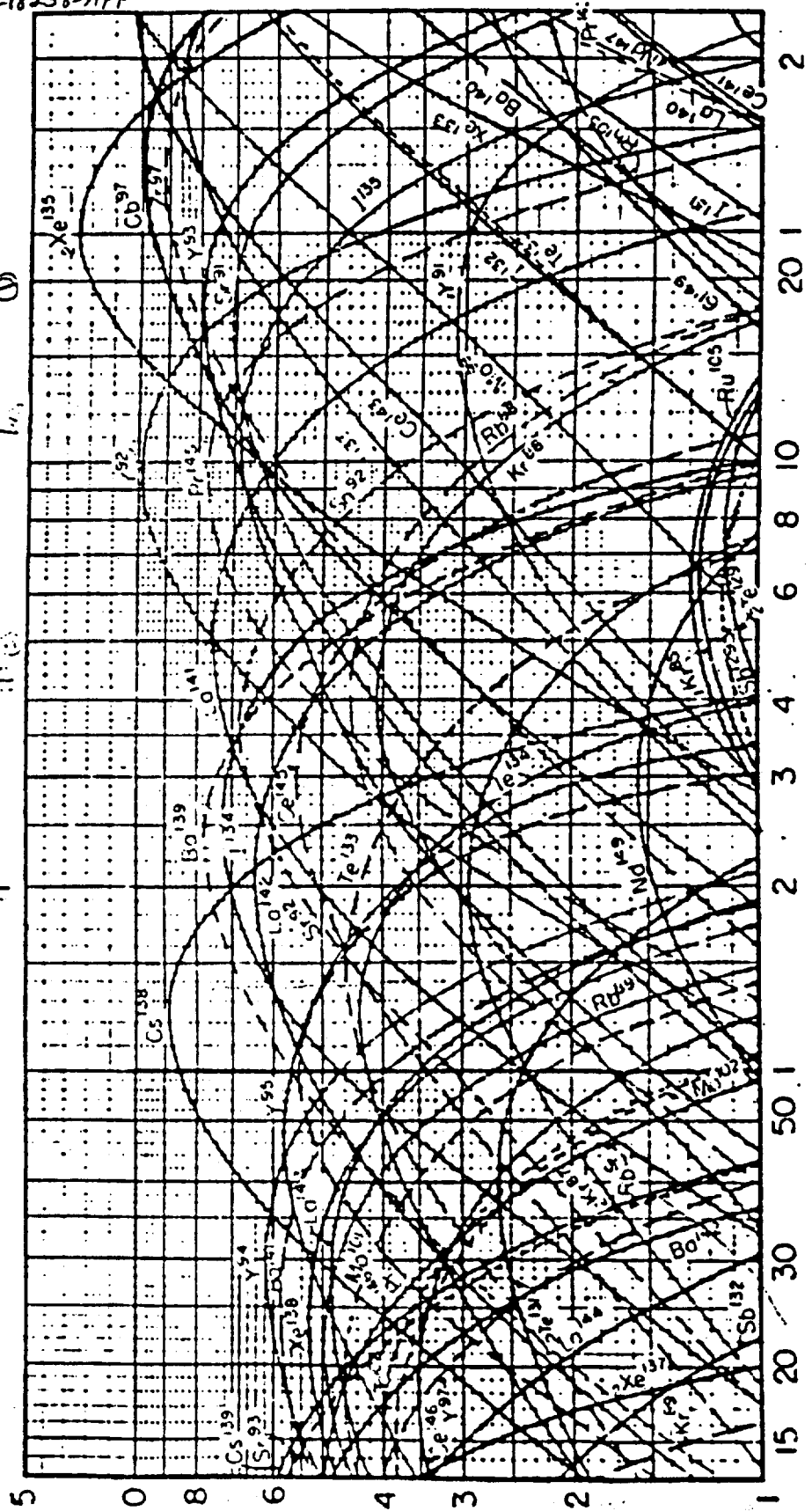
Relative activities of the nuclide products of simultaneous slow-neutron fission of U²³⁵.



NUCLEONICS, Vol. 9, 1951
Relative activities of element 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.



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HW-18258-APP

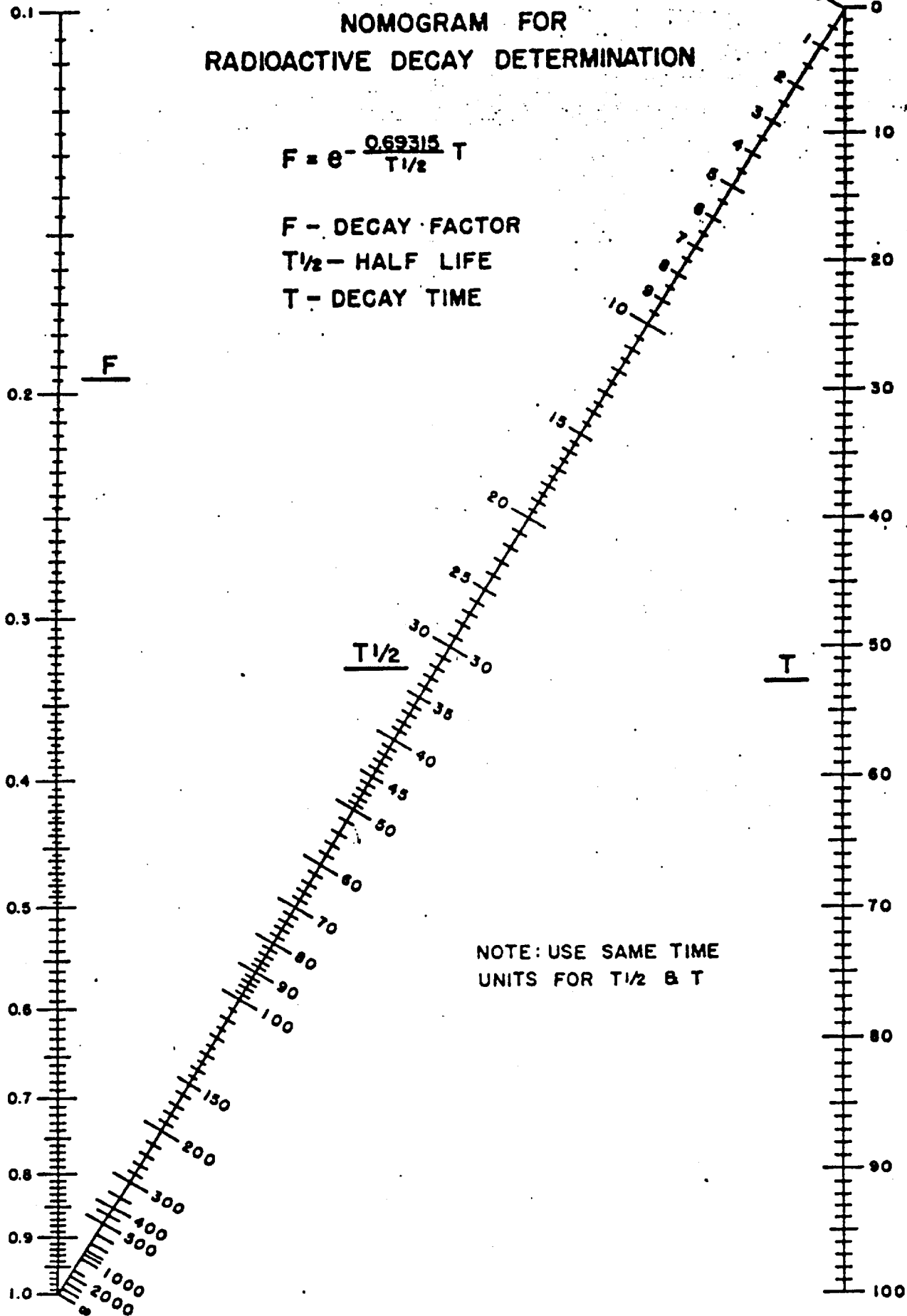
NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

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

F - DECAY FACTOR

T_{1/2} - HALF LIFE

T - DECAY TIME



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

1083835

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CALCULATION FACTORS FOR CONVERTING COUNTS/MINUTE
TO UNITS OF 10^{-6} $\mu\text{C}/\text{ml}$ FOR GIVEN VOLUMES
(REACTOR EFFLUENT STUDIES 1-1-56)

ISOTOPE(S)	SHELF					VOL. (ml)	PREC. (mg/cm ²)
	1	2	3	4	5		
CROSS BETA	0.79 1.59	2.4 4.82	5.7 11.4	9.8 19.6	15.4 30.8	2 1	0 0
RARE EARTHS AND YTTERIUM	0.031 1.56	0.094 4.7	0.22 10.9	0.374 18.7	0.58 29.1	50 1	7.85 7.85
SILICON-31	0.015 1.5	0.045 4.5	0.103 10.3	0.177 17.7	0.274 27.4	100 1	10.0 10.0
SODIUM-24	0.0145 1.45	0.044 4.4	0.102 10.2	0.174 17.4	0.27 27	100 1	7.18 7.18
COPPER-64*	0.28 2.8	0.91 9.1	2.2 22	4.3 43	7.1 71	10 1	5.1 5.1
ARSENIC-76	0.0144 1.44	0.043 4.3	0.099 9.9	0.167 16.7	0.257 25.7	100 1	8.15 8.15
STRONTIUM (TOTAL)	0.0157 1.57	0.048 4.8	0.112 11.2	0.193 19.3	0.304 30.4	100 1	7.9 7.9
MANGANESE-56	0.3 3	0.83 8.3	1.76 17.6	2.96 29.6	4.5 45	10 1	3.13 3.13
BARIUM TOTAL	0.0146 1.46	0.043 4.3	0.099 9.9	0.165 16.5	0.254 25.4	100 1	7.4 7.4
PHOSPHORUS-32	0.003 1.5	0.0091 4.55	0.0202 10.1	0.0334 16.7	0.0509 25.4	500 1	21.95 21.95
IODINE (TOTAL)	0.0016 1.6	0.0049 4.9	0.0113 11.3	0.0193 19.3	0.03 30	1000 1	14.8 14.8
NEPTUNIUM-239	0.095 2.38	0.324 8.1	0.860 21.4	1.68 41.9	3.04 76	25 1	0 0
Ba ¹⁴⁰ / La ¹⁴⁰	0.001 1.5	0.0032 4.7	0.0074 11.1	0.0129 12.4	0.0205 30.7	1500 1	7.4 7.4
Sr ⁸⁹ / Sr ⁹⁰	0.001 1.54	0.0032 4.76	0.0074 11.1	0.0126 18.9	0.0198 29.7	1500 1	7.9 7.9
Y ⁹⁰ (Sr ⁹⁰)**	0.0021 3.15	0.0062 9.35	0.0134 20.9	0.0236 35.5	0.0364 54.5	1500 1	7.85 7.85

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

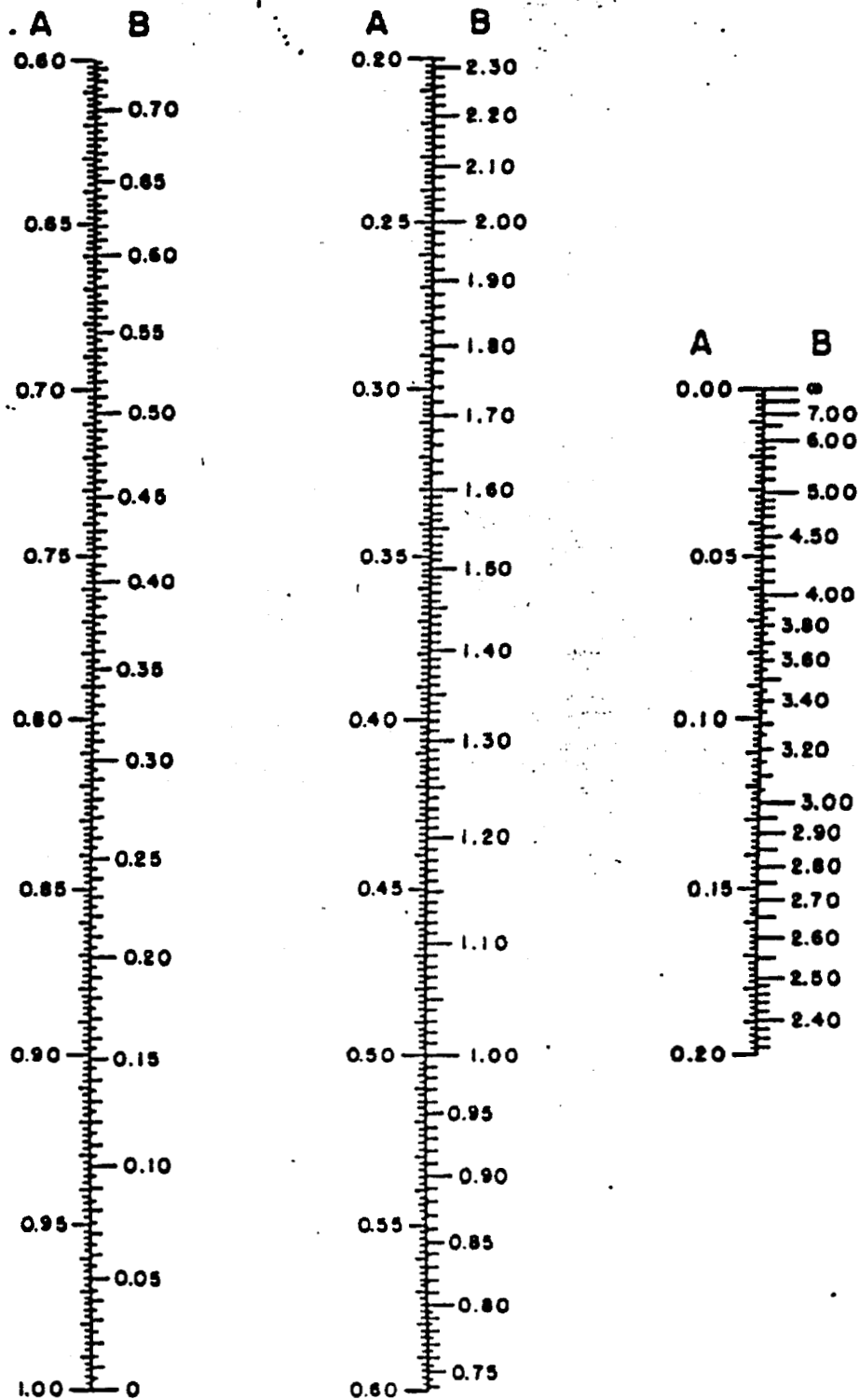
** Divide by 2.0 to get Y⁹⁰ exclusively. Factors given are for Sr⁹⁰ / Y⁹⁰

NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

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

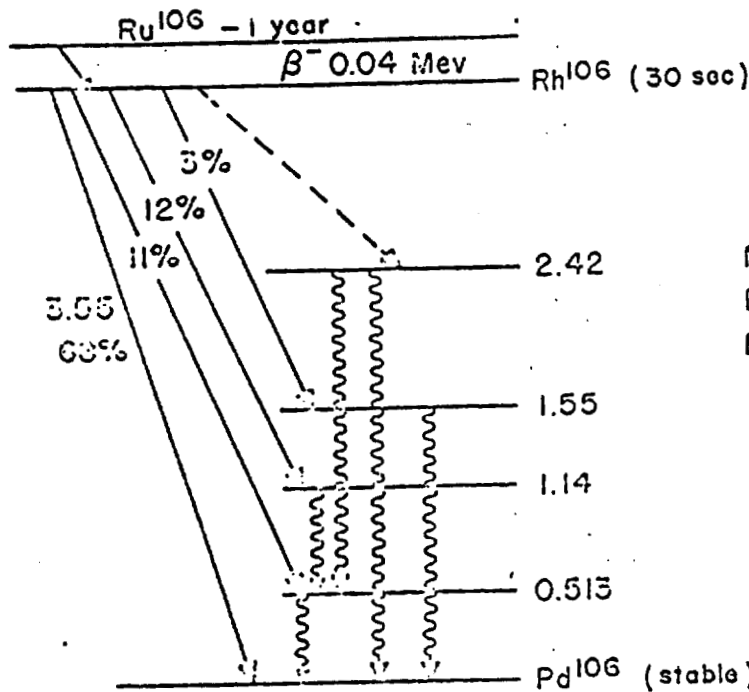
A - DECAY FACTOR

B - DECAY TIME ÷ HALF LIFE



DECAY SCHEME OF RUTHENIUM - RHODIUM ISOTOPES

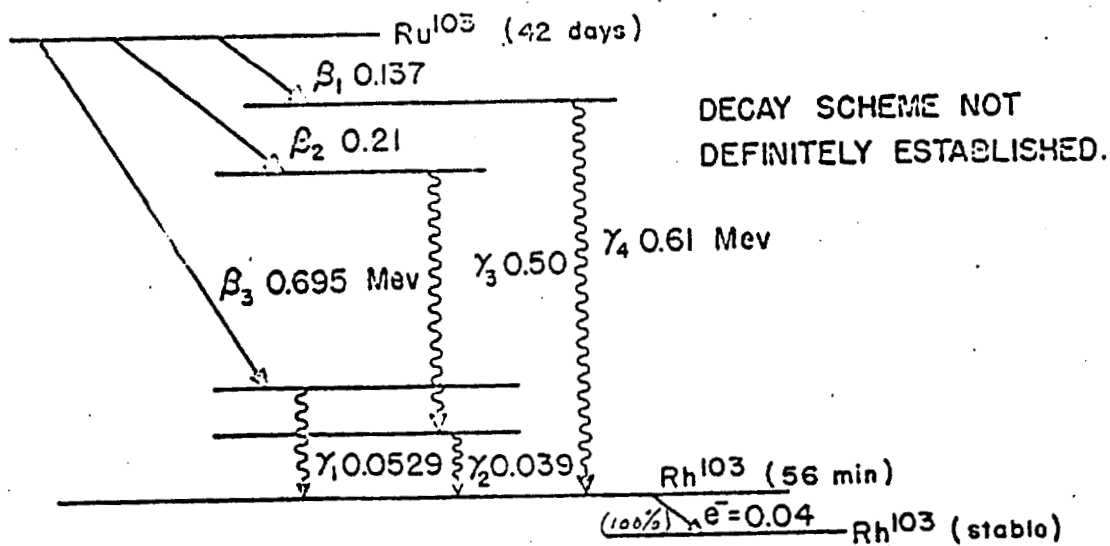
$Ru^{106} - Rh^{106}$



MOST RECENT SCHEME.
 DECAY SCHEME NOT
 DEFINITELY ESTABLISHED.

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

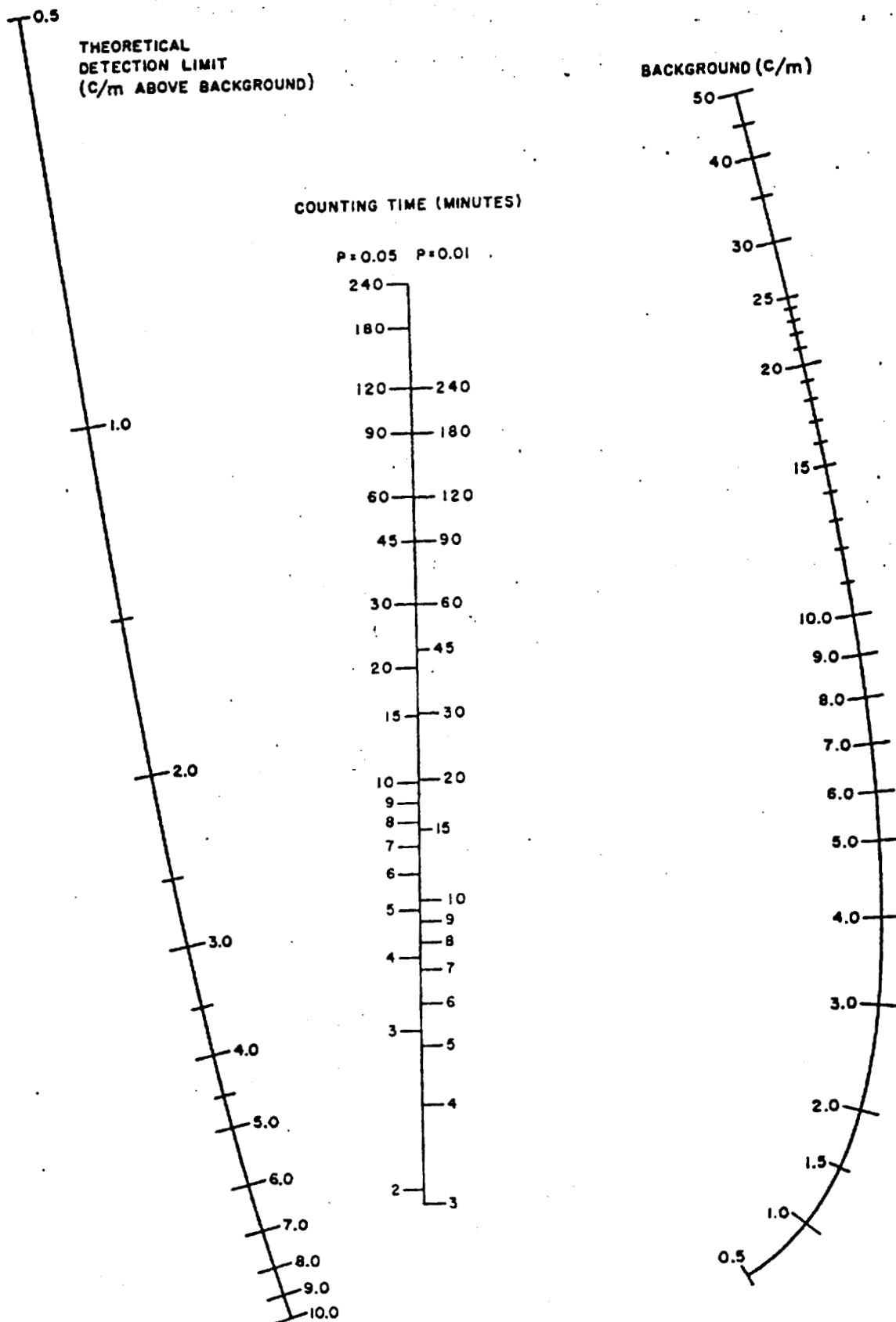
$Ru^{103} - Rh^{103}$



DECAY SCHEME NOT
 DEFINITELY ESTABLISHED.

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

THEORETICAL DETECTION LIMIT NOMOGRAM

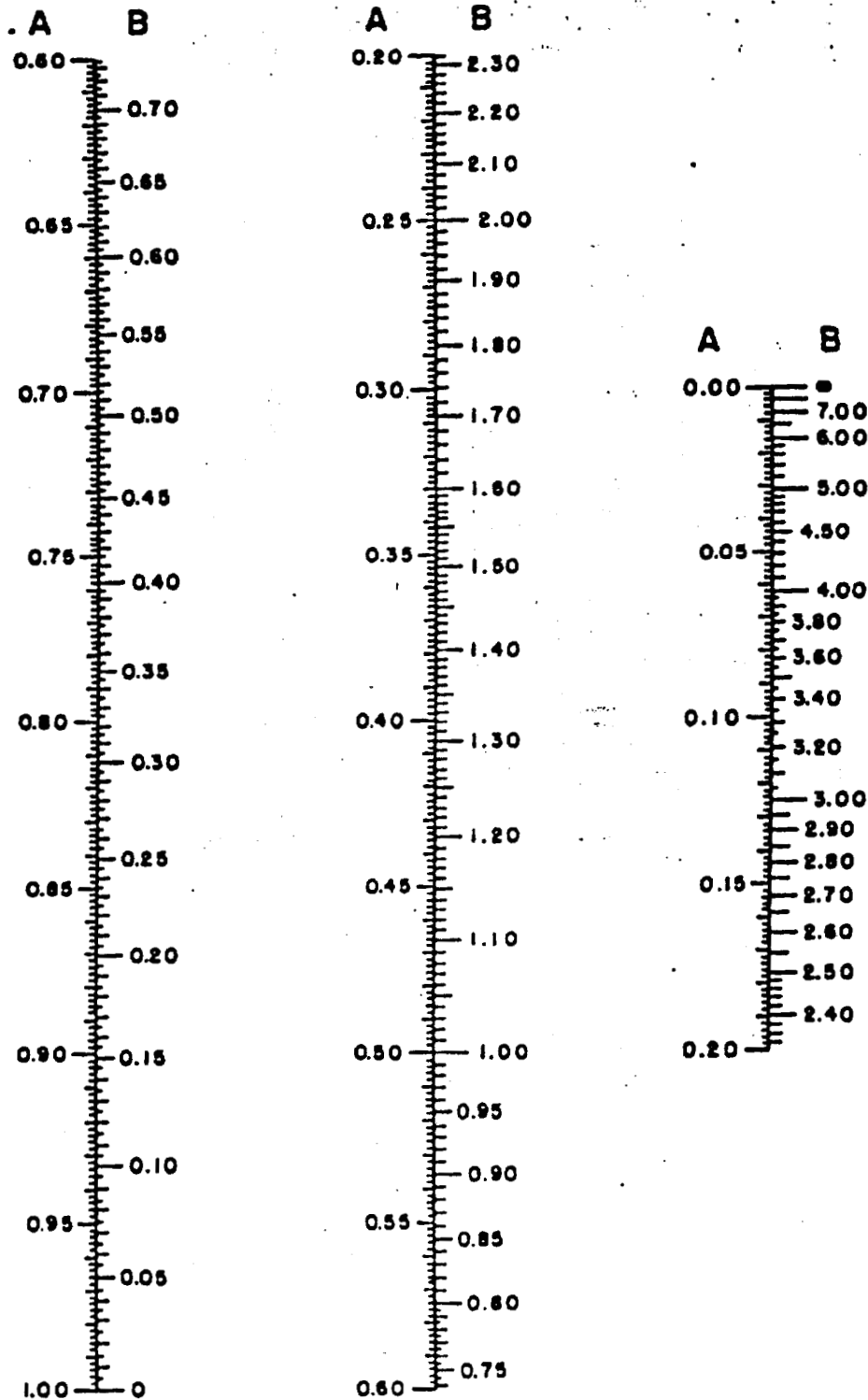


NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

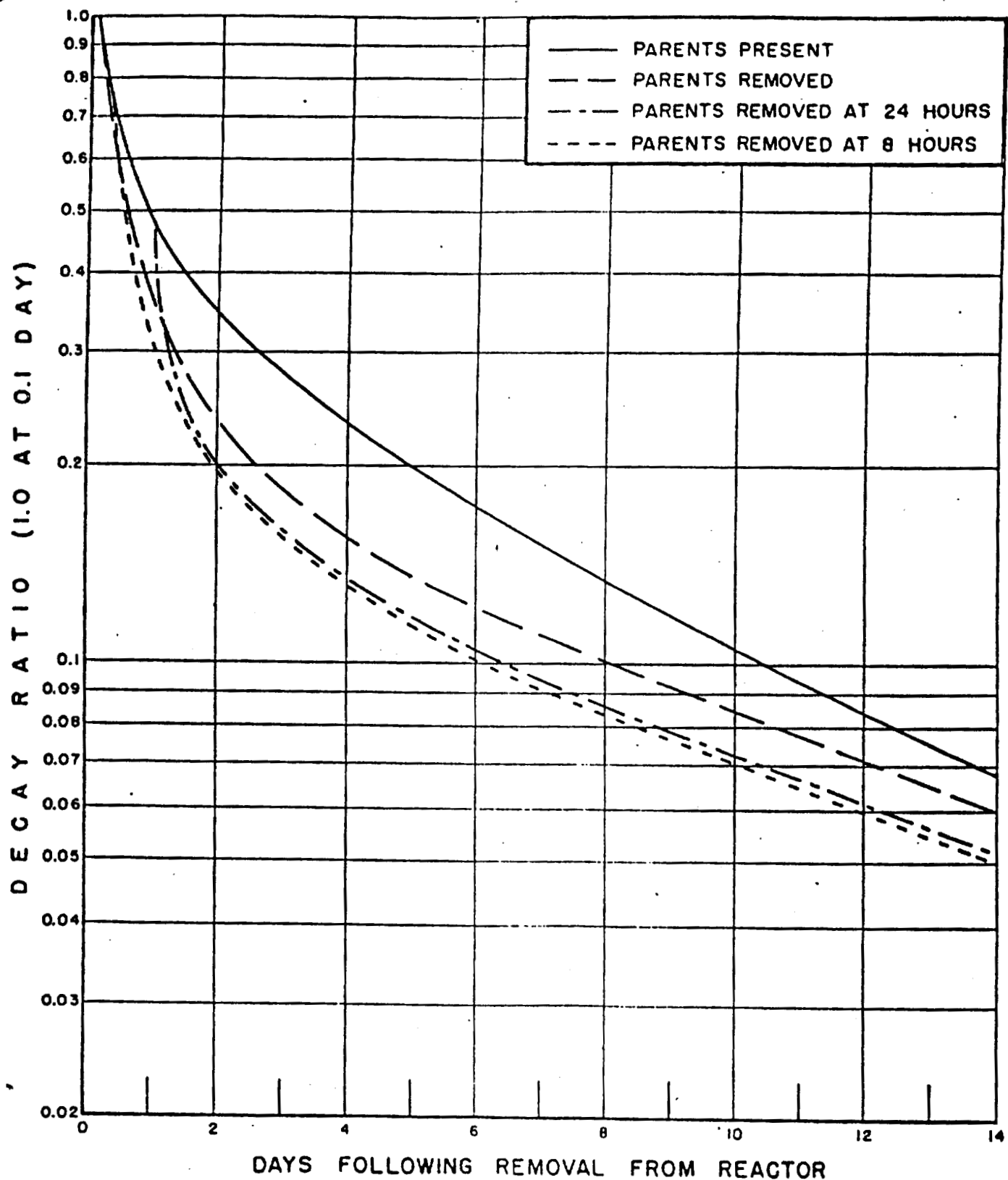
$$A = e^{-0.69315B}$$

A - DECAY FACTOR

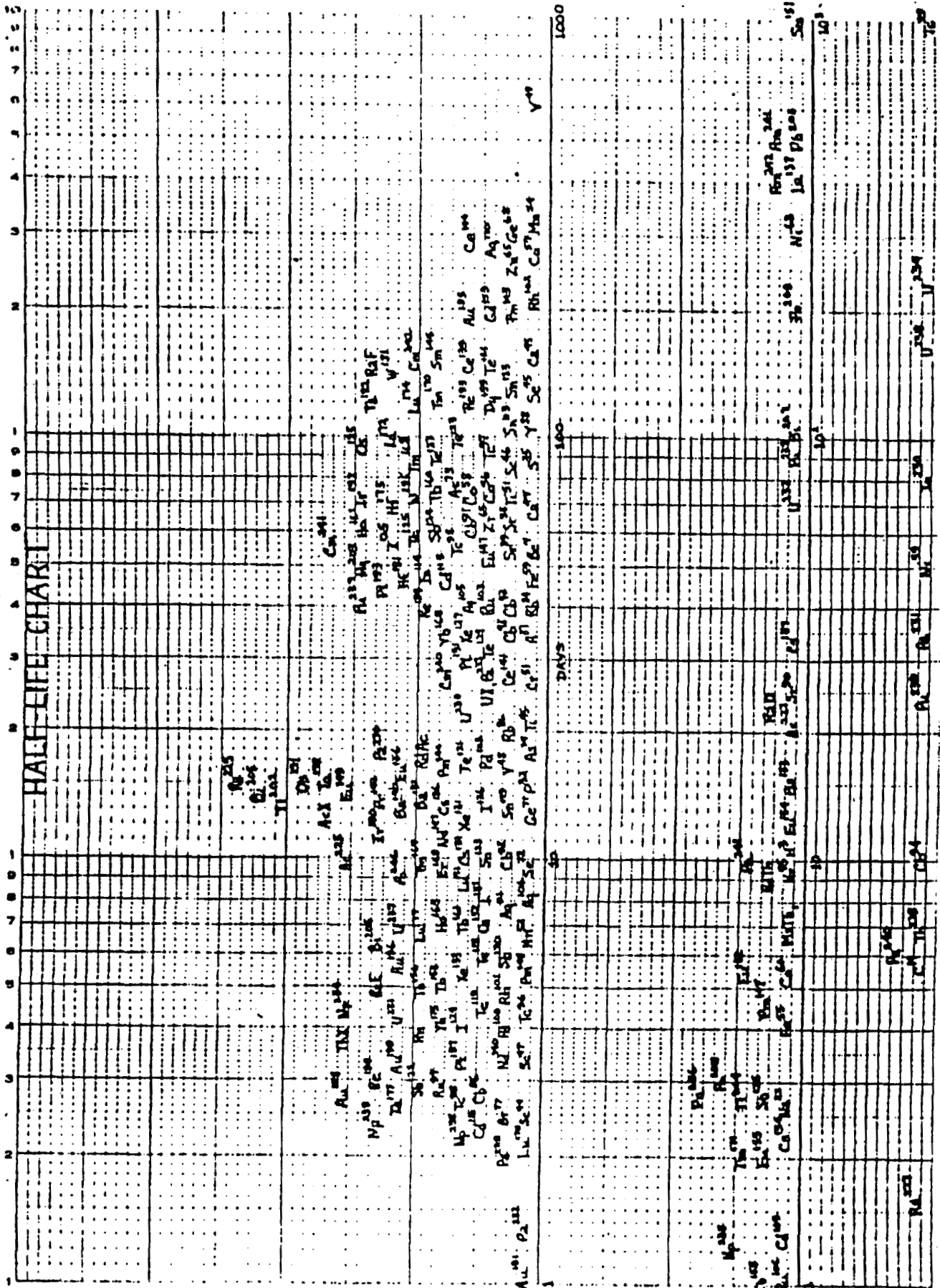
B - DECAY TIME ÷ HALF LIFE



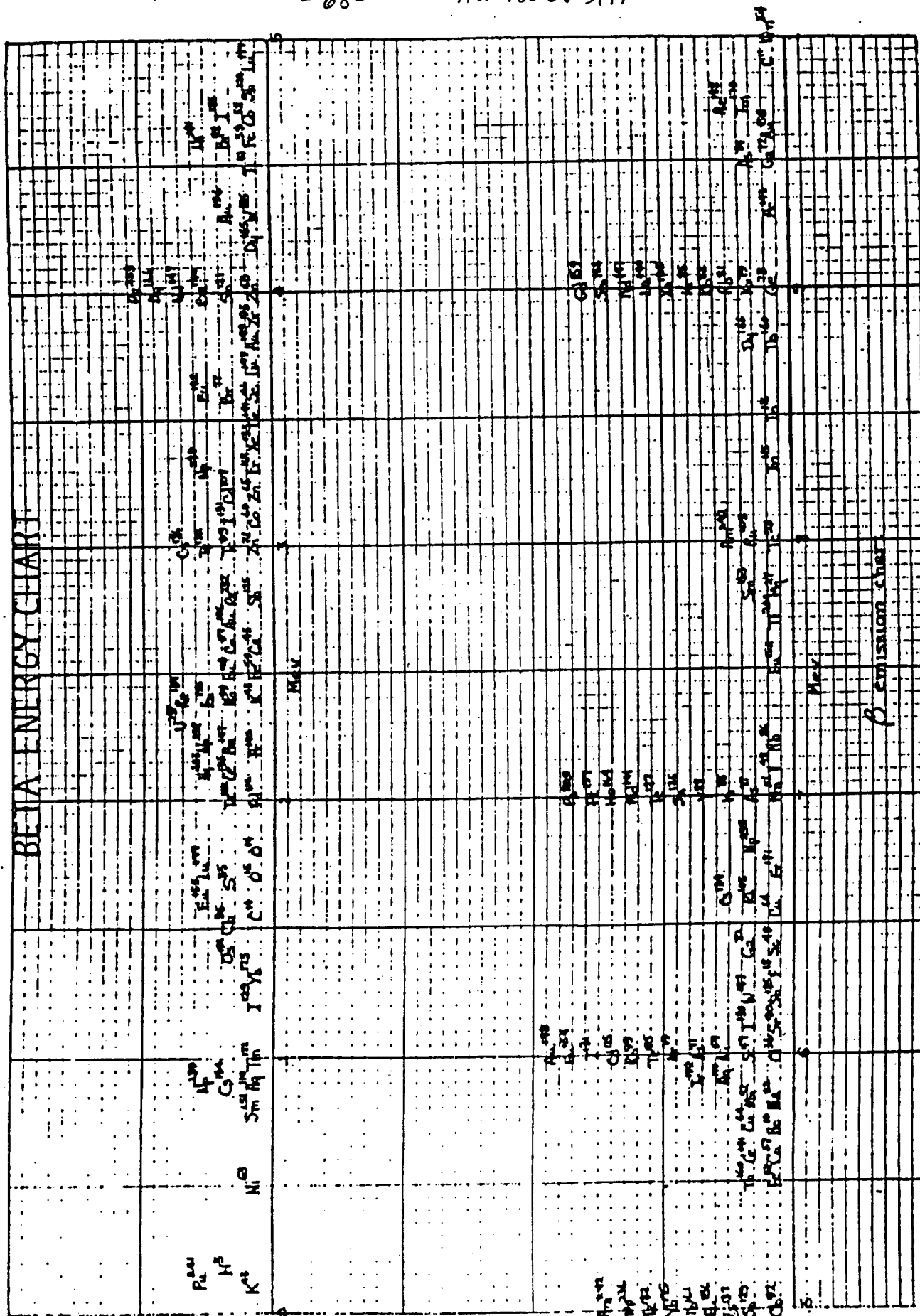
THEORETICAL GROSS IODINE FISSION PRODUCT DECAY (ALL ISOTOPES BUT I^{129} AT EQUILIBRIUM)



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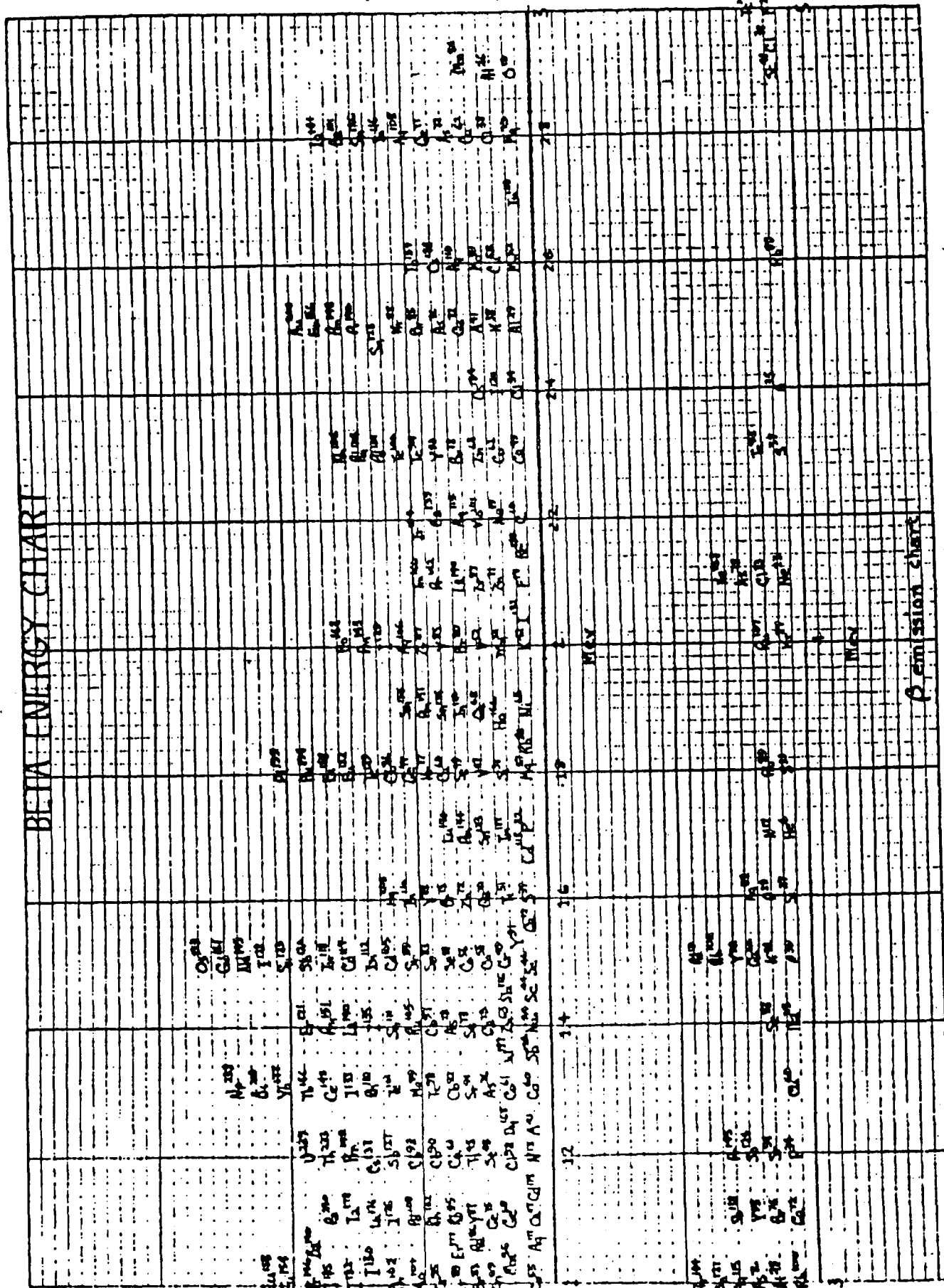


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B emission chart

BEAVER CANYON



THEORETICAL

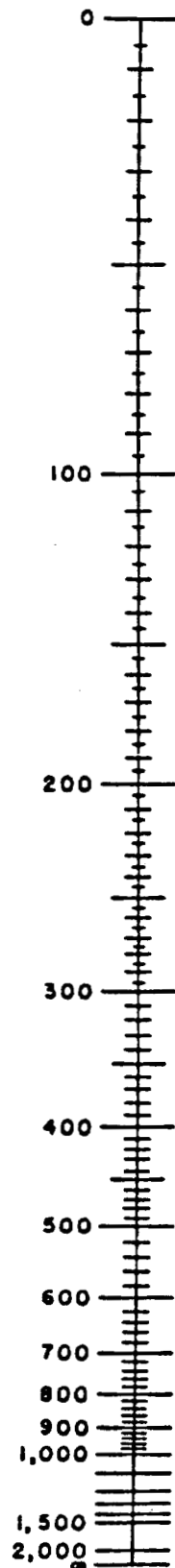
RATIO

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

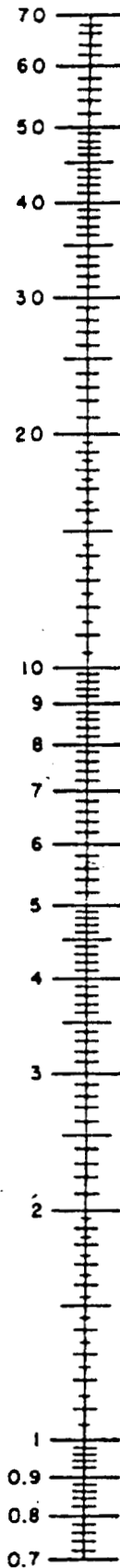
ACTIVITY

Hw-18258-APP

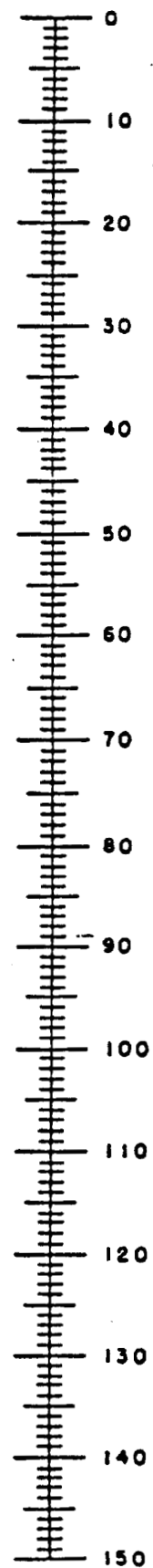
IRRADIATION TIME
DAYS



RATIO



DECAY TIME
DAYS



1083845

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/cm^2) 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/cm^2 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 CaC_2O_4 , AgCl , $\text{Al}(\text{OH})_3$, and BaCO_3 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 $\text{Al}(\text{OH})_3$ 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 CaC_2O_4 and BaCO_3 gave smooth, fairly uniform, symmetrical sources. The average measured area for these precipitates was 10 cm^2 for the 1-1/2" plates and 4.5 cm^2 for the one-inch plates. These areas are larger than the tabled values and reflect the

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.

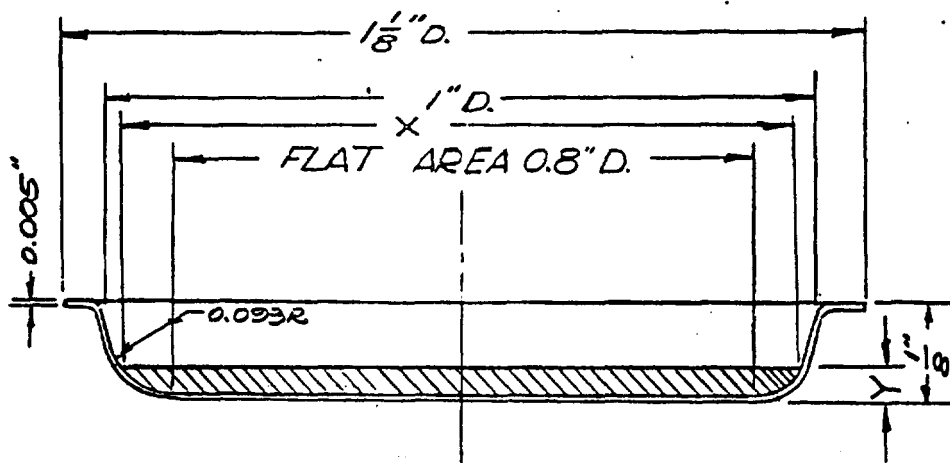
These areas will approach those actually achieved for weights of precipitates commonly employed, however, they must be used with recognition of limitations enumerated above.

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

LCS:R

1083847

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. $\text{BaCO}_3 = 4.29$

$\text{La}_2\text{O}_3 = 6.51$

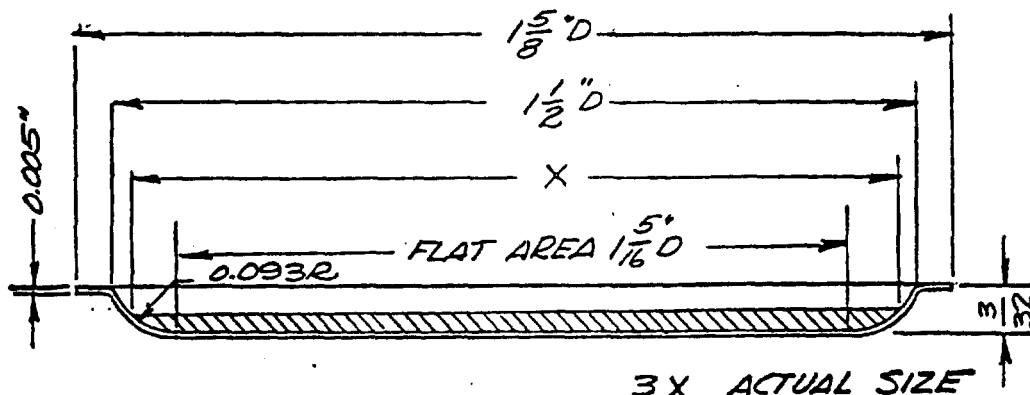
$\text{AgCl} = 5.56$

$\text{CsClO}_4 = 3.32$

$\text{MnO}_2 = 5.03$

$\text{CeF}_3 = 5.8$

CROSS SECTION THROUGH
STD. $1\frac{1}{2}$ " 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 Δ	WT.(MG) ON DISH	WT Δ	WT.(MG) ON DISH	WT Δ
000	1.312	8.72	—	—	—	—	—	—
0001	1.339	9.07	23.0	254	69.0	7.62	115	12.70
0002	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
0010	1.396	9.87	240.8	24.40	722.4	73.20	1204	122.0
0020	1.427	10.30	496.1	48.16	1488	144.8	2480	240.8
0030	1.448	10.62	761.8	71.73				
0040	1.465	10.86	1035	95.30				
0050	1.477	11.03						