HW-18258-APP

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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.

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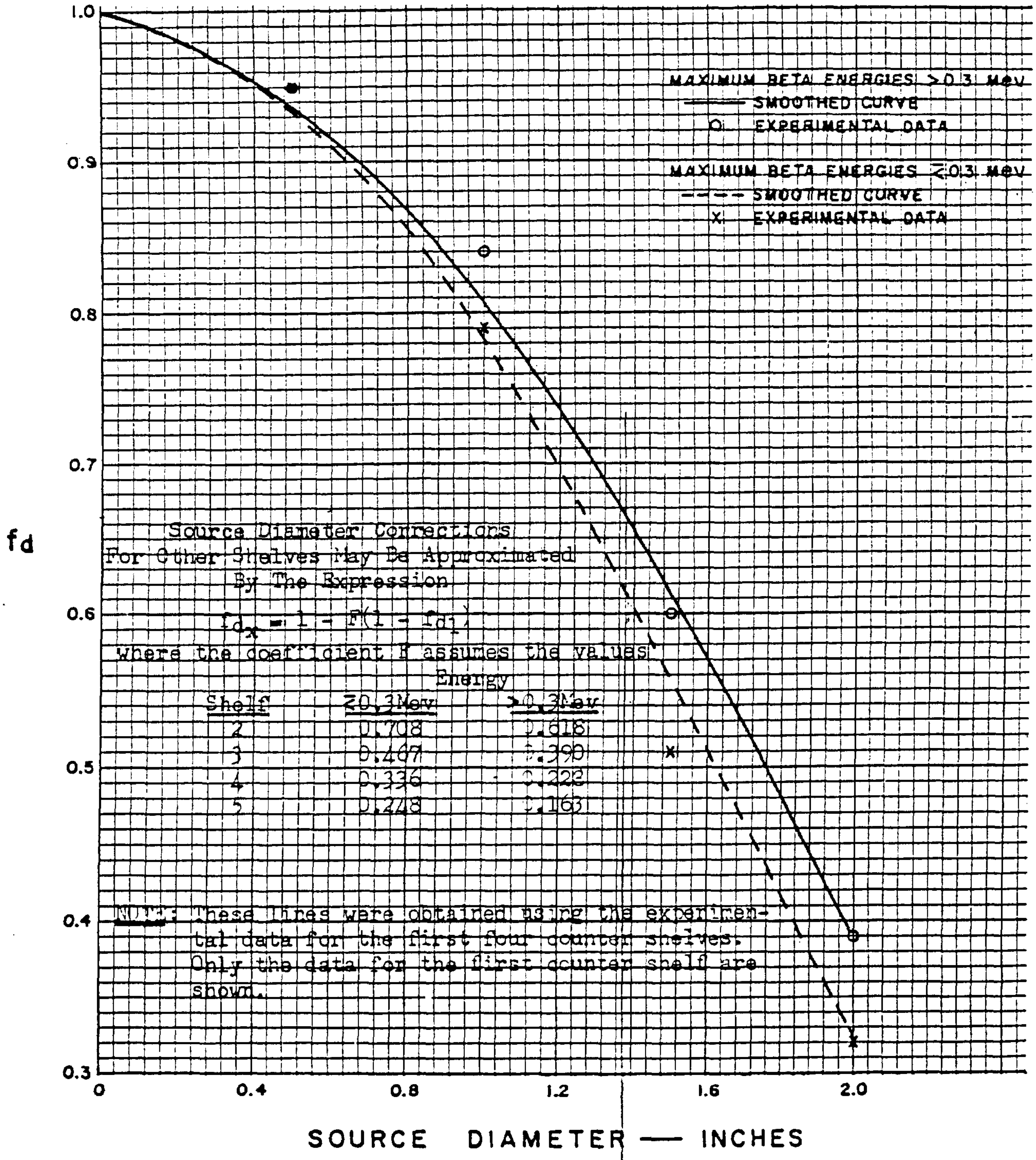
FIGURE - 1
FIRST SHELF SOURCE DIAMETER CORRECTIONS (f_d) FOR FLAT CIRCULAR SOURCE MOUNTING



Source Diameter Corrections
For Other Shelves May Be Approximated
By The Expression

$$f_{d_x} = 1 - F(1 - f_{d1})$$

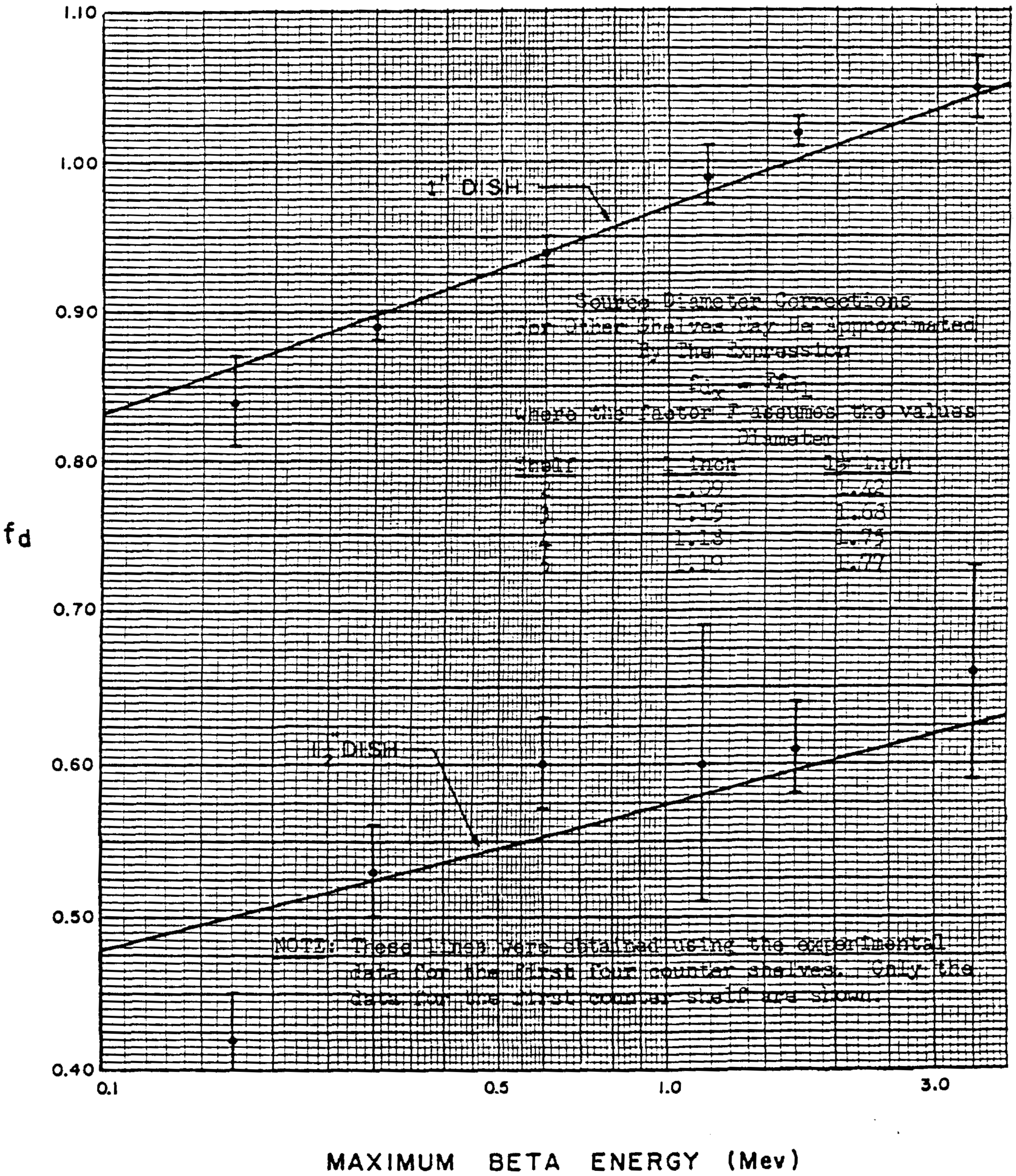
Where the coefficient F assumes the values

	Energy	
Shelf	≦0.3Mev	>0.3Mev
2	0.708	0.618
3	0.467	0.390
4	0.336	0.222
5	0.248	0.163

NOTE: These lines were obtained using the experimental data for the first four counter shelves. Only the data for the first counter shelf are shown.

millipore

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

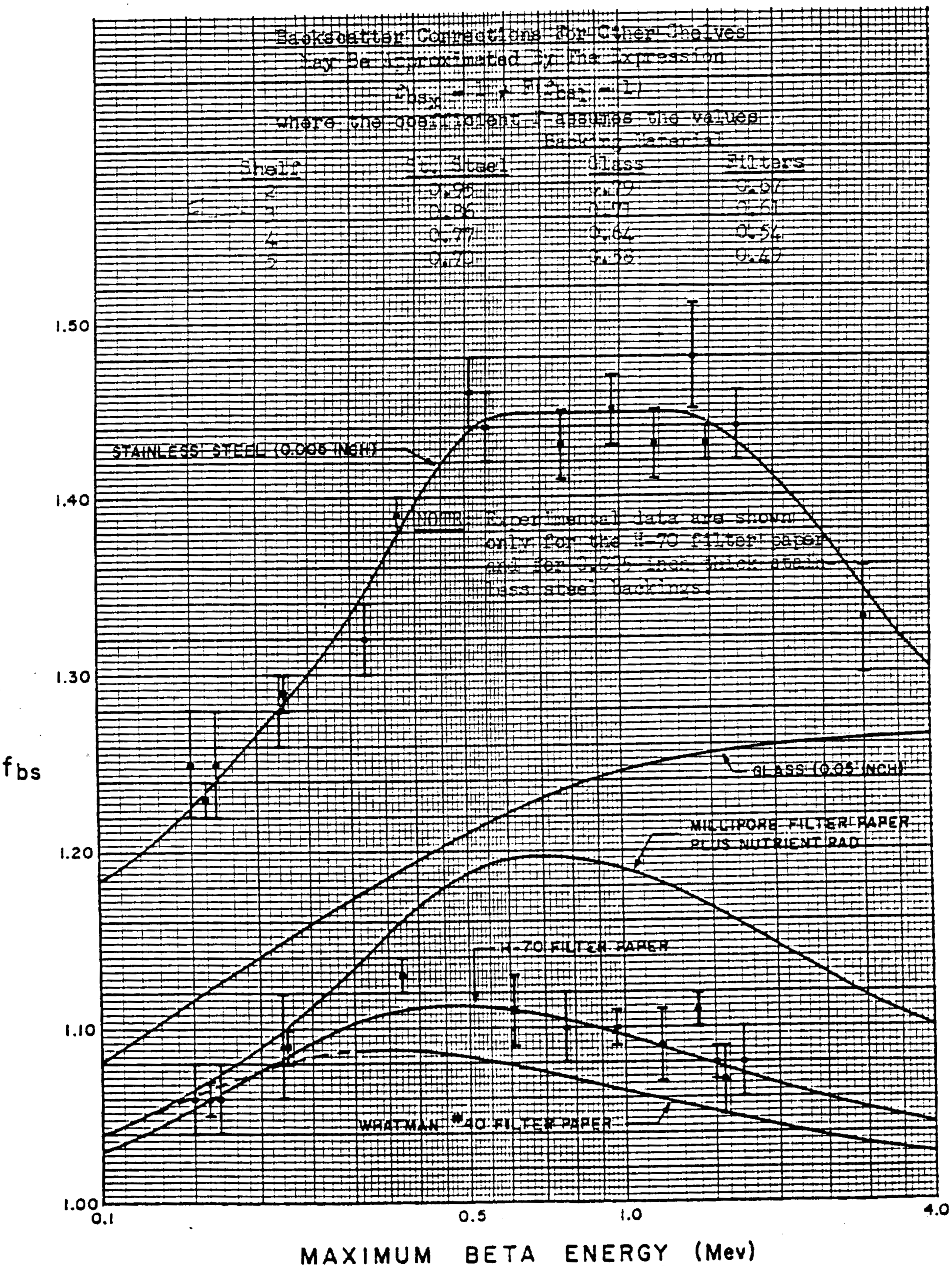


Source Diameter Corrections
For Other Shelves May Be Approximated
By The Expression
$fd_x = F fd_1$
Where the factor F assumes the values

	Diameter	
Shelf	1 inch	1½ inch
2	1.09	1.62
3	1.15	1.68
4	1.13	1.75
5	1.10	1.77

NOTE: These lines were obtained using the experimental data for the first four counter shelves. Only the data for the first counter shelf are shown.

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



Backscatter Corrections For Other Shelves May Be Approximated By The Expression

$$f_{bs_x} = 1 + F(f_{bs_1} - 1)$$

where the coefficient F assumes the values

	Backing Material		
Shelf	St. Steel	Glass	Filters
2	0.95	0.79	0.67
3	0.86	0.71	0.61
4	0.77	0.64	0.54
5	0.70	0.56	0.47

NOTE: Experimental data are shown only for the H-70 filter paper and for 0.005 inch thick stainless steel backings.

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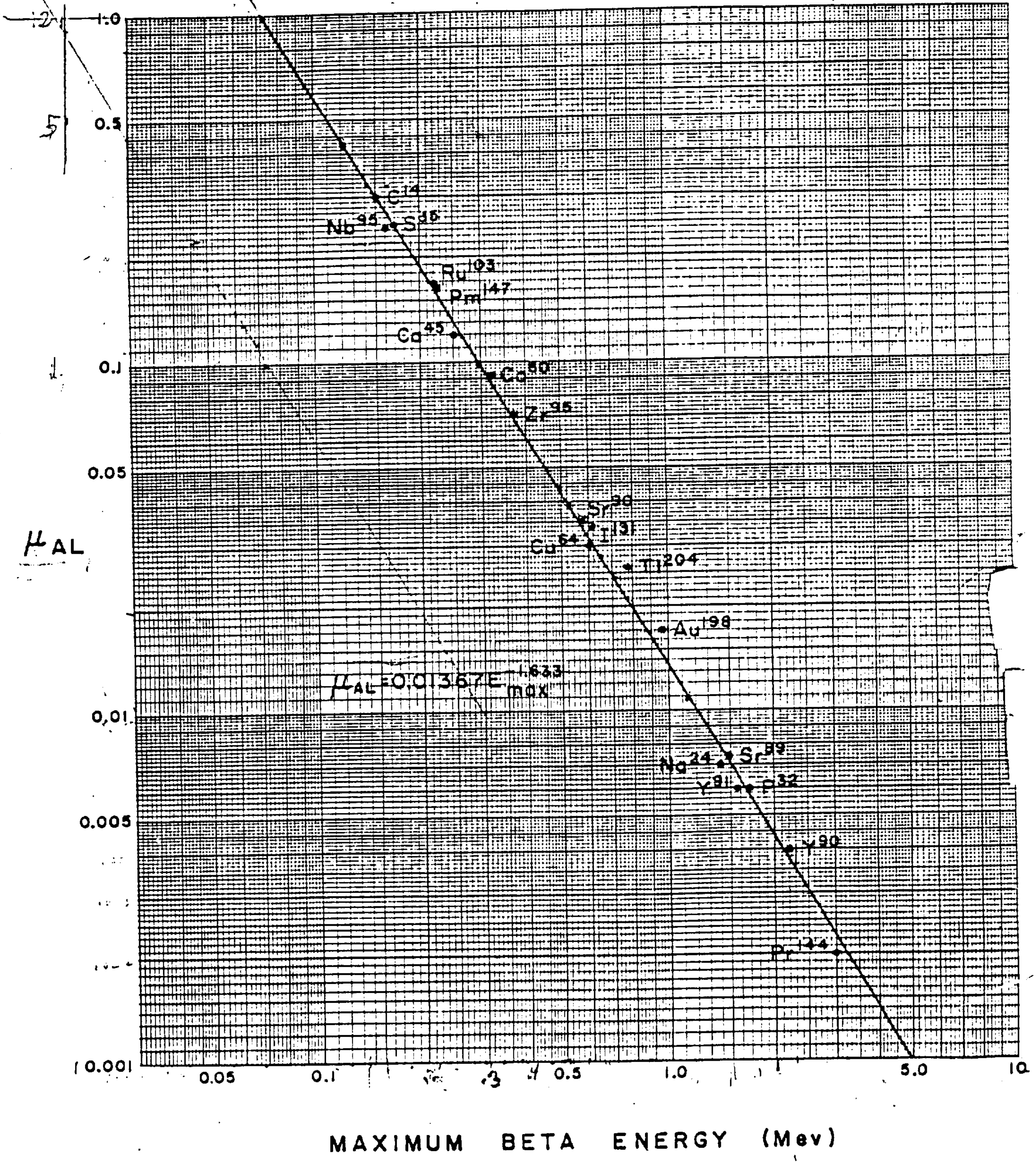
FIGURE - 4
MASS ABSORPTION COEFFICIENT
AS A FUNCTION OF MAXIMUM ENERGY



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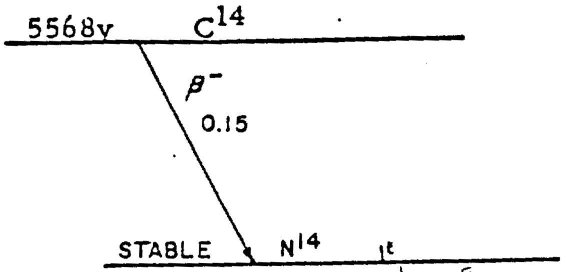
AEC-GE RICHLAND, WASH.

ISOTOPE Carbon^{14}

METHOD Distillation

YIELD 100% = 32.8 mg. (10mg. $CO_3^{=}$)
(As $BaCO_3$)

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)

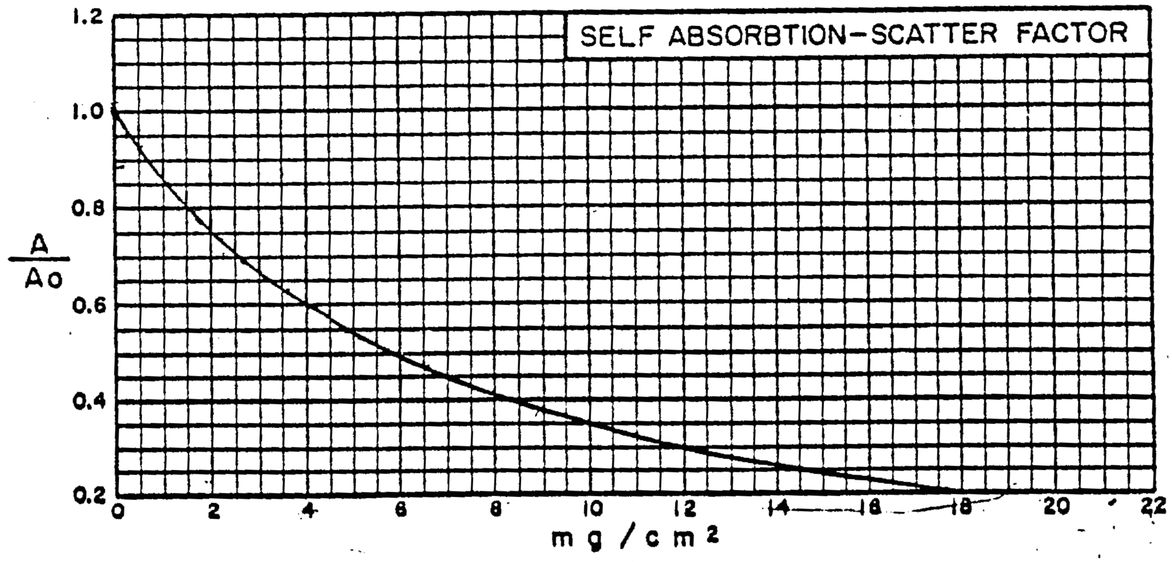
1/4 = .68

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
SHELF 1	0.86 .68	~~0.44~~ .54	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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

Remarks: C^{14} as $BaCO_3$ on 1 1/2" Dish 1st shelf

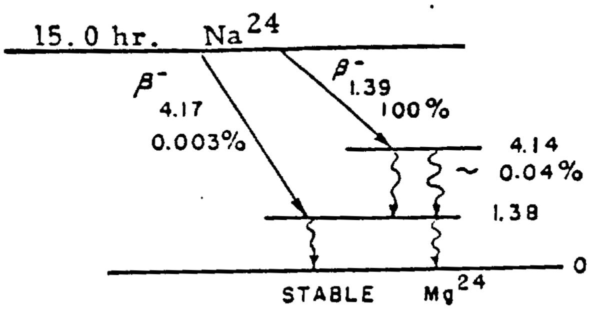
$D_{\frac{1}{2}}$ = 63.29 mg/cm

ISOTOPE Sodium^{24}

METHOD Group Elimination

YIELD 37.0mg = 100% (10mg Na)
(As $NaNO_3$)

μ_{Al} = 0.0079 μ_{Air} = ______



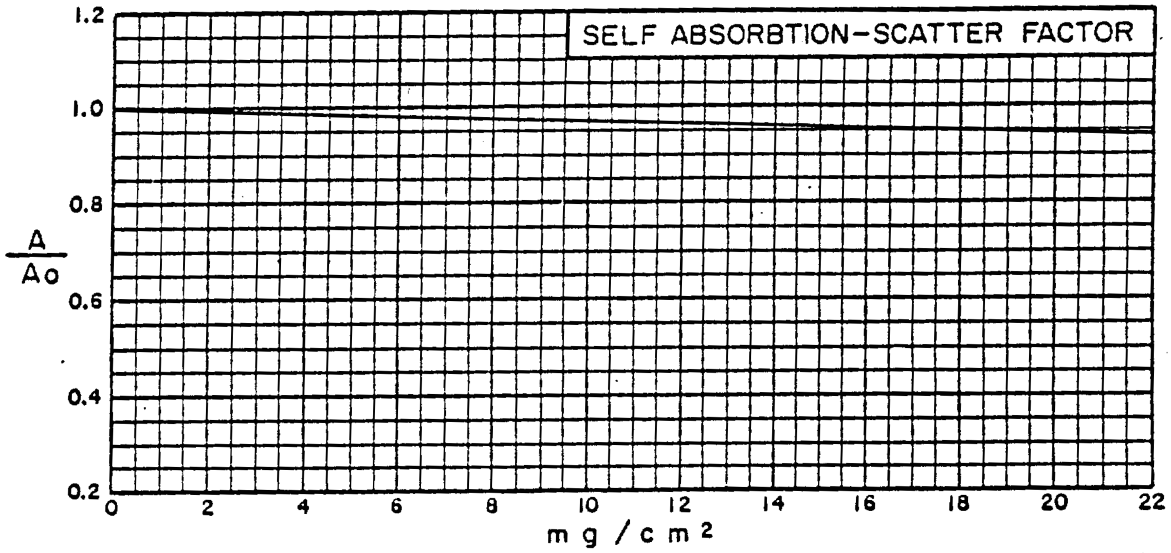
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.94

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

Remarks: Na^{24} in $NaNO_3$ on 1" dishes

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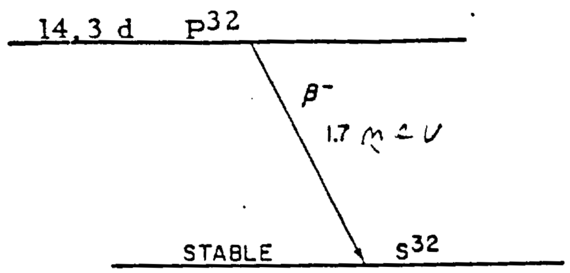
ISOTOPE Phosphorus^{32}

METHOD Phosphomolybdate

YIELD 98.8 mg=100% (2.5 mg $PO_4^{\equiv}$)
(As $(NH_4)_3$ $(PMo_{12}O_{40})$)

μ_{Al} = 0.0058 μ_{Air} = ______



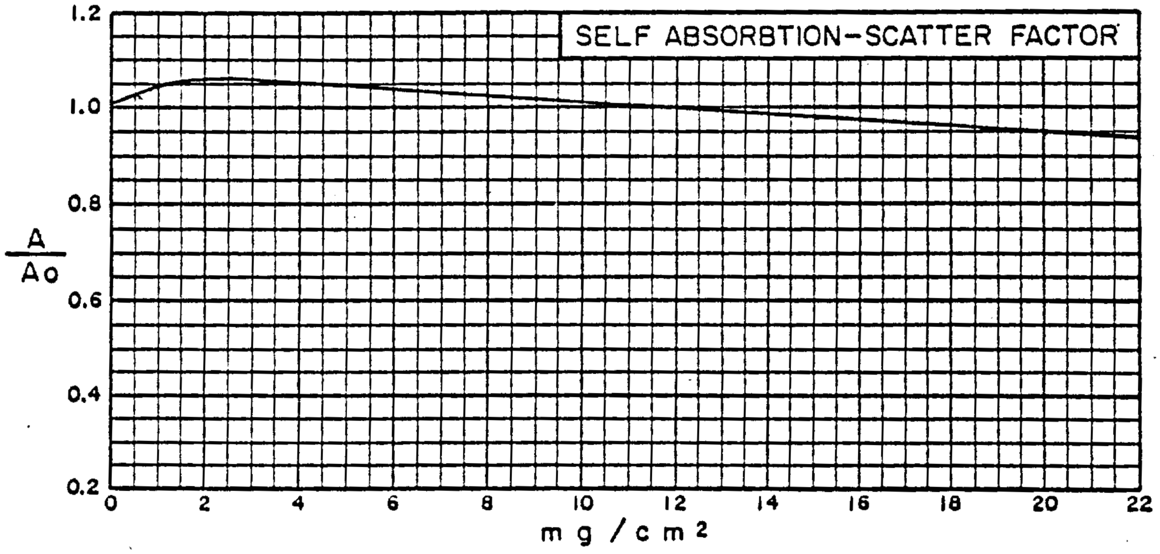
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.97
3	0.96

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

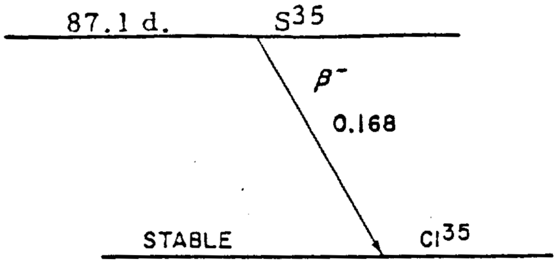
Remarks: P^{32} in Ammonium Molybdiphosphate on 1" st. stl. dishes (1st sh.)

ISOTOPE Sulphur^{35}

METHOD Barium Sulphate

YIELD 24.3 mg=100% (10 mg-$SO_4^{=}$)
(As $BaSO_4$)

μ_{Al} = 0.25 μ_{Air} = ______ new T



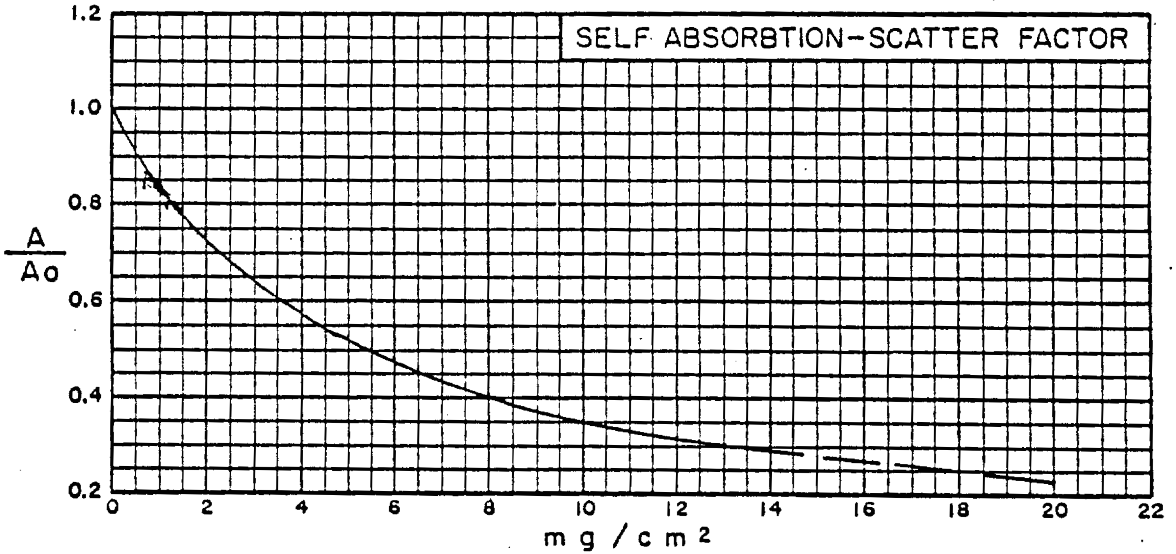
SHELF	AIR & MICA WINDOW FACTORS
1	0.40 (1.5)
2	0.25
3	0.16

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

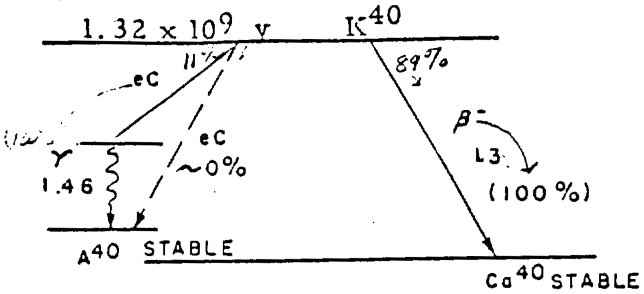
Remarks: S^{35} as $BaSO_4$ on 1 1/2" dishes

ISOTOPE Potassium^{40}

METHOD Perchlorate

YIELD 70.9 mg=100%
(As K ClO_4)

μ_{Al} = 0.009 μ_{Air} = ______



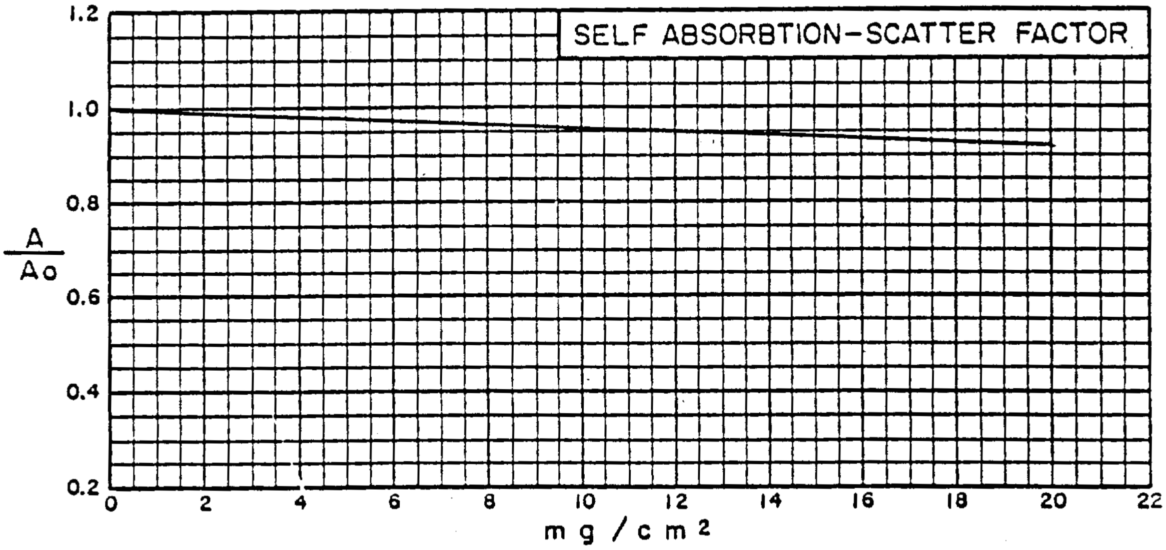
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.95
3	0.94

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



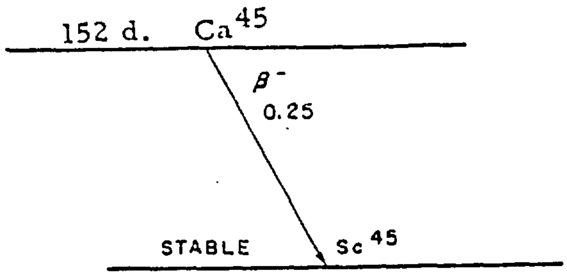
CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

ISOTOPE Calcium^{45}

METHOD Calcium Oxalate

YIELD 36.5 mg=100% (10 mg Ca): (As CaC_2O_4)

μ_{Al} = 0.13 μ_{Air} = ______



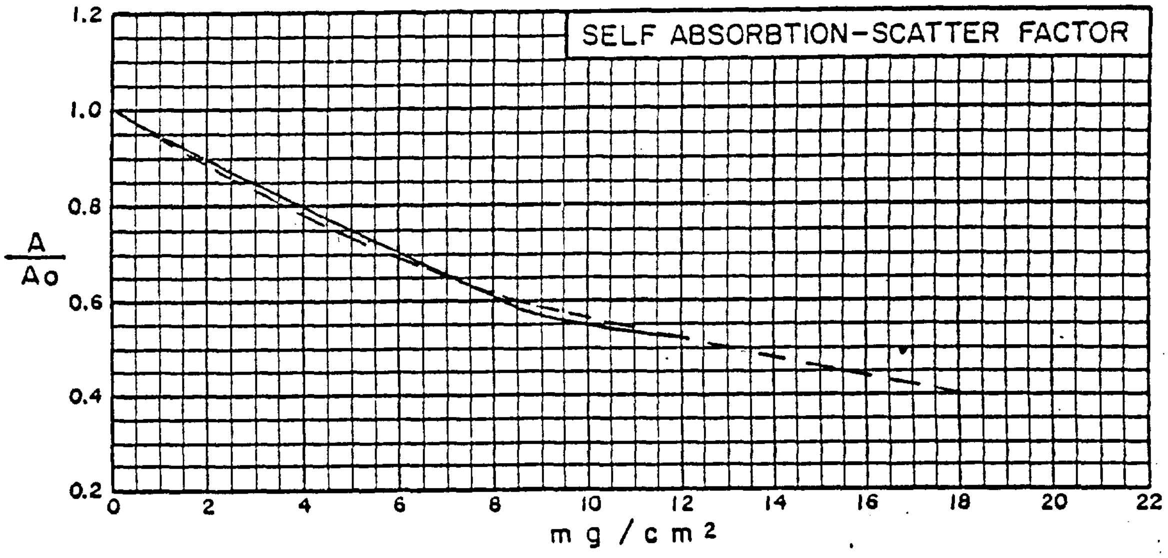
SHELF	AIR & MICA WINDOW FACTORS
1	0.62 (.78)
2	0.49
3	0.38

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



$$\text{CALCULATION PROCEDURE: } \frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$$

Remarks: Ca^{45} as CaC_2O_4 in 1 1/2" dishes

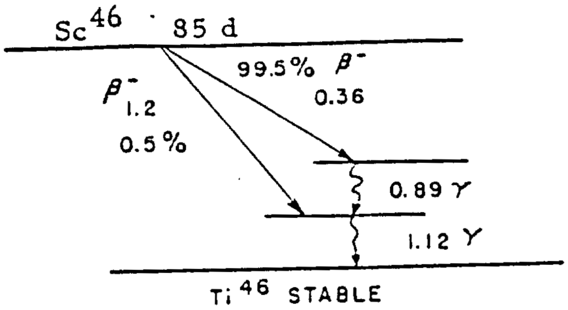
$$- - - = \frac{A}{A_o} = \frac{1}{\mu x}(1-e^{-\mu x})$$

ISOTOPE Scandium^{46}

METHOD Scandium Fluoride

YIELD 61.3 mg=100%
(As Sc_2O_3)

μ_{Al} = 0.072 μ_{Air} = ______



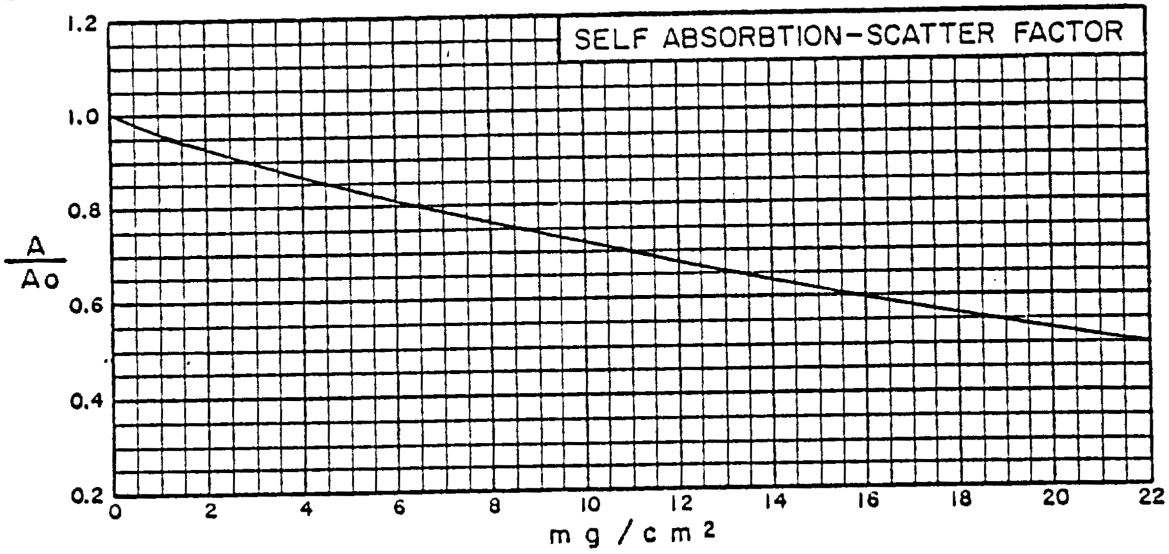
SHELF	AIR & MICA WINDOW FACTORS
1	0.77
2	0.67
3	0.59

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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

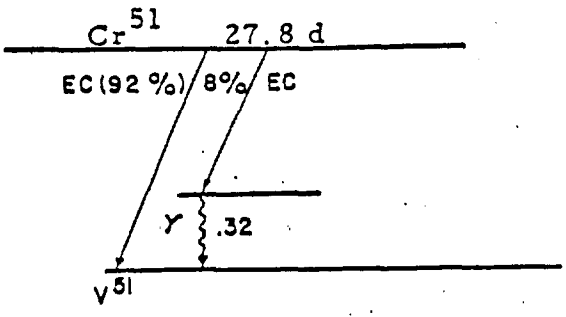


CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

ISOTOPE Chromium^{51}

METHOD ______________ YIELD ______________



μ_{Al} = ______ μ_{Air} = ______

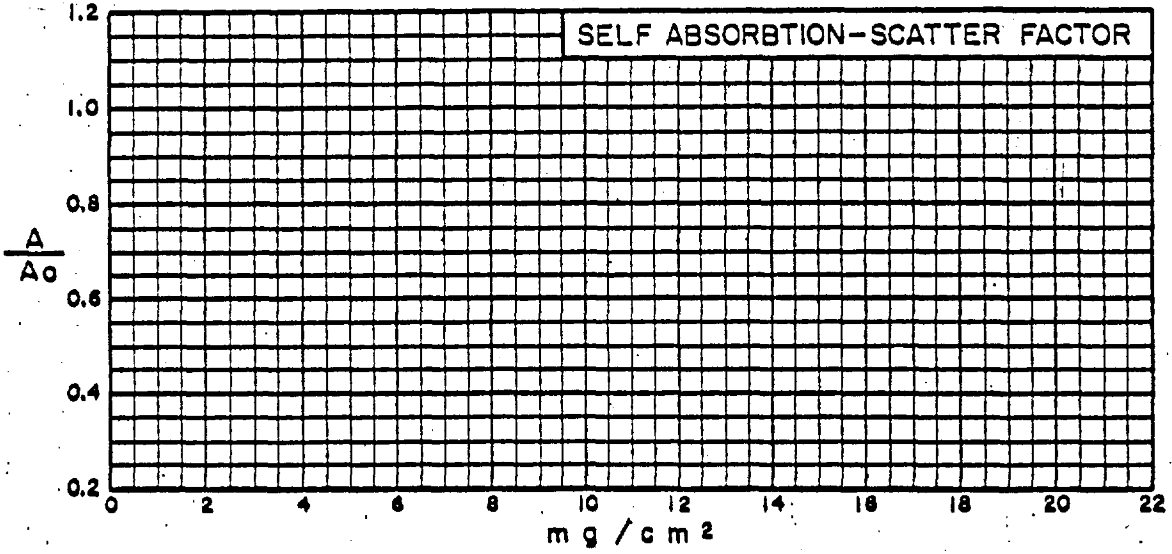
SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
SHELF 1					
SHELF 2					
SHELF 3					

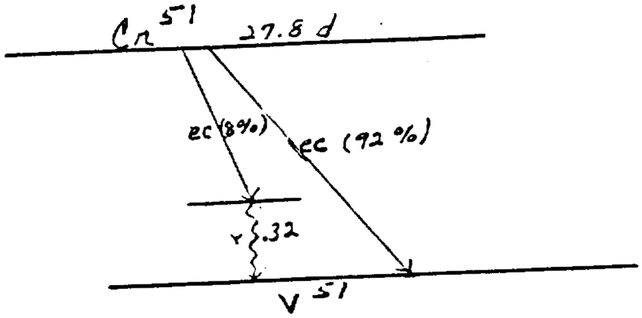
BACK-SCATTER FACTORS

SHELF 1					
SHELF 2					
SHELF 3					



CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

Chromium - 51



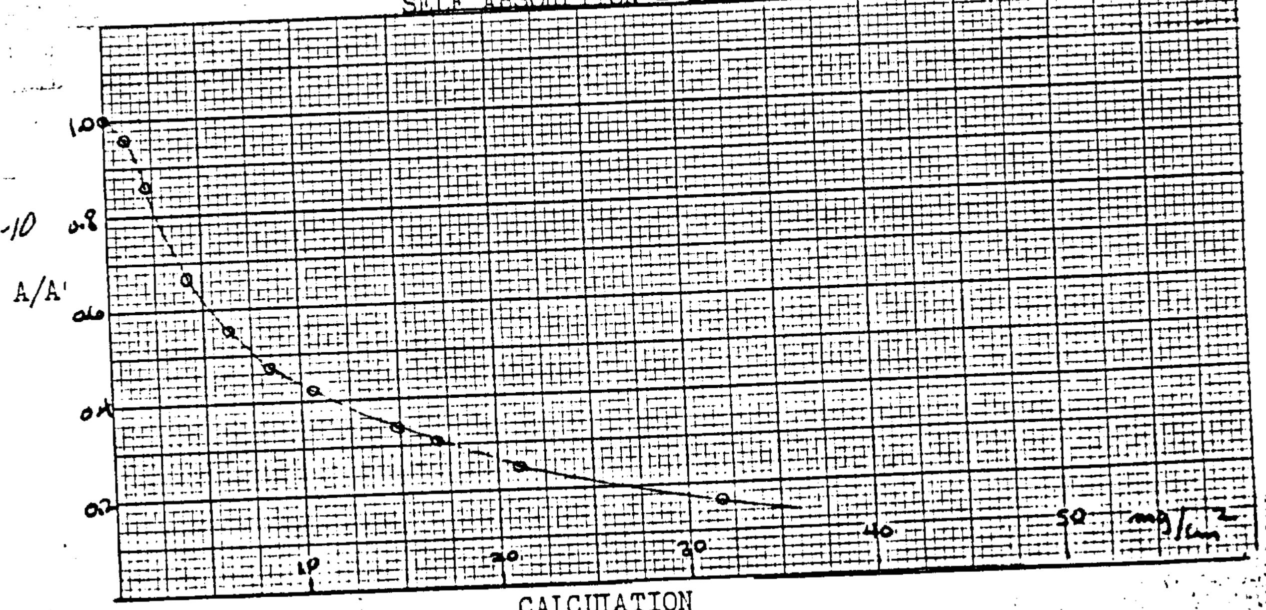
μal - μair-

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

	Shelf	SOURCE SPREAD			
		1" dish	1½" dish	1½" Filter	1.38" millipore
LGO	1	.79	.51	.51	.66
BGO	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*	1.65*
3				
4				
5				

SELF ABSORPTION - SCATTER



CALCULATION

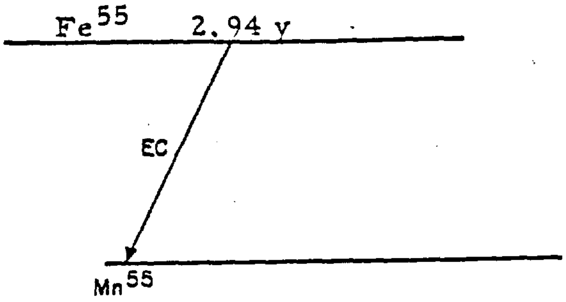
$$\frac{(C/M)\ (\text{Volume Factor})}{(\text{Geo.})\ (2.2 \times 10^{6})\ (SS)\ (bs)\ (SSA)(A\&MW)(\text{Yield})} = \ \text{uc/unit}$$

COMMON METHOD

* Interpreted

ISOTOPE Iron^{55}

METHOD ______________________ YIELD ______________________



μ_{Al} = ______ μ_{Air} = ______

SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
SHELF 1					
SHELF 2					
SHELF 3					

BACK-SCATTER FACTORS

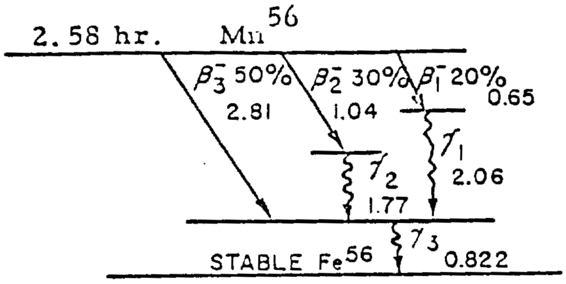
[redacted]

ISOTOPE Manganese^{56}

METHOD Manganese Dioxide

YIELD 31.7 mg=100%
(As MnO_2)

μ_{Al} = 0.010 μ_{Air} = ______



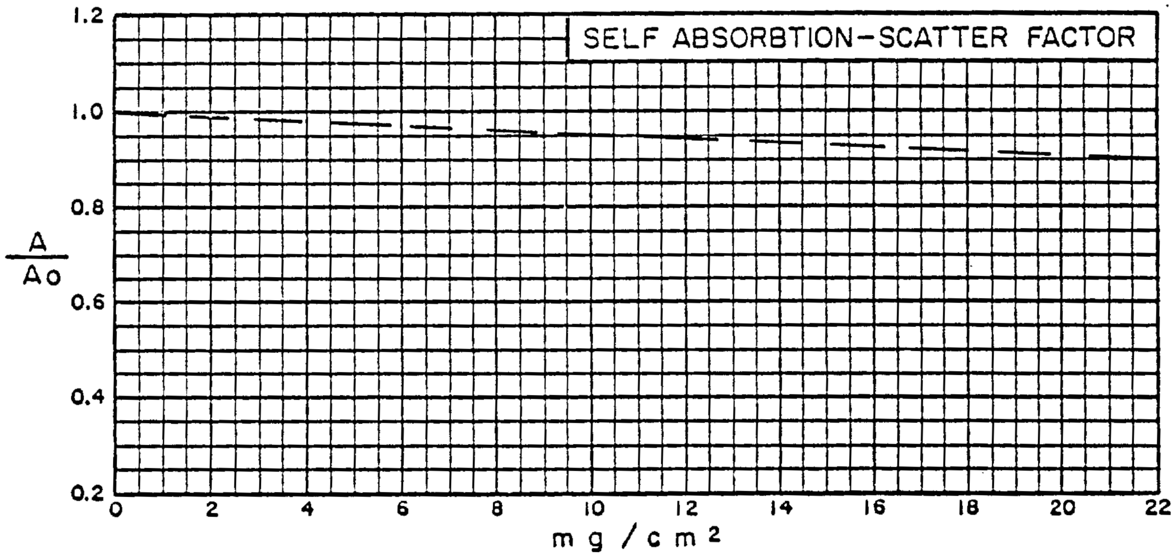
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.94
3	0.93

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

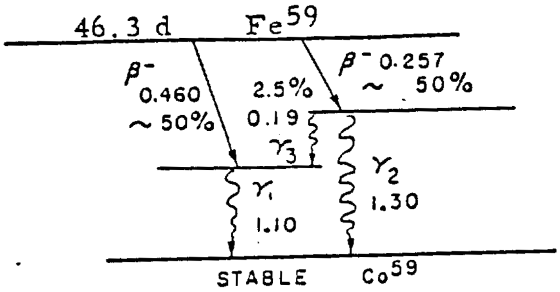
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x}(1-e^{-\mu x})$

ISOTOPE Iron^{59}

METHOD Ether Extraction

YIELD 28.6 mg = 100 %
(As Fe_2O_3)

μ_{Al} = 0.085 μ_{Air} = ______



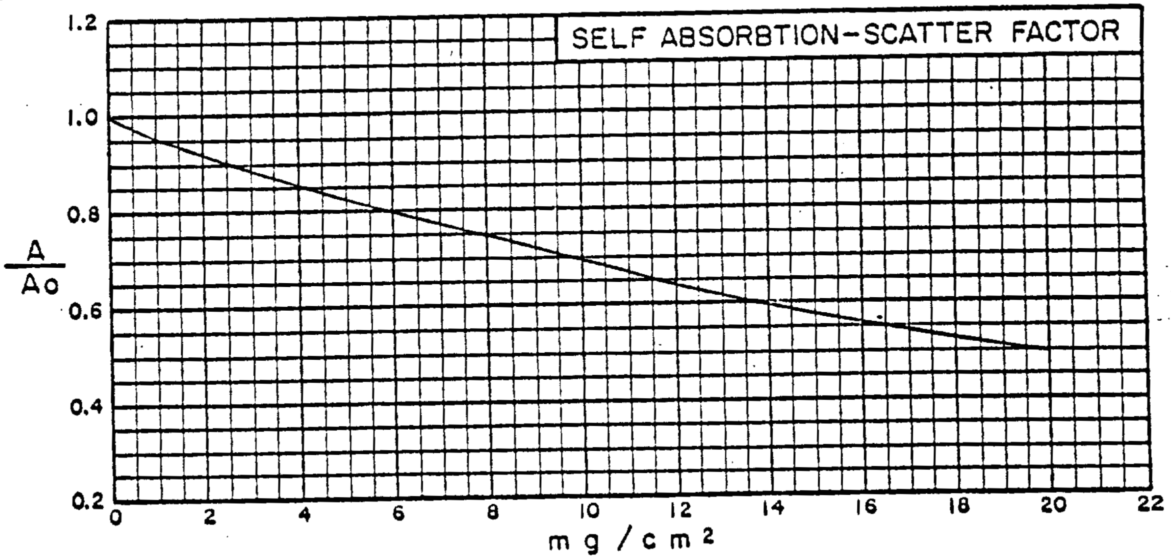
SHELF	AIR & MICA WINDOW FACTORS
1	0.74
2	0.63
3	0.55

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS(FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

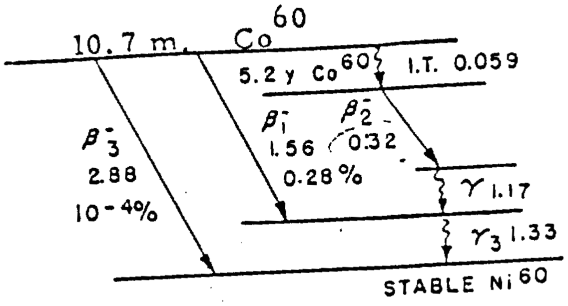
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x} (1 - e^{-\mu x})$

ISOTOPE Cobalt^{60}

METHOD* Potassium Cobaltinitrite

YIELD 80.2 mg = 100%
(As $K_3 CO (NO_2)_6 \bullet H_2O$)

μ_{Al} = 0.088 μ_{Air} = 0.06



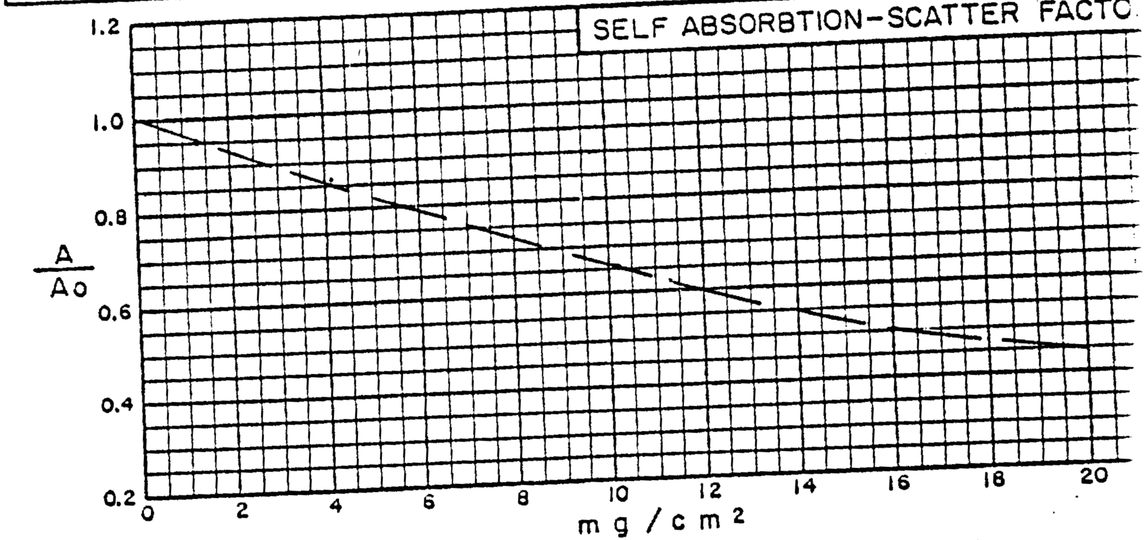
SHELF	AIR & MICA WINDOW FACTORS
1	0.73 (.77)
2	0.62
3	0.52

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu$

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

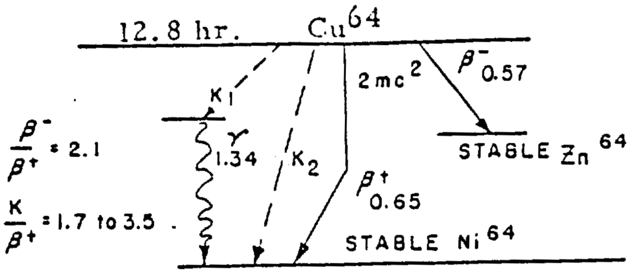
*Additional Method
Gamma Spectrometer

ISOTOPE Copper^{64}

METHOD Cuprous Thiocyanate

YIELD 38.2 mg. = 100%
(As Cu SCN)

μ_{Al} = 0.032 μ_{Air} = ______



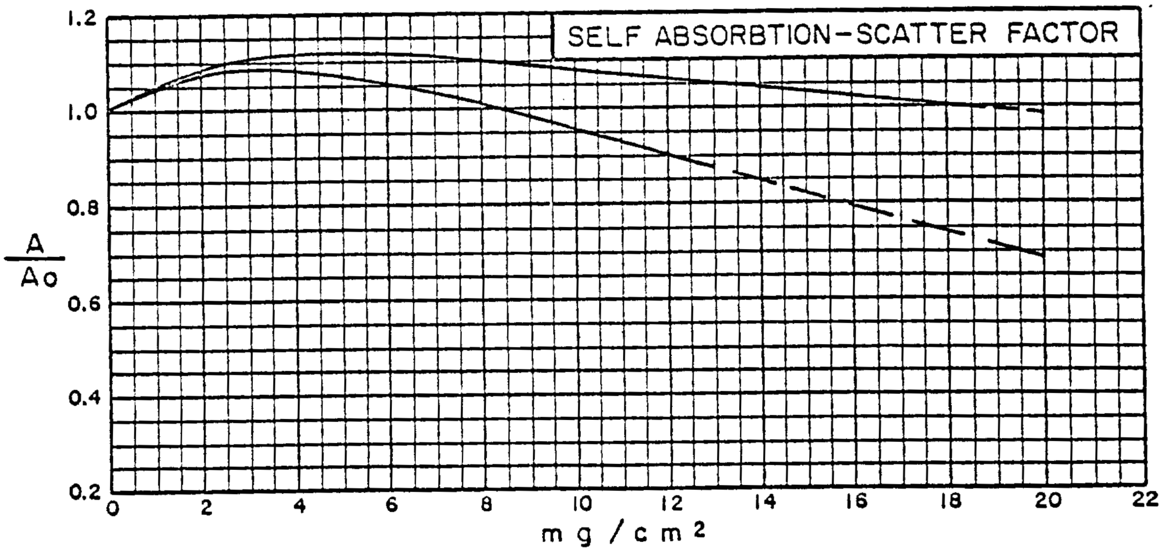
SHELF	AIR & MICA WINDOW FACTORS
1	0.89
2	0.84
3	0.79

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

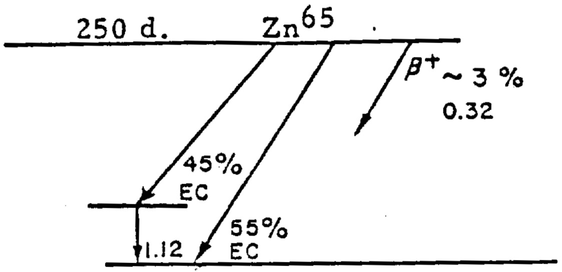
Form: Electroplated Cu on 2.27 cm.^{2} St. Stl.
Remarks: Upper curve 1st shelf
Lower curve 2nd shelf

ISOTOPE Zinc^{65}

METHOD* Zinc Sulfide

YIELD 29.8 mg = 100%
(As ZnS)

μ_{Al} = 0.088 μ_{Air} = ______



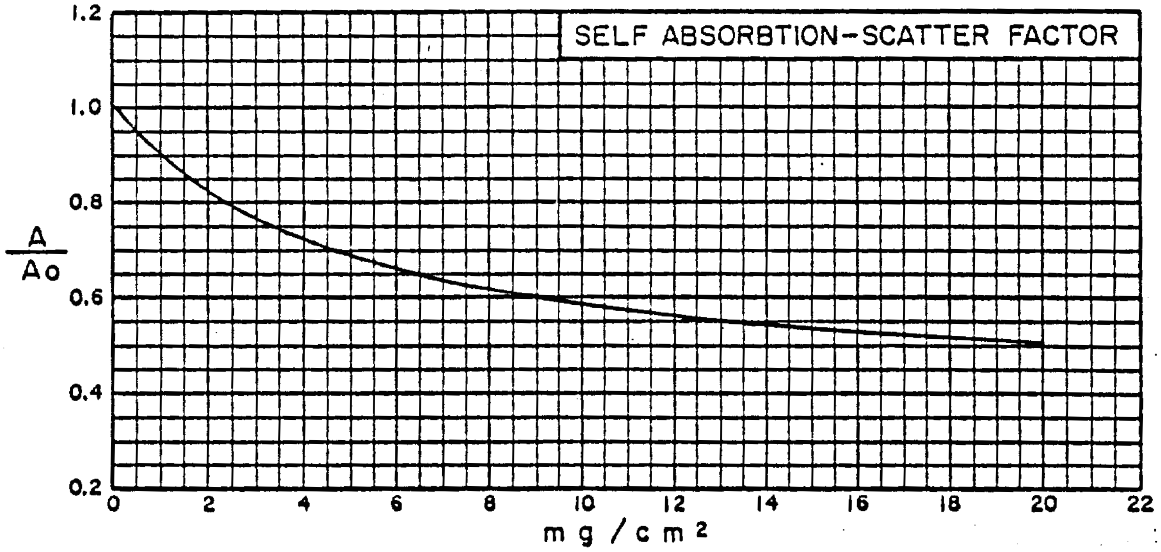
SHELF	AIR & MICA WINDOW FACTORS
1	0.73
2	0.62
3	0.52

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

Remarks: Zn^{65} in ZnS on 1" dish - 1st shelf

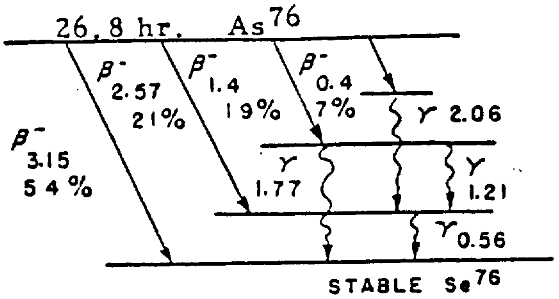
* Additional Method
Gamma Spectrometer

ISOTOPE Arsenic^{76}

METHOD Arsenic Sulfide

YIELD 32.8 mg. = 100%
(As As_2S_3)

μ_{Al} = 0.007 μ_{Air} = ______



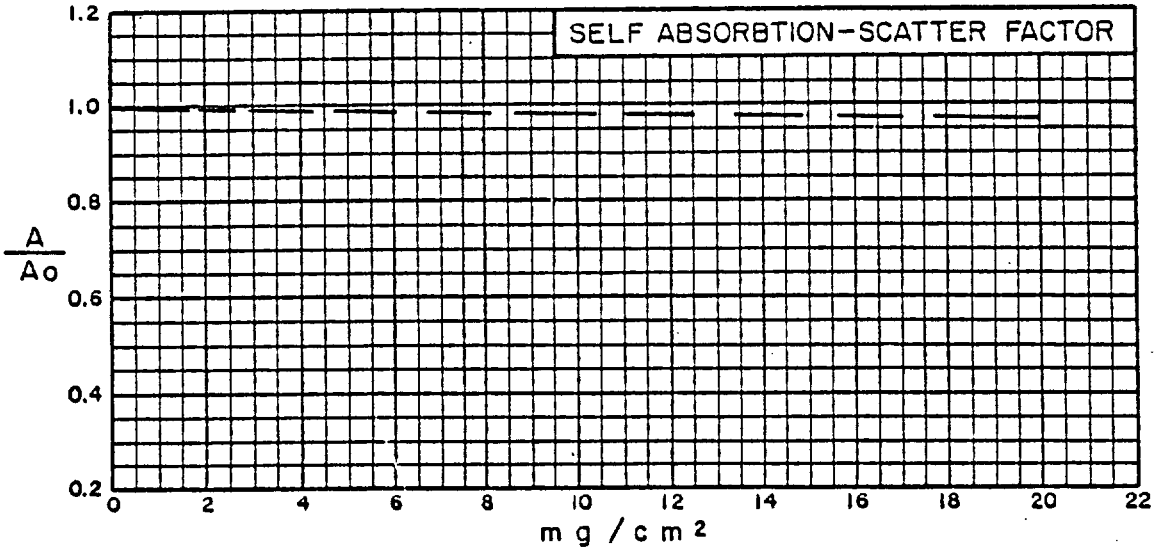
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\dfrac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

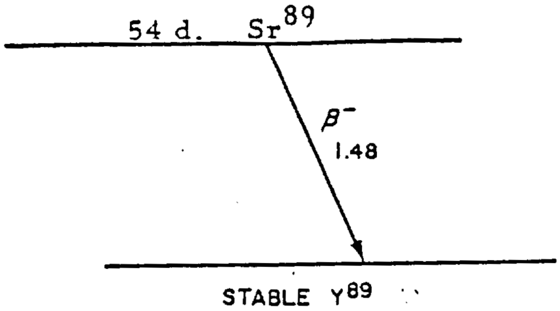
ISOTOPE Strontium^{89}

METHOD Fuming Nitric Acid

YIELD ~~44.2~~ 33.7 mg = 100%
(As SrC_2O_4)

μ_{Al} = 0.0072 μ_{Air} = ______

3.111



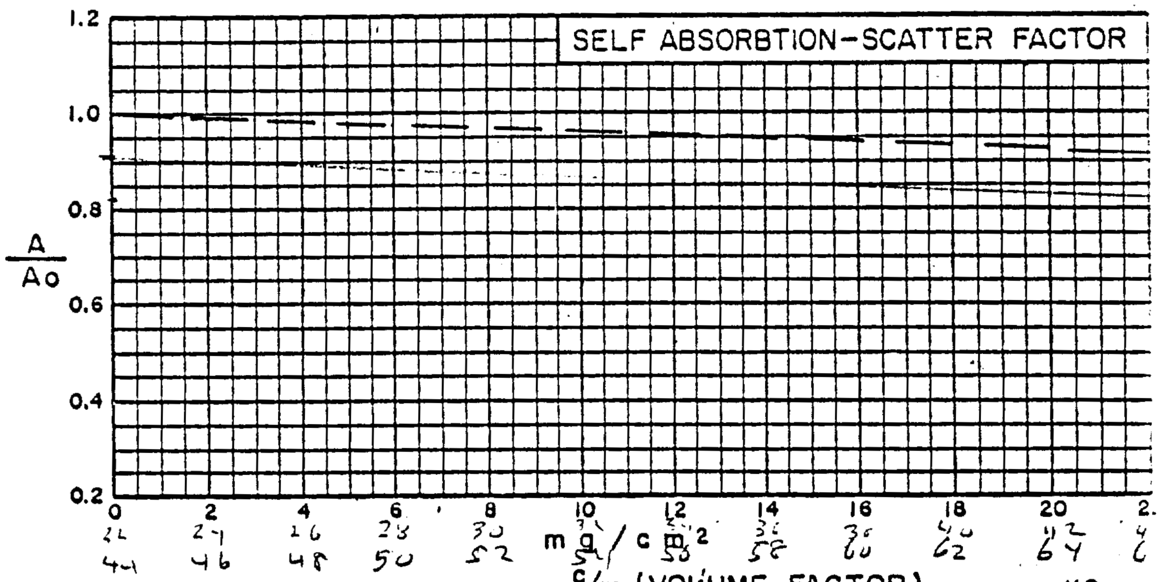
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\dfrac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{uni}$

66 68 70

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

As $SrCO_3$ 4 ml carrier : 67.4

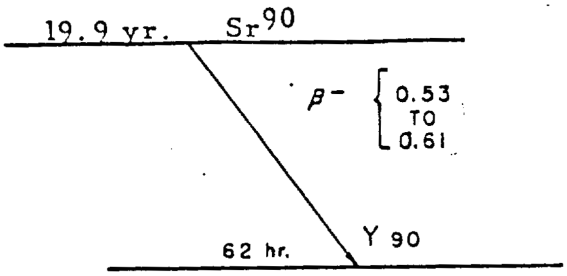
ISOTOPE Strontium^{90}

METHOD Fuming Nitric Acid

33.7 mg. = 100% Carbonate

YIELD 44.2 mg. = 100%
(As SrC_2O_4)

μ_{Al} = 0.034 μ_{Air} = ______



3,654

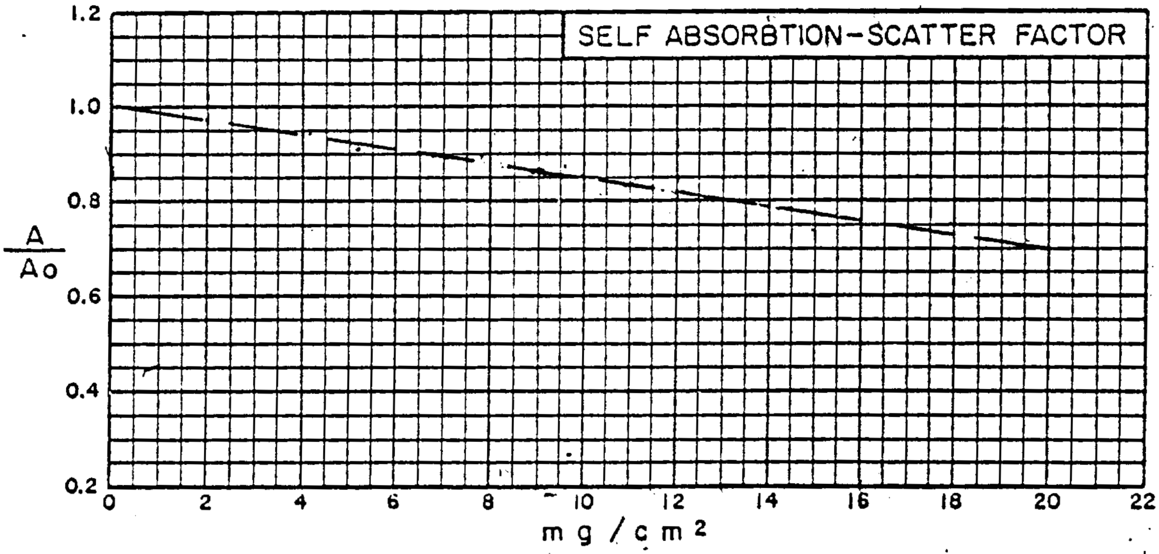
SHELF	AIR & MICA WINDOW FACTORS	
1	0.88	0.96
2	0.83	0.89
3	0.78	0.84

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
SHELF 1	0.94 [illegible]	0.55	0.81	0.66	0.56
SHELF 2	1.02 [illegible]	0.78	0.88	0.79	0.73
SHELF 3	1.08 1.0	0.92	0.93	0.87	0.83

BACK-SCATTER FACTORS

SHELF 1	1.45 1.00	1.45	1.22	1.19	1.11
SHELF 2	1.43 1.02	1.43	1.17	1.13	1.07
SHELF 3	1.39 1.38	1.39	1.16	1.12	1.07



CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{\text{(Geo.)}(2.2\times10^6)\text{(S.S.)(b.s.)(S.S.A.)(A+M.W.)(Yield)}} = \mu c/\text{unit}$ γ

0.77
0.67

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

TMJ Geo = .1339 shelf #2
2/4/83 KW sel #65

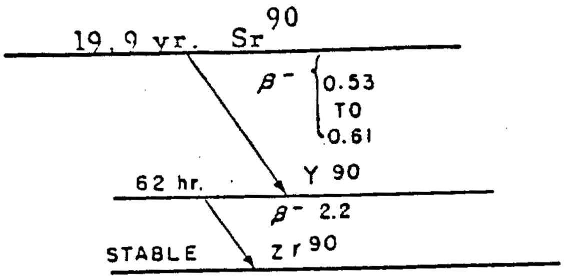
ISOTOPE Strontium^{90} - Yttrium^{90}

METHOD Fuming Nitric Acid

YIELD 44.2 mg. = 100%
(As SrC_2O_4)

μ_{Al} = 0.019 μ_{Air} = ______

3.28



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

.81

SOURCE SPREAD DIAMETER FACTORS

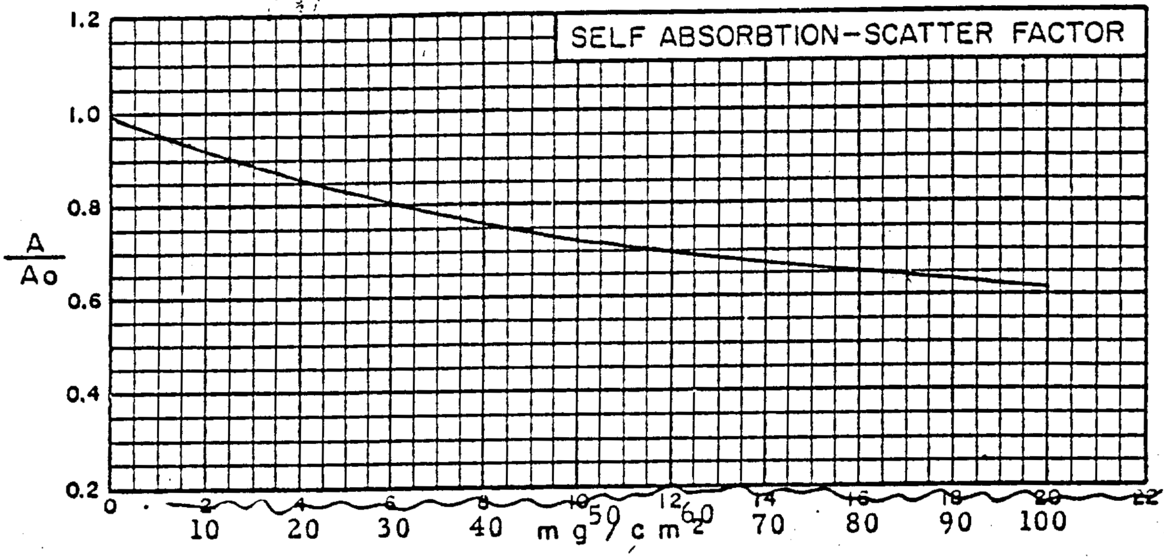
MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
SHELF 1	0.98	0.58	0.81	0.66	0.56
SHELF 2	1.07	0.83	0.88	0.79	0.73
SHELF 3	1.13	0.97	0.93	0.87	0.83

1.19
1.24

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

[illegible]


SELF ABSORBTION-SCATTER FACTOR

CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(Geo.)(2.2\times10^6)(S.S.)(b.s.)(S.S.A.)(A+M.W.)(Yield)} = \mu c/unit$

Remarks: Sr^{90} - Y^{90} in river water salts on 1" dish - 1st shelf

$\frac{\text{wt of ppt}}{\text{100\% yield wt.}}$

$\frac{c/m}{(1.43\times10^6)(SSA)(Y)}$

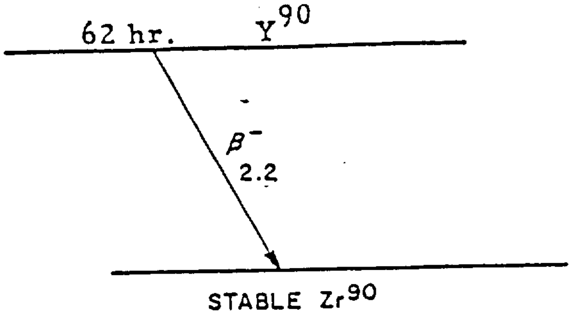
ISOTOPE Yttrium^{90}

METHOD Yttrium Fluoride

YIELD 25.4 mg ~~50.8~~ mg = 100%
(As Y_2O_3)

μ_{Al} = 0.0038 μ_{Air} = ______

3,033



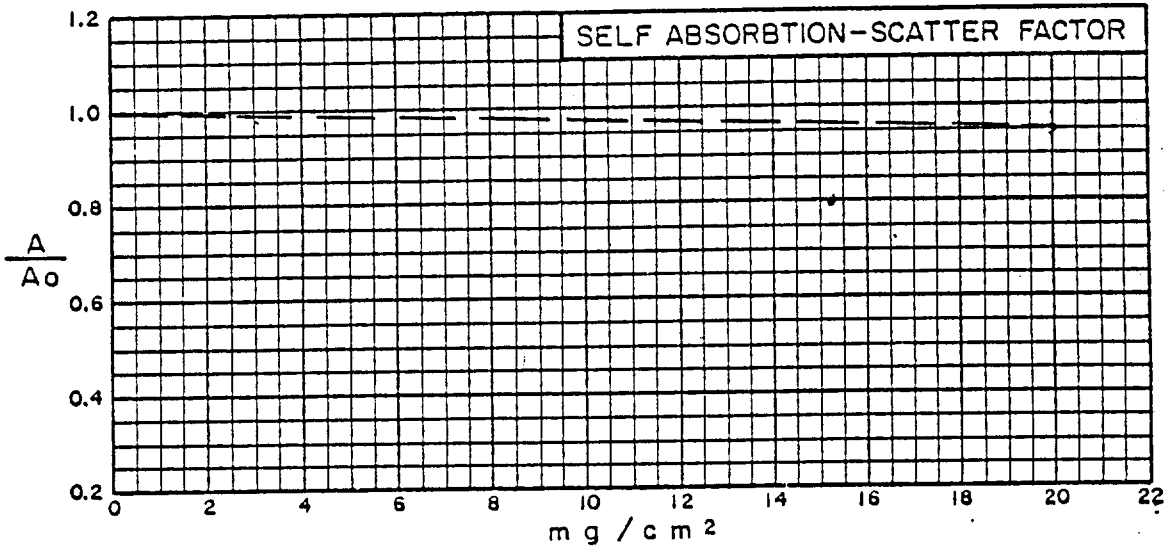
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.98
3	0.97

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

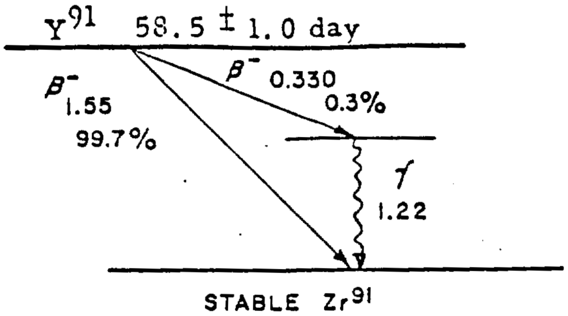
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x}(1-e^{-\mu x})$

ISOTOPE Yttrium^{91}

METHOD Yttrium Fluoride

YIELD ≥5.4 mg ~~50.8 mg~~ = 100% (As Y_2O_3)

μ_{Al} = 0.0067 μ_{Air} = ______



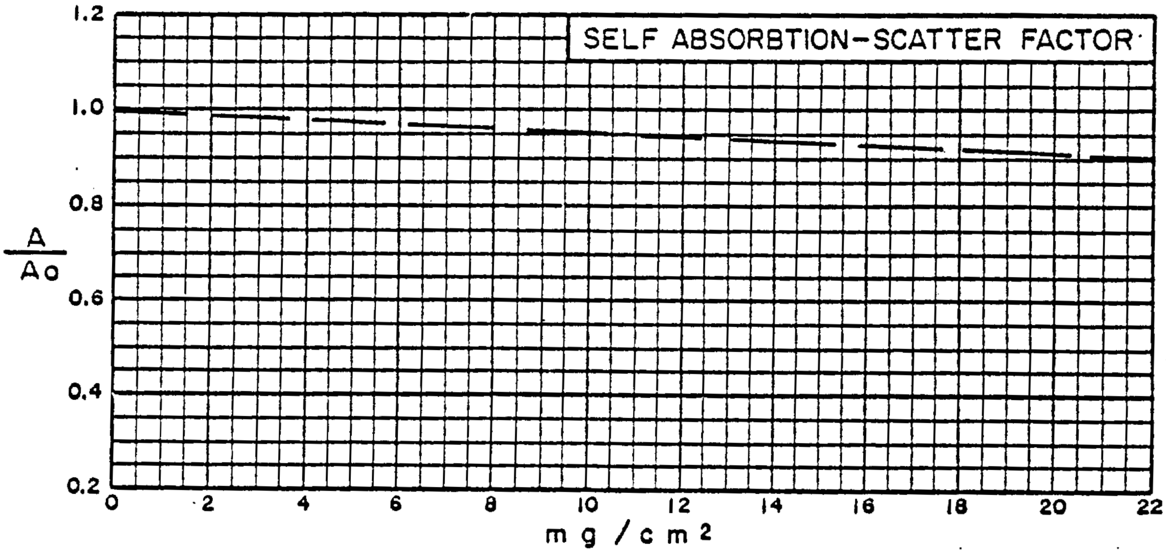
SHELF	AIR & MICA WINDOW FACTORS
1	0.98
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



$$\text{CALCULATION PROCEDURE: } \frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A}+\text{M.W.})(\text{Yield})} = \mu c/\text{unit}$$

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

HW-18258-APP

ISOTOPE Zirconium^{95}

METHOD* Barium Fluozirconate

YIELD 27.0 mg = 100% (As ZrO_2)

Zr^{95}

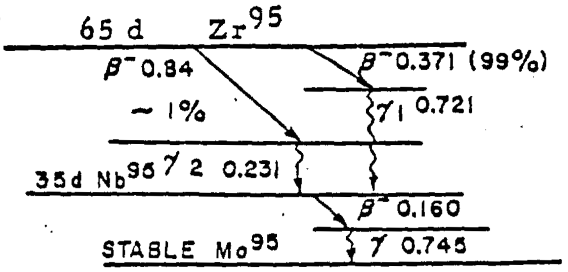
μ_{AL} = 8.072 ~~8.217~~ μ_{Air} =

[redacted]

ISOTOPE Zirconium^{95} - Niobium^{95}

METHOD Spike - Direct Plate

YIELD



μ_{Al} = 0.15 μ_{Air} =

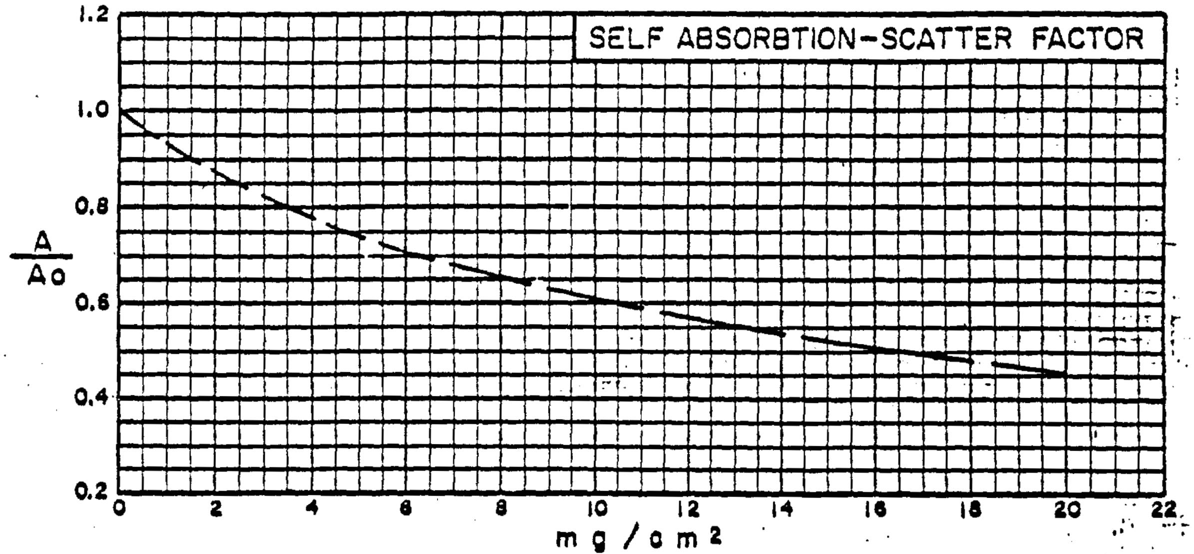
SHELF	AIR & MICA WINDOW FACTORS
1	0.58
2	0.46
3	0.37

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit.}$

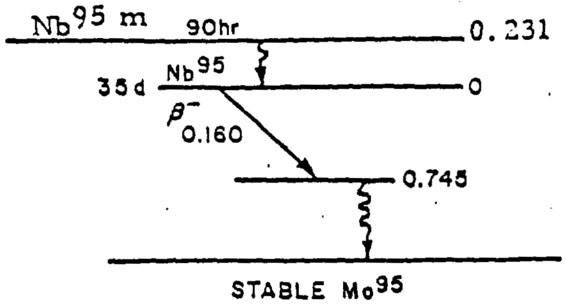
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x}(1-e^{-\mu x})$

ISOTOPE Niobium^{95}

METHOD Niobic Oxide

YIELD 28.6 mg = 100%
(As Nb_2O_5)

μ_{Al} = 0.27 μ_{Air} = ______



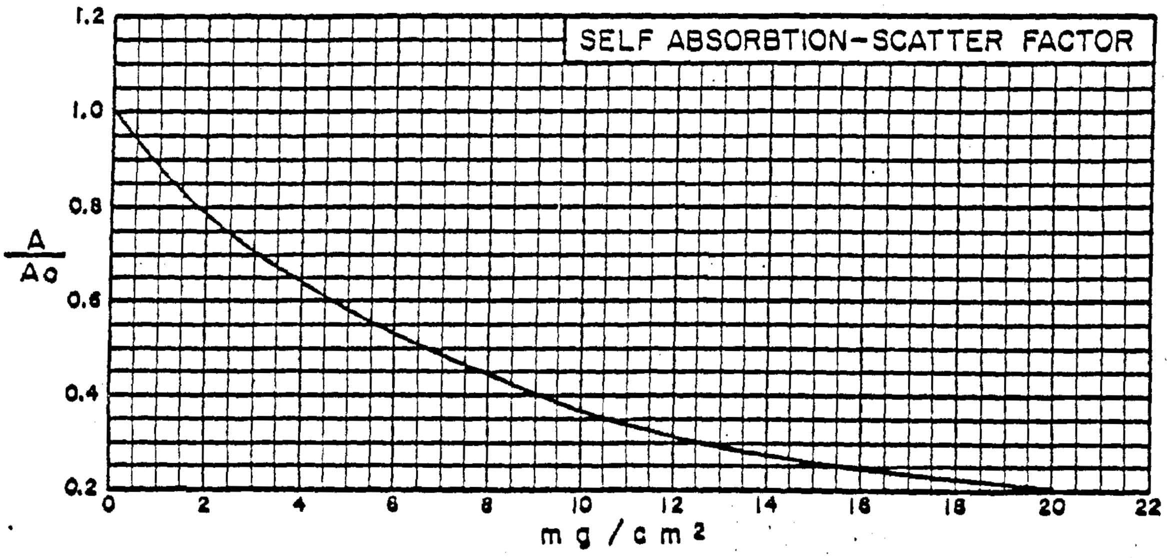
SHELF	AIR & MICA WINDOW FACTORS
1	0.38
2	0.23
3	0.14

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



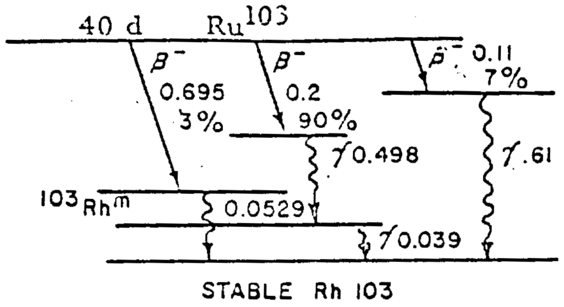
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A}\div\text{M.W.})(\text{Yield})} = \mu c/\text{unit}$

ISOTOPE Ruthenium 103

METHOD* Distillation

YIELD 100% = 28.0 mg.
(As RuO_2 standardized)

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



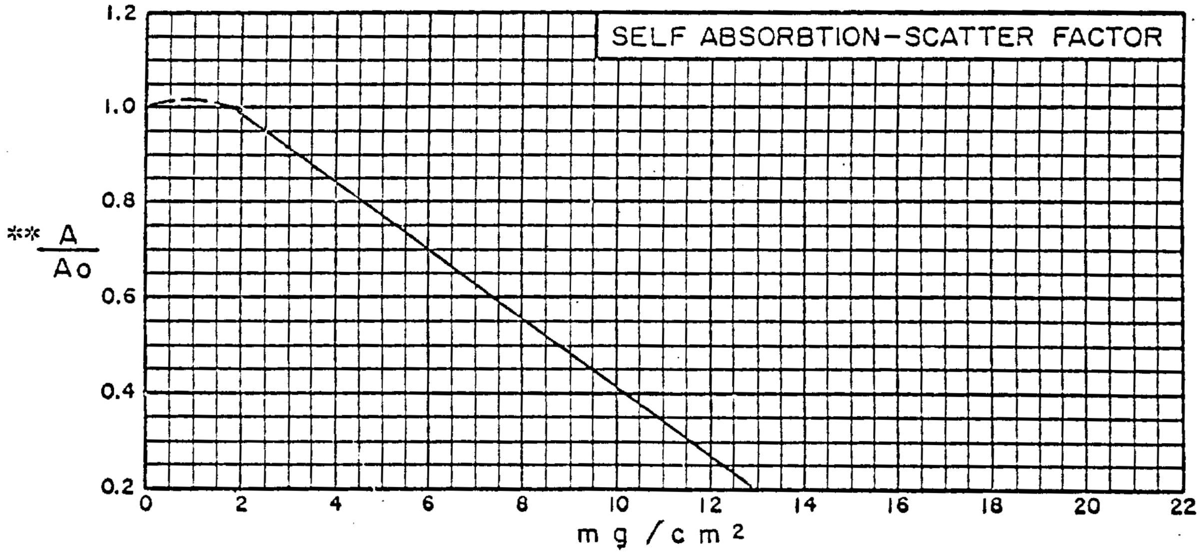
SHELF	AIR & MICA WINDOW FACTORS
1	0.50
2	0.35
3	0.25

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

* Additional Methods	Mounting	Yield
Reduction	1" S S dish	100% = 20 mg.
Carrier-free (CCl_4)	1" S S dish	100%

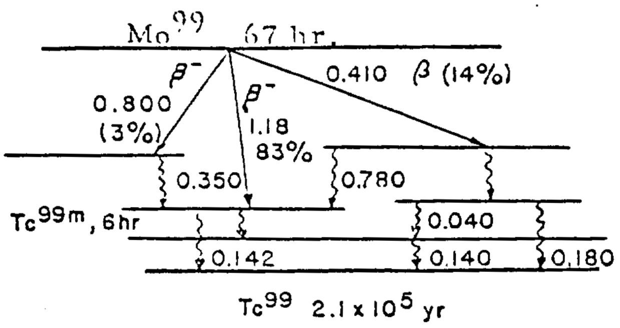
** Remarks: Ru^{103} as $RuO(OH)_2$ on std. 1" dishes (4.5 CM^2) on shelf one.

ISOTOPE Molybdenum^{99}

METHOD α-Benzoinoxime

YIELD 30.0 mg = 100%
(As MoO_3)

μ_{Al} = ______ μ_{Air} = ______



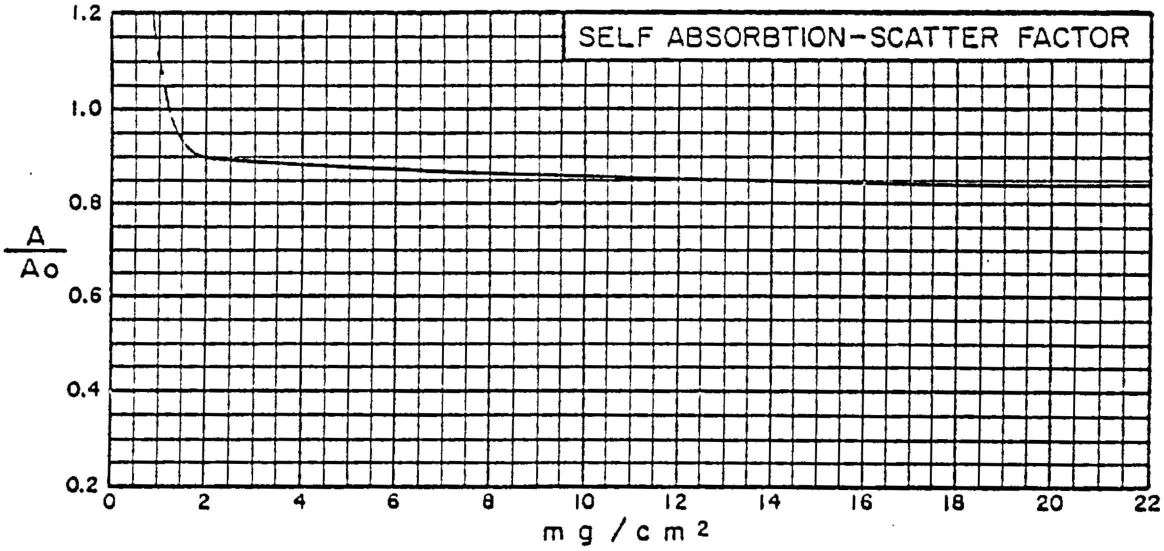
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.91
3	0.88

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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

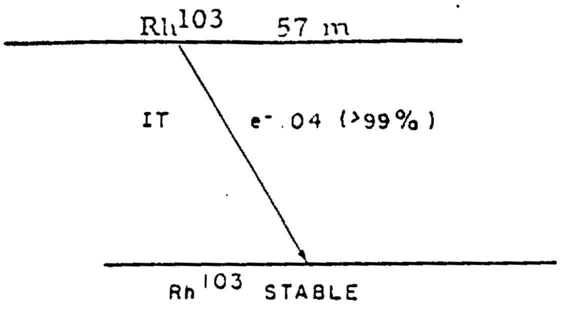


CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

Remarks: MoO_3 on 1" dishes

ISOTOPE Rhodium^{103}

METHOD ____________________ YIELD ____________________



μ_{Al} = ________ μ_{Air} = ________

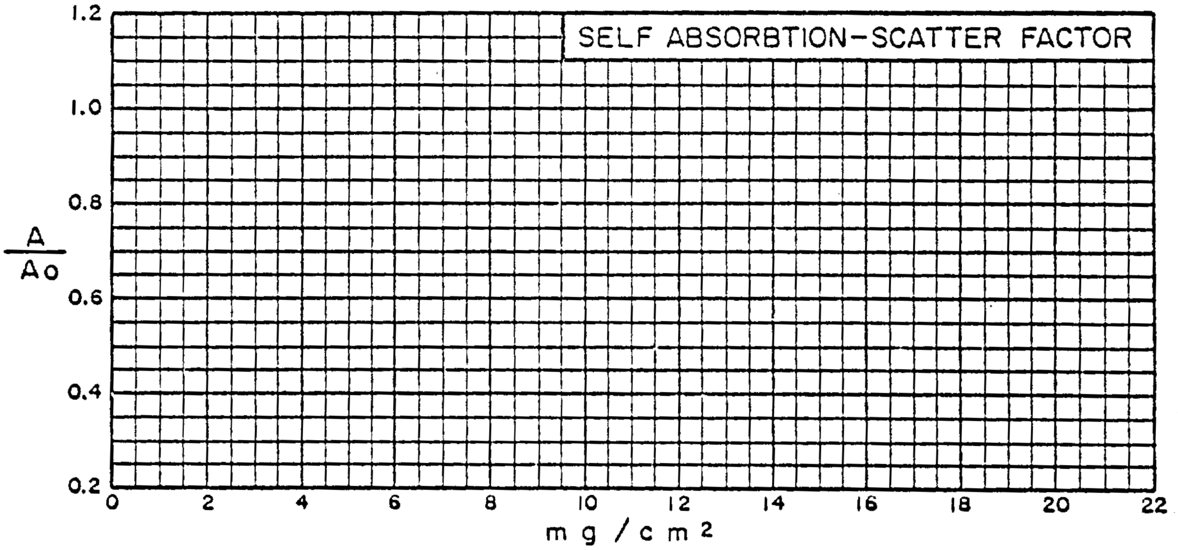
SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm^2	$1\frac{1}{2}$" S.S. DISH 10 cm^2	1" GLASS (FLAT) 5.0 cm^2	1.38" MILLIPORE 9.6 cm^2	$1\frac{1}{2}$" FILTER 13 cm^2
SHELF 1					
SHELF 2					
SHELF 3					

BACK-SCATTER FACTORS

SHELF 1					
SHELF 2					
SHELF 3					



CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

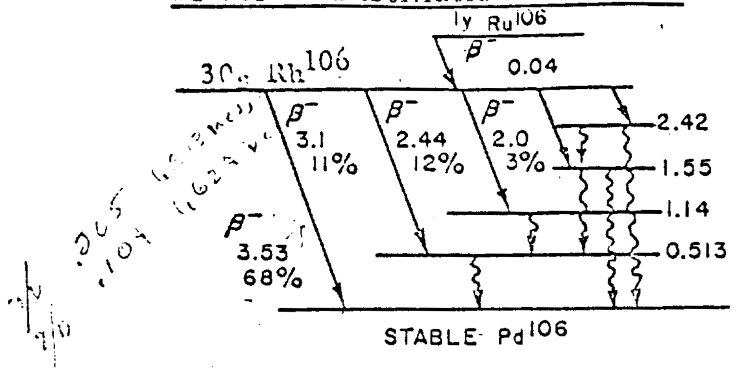
ISOTOPE Rhodium^{106} (Ruthenium^{106})

METHOD* Distillation

YIELD 28.0 mg = 100%

(As RuO_2 standardized)

μ_{Al} = 0.002 μ_{Air} = ______



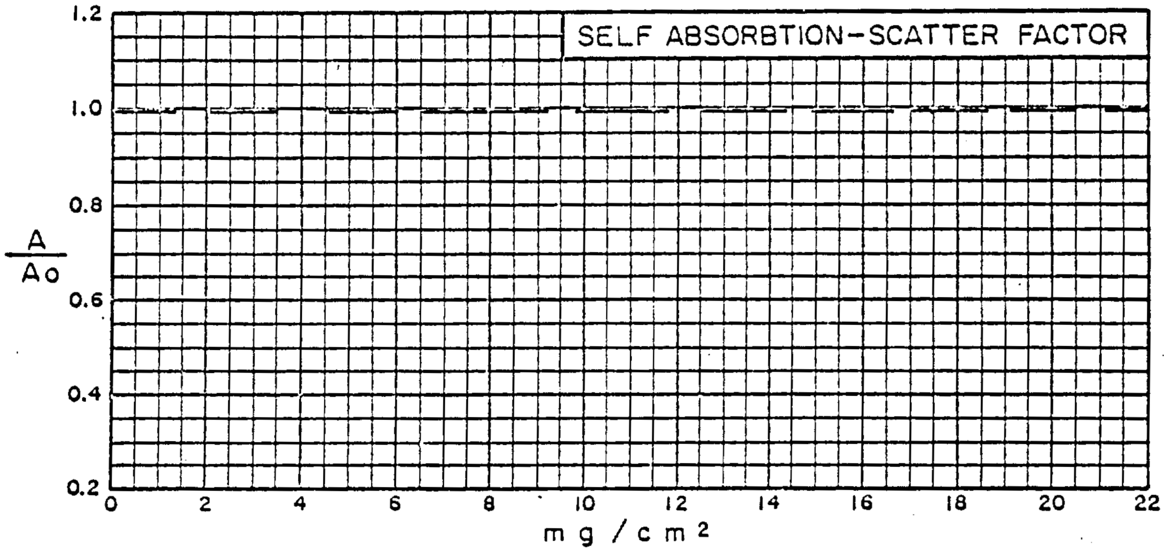
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.99
3	0.99

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

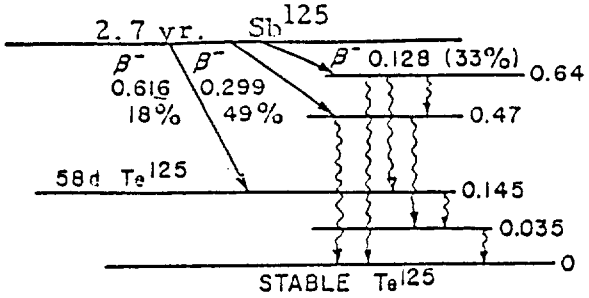
* Additional Methods	Mounting	Yield
Reduction	1" S S dish	100% = 20 mg.
Carrier-free(CCl_4)	1" S S dish	100%

ISOTOPE Antimony^{125}

METHOD Antimony Sulfide

YIELD 27.9 mg = 100%
(As Sb_2S_3)

μ_{Al} = 0.15 μ_{Air} = ______



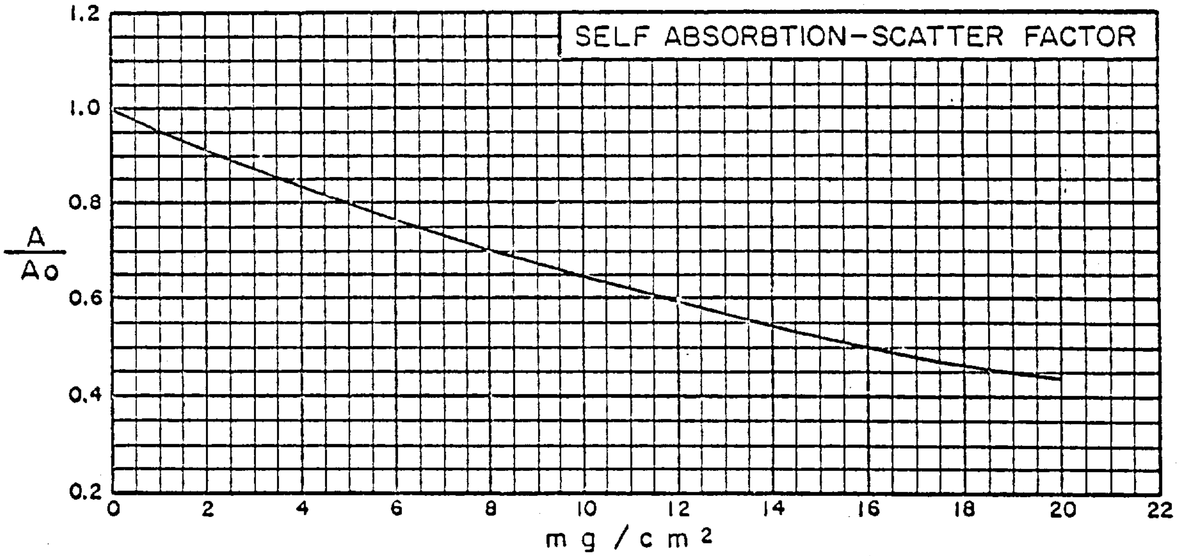
SHELF	AIR & MICA WINDOW FACTORS
1	0.58
2	0.48
3	0.40

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



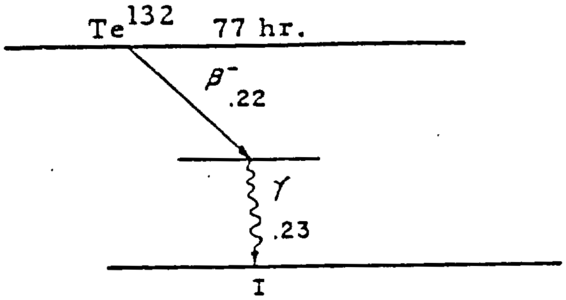
CALCULATION PROCEDURE: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

ISOTOPE Tellurium^{132}

METHOD SO_2 - Reduction

YIELD 20.0 mg = 100%
(As Te^o)

μ_{Al} = 0.16 μ_{Air} = _____



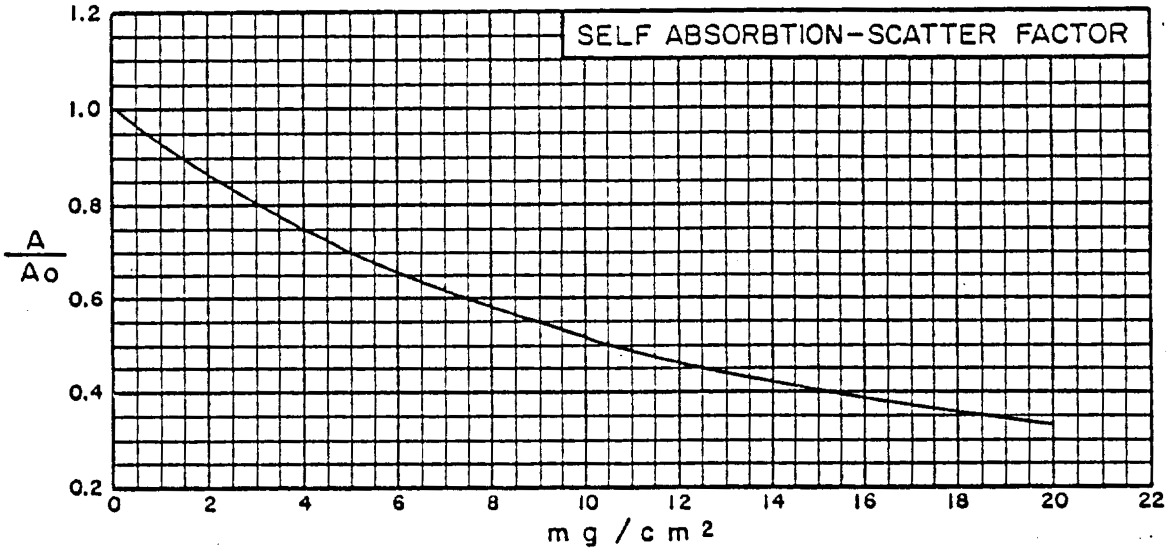
SHELF	AIR & MICA WINDOW FACTORS
1	0.56
2	0.42
3	0.31

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



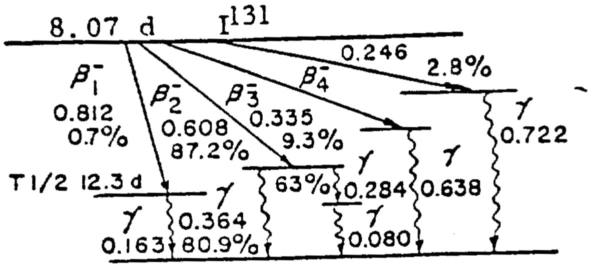
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

ISOTOPE Iodine^{131}

METHOD Silver Iodide

YIELD 42.3 mg = 100%
(As AgI standardized)

μ_{Al} = 0.039 μ_{Air} = ______



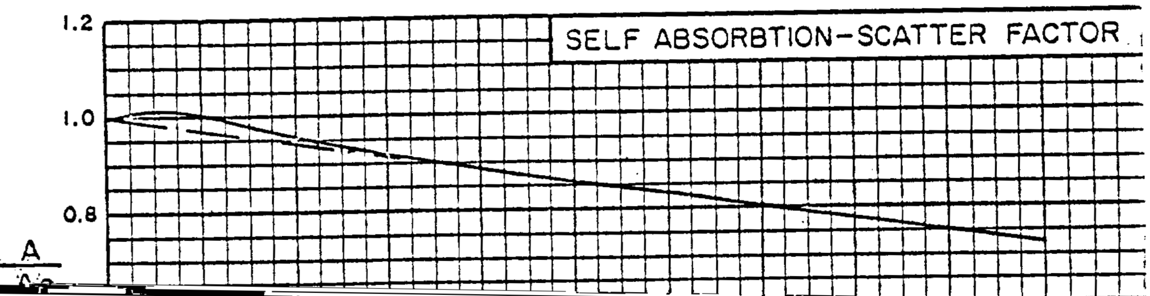
SHELF	AIR & MICA WINDOW FACTORS
1	0.87
2	0.82
3	0.76

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



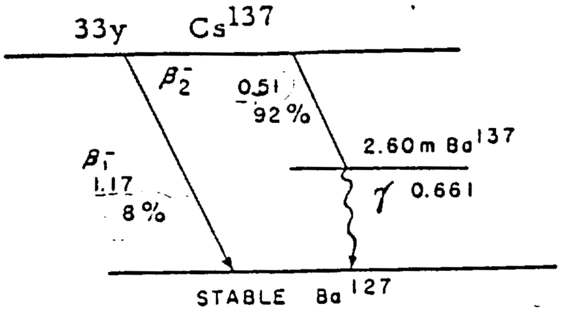
[redacted]

ISOTOPE Cesium^{137}

METHOD* Cesium Silicowolframate

YIELD 100 mg = 100%
(As $Cs_8SiW_{12}O_{42}$ standard

μ_{Al} = 0.039 μ_{Air} = ______



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

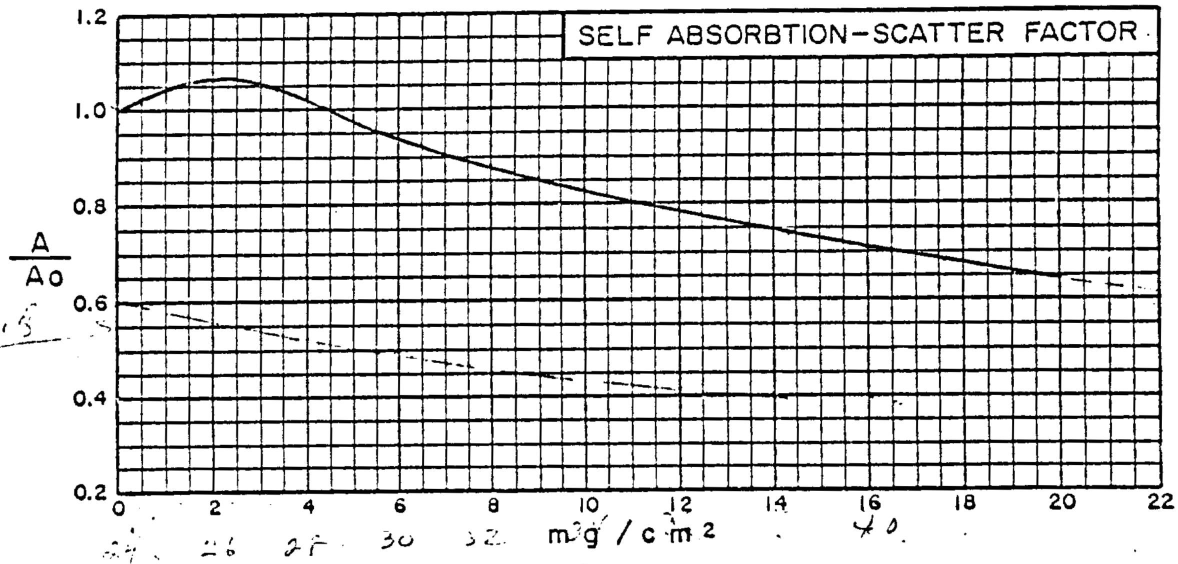
SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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

instantaneous slope!



CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

Remarks: Cs^{137} as Cesium Silicowolframate on one inch dishes (shelf

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

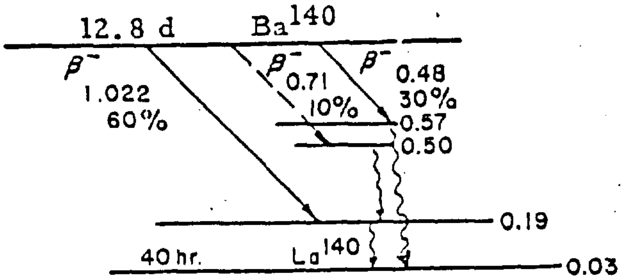
$$\frac{c/m}{(1.569\times10^6)(SSA)(V)(v)} =$$

ISOTOPE Barium^{140}

METHOD Barium Chromate

YIELD 36.8 mg = 100%
(As $BaCrO_4$)

μ_{Al} = 0.023 μ_{Air} = ______



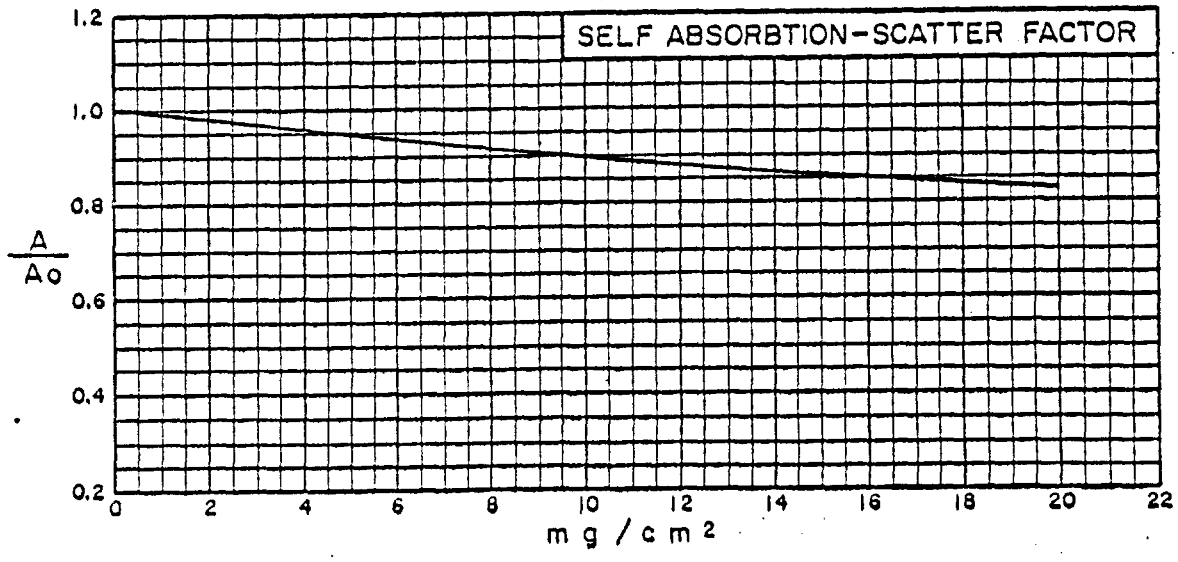
SHELF	AIR & MICA WINDOW FACTORS
1	0.92
2	0.88
3	0.84

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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


SELF ABSORBTION-SCATTER FACTOR

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

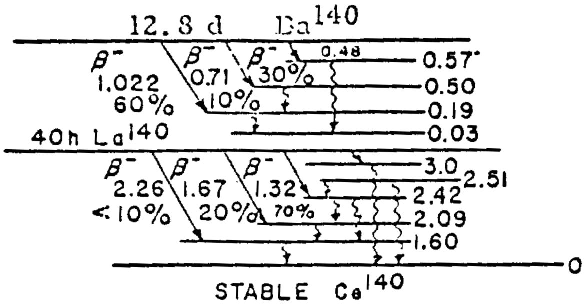
ISOTOPE Barium^{140} Lanthanum^{140}

METHOD Barium Chromate

YIELD 36.8 mg = 100%

(As $BaCrO_4$)

μ_{Al} = 0.014 μ_{Air} = ______



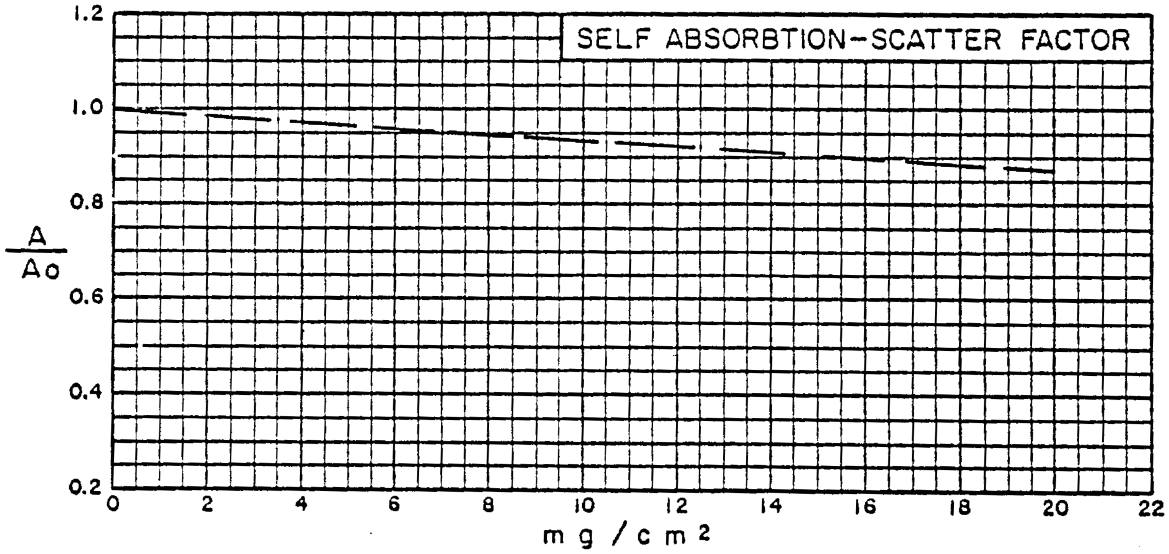
SHELF	AIR & MICA WINDOW FACTORS
1	0.95
2	0.92
3	0.89

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m \text{ (VOLUME FACTOR)}}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

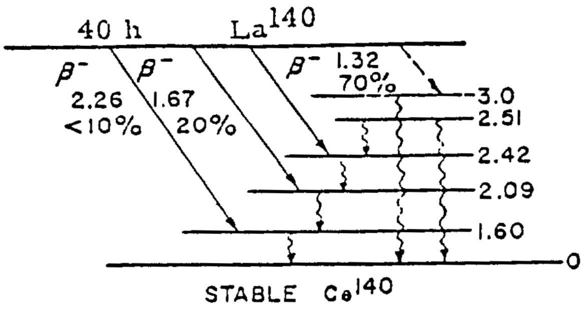
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x}(1-e^{-\mu x})$

ISOTOPE Lanthanum^{140}

METHOD Lanthanum Fluoride

YIELD 24.6 mg = 100%
(As La_2O_3)

μ_{Al} = 0.008 μ_{Air} = ______



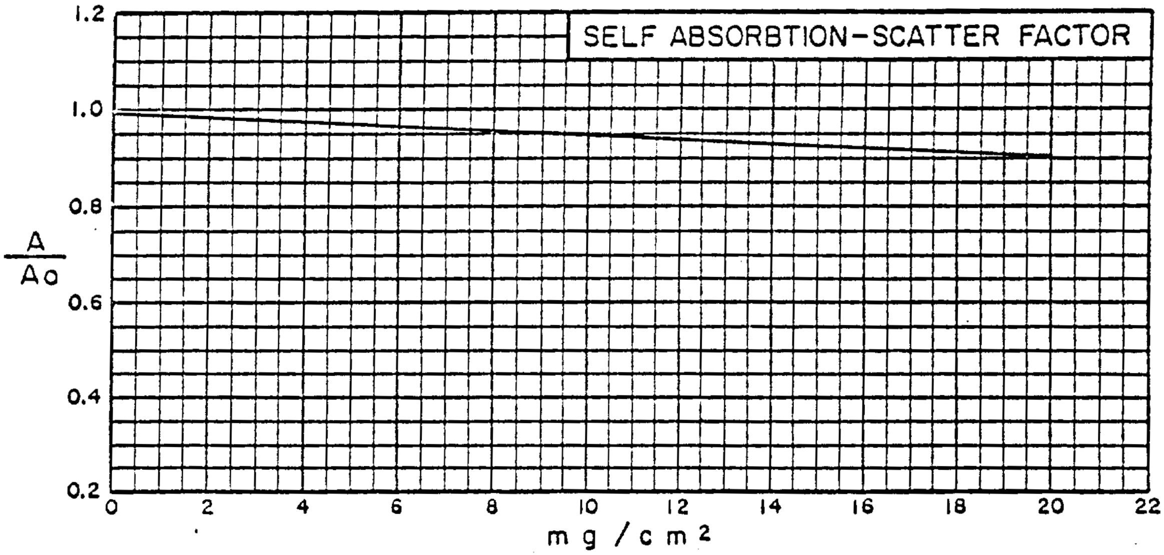
SHELF	AIR & MICA WINDOW FACTORS
1	0.97
2	0.96
3	0.95

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



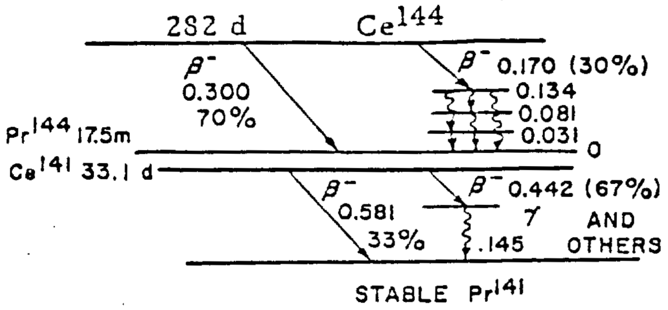
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

ISOTOPE Rare Earths*

METHOD Ceric Fluoride

YIELD 23.4 mg = 100%
(As Ce_2O_3)

μ_{Al} = 0.055 μ_{Air} = ______



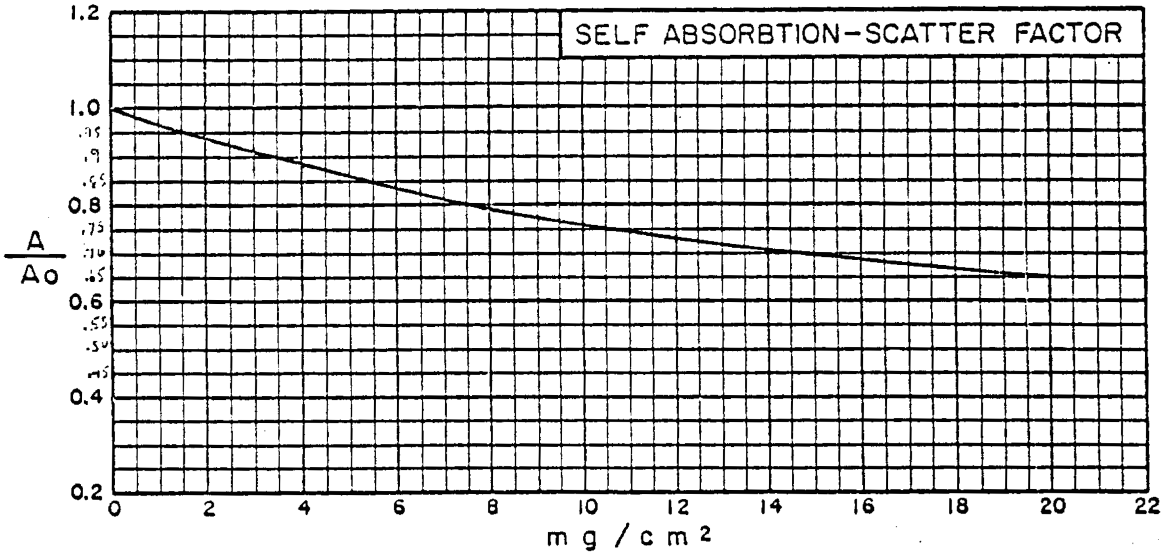
SHELF	AIR & MICA WINDOW FACTORS
1	0.82
2	0.76
3	0.69

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m \text{ (VOLUME FACTOR)}}{(Geo.)(2.2 \times 10^6)(S.S.)(b.s.)(S.S.A.)(A+M.W.)(Yield)} = \mu c/unit$

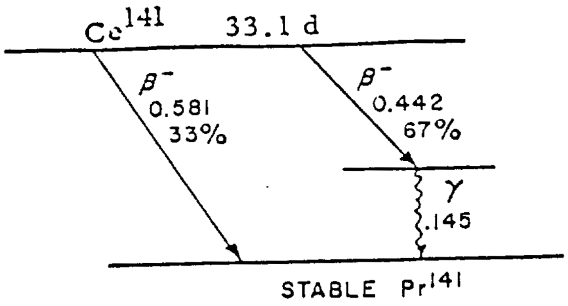
*Remarks: Assume 1/3 Ce^{141}, 1/3 Ce^{144}, 1/3 Pr^{144}

ISOTOPE Cerium^{141}

METHOD Cerium Fluoride

YIELD 23.4 mg = 100% (As Ce_2O_3)

μ_{Al} = 0.045 μ_{Air} = ______



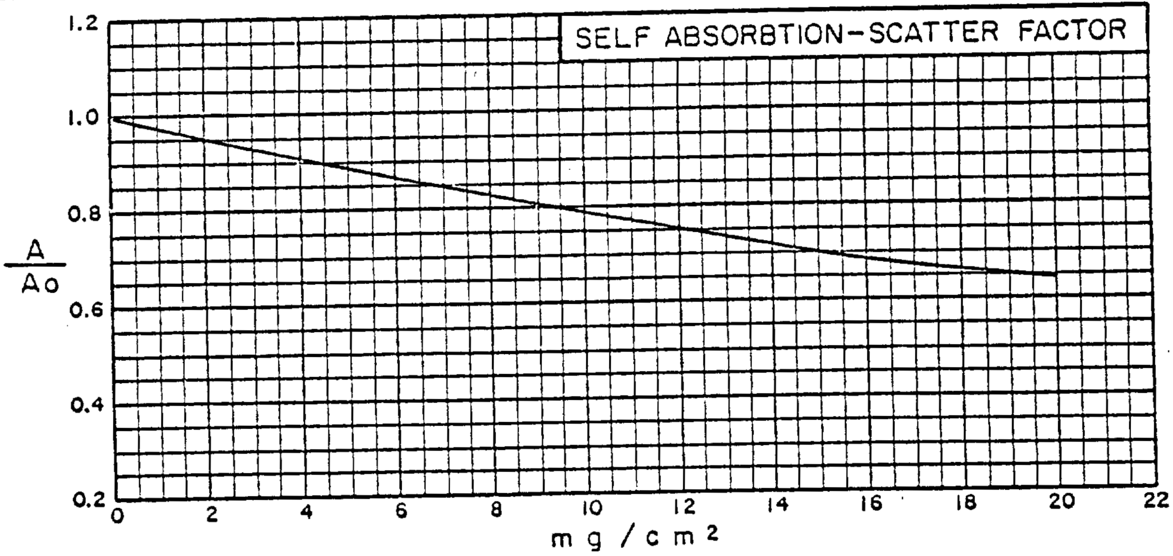
SHELF	AIR & MICA WINDOW FACTORS
1	0.85
2	0.79
3	0.71

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



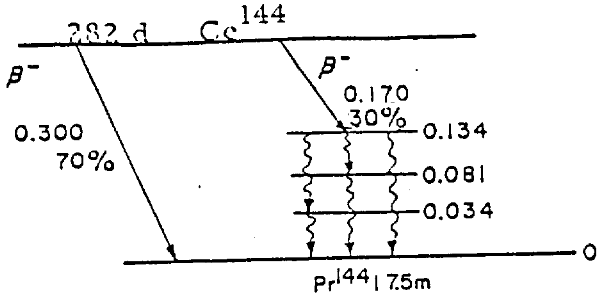
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2 \times 10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

ISOTOPE Cerium^{144}

METHOD Cerium Fluoride

YIELD 23.4 ~~mg~~ = 100%
(As Ce_2O_3)

μ_{Al} = 0.13 μ_{Air} = ______



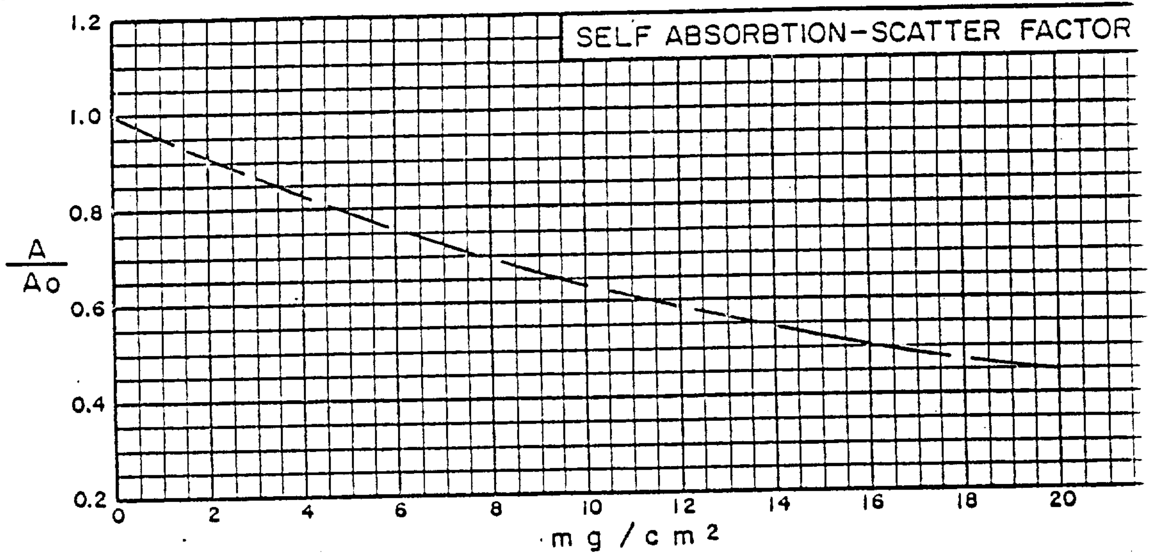
SHELF	AIR & MICA WINDOW FACTO
1	0.62
2	0.49
3	0.39

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
SHELF 1	0.89	0.51	0.78	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



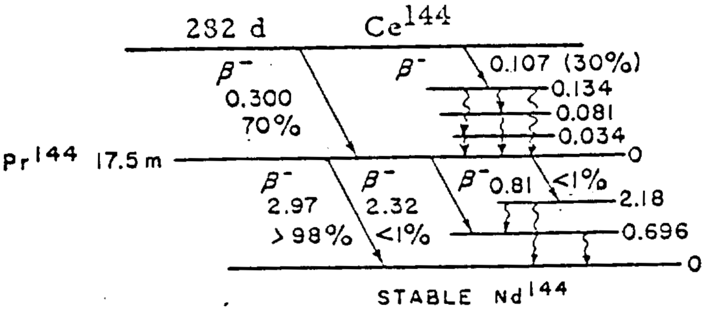
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{un}$

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

ISOTOPE Cerium^{144} - Praseodymium^{144}

METHOD Ceric Flouride

YIELD 23.4 mg = 100%
(As Ce O_3)



μ_{Al} = 0.06 μ_{Air} =

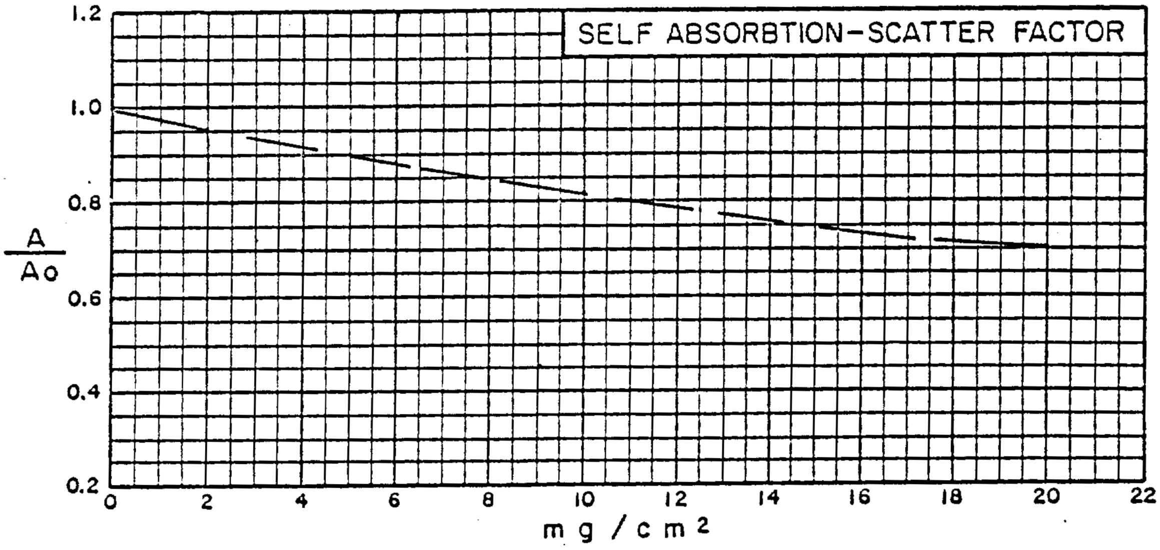
SHELF	AIR & MICA WINDOW FACTORS
1	0.80
2	0.74
3	0.69

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

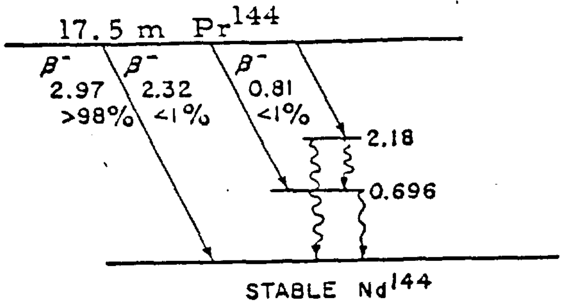
ISOTOPE Praseodymium^{144}

METHOD Praseodymium - Cerium Separation

YIELD 50.8 mg = 100%

(As $Nd_2(C_2O_4)_3 \cdot 10\ H_2O$)

μ_{Al} = 0.0025 μ_{Air} = ______



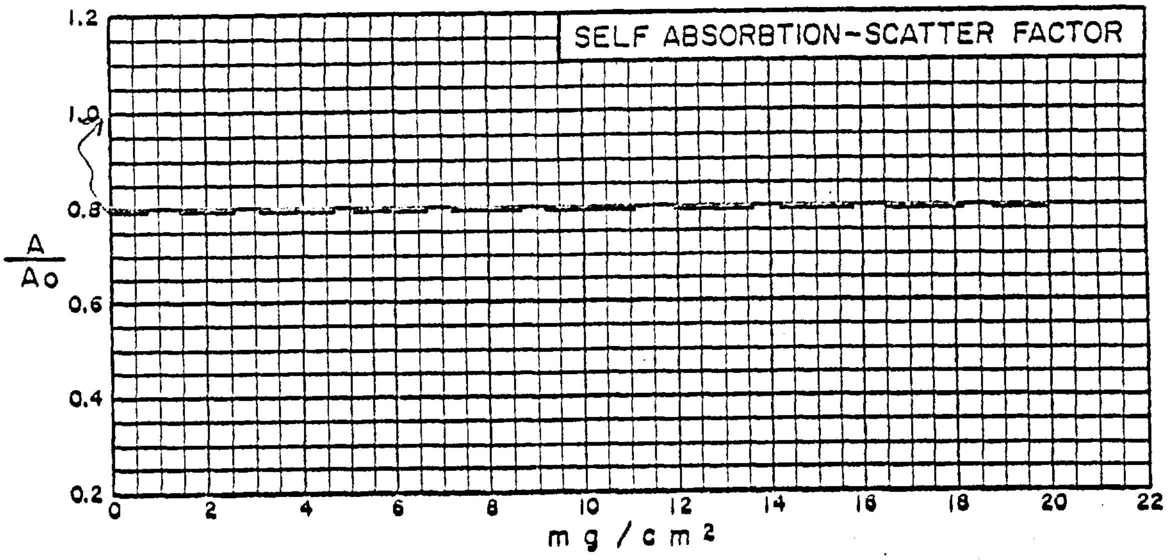
SHELF	AIR & MICA WINDOW FACTORS
1	0.99
2	0.99
3	0.98

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

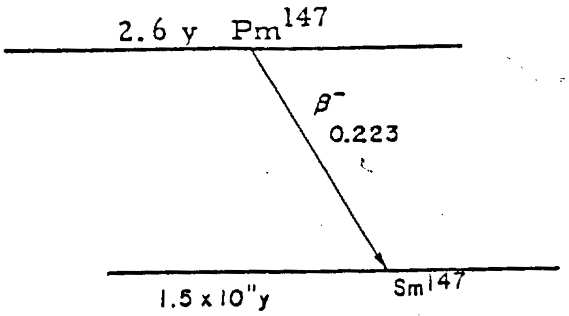
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x}(1-e^{-\mu x})$

ISOTOPE Promethium^{147}

METHOD Promethium Fluoride

YIELD 50.8 mg = 100%
(As $Nd_2(C_2O_4)_3 \cdot 10\ H_2O$)

μ_{Al} = 0.158 ; μ_{Air} = ______



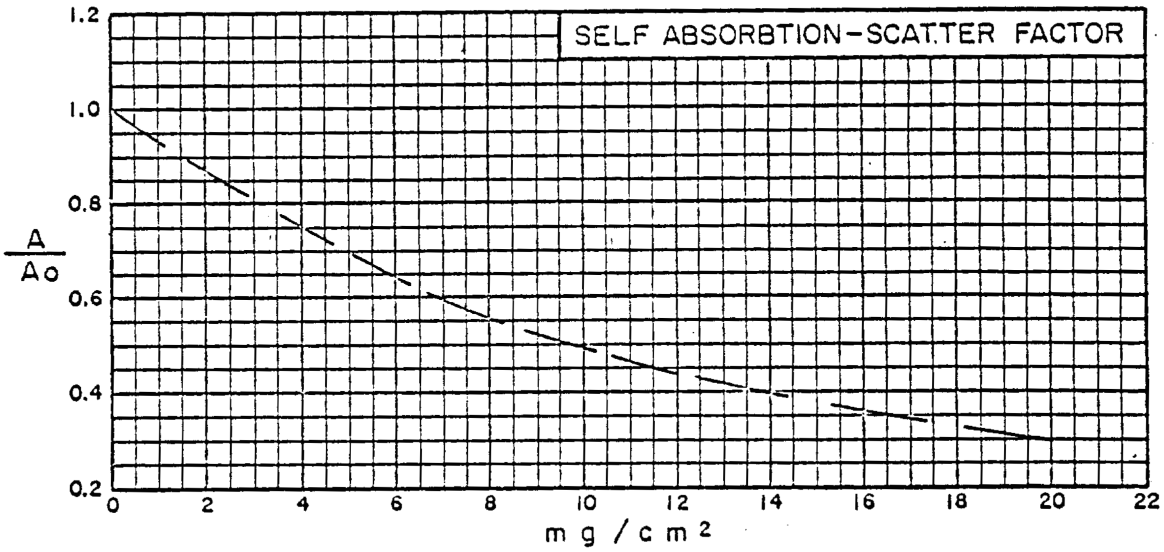
SHELF	AIR & MICA WINDOW FACTORS
1	0.57
2	0.42
3	0.31

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



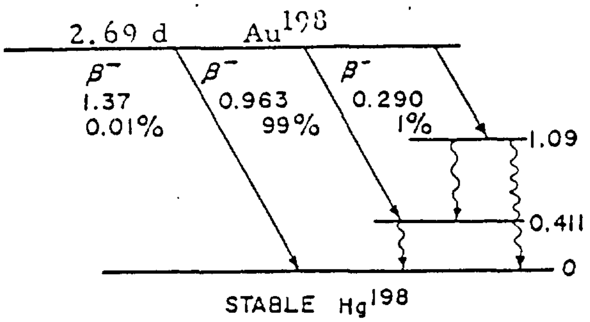
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

ISOTOPE Gold^{198}

METHOD Ethyl Acetate Extraction

YIELD 5 mg = 100% (As Au^0)



μ_{Al} = 0.015 μ_{Air} = ______

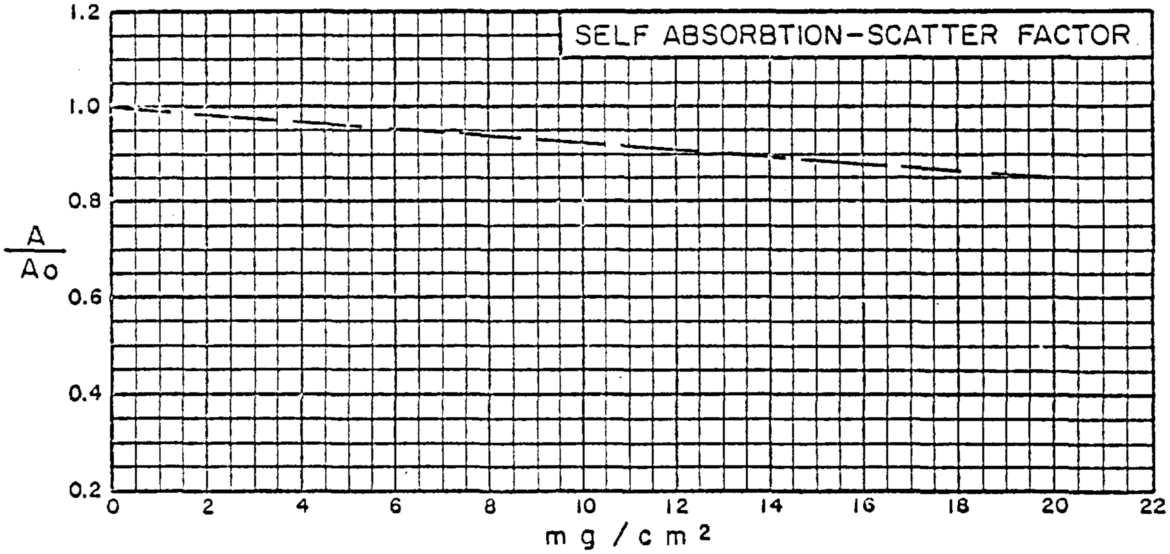
SHELF	AIR & MICA WINDOW FACTORS
1	0.95
2	0.92
3	0.89

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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



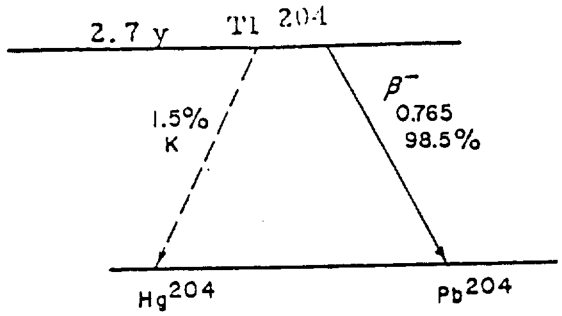
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

ISOTOPE Thallium^{204}

METHOD Spike - Direct Plate

YIELD



μ_{Al} = 0.0212 μ_{Air} = 36[illegible]

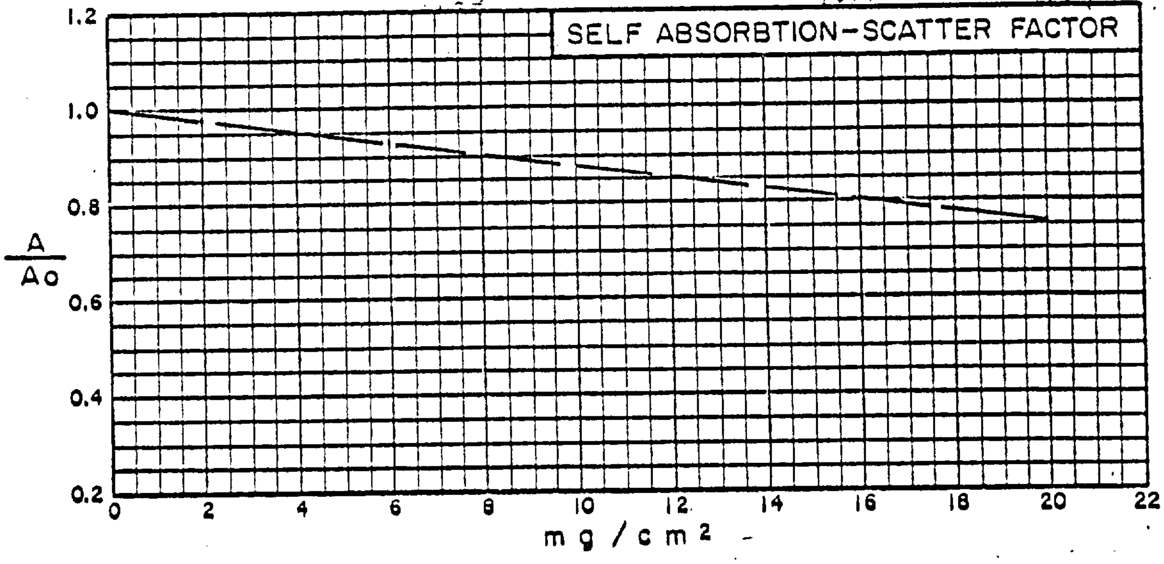
SHELF	AIR & MICA WINDOW FACTORS	
1	0.93	0.991
2	0.89	(0.93)
3	0.85	(0.88)
4	0.81	.84
5	0.76	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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	.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
		1.33		1.11	1.07



CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

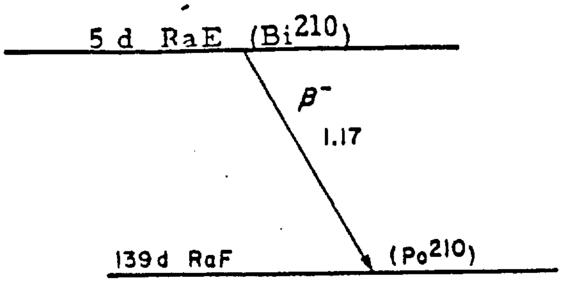
Shelf 3 .0675
5 .0249

ISOTOPE Bismuth^{210} (RaE)

METHOD Bismuth Sulfide

YIELD 49.2 mg = 100%
(As Bi_2O_3)

μ_{Al} = 0.011 μ_{Air} = ____



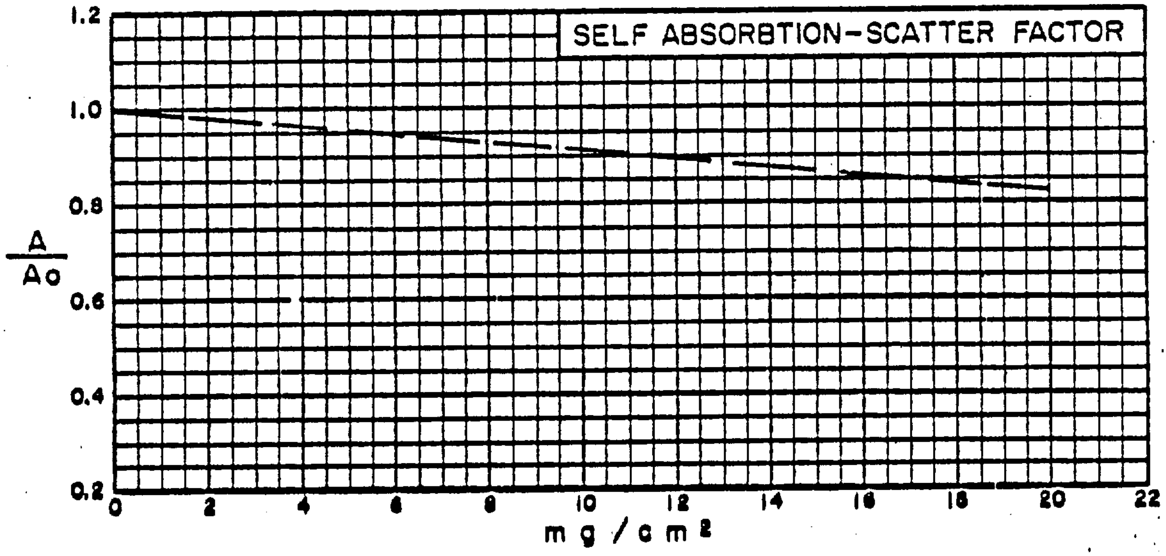
SHELF	AIR & MICA WINDOW FACTORS
1	0.96
2	0.94
3	0.92

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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

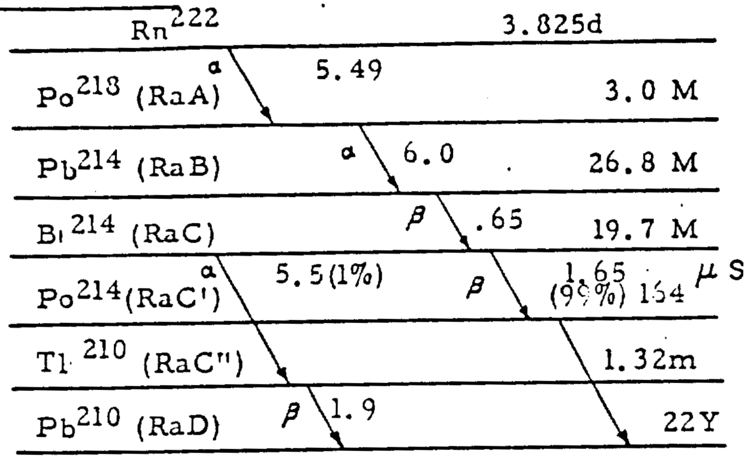


CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2 \times 10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

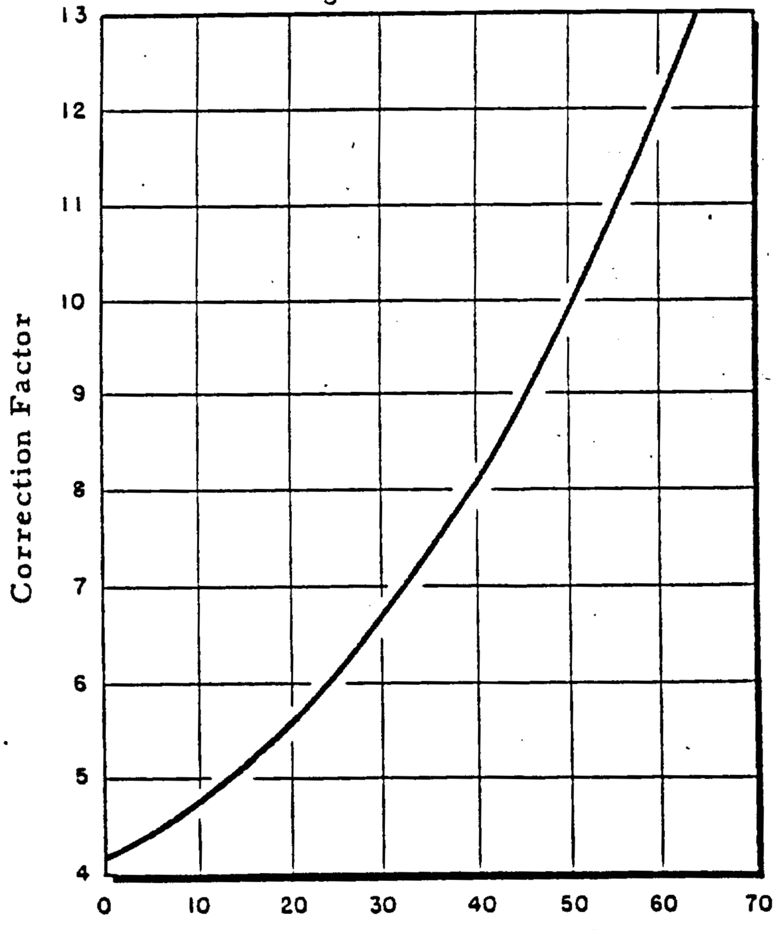
Remarks: $\frac{A}{A_o} = \frac{1}{\mu x}(1 - e^{-\mu x})$

RADON^{222}

METHOD: Lead Sulfide



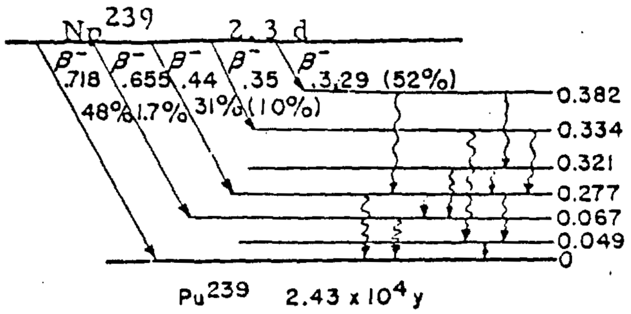
Radon Disintegration Rate From Counting Rate of RaB and RaC



ISOTOPE Neptunium^{239}

METHOD TTA Extraction

YIELD Carrier Free



μ_{Al} = 0.088 μ_{Air} =

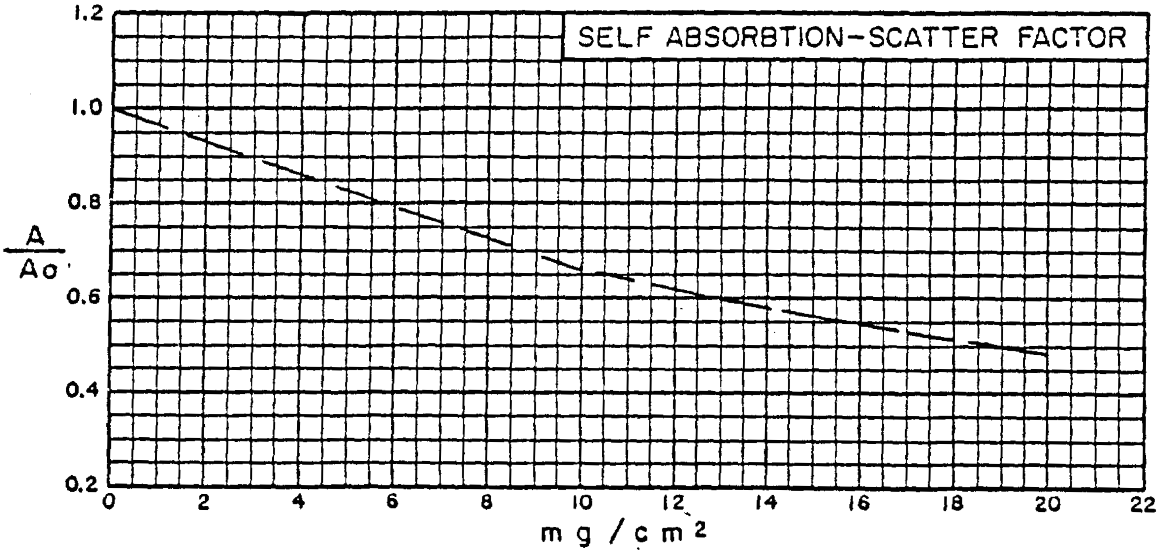
SHELF	AIR & MICA WINDOW FACTORS
1	0.73
2	0.62
3	0.52

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm²	1½" S.S. DISH 10 cm²	1" GLASS (FLAT) 5.0 cm²	1.38" MILLIPORE 9.6 cm²	1½" FILTER 13 cm²
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: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^{6})(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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

ISOTOPE URANIUM

METHOD ____________________ YIELD ____________________

____________________ μ_{Al} = ________ μ_{Air} = ________

____

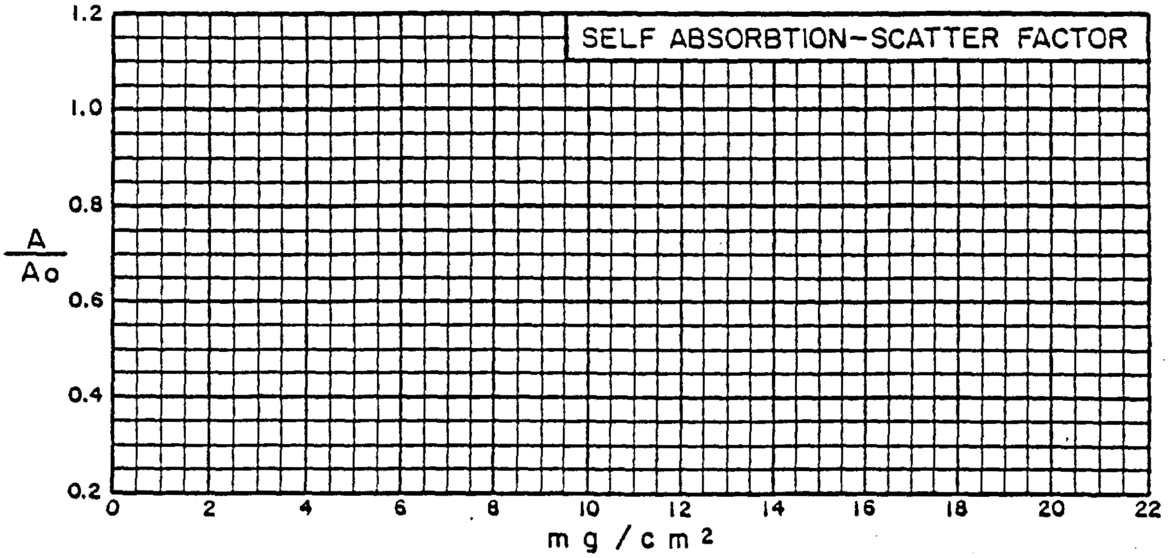
SHELF	AIR & MICA WINDOW FACTORS
1	
2	
3	

SOURCE SPREAD DIAMETER FACTORS

MOUNTING EFFECTIVE AREA	1" S.S. DISH 4.5 cm^2	$1\frac{1}{2}$" S.S. DISH 10 cm^2	1" GLASS (FLAT) 5.0 cm^2	1.38" MILLIPORE 9.6 cm^2	$1\frac{1}{2}$" FILTER 13 cm^2
SHELF 1					
SHELF 2					
SHELF 3					

BACK-SCATTER FACTORS

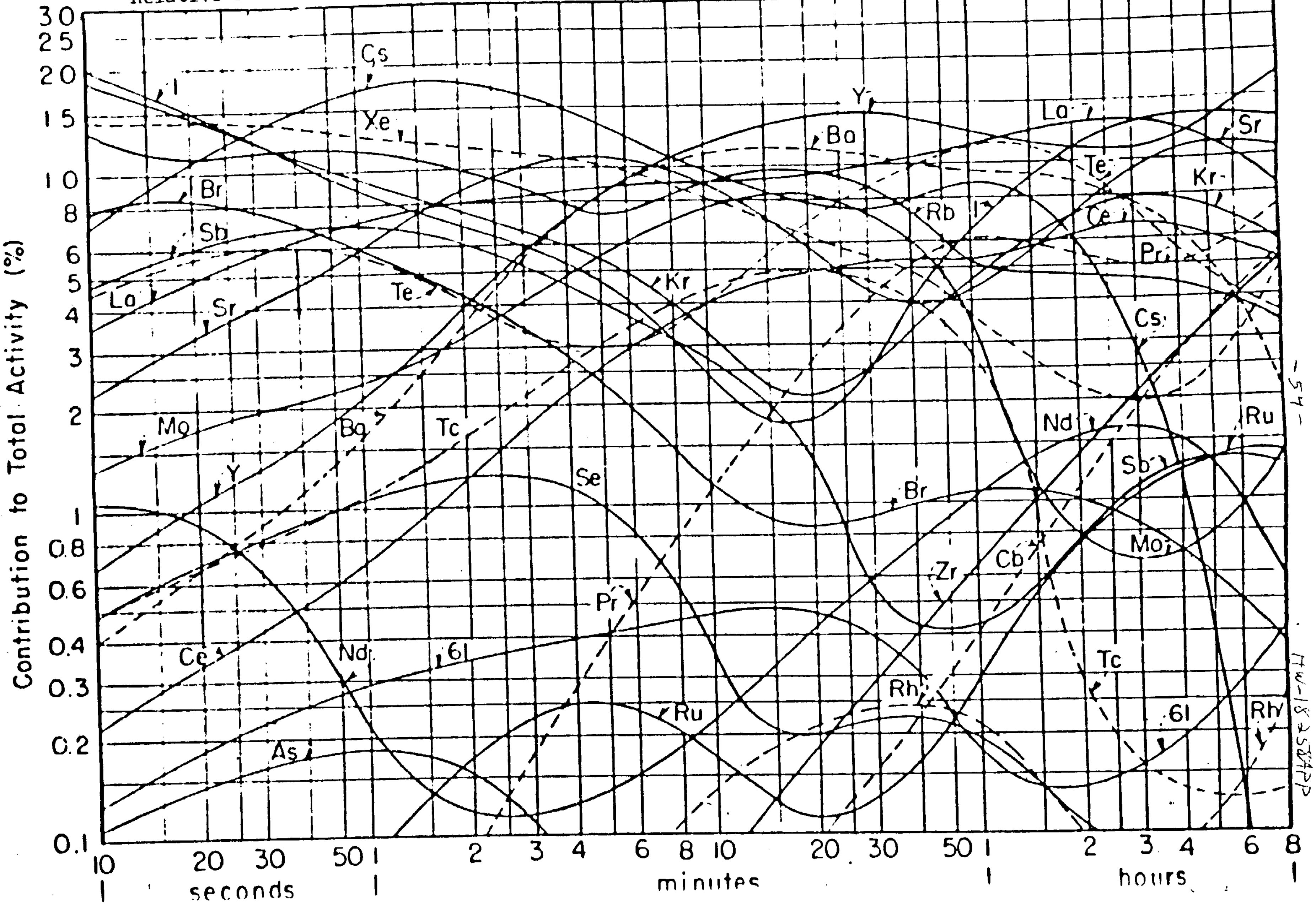
SHELF 1					
SHELF 2					
SHELF 3					



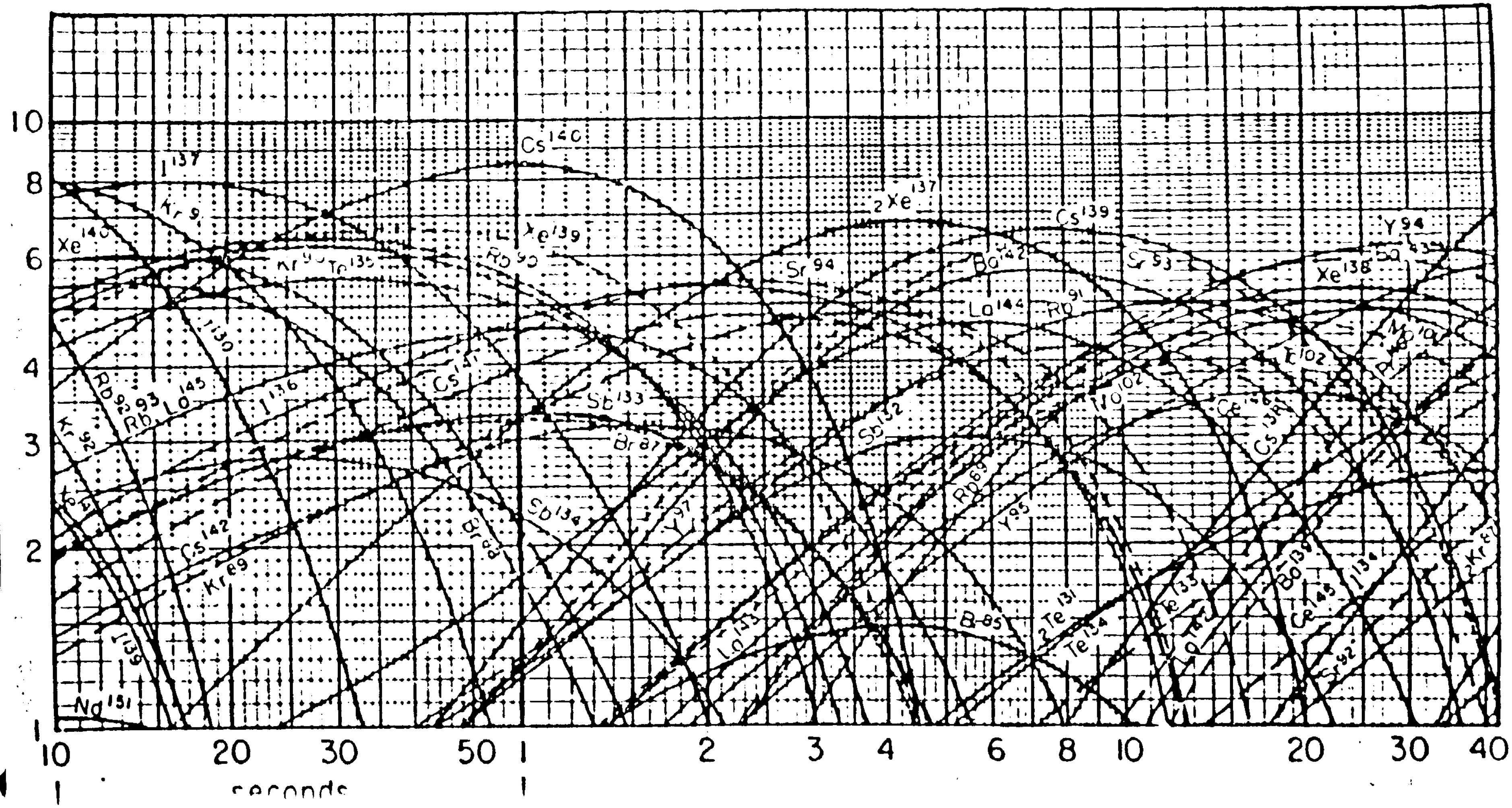
CALCULATION PROCEDURE: $\frac{c/m\ (\text{VOLUME FACTOR})}{(\text{Geo.})(2.2\times10^6)(\text{S.S.})(\text{b.s.})(\text{S.S.A.})(\text{A+M.W.})(\text{Yield})} = \mu c/\text{unit}$

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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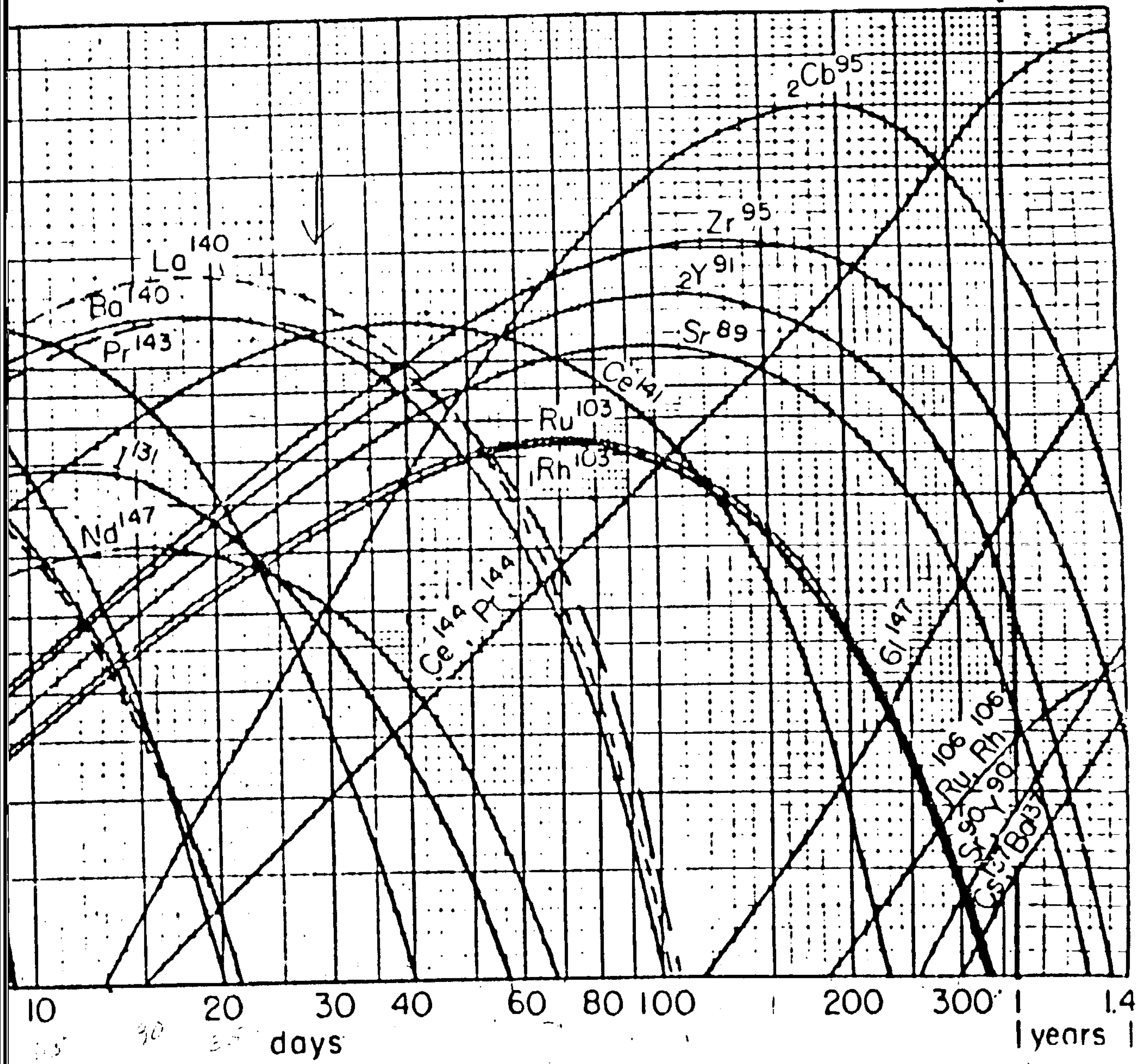
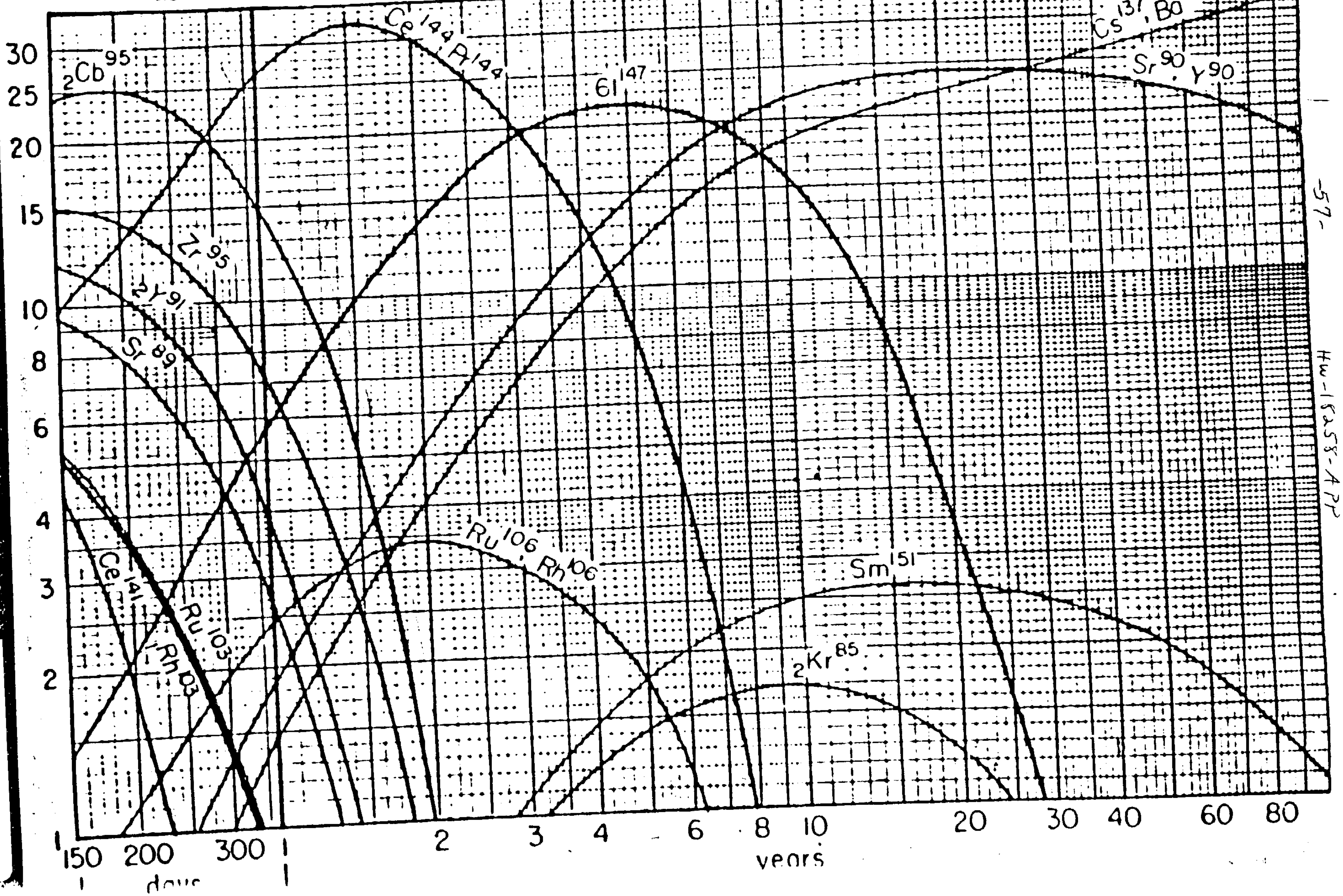
f the nuclide products of simultanecus slow-neutron fission of U^{235}.

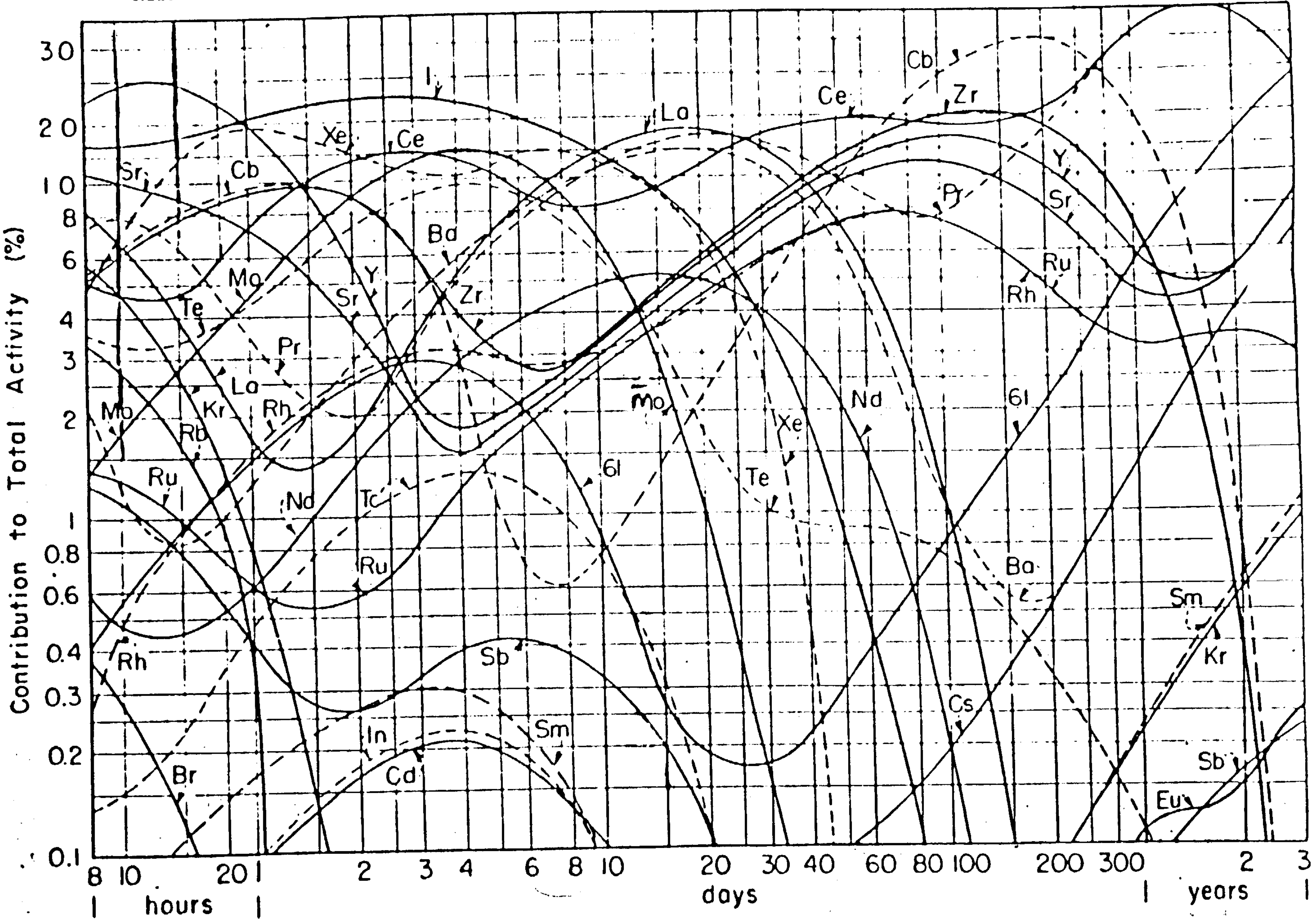


NUCLEONICS, Vol. 9, 1951

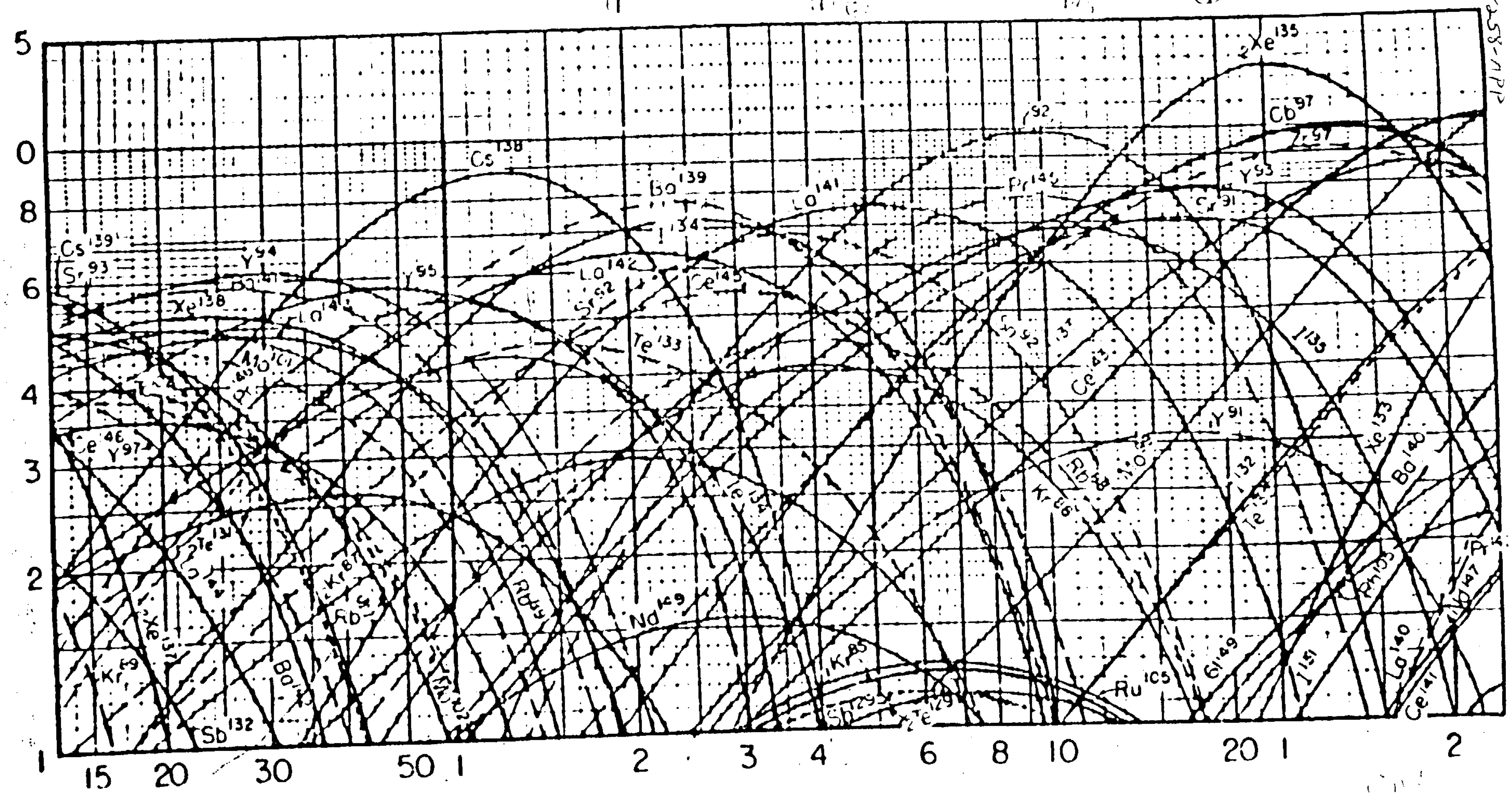
Relative activities of the nuclide products of simultaneous slow-neutron fission of U^{235}.



NUCLEONICS, Vol. 9, 1951
Relative activities of element products of simultaneous slow-neutron fission of U^{235}.



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



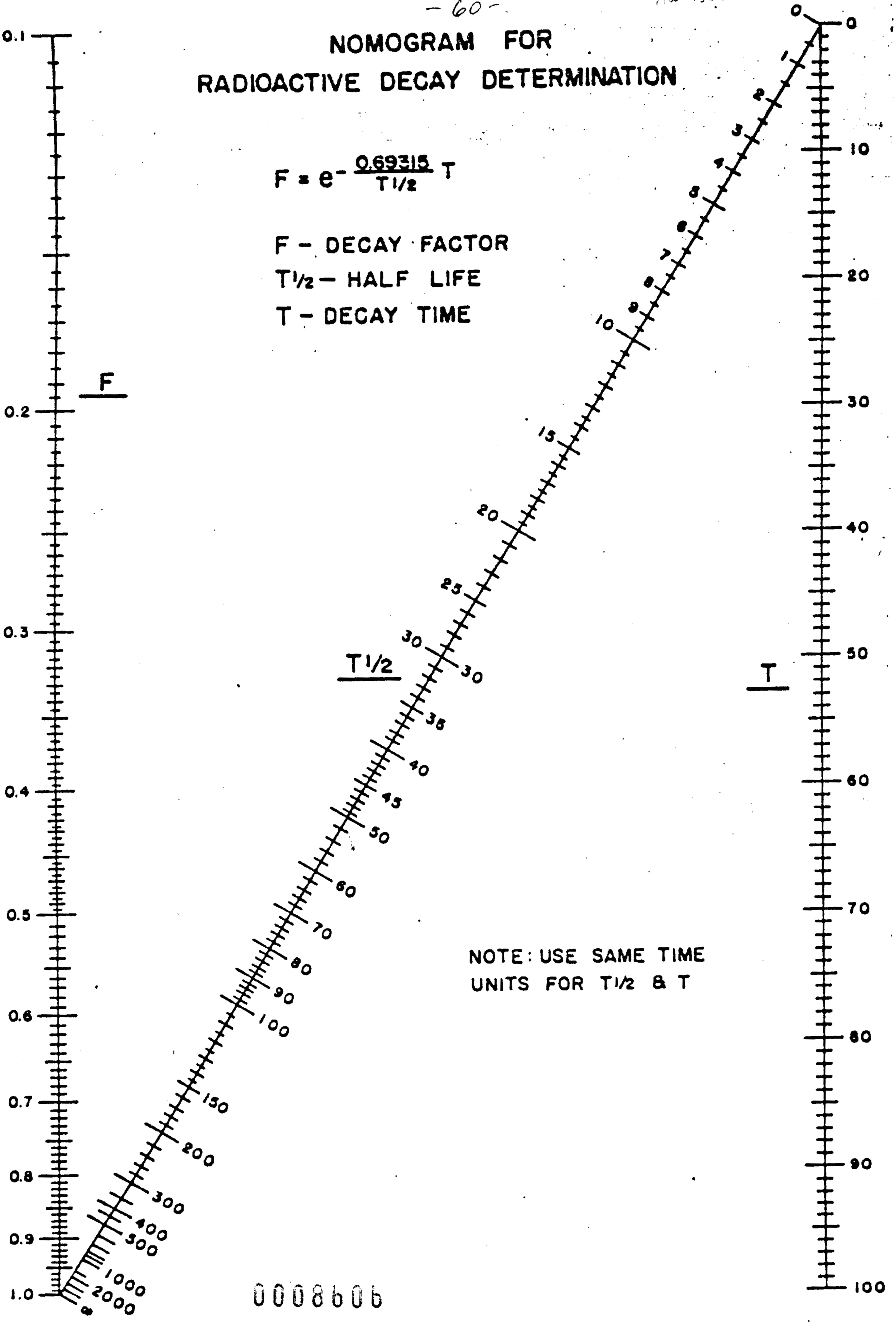
NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

$$F = e^{-\frac{0.69315}{T1/2}T}$$

F - DECAY FACTOR

T1/2 - HALF LIFE

T - DECAY TIME



NOTE: USE SAME TIME UNITS FOR T1/2 & T

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

	SHELF					VOL. (ml)	PREC. (mg/cm^2)
ISOTOPE(S)	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	0.031	0.094	0.22	0.374	0.58	50	7.85
AND YTTRIUM	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	7.18
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	0.0157	0.048	0.112	0.193	0.304	100	7.9
(TOTAL)	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	0.0146	0.043	0.099	0.165	0.254	100	7.4
TOTAL	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	0.0016	0.0049	0.0113	0.0193	0.03	1000	14.8
(TOTAL)	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
	1.54	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 0.58 to get beta plus positron activity density exclusive of EC

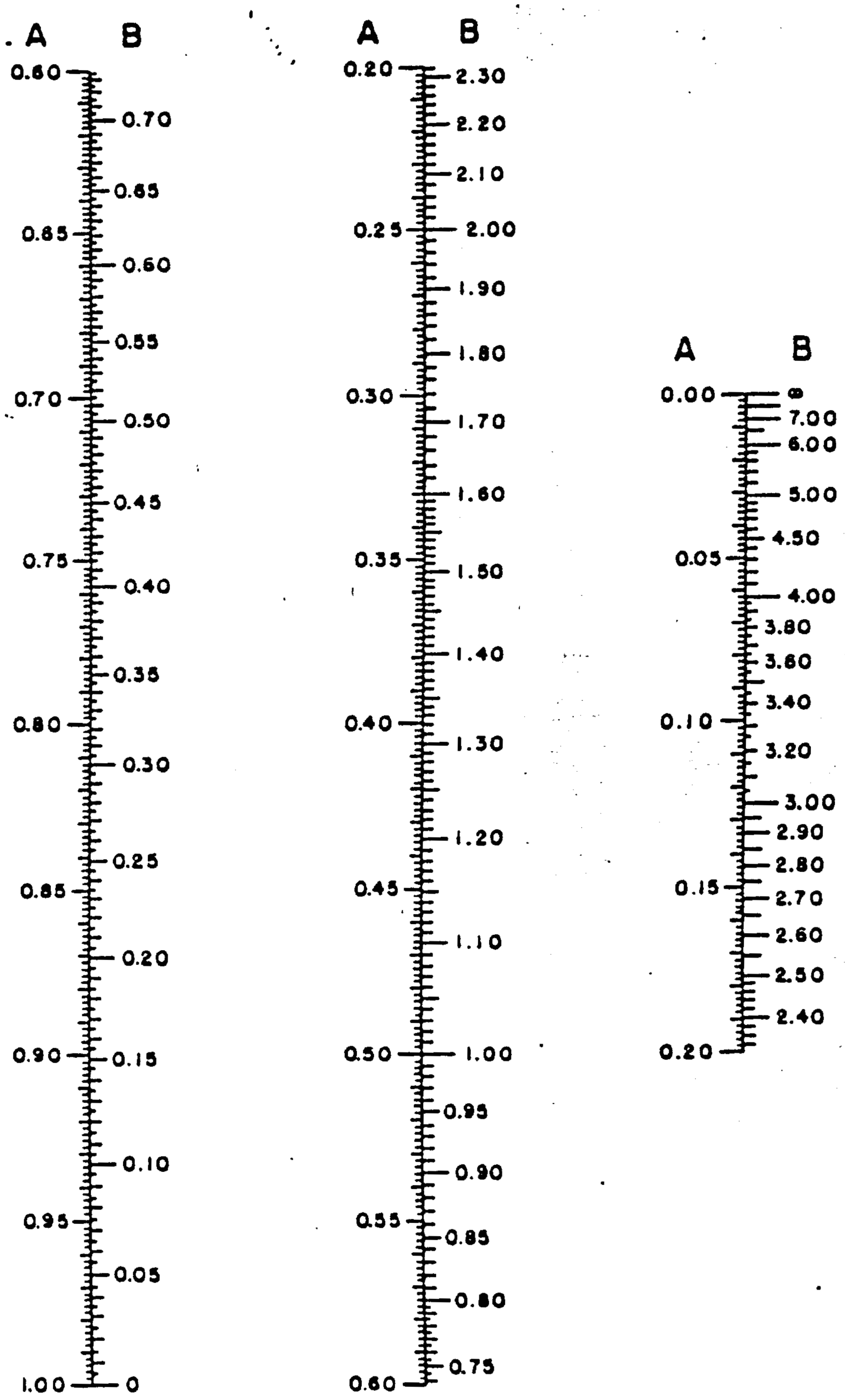
** Divide by 2.0 to get Y^{90} exclusively. Factors given are for $Sr^{90} + Y^{90}$

NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

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

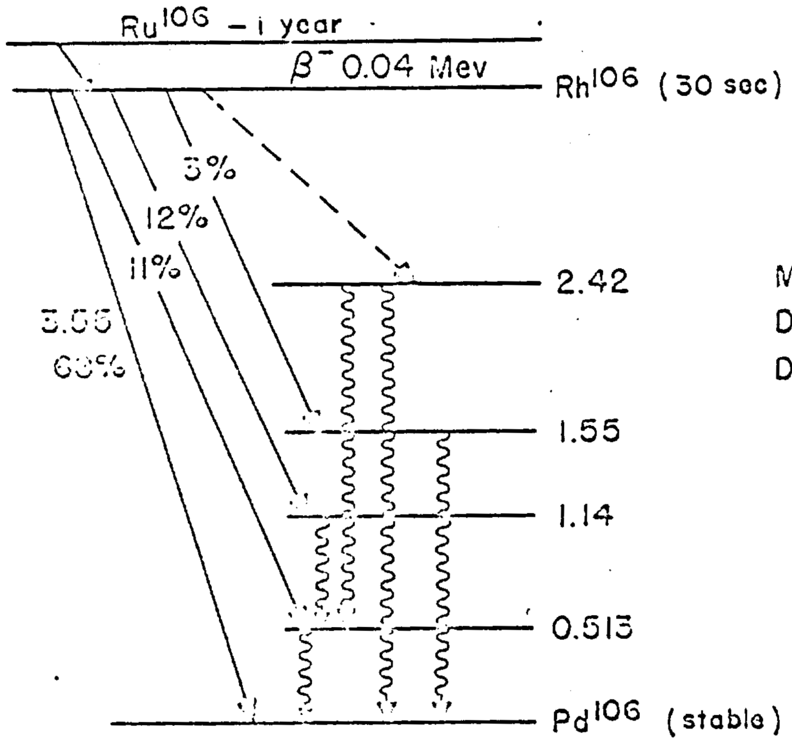
A - DECAY FACTOR

B - DECAY TIME ÷ HALF LIFE



DECAY SCHEME OF RUTHENIUM-RHODIUM ISOTOPES

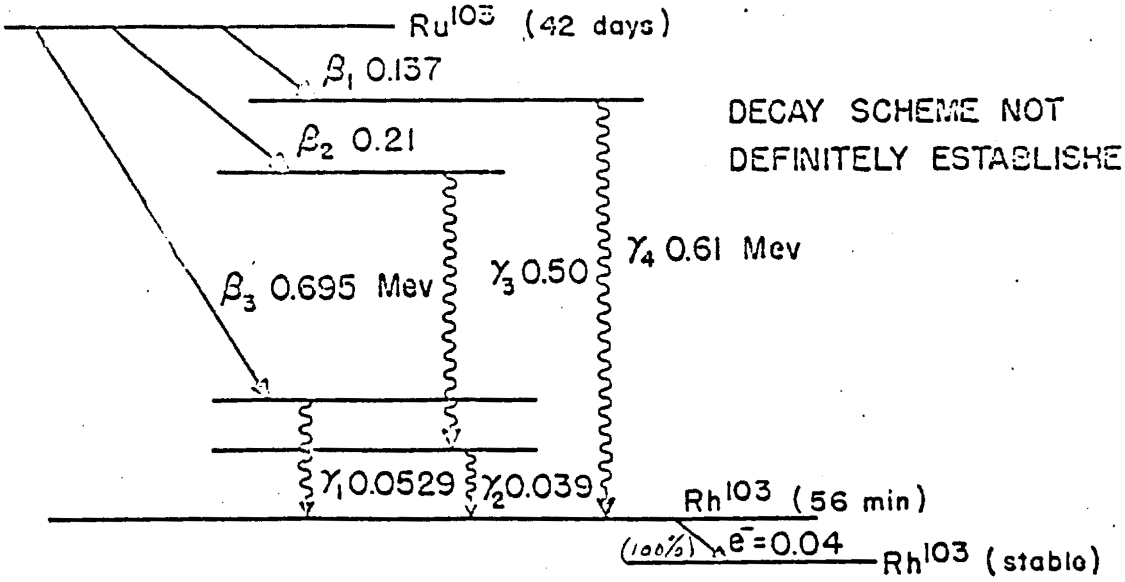
Ru^{106} - Rh^{106}



MOST RECENT SCHEME.
DECAY SCHEME NOT
DEFINITELY ESTABLISHED.

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

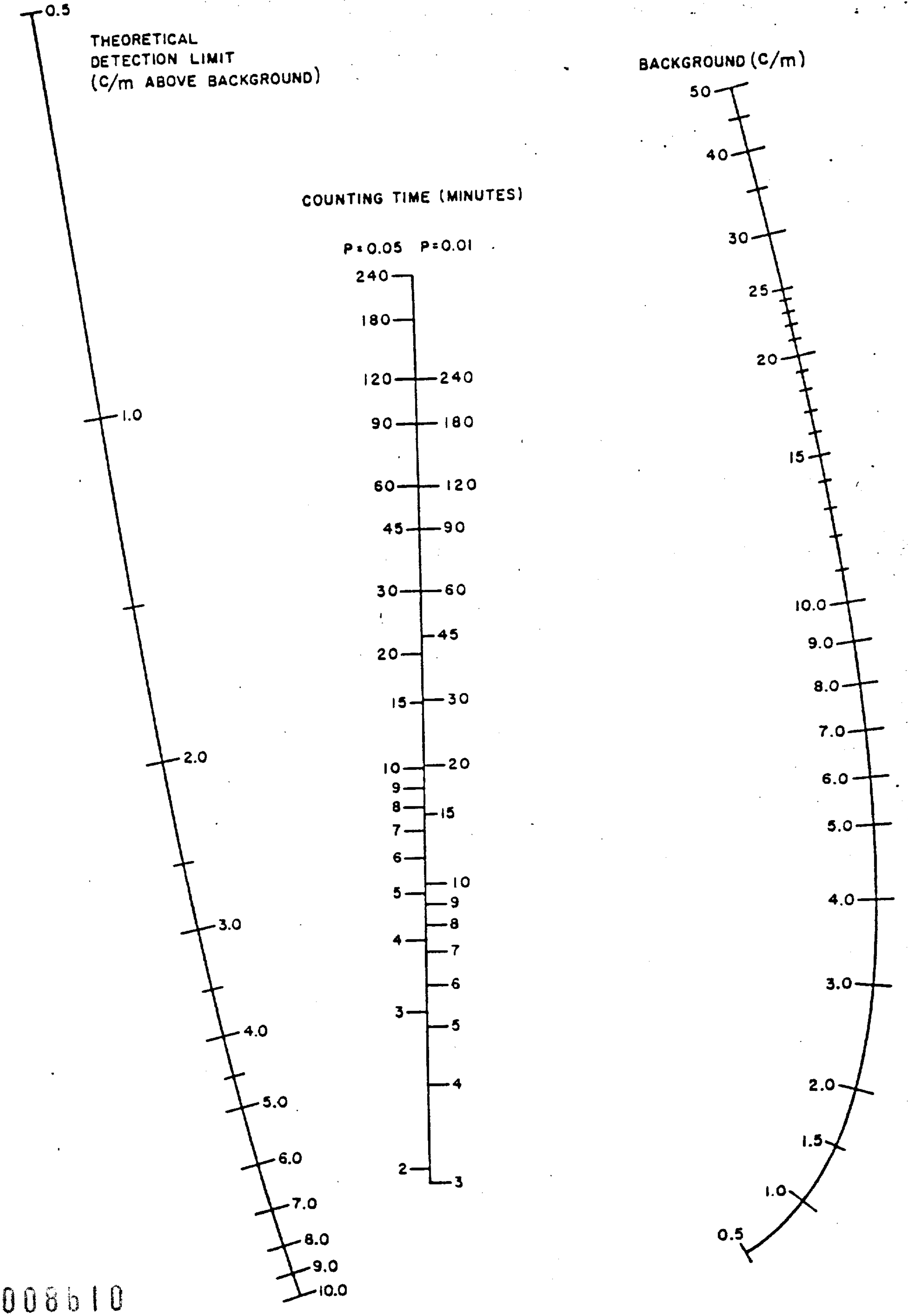
Ru^{103} - Rh^{103}



DECAY SCHEME NOT
DEFINITELY ESTABLISHED.

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

THEORETICAL DETECTION LIMIT NOMOGRAM

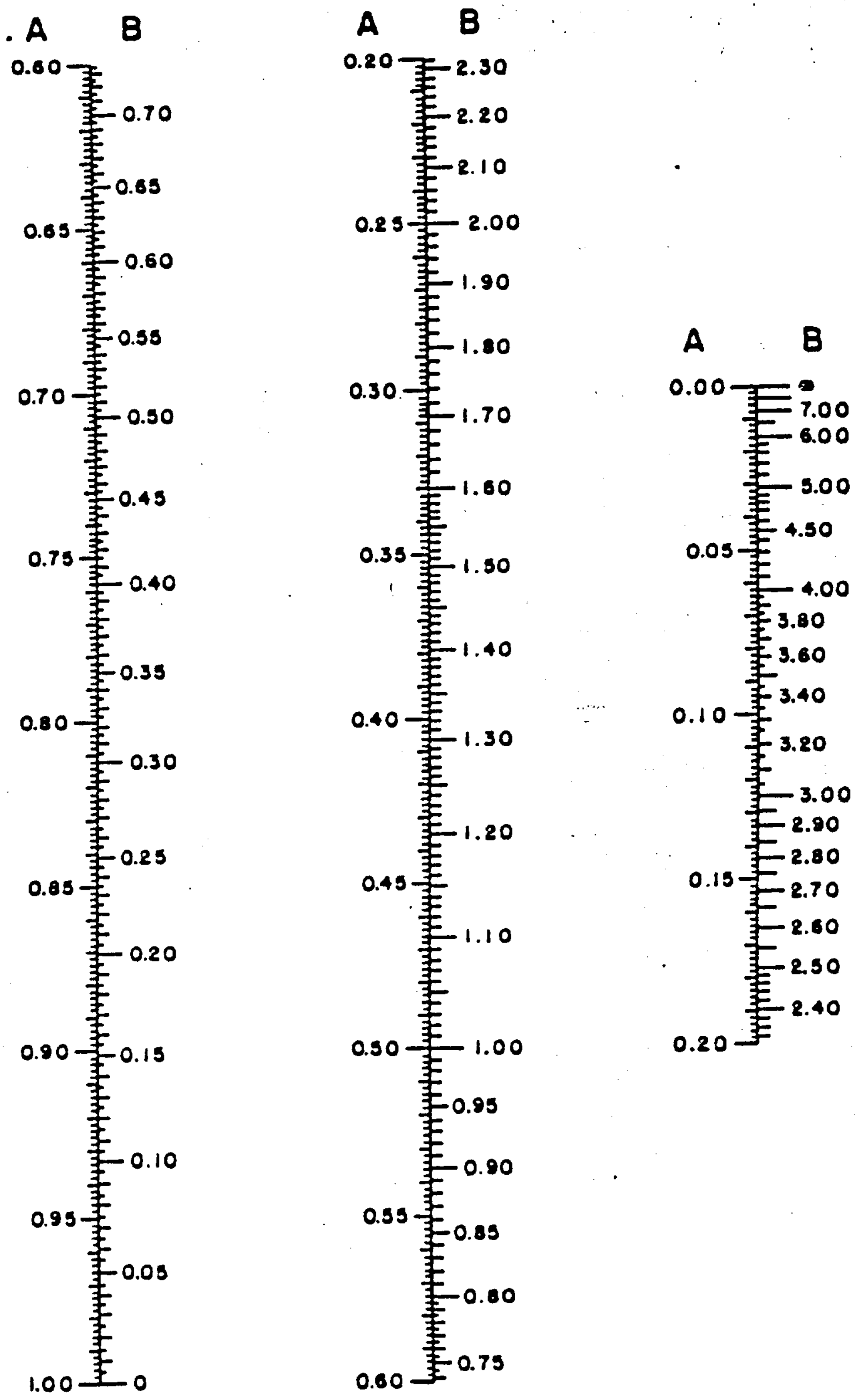


NOMOGRAM FOR RADIOACTIVE DECAY DETERMINATION

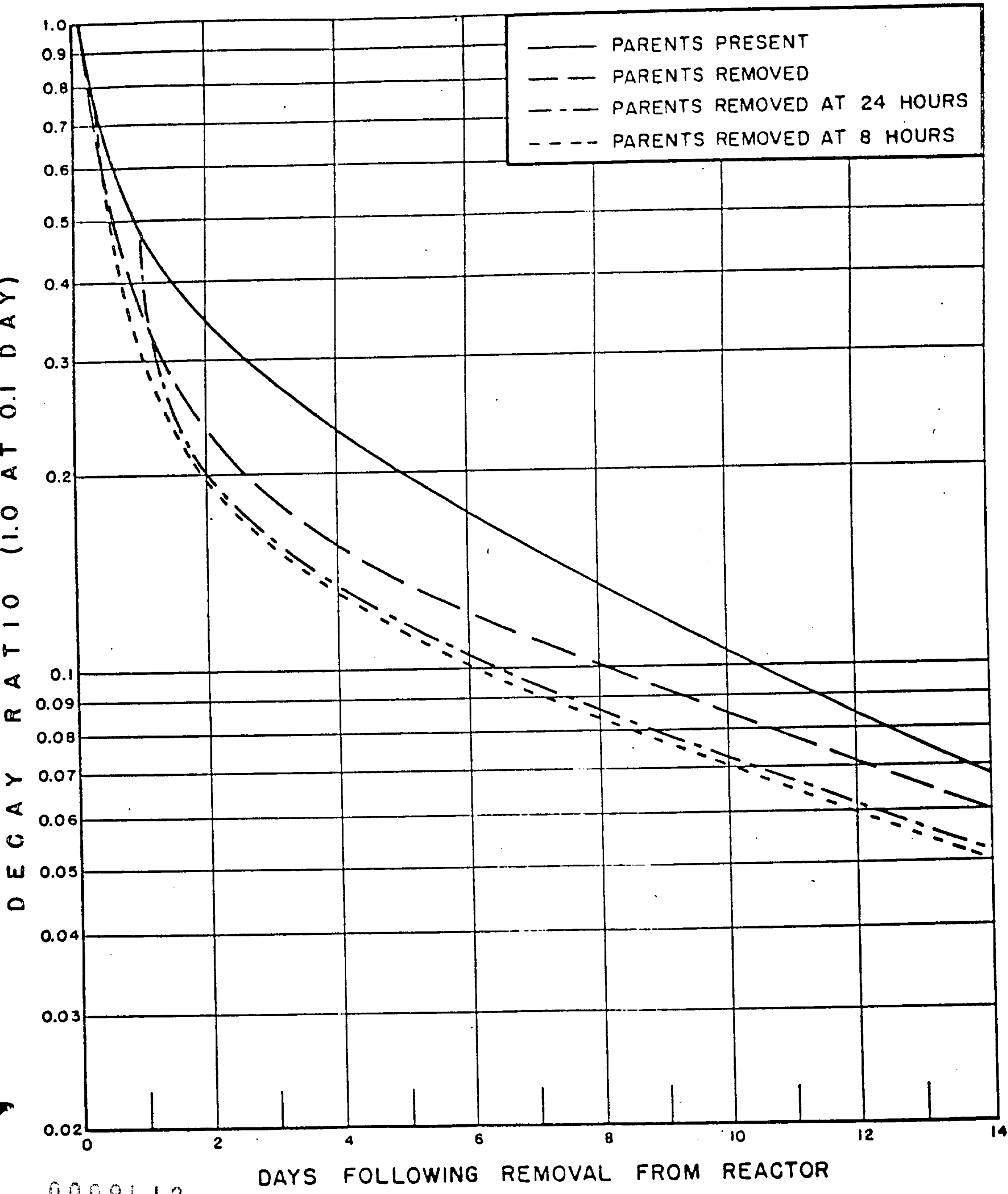
$$A = e^{-0.69315B}$$

A – DECAY FACTOR

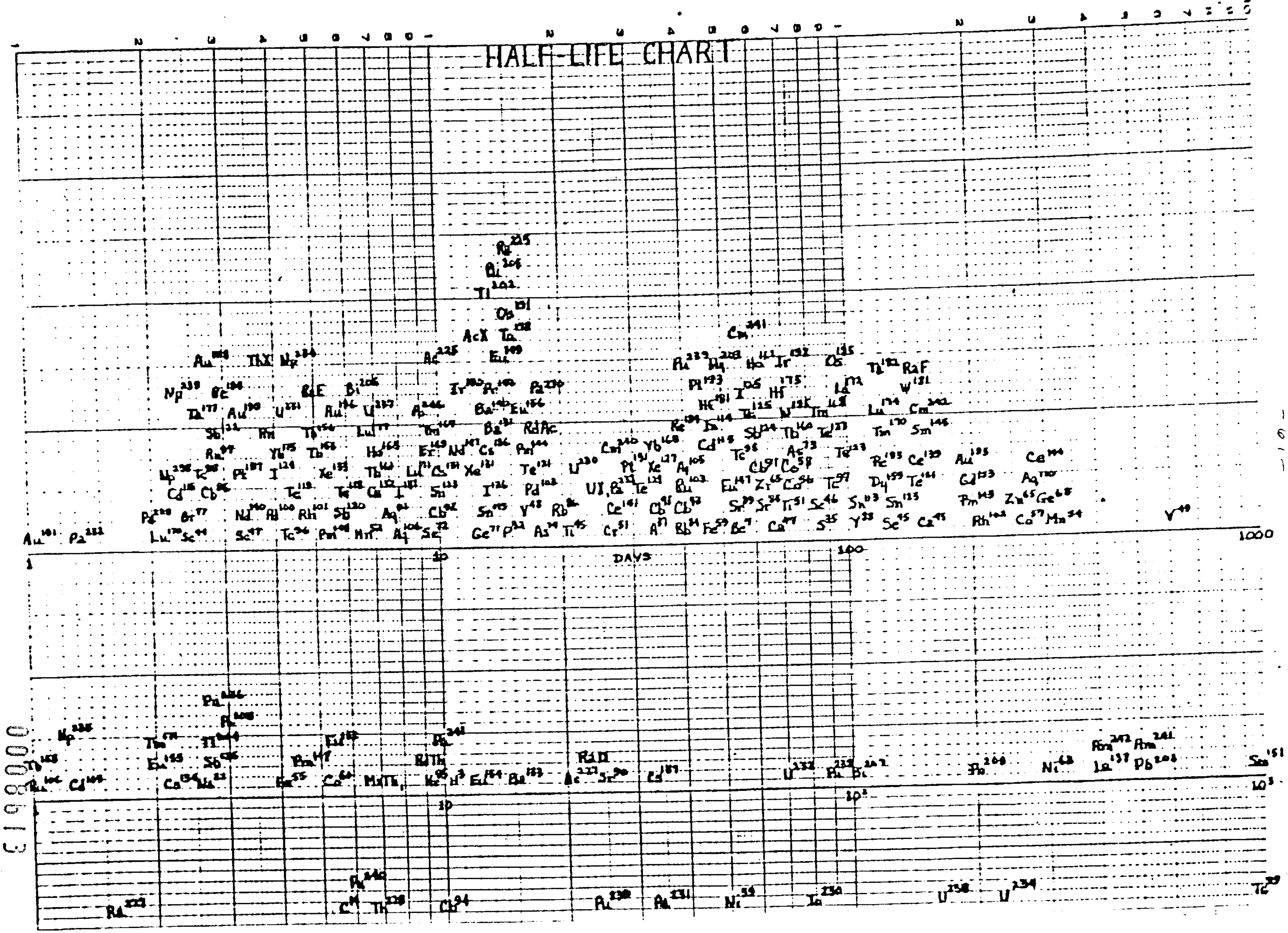
B – DECAY TIME ÷ HALF LIFE



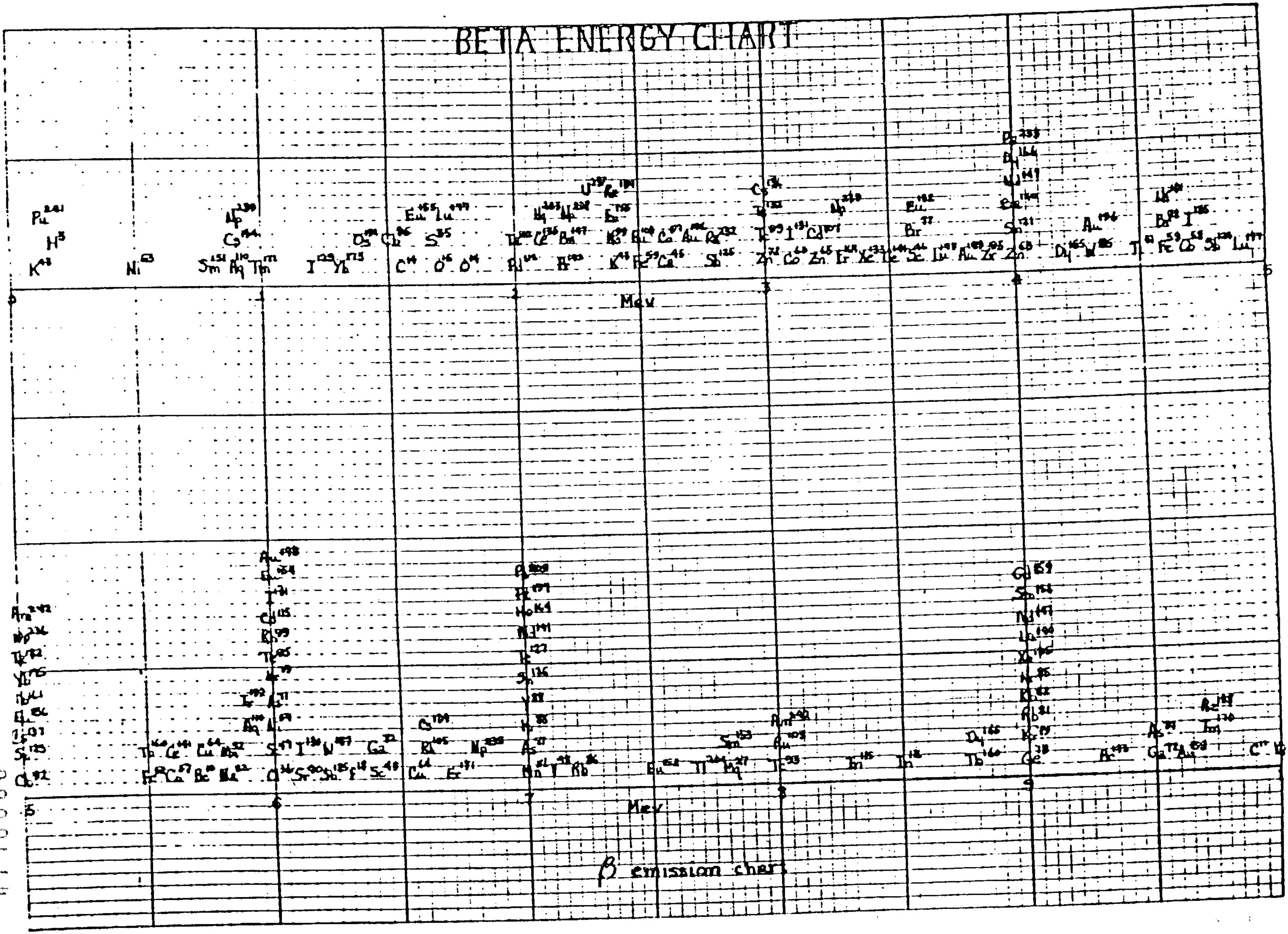
THEORETICAL GROSS IODINE FISSION PRODUCT DECAY
(ALL ISOTOPES BUT I^{129} AT EQUILIBRIUM)



HALF-LIFE CHART



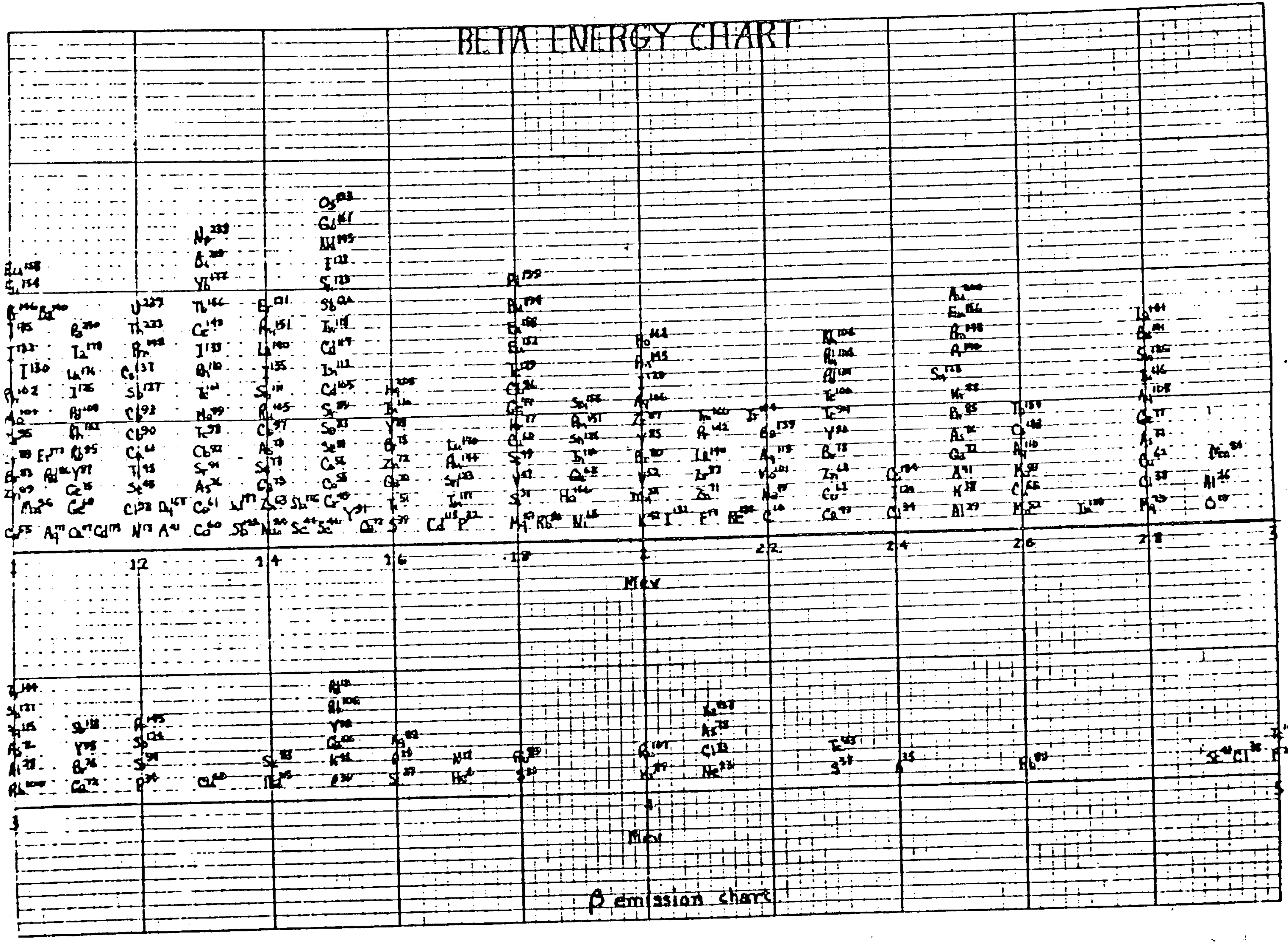
- 61 -



BETA ENERGY CHART

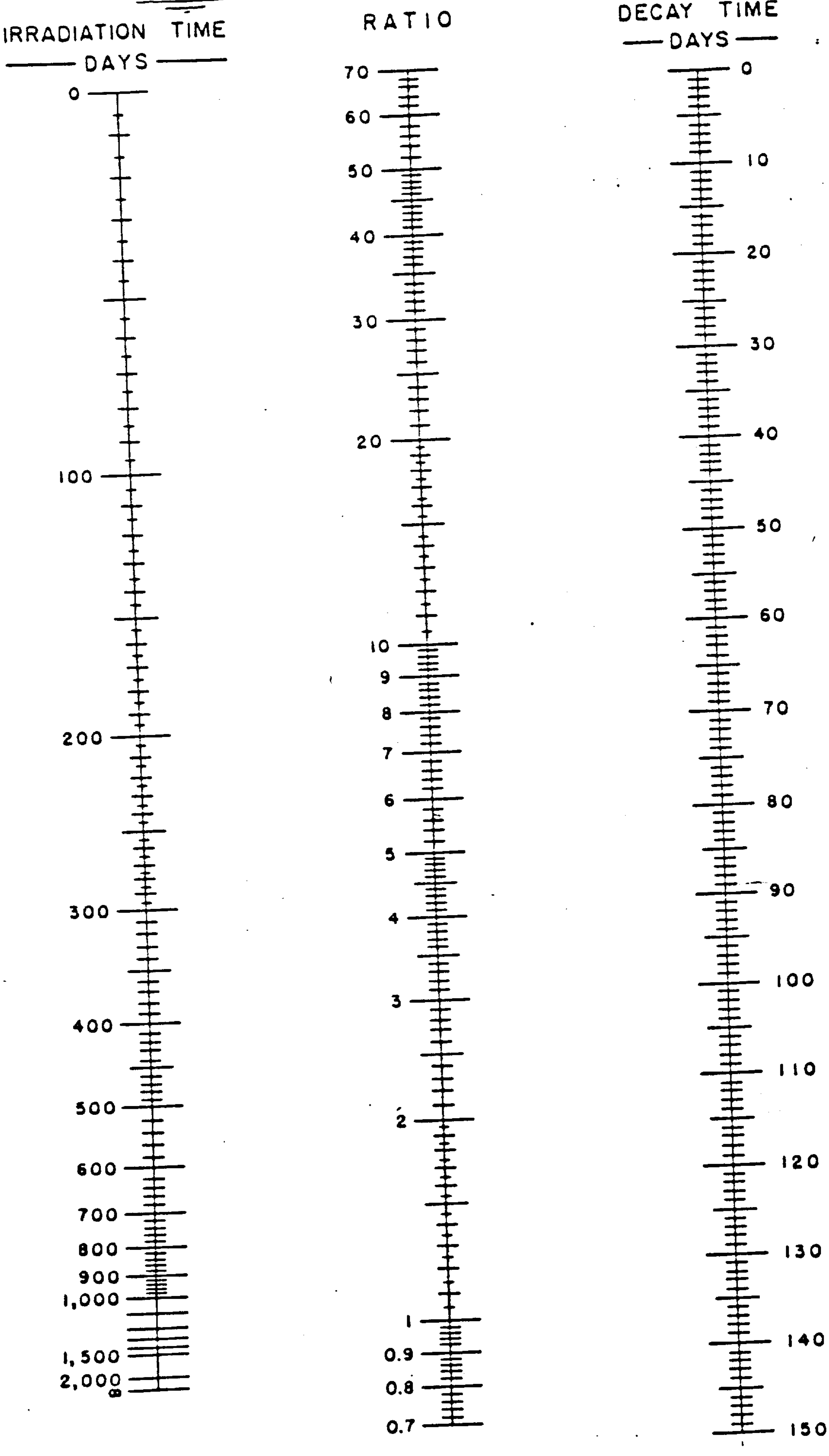
β emission chart

BETA ENERGY CHART



β emission chart

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



[redacted]

HW-18258-APP

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, $Al(OH)_3$, 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 $Al(OH)_3$ 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 CaC_2O_4 and $BaCO_3$ gave smooth, fairly uniform, symmetrical sources. The average measured area for these precipitates was 10 cm^3 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/cm^2, the plate description given, and the nominal plate area used to convert total weight to mg/cm^2 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 cm^2

For 1-1/2 inch dishes, 10.0 cm^2

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

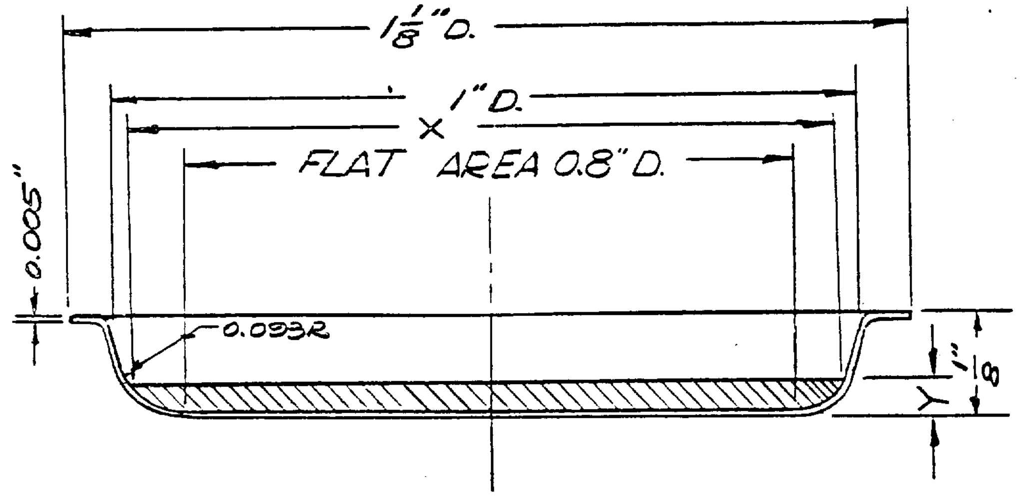
These areas will approach those actually achieved for weights of precipitates commonly employed, however, they must be used with recognition of limitations enumerated above.

L. C. Schwendiman

L. C. Schwendiman
Radiochemical Standards

LCS:R

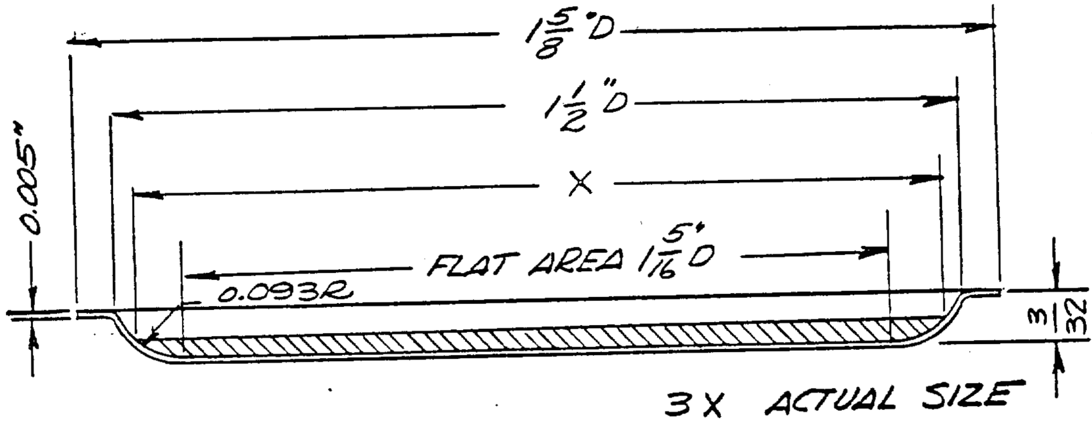
CROSS SECTION THROUGH STD. "ONE-INCH" COUNTING DISH



"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	$\frac{WT.}{A}$	WT.(MG) ON DISH	$\frac{WT.}{A}$	WT.(MG) ON DISH	$\frac{WT.}{A}$
0	0.800	3.24	0.00	0.00	0.000	0.000	000	000
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	4642	12.37	139.3	37.11	232.1	61.85
0.010	0.884	396	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: $BaCO_3$ = 4.29 La_2O_3 = 6.51
$AgCl$ = 5.56 $CsClO_4$ = 3.32
MnO_2 = 5.03 CeF_3 = 5.8

CROSS SECTION THROUGH STD. "1½" INCH COUNTING DISH.



3 X ACTUAL SIZE

"Y" (IN.)	"X" (IN.)	AREA AT "Y" (CM²)	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	2.54	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	496.1	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						