

May 71 Review With Borte

"BIODEGRADATION CONSISTS OF A CHANGE OF A CHEMICAL OR GROUP OF MATERIALS BY LIFE PROCESS AS WITH AN ACCOMPANYING TRANSFER OF ENERGY."

Definition proposed by a sub-committee of the standard methods committee for the W.P.C.F.

"The conversion of chemicals which are potential environmental pollutants to innocuous substances via the biological action of living organisms."

Primary Biodegradation - Minimum alteration of the chemical structure of the material in question to an extent that the characteristic properties of the original material are no longer evident.

Ultimate Biodegradation - Complete conversion of the material in question to CO₂, H₂O, inorganic salts, and products normally associated with the natural metabolic processes of living organisms.

NEV 026987



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"Develop a laboratory test procedure which will measure the susceptibility of selected Organic Division Products to primary biodegradation via the biological action of bacteria. Furthermore, the procedure should produce results in a reasonable period of time at a reasonable cost which can be easily extrapolated to the environment."

Potential Environmental Pollutants

Selected Organic Division Products

Living Organisms

Bacteria

Conversion

Primary Biodegradation

Mixed Bacterial Population

or

Pure Bacterial Culture

Mixed Foods

or

Sole Carbon Source

Aerobic

or

Anaerobic (Slower
(Difficult

✓ River Die-Away Test (1×10^5 cells/ml)

Fortified and Inoculated Water Test

Shake Culture Test

Laboratory Trickling Filters

Continuous Flow Activated Sludge

Batch Sludge Die Away

✓ Semi-Continuous Activated Sludge (2×10^8 cells/ml)

✓ Soil Percolation

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Standard Operating Conditions

Vol. 1500ml
 SS 3750mg (2500ppm) Activated Sludge
 Air $\frac{1}{2}$ ft³/hr
 Synthetic Sewage { Dextrose
 Test compd (EtOH) { KH_2PO_4

MECHANICAL CYCLE

Feed Syn. Sewage
 " Test (ump)
 Aerate & stir - 1 hr - after
 Feeding ("0" time) sample taken
 for analysis.

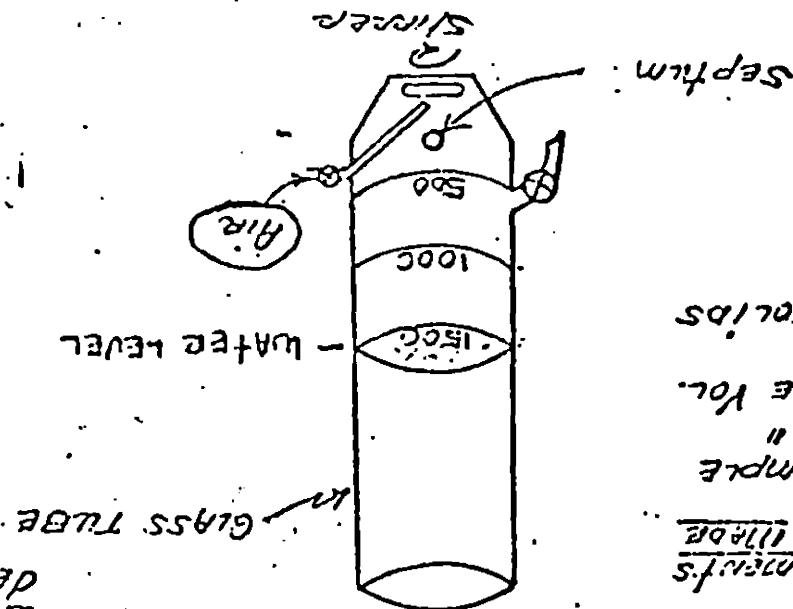
5-2 1/2 hr
 cycles

Aerate & stir - 21 hrs
 before feeding sample
 taken for analysis

Sewage Volume
 measured, 2/3
 of supernatant
 with decant - pH
 measured.
 Aeration & stirring
 resumed and 1 L
 tap water added

Suspended Solids
 used directly and
 concentration measured
 unit adjusted to
 desired level.

Measurements
 1. AF Sample
 2. BF "
 3. Sludge Vol.
 4. pH
 5. SS, Solids

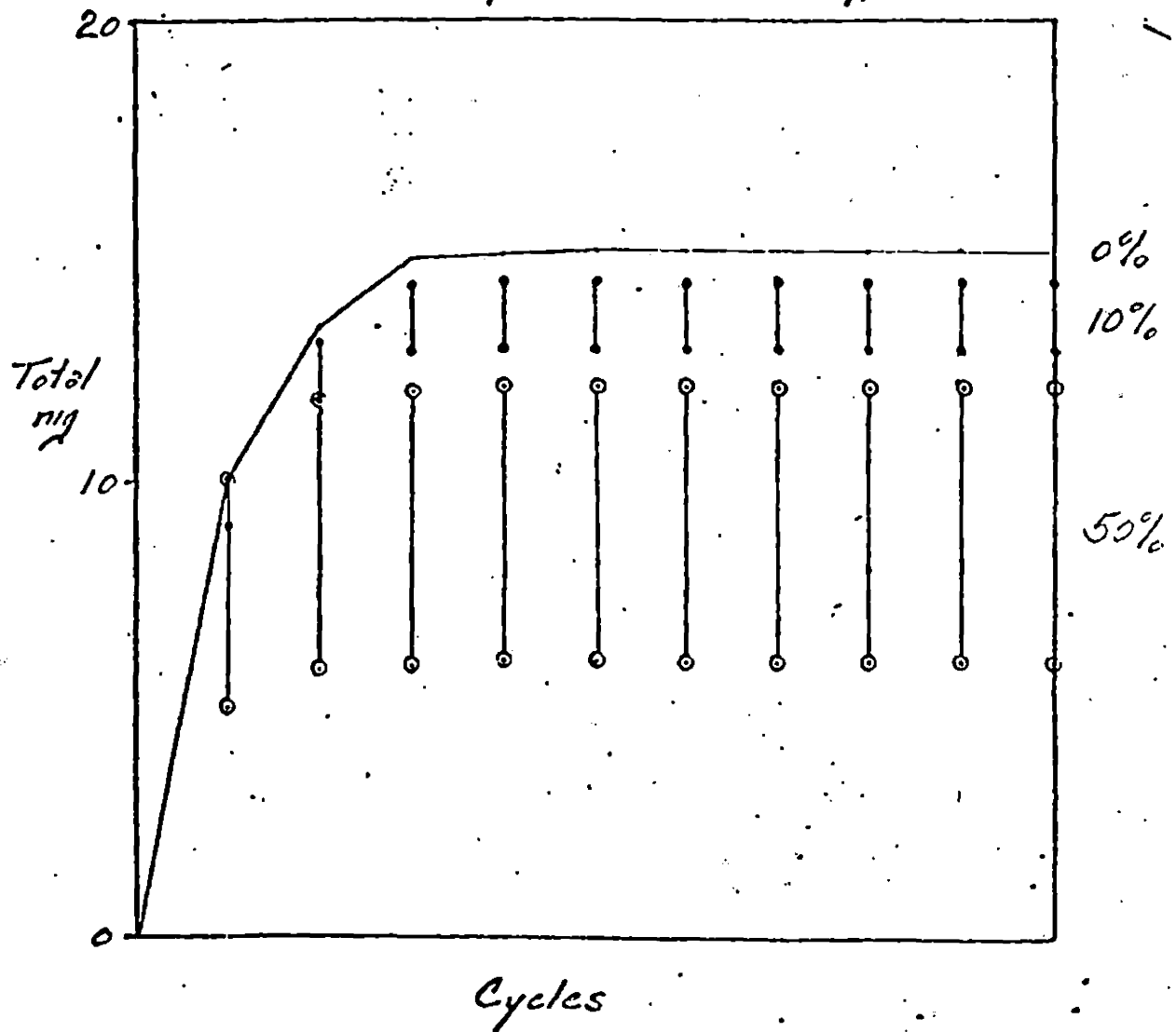


Test Compound	Molecular Structure	Feed Level (mg)	Cycle Time (hr)	Disappearance Rate (%)	Water Solubility (g/l)	Vapor Pressure mmHg (25°C)	Method of Analysis
LAS (Dodecane-1)		20	24	>99.5	Soluble		Colorimetric
p-Chloroaniline		5	24	97.3 ± 1.6	0.5	0.1	UV
MIPB		10	24	78.2 ± 3.2		0.005	UV, FID-GC
HB-40		10	24	48.6 ± 6.9		N.S.	UV, FID-GC
S-711 M		10	24	48.3 ± 7.7			UV
o-NCB		5	24	37.5 ± 8.8	0.050		UV
Nitroated Orthene		5	24	40.3 ± 3.2			UV
p-NCB		5	24	33.9 ± 2.9	0.005		UV
Aroclor 1221		1	48	~70.0		0.005	UV
2,2'-Dichloro Diphenyl Ether		5	24	12.0 ± 4.8			EC-GC
MCS 1043		1	48	56.2 ± 15.5			UV, EC-GC
Aroclor 1232		1	48	54.1 ± 19.3			UV, EC-GC
MCS 1016		1	48	32.9 ± 13.8			UV, EC-GC
Aroclor 1242		1	48	26.3 ± 15.3	2 x 10 ⁻⁵	1.4 x 10 ⁻³	UV, EC-GC
Aroclor 1254		1	48	15.0 ± 3.7	5 x 10 ⁻⁶	3.4 x 10 ⁻⁴	EC-GC
TCC		1	24	0	<0.001		UV

* Initial Disappearance Rate 71.3 ± 5.5 %

Water Soluble

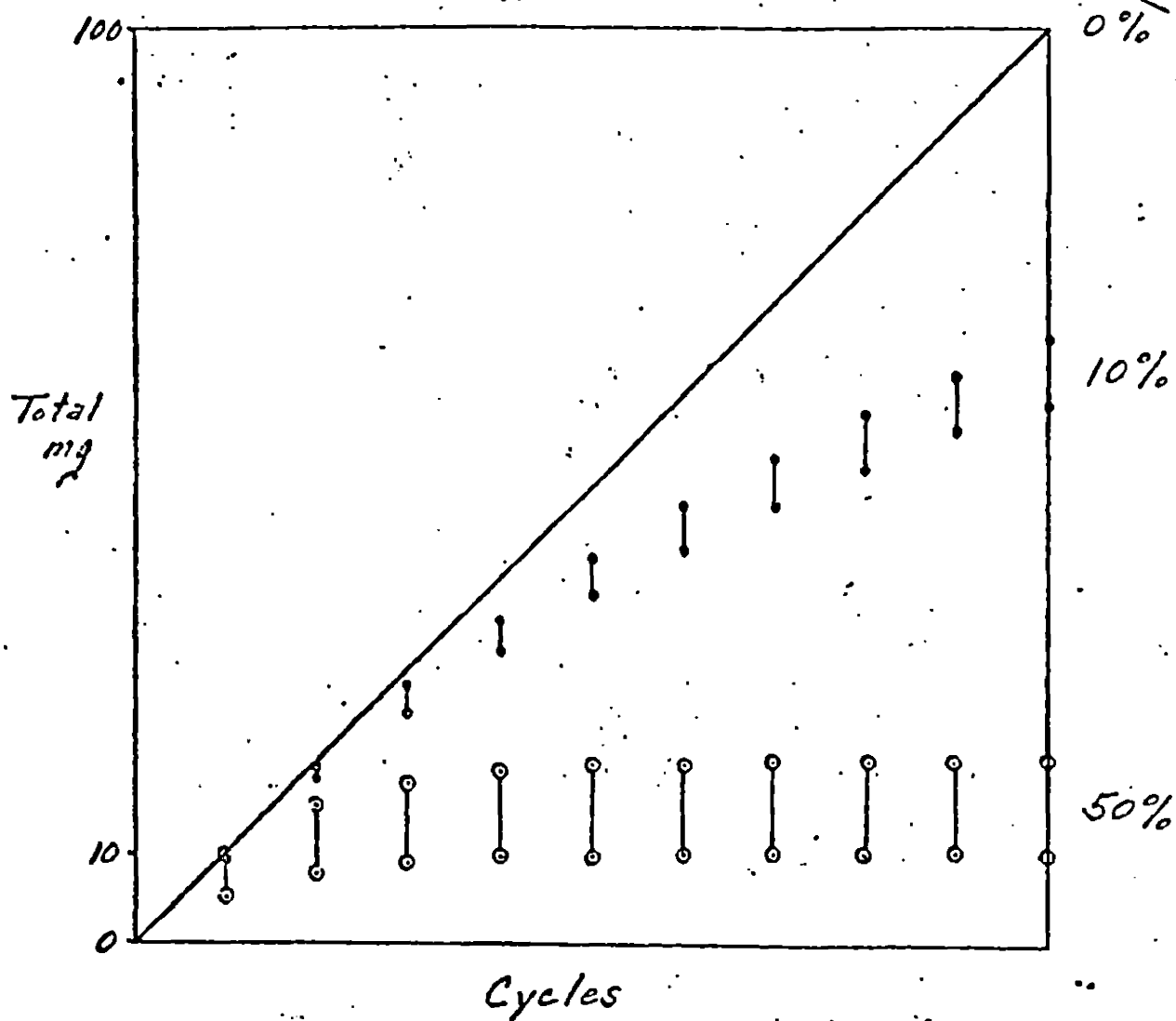
Residue Degradable (Non-Degradable)



NEV 026992

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Water Insoluble
Residue Degradable

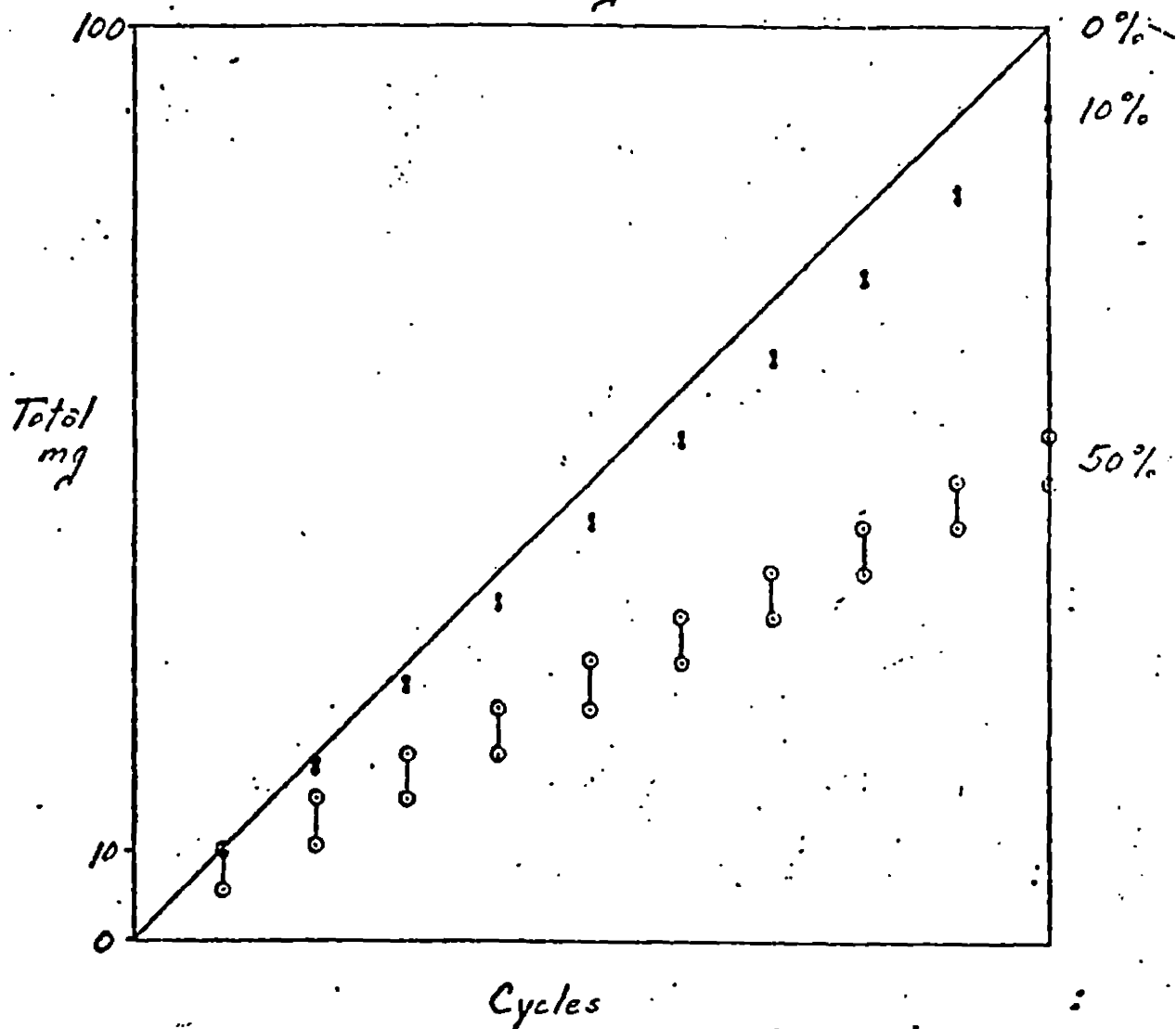


MS
Res 019

NEV 026993

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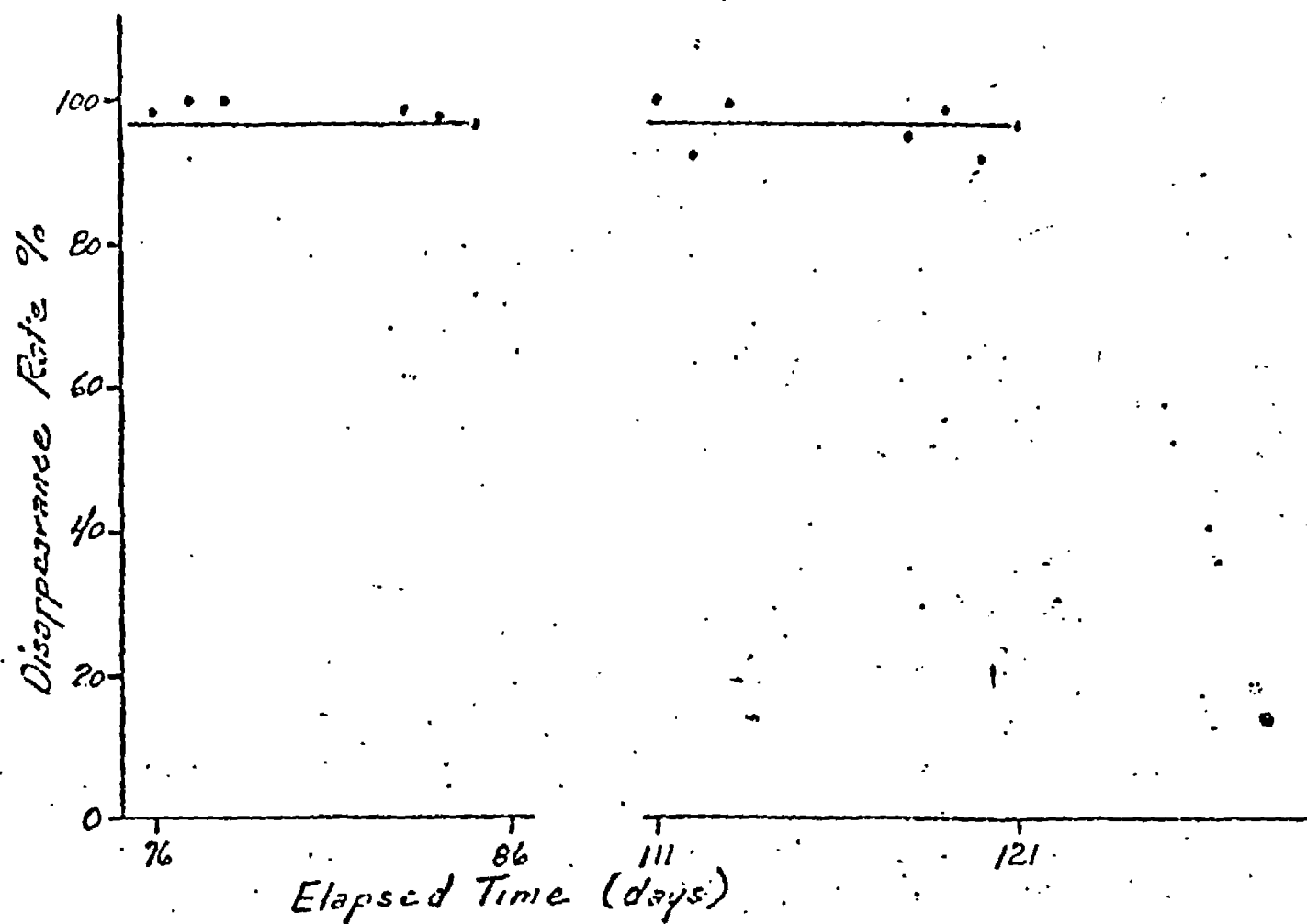
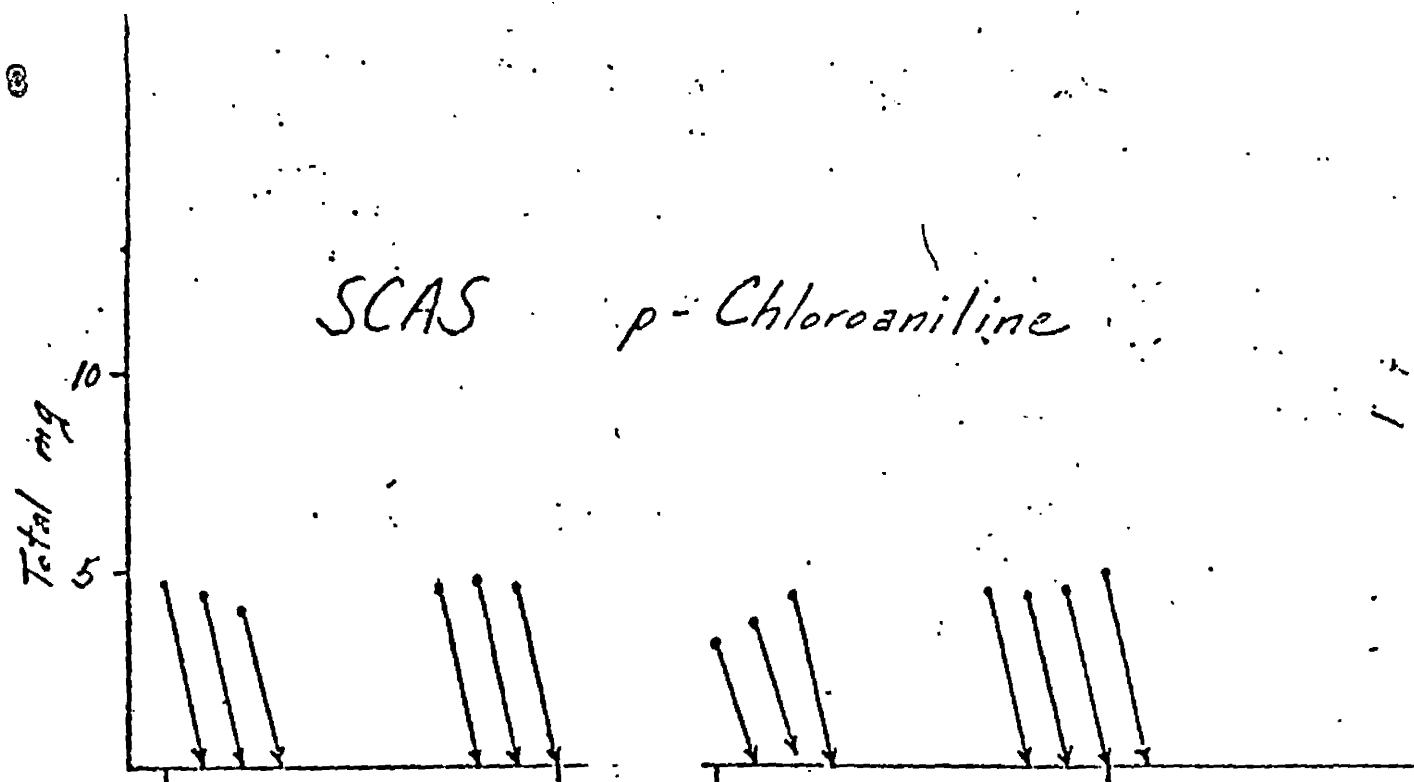
Water Insoluble
Residue Non-Degradable



NEV 026994

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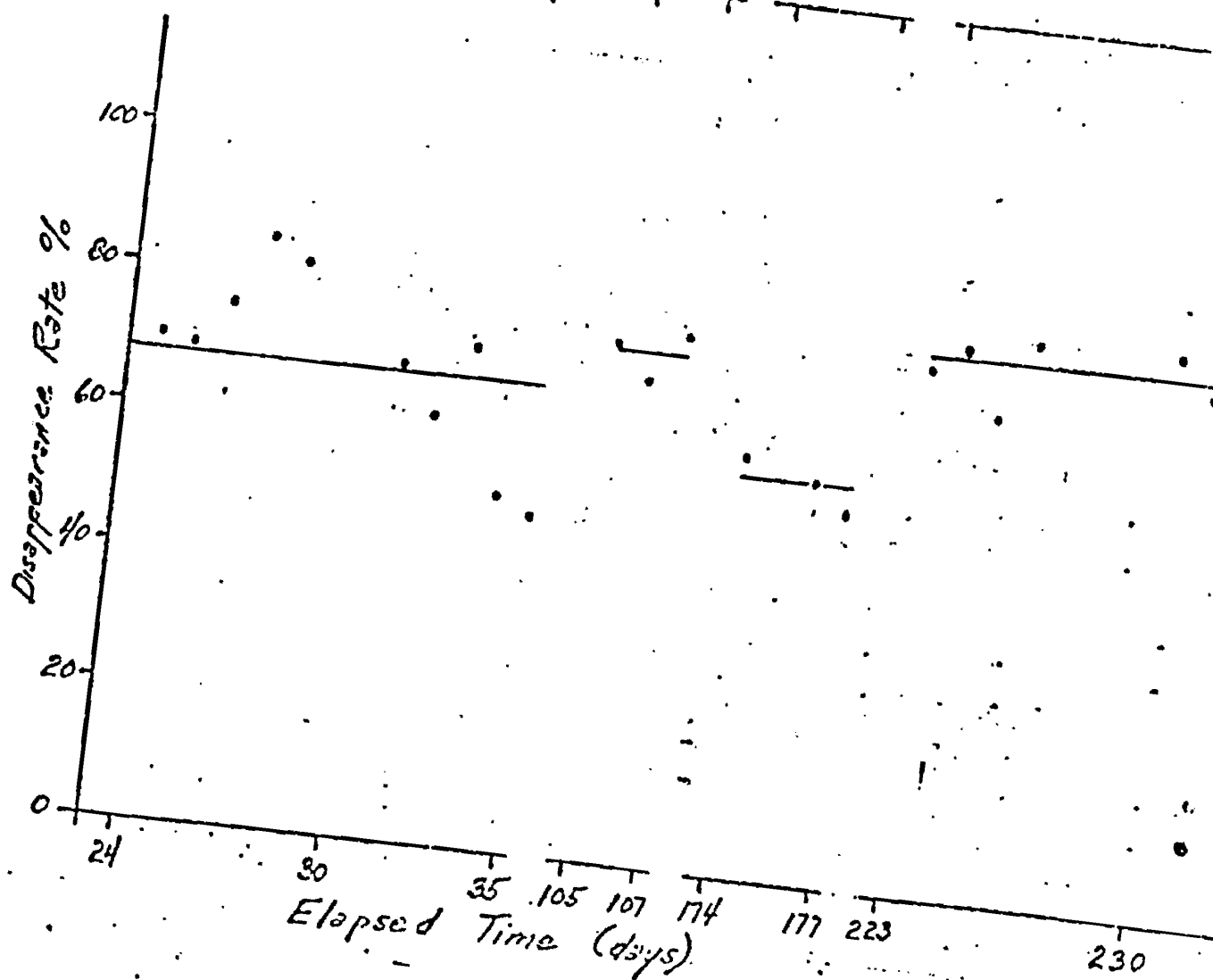
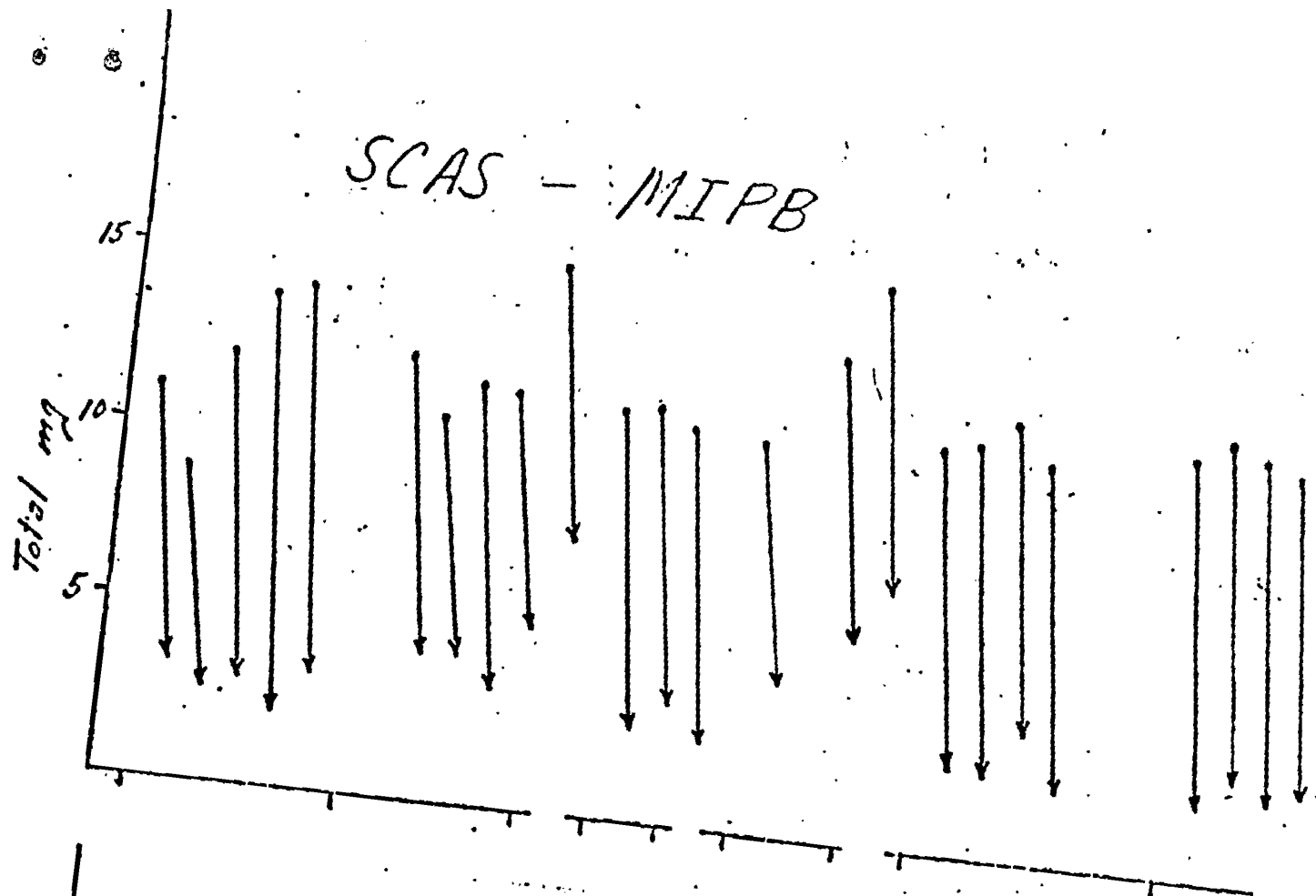
SCAS p-Chloroaniline



NEV 026995

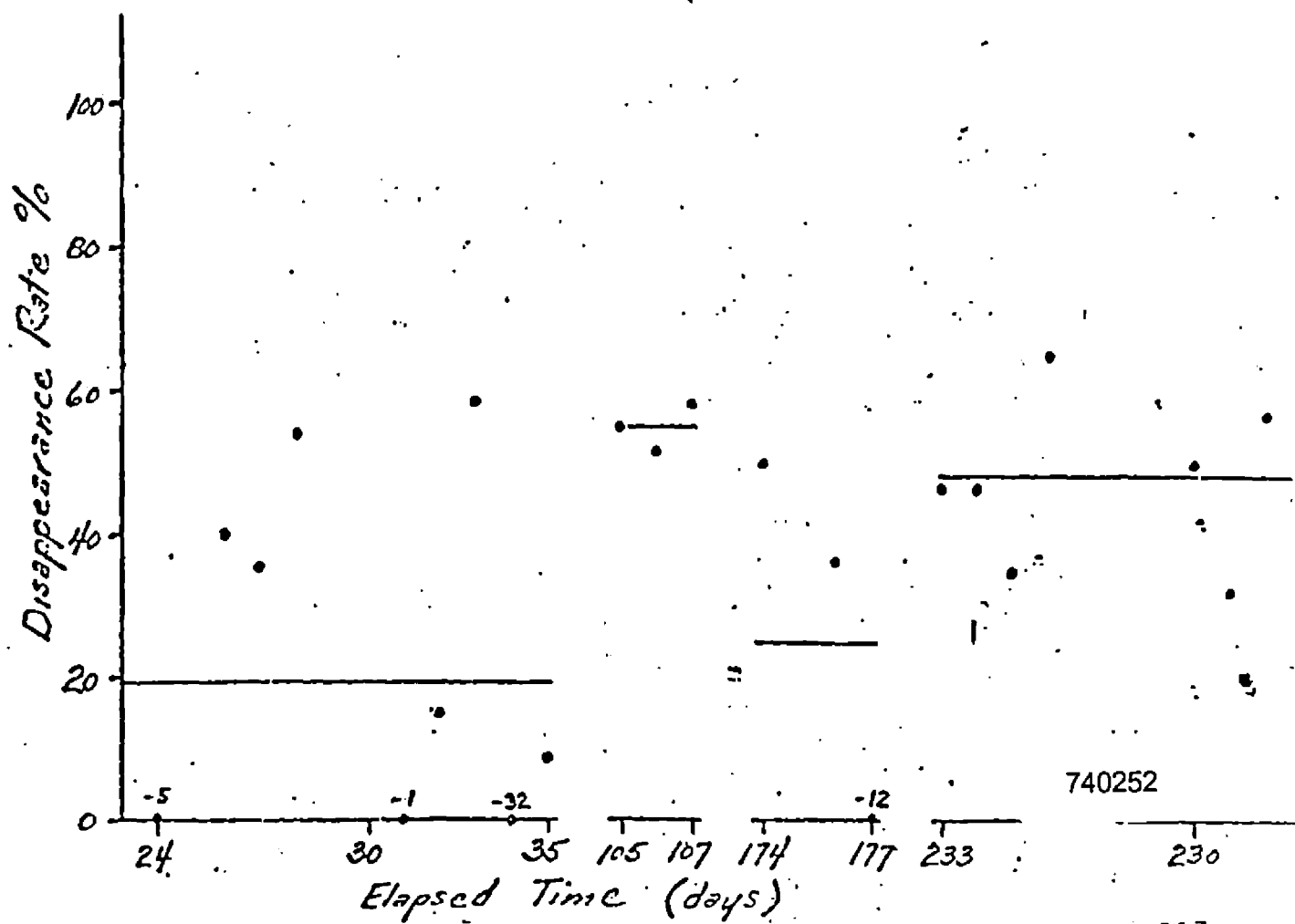
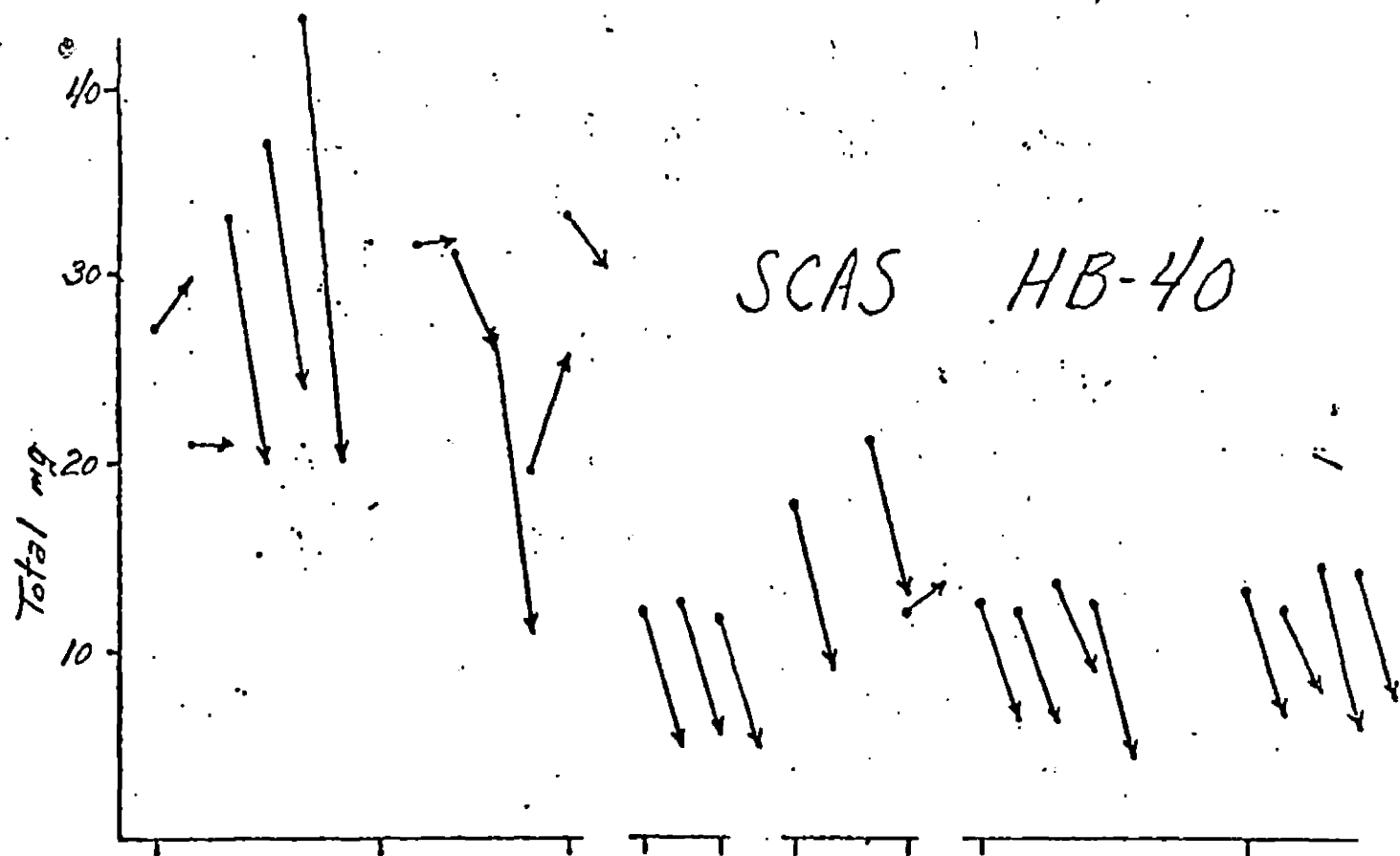
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SCAS - MIPB



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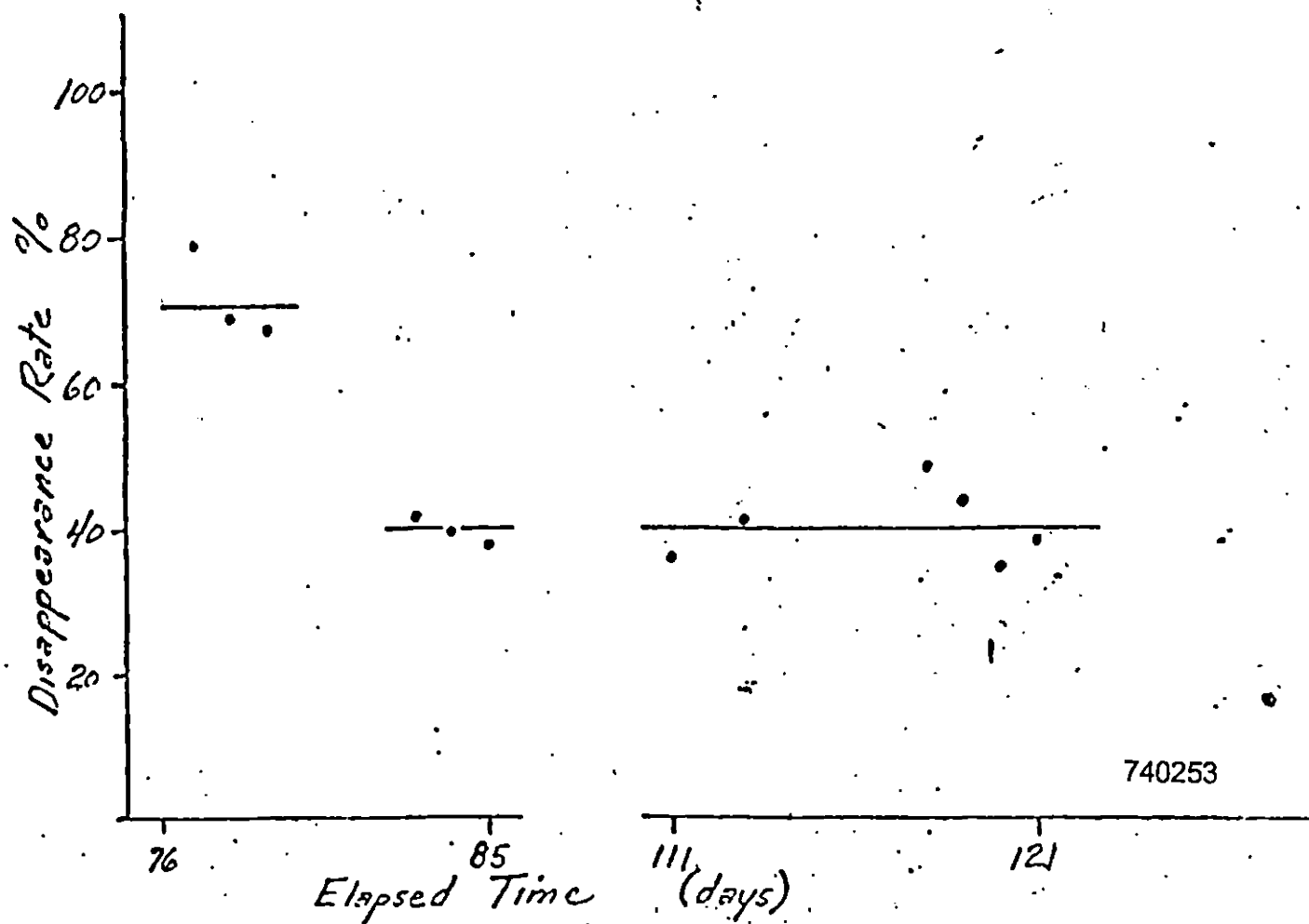
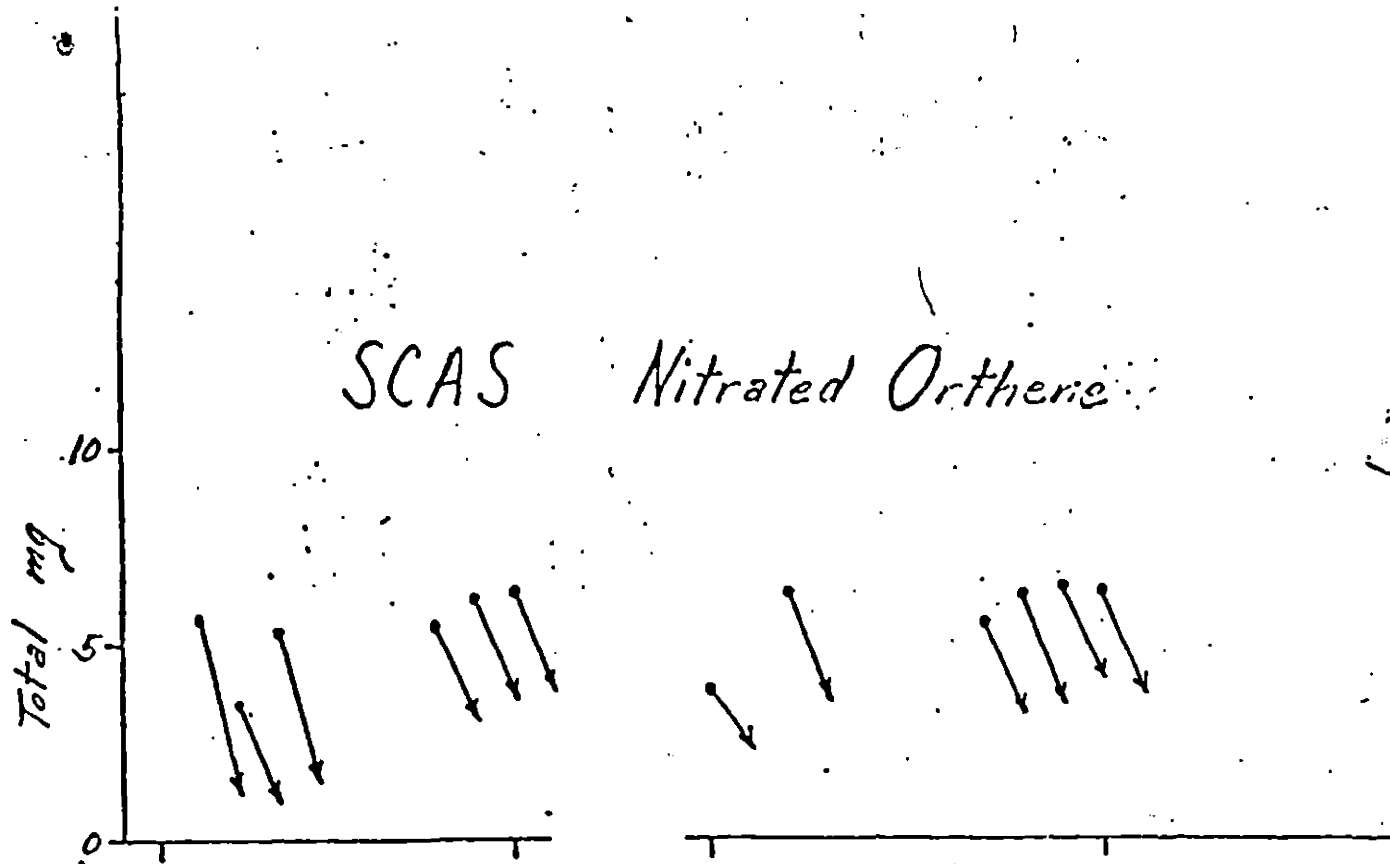
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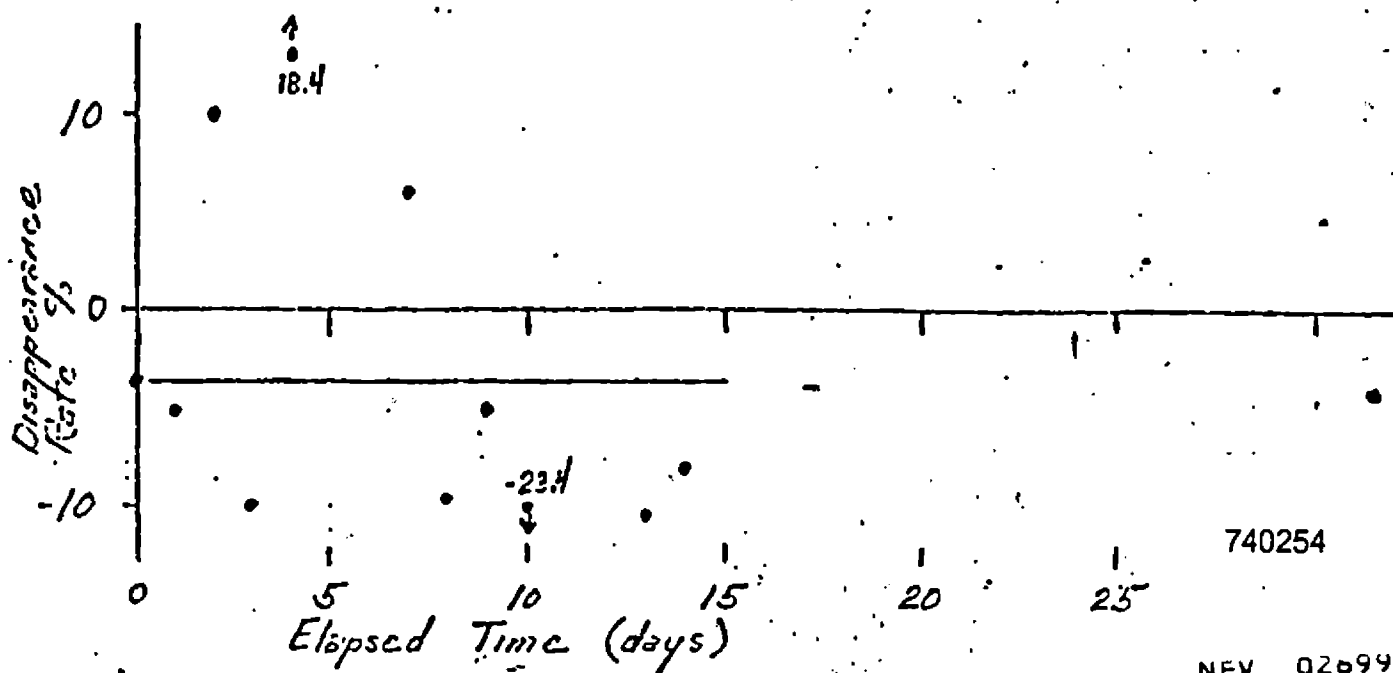
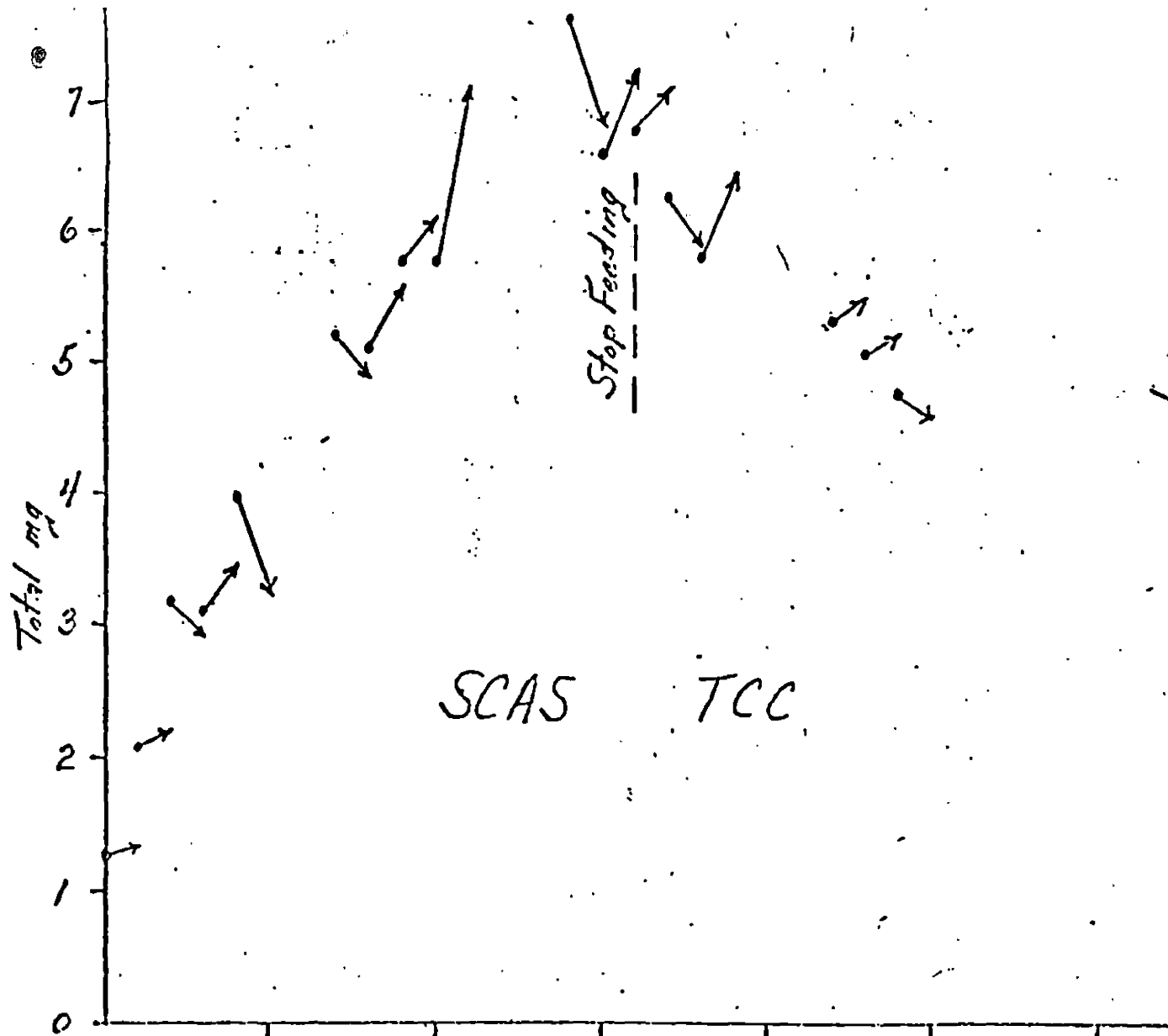
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SCAS Nitratd Ortheric



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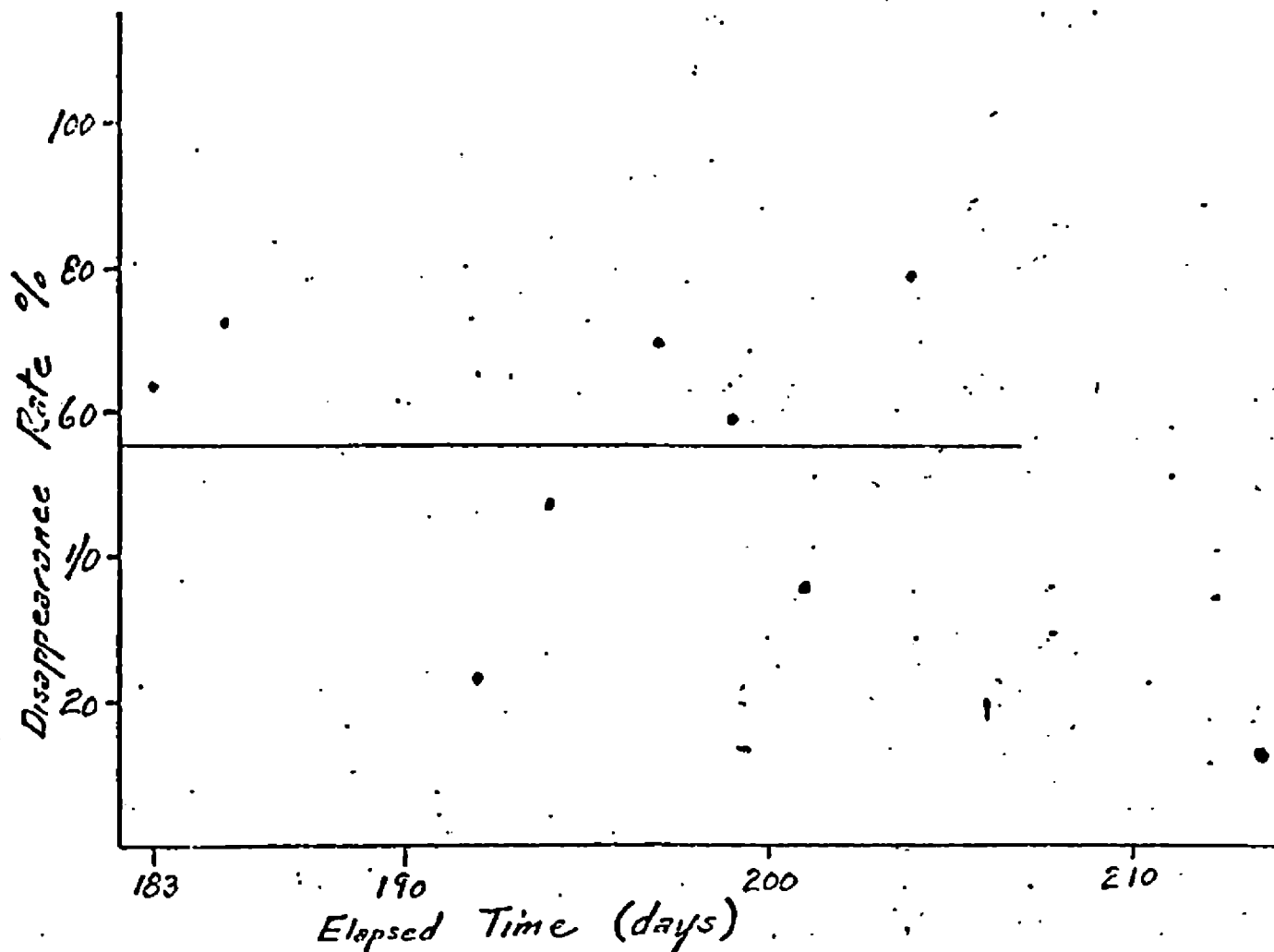
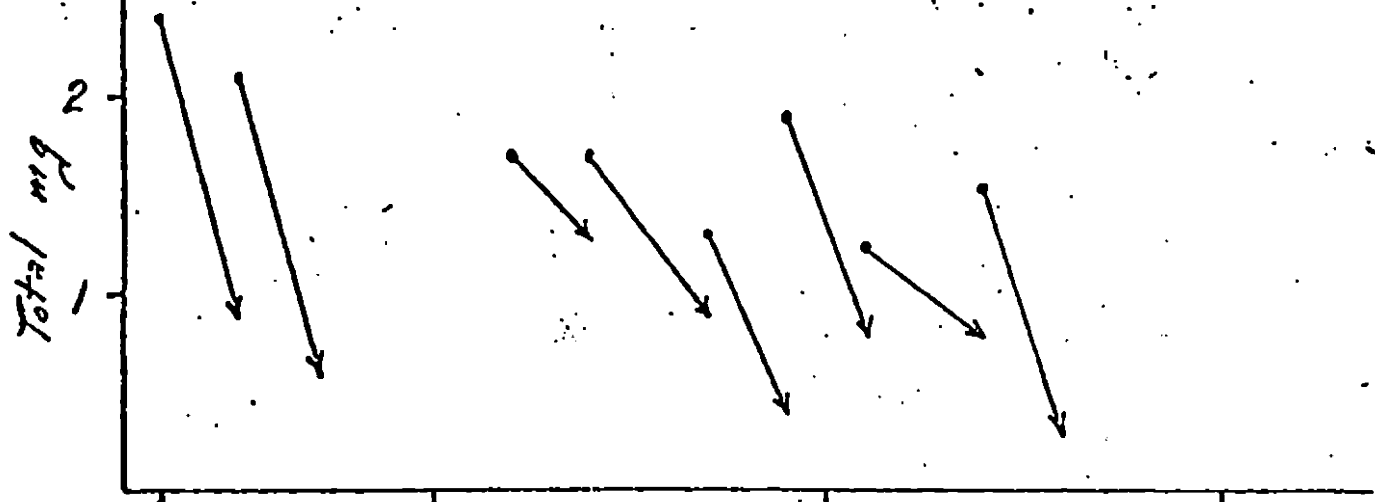
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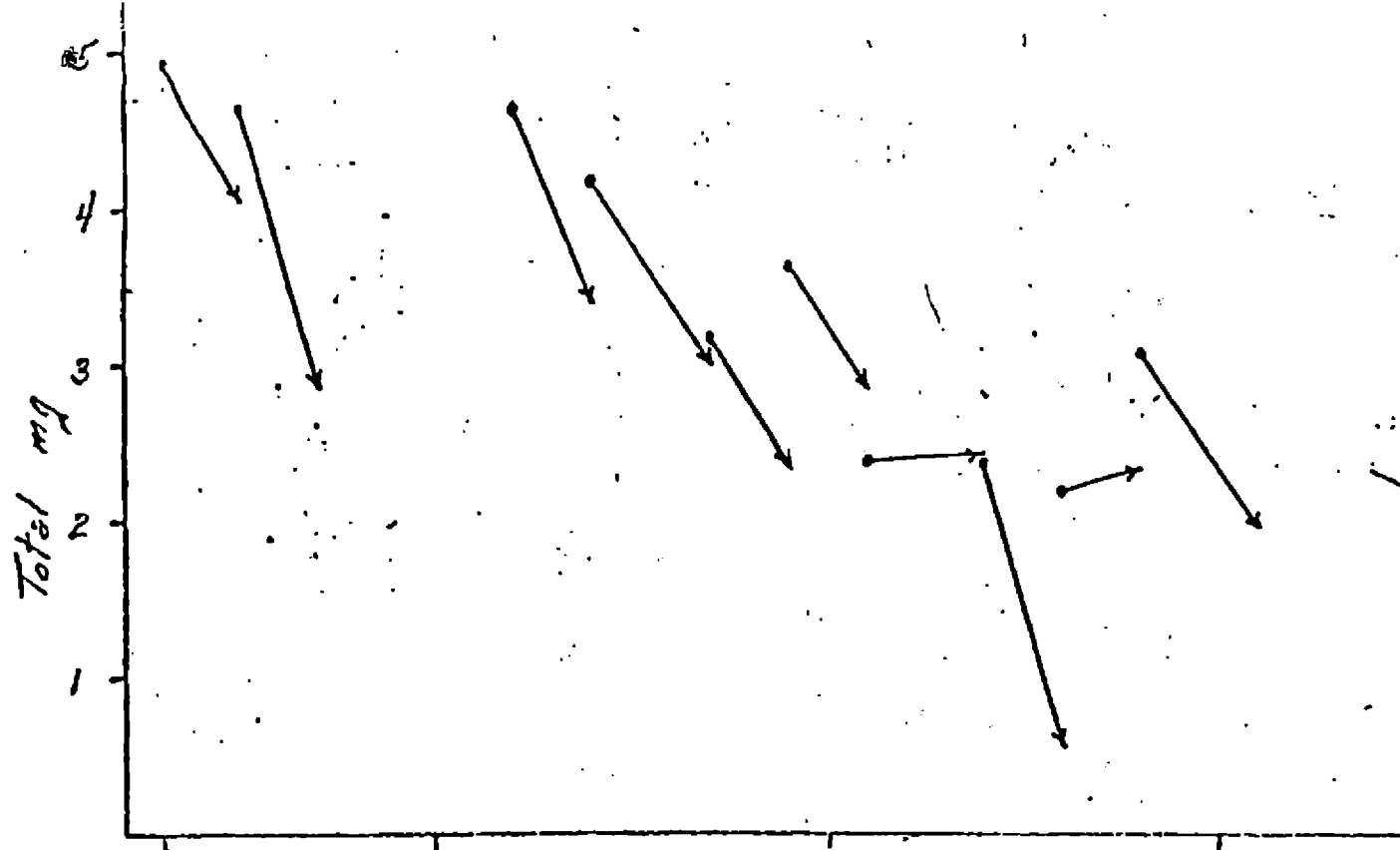
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SCAS MCS 1043

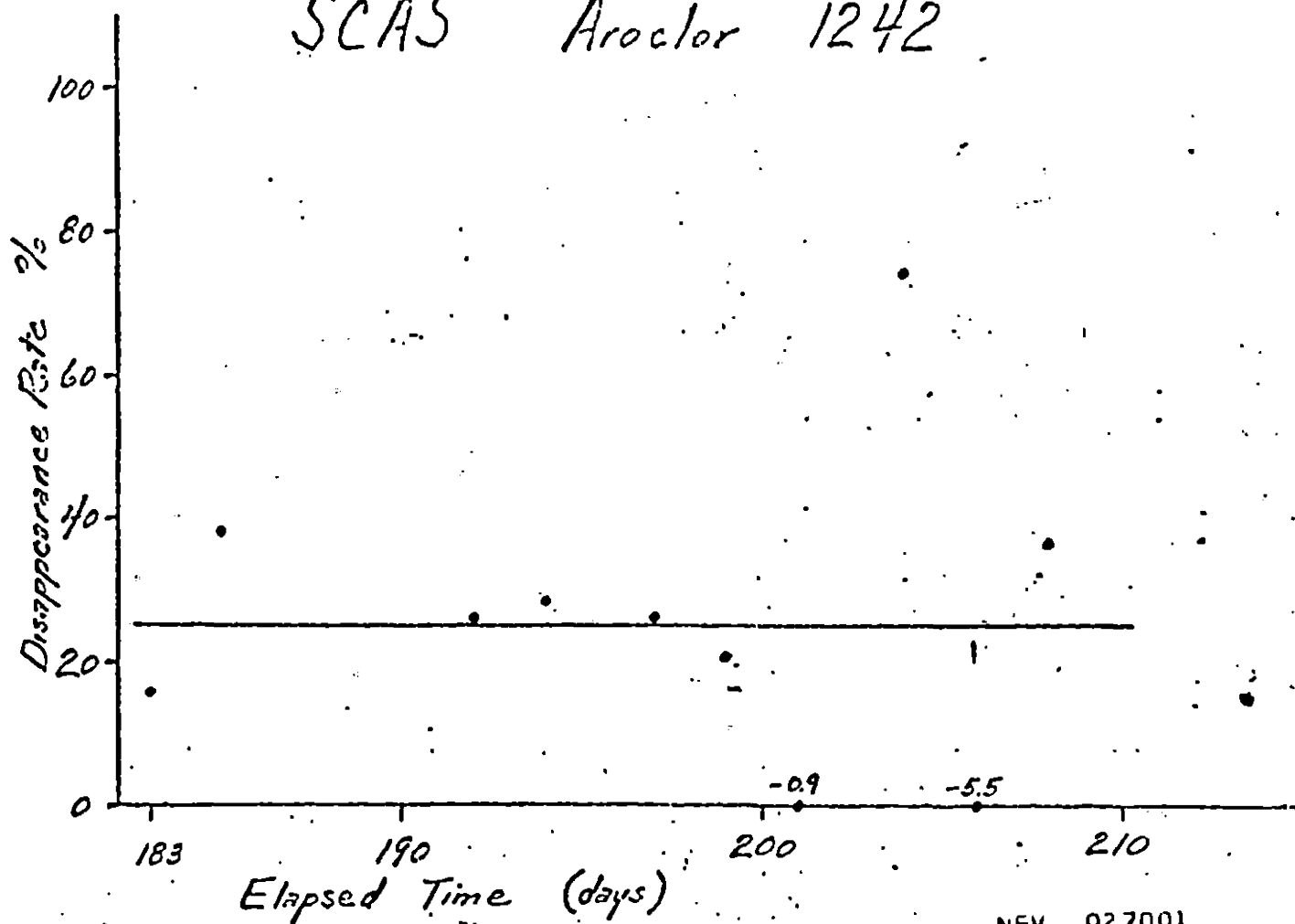


NEV 027000

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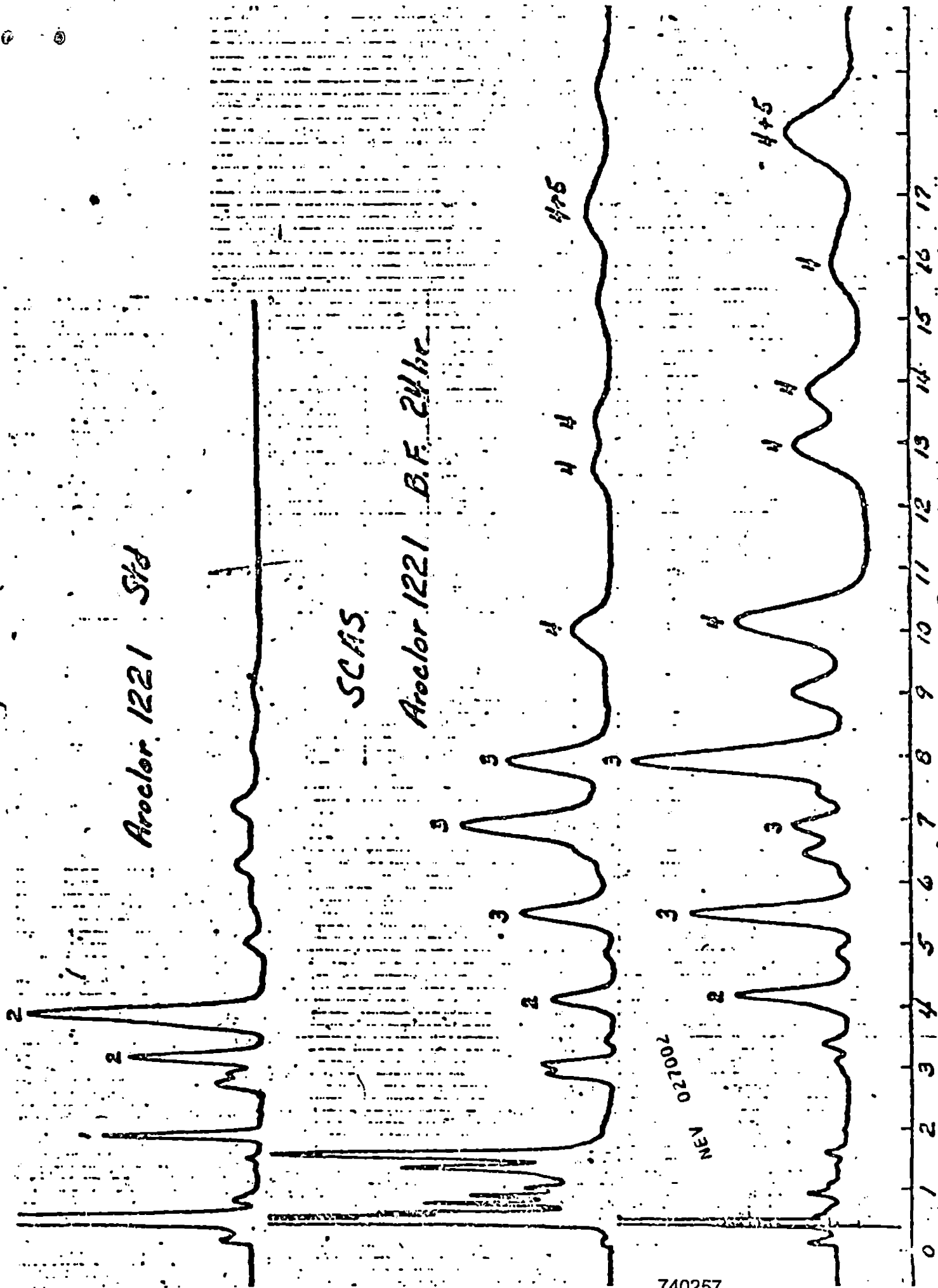


SCAS Aroclor 1242

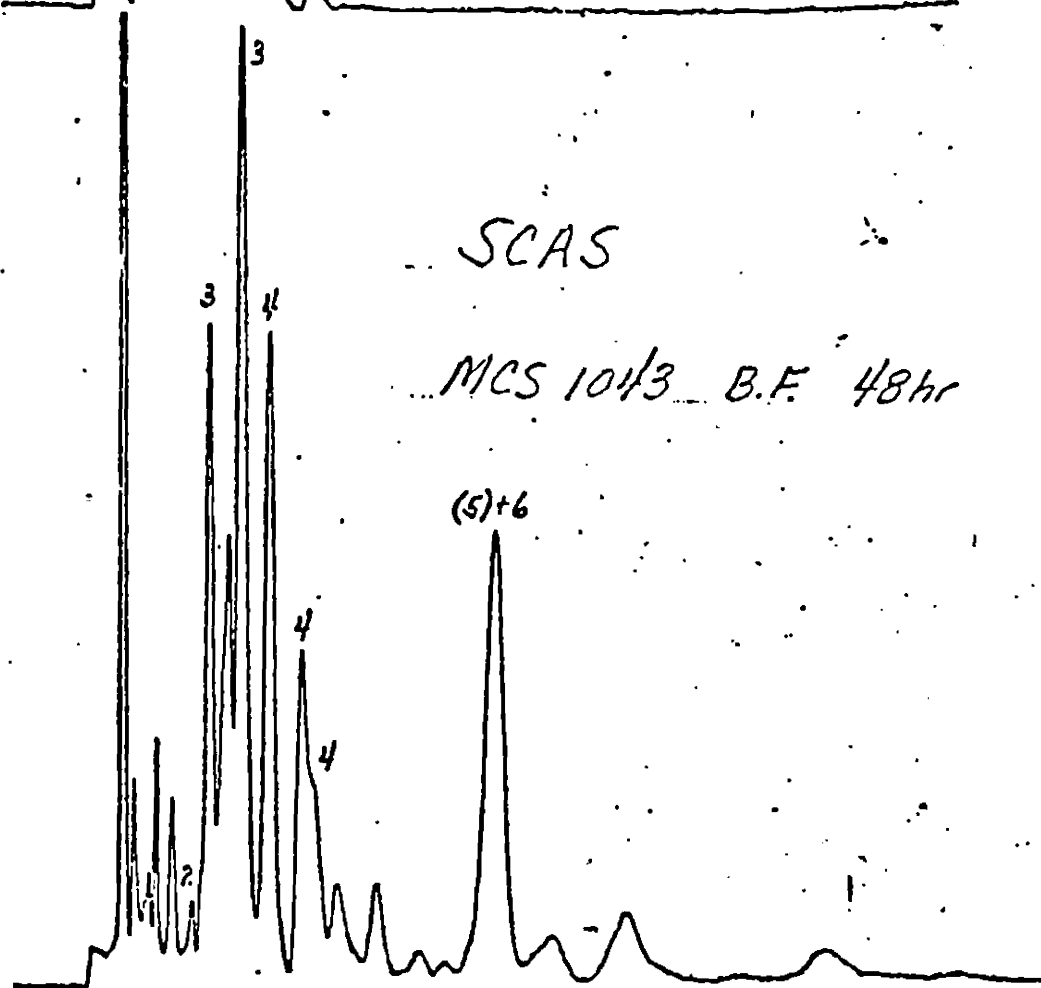
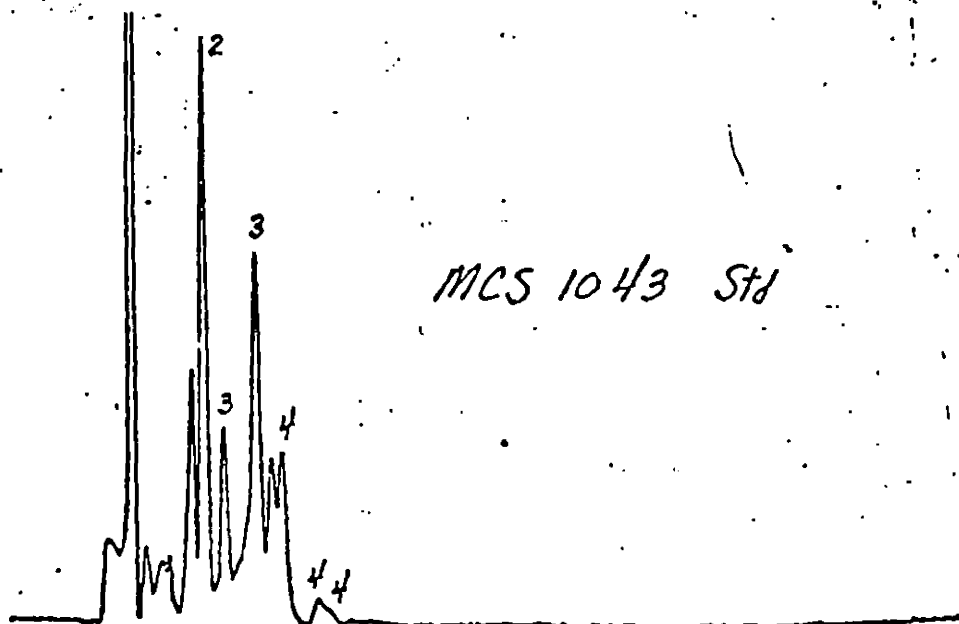


NEV 027001

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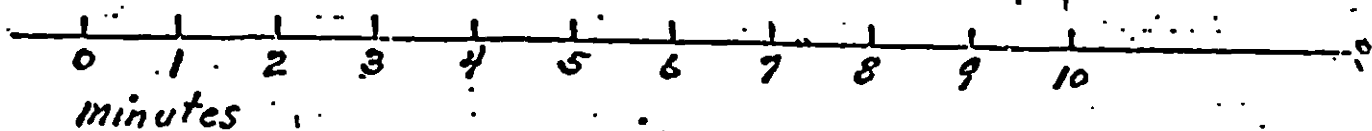
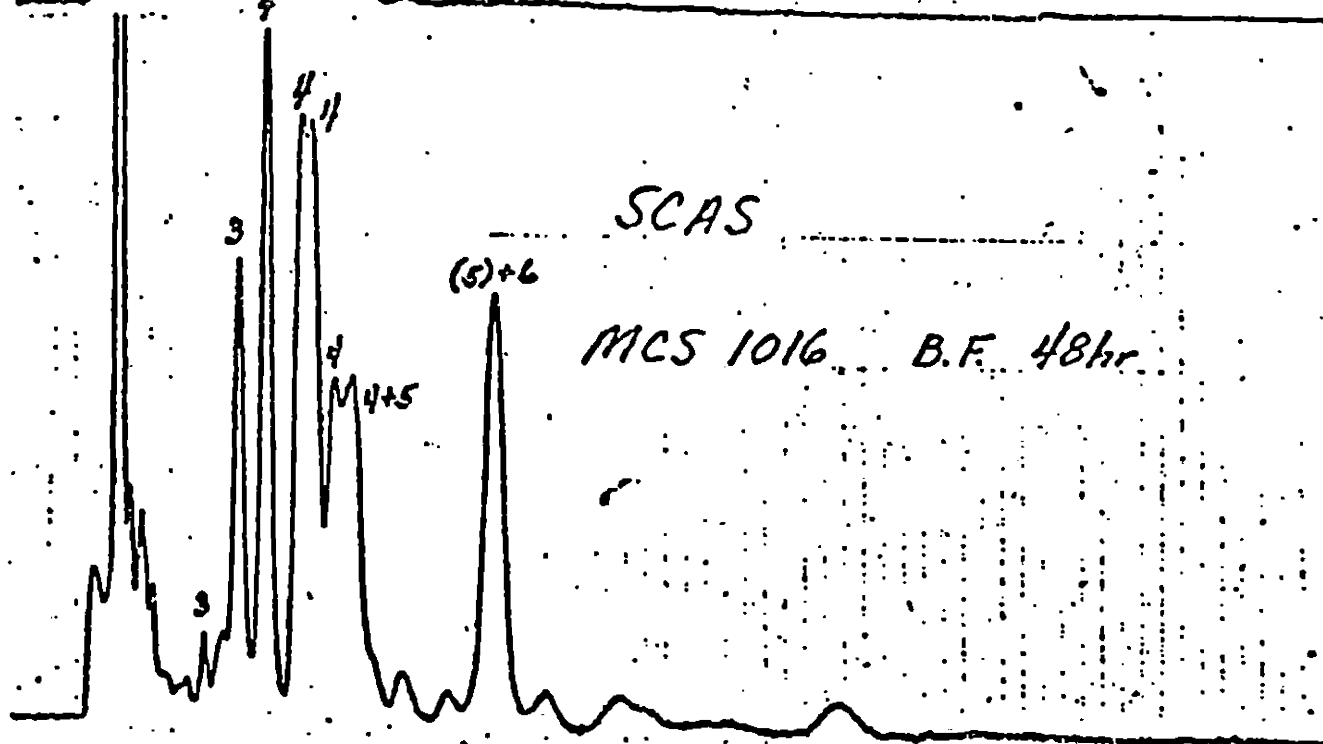
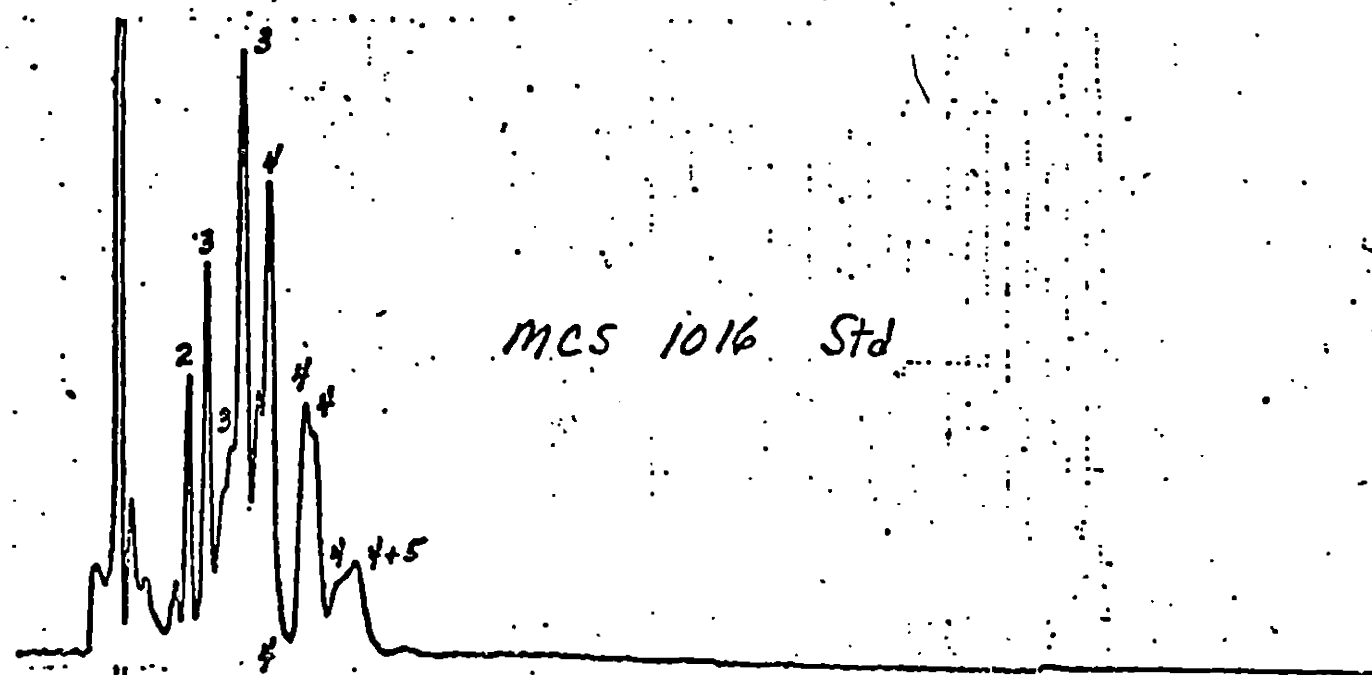
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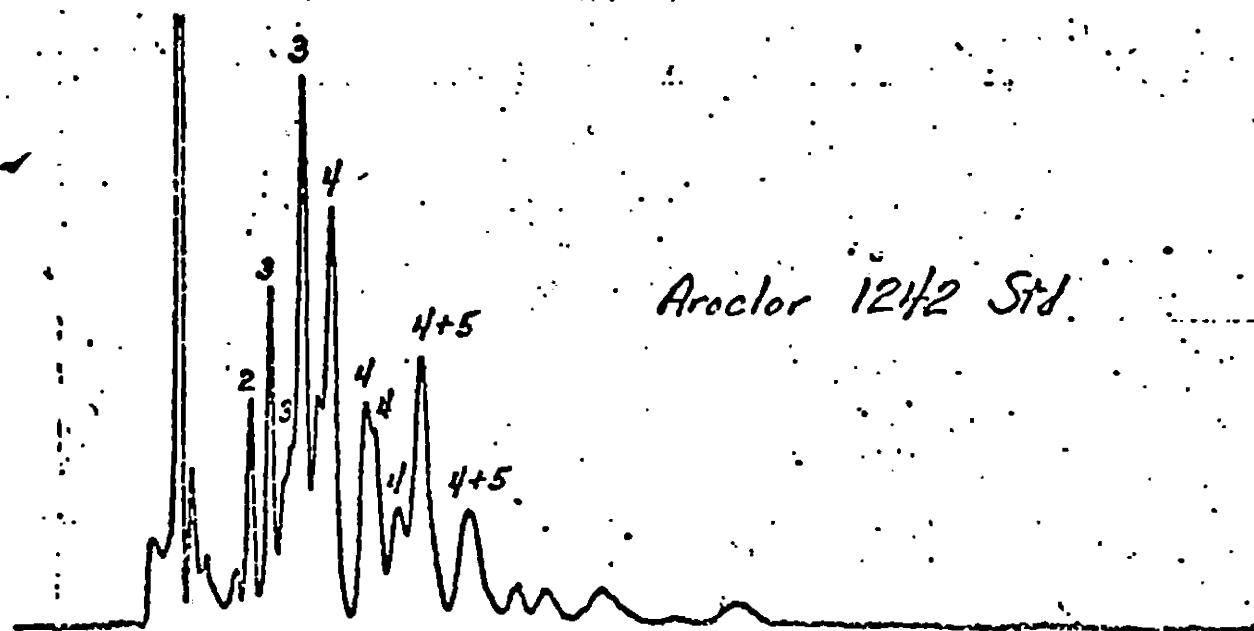


0 1 2 3 4 5 6 7 8 9 10
minutes

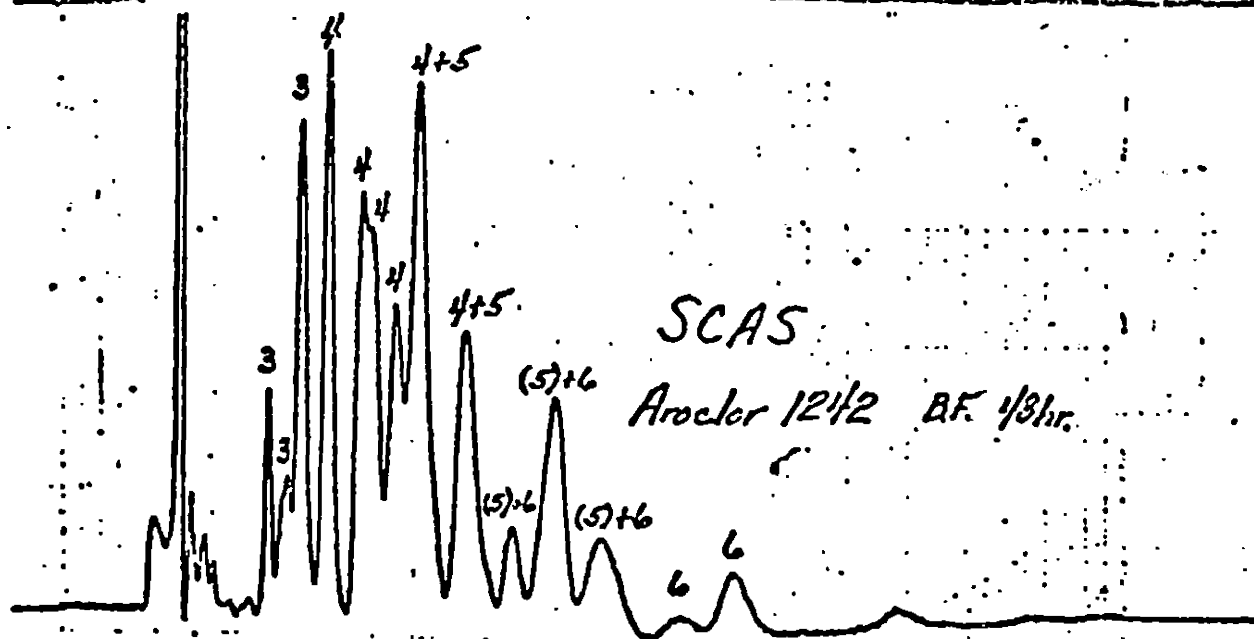
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Aroclor 1242 Std.



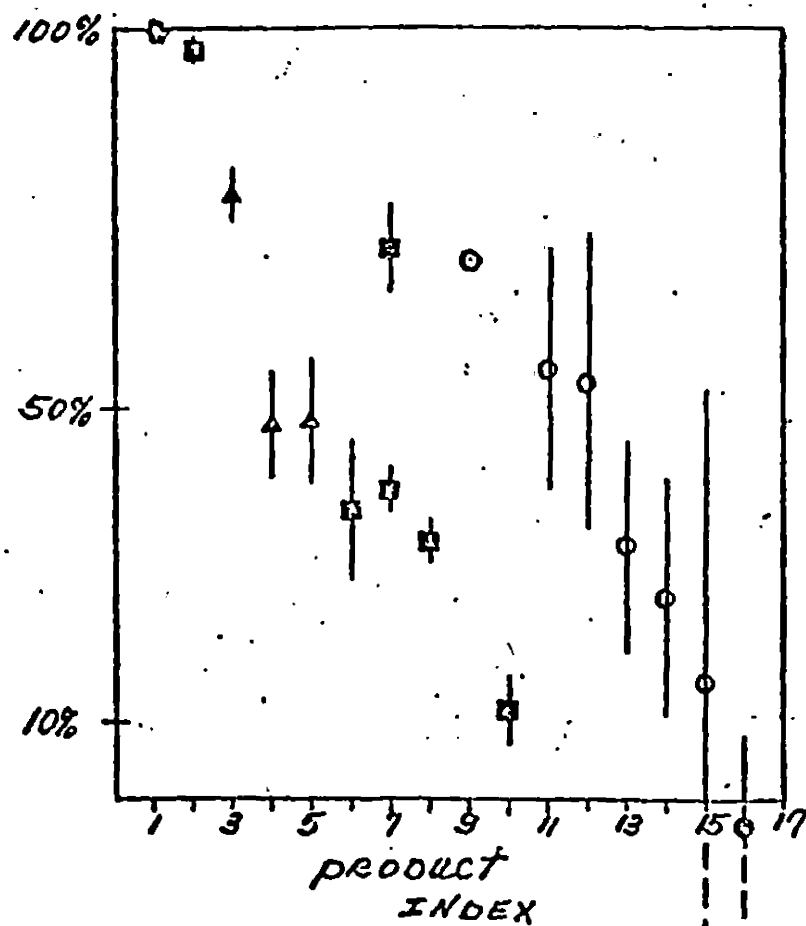
SCAS

Aroclor 1242 BF 1/3 hr.

minutes

NEV 027005

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NEV 027006

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