Summary of the Research Progress Meeting

Author
Folden, Margaret Foss

Publication Date
1948-04-01

UNIVERSITY OF CALIFORNIA

Radiation Laboratory

BERKELEY, CALIFORNIA

UNIVERSITY OF CALIFORNIA
RADIATION LABORATORY

Cover Sheet
Do not remove

INDEX NO. UCRL 108
This document contains 6 pages
and 0 plates of figures.
This is copy 76 of 83. Series A

Issued to: Info Div.

UNCLASSIFIED
RESTRICTED
Classification

Each person who received this document must sign the cover sheet in the space below.

Route to	Noted by	Date	Route to	Noted by	Date
	R.K. Wakerling	5/28/48			

UNCLASSIFIED

RESTRICTED

UCRL-108
Physics-General

UNIVERSITY OF CALIFORNIA

Radiation Laboratory

Contract No. W-7405-eng-48

DOWNGRADE TO ~~SECRET, CONFIDENTIAL, OR~~ UNCLASSIFIED
ON 1-4-53 BY A K Wakerling (BJ)
(SIGNATURE OF ORIGINATOR OR CLASSIFYING AUTHORITY)

SUMMARY OF THE RESEARCH PROGRESS MEETING

April 15, 1948

by Margaret Foss Folden

Berkeley, California

Standard Distribution	copy numbers
Argonne National Laboratory	1-8
Armed Forces Special Weapons Project	9
Atomic Energy Commission, Washington	10-11
Battelle Memorial Institute	12
Brookhaven National Laboratories	13-20
Carbide & Carbon Chemicals Corporation (K-25 Area)	21-24
Carbide & Carbon Chemicals Corporation (Y-12 Area)	25-28
Columbia University (Dunning)	29
General Electric Company	30-33
Hanford Directed Operations	34-38
Iowa State College	39
Los Alamos	40-42
Monsanto Chemical Company, Dayton	43-44
National Bureau of Standards	45-46
Naval Radiation Laboratory	47
NEPA	48
New York Directed Operations	49-50
Oak Ridge National Laboratory	51-58
Patent Advisor, Washington	59
Technical Information Division, ORDO	60-74
UCLA Medical Research Laboratory (Warren)	75
University of California Radiation Laboratory	76-81
University of Rochester	82-83
Total	83

SUMMARY OF THE RESEARCH PROGRESS MEETING

April 15, 1948

by, Margaret Foss Folden

Mass Spectrometer. F. L. Reynolds.

A spectrometer has been developed for the mass assignment of radioactive isotopes. Two slides, Figs. 1 and 2, of the instrument were shown and the parts explained.

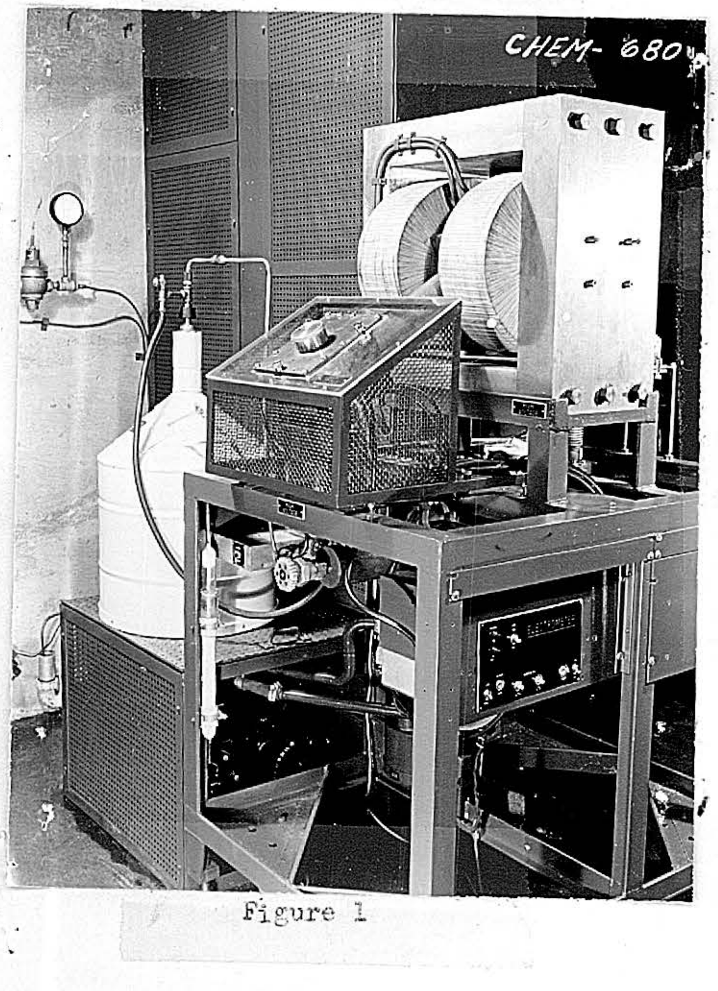

Figure 1

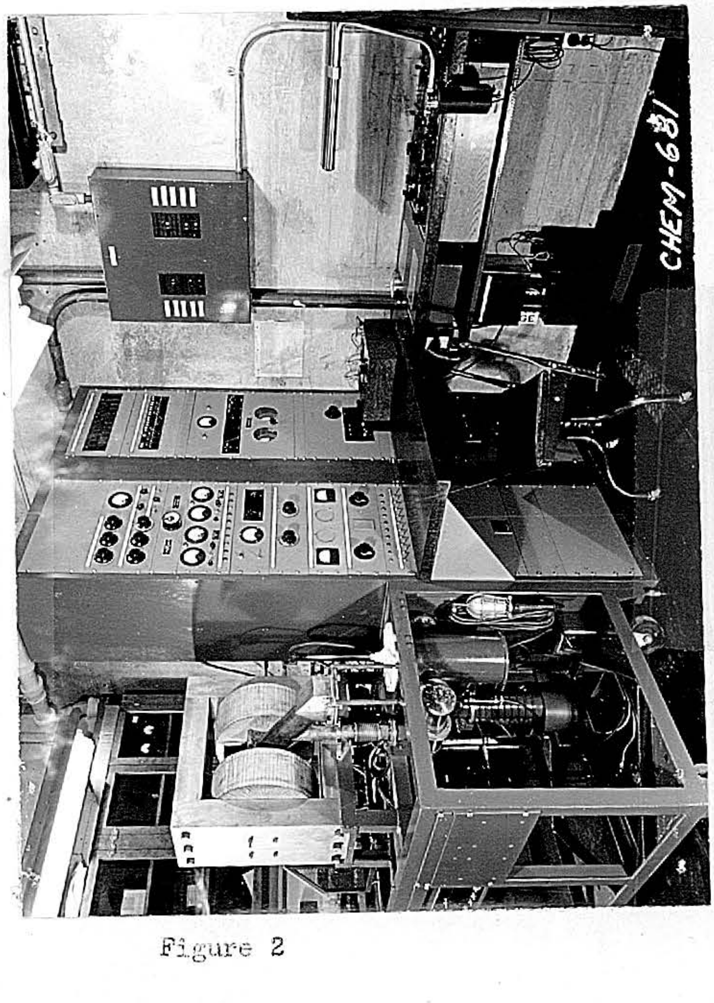

Figure 2

The source is excited by thermal means and consists of a 1 x 30 mil filament mounted on a plate, followed by a defining slit. Alternatively a bombardment source may be used for some elements. Generally the beam is recorded photographically; however, an arrangement employing an electrometer may also be used.

Measurements on the mass spectrometer give the following results:

Mass	Dispersion
6-7	57 mm
50-51	8 mm
100-101	4 mm
150-151	2.6
200-201	2.0
250-251	1.6
1000-1001	.4 (Practical Resolution)

Lines have been obtained from neodymium. However, with lead, no lines were seen from a thermal source. The instrument is not suited for abundance ratios but must be used for mass assignments.

The sample technique with the thermal source is important and the uniformity of sample on the filament has a good deal to do with uniformity of line. A photographic plate is superimposed on the initial undeveloped plate and finally both plates are developed. The stable isotopes give the location reference points for the new radioactive isotopes.

The following are the amounts and energies of various particles relative to the blackening of an Eastman III-0 photographic plate:

1×10^{10}	100 - 150 mass	8000 positive ions
1×10^{6}	1 Mev	gamma rays
1×10^{5}	1 Mev	beta particles

Depending on the material, one positive ion will strike the photographic plate for every 10^2 to 10^6 atoms placed on the filament.

The rare earths, aluminum and magnesium are examples of usable materials on the thermal source.

Metabolism of Carrier-Free Beryllium. Kenneth Scott.

Experiments have been conducted to determine the toxic qualities of soluble salts of beryllium. These salts may be compared with mercuric chloride as to toxicity and are toxic at the milligram level. They are administered in the carrier-free state.

The experiments were done with Be^7, prepared by the proton bombardment of spectrographically pure Li. The Be^7 had a half life of 52 days and a 4 per cent contamination with a 52 day β emitter.

Dosages were admjnistered to rats in the left leg by intramuscular injection with the results listed below:

Present Dose per Organ

	1 day	4 days	8 days	16 days	32 days	64 days
Liver	5	9	1.9	5.0	0.7	0.12
Kidney	3	2	0.3	0.8	0.2	0.1
Skeleton	29	32	32.0	28.0	32.0	29.0
Urine	42	38	24.2	43.0	20.0	15.0
Feces	11	10	37.8	16.0	40.0	54.0
Unabsorbed Balance in Left Rear Leg	60	58	24.0	43.0	23.0	14.0

Beryllium has been shown to cause bone tumors in rabbits.

Meson Production in the Synchrotron. L. Baumhoff.

Calculations for predicting meson production in the synchrotron have been made. The cross section for the production of mesons by γ rays has been given by Bethe as follows:

$$4\pi \frac{e^2}{\hbar c} \frac{g^2}{\hbar c} \left(\frac{h}{\mu c}\right)^2 \frac{v}{c} = 4.3 \times 10^{-28} \frac{v}{c}$$

where v is the meson velocity.

This gives the distribution velocity of mesons produced by γ rays.

The following gives the number of mesons per second produced by the γ's for a beam of one electron per sq. cm. per sec.

$$\frac{d\sigma}{dE} = 4.3 \times 10^{-28} \sqrt{1 - \left(\frac{\mu c}{E}\right)^2} \cdot \frac{1}{E}$$

The average cross section over the range of gammas that produce mesons is

$$\bar{\sigma} = 2.2 \times 10^{-28} \text{ cm}^2$$

The predicted cross section for electron-positron pair production is:

$$\frac{z^2}{(137)^3}\left(\frac{\bar{h}}{mc}\right)^2 \quad 2 \log \frac{E}{2\ mc^2}$$

Averaged over γ ray spectrum it is

$$z^2 \ (2.1 \times 10^{-26}) \text{ per nucleus}$$

so that

$$\frac{\sigma \text{ pairs}}{\sigma \text{ mesons}} = 100\ z$$

Separation of electrons from mesons is accomplished by a magnetic field and a system of slits.

RESTRICTED