oxygen. It is not surprising, therefore, that in this case the amount of decomposition and amount of synthesis do not equal 100%, as with helium. In view of these facts, we have omitted the data until the phenomena can be further investigated.

Summary

1. An apparatus suitable for producing a high frequency oscillatory electrodeless discharge has been described.

2. Under the influence of this discharge, the equilibrium

$$2CO + O_2 \rightleftharpoons 2CO_2$$

has been shown to be established, and data for this equilibrium at various pressures are given.

3. Variation in the length of time of discharge indicates that the reaction is brought to equilibrium in two minutes. Five minutes was adopted as the standard interval in these experiments.

4. The results obtained by variation in the percentage composition of the gas mixtures employed are not in agreement with the law of mass action. K_p is not a constant, but shows a decrease with increasing values of the equilibrium pressures.

5. Increased pressure decreases the extent of decomposition of carbon dioxide and increases the extent of synthesis, a fact, however, which is only in qualitative agreement with the law of mass action.

6. An inert gas, such as helium, displaces the equilibrium in the direction of increased decomposition of carbon dioxide.

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[Contribution from the Chemical Laboratory of the University of Illinois]

THE VAPOR PRESSURE OF SODIUM. LOW PRESSURE MEASUREMENTS WITH THE ABSOLUTE MANOMETER

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The reliable measurements on the vapor pressure of sodium at pressures below 0.1 mm. have all been made by the effusion method of Knudsen and the vapor pressures can only be calculated by assuming some value for the vapor density. Rodebush and Walters[1] have shown that the assumption of normal density for sodium at low pressures is justified, but it seemed desirable to check this by a direct measurement of the vapor pressure. This measurement presented an excellent opportunity to try out the absolute manometer described by Rodebush and Coons.[2]

For the measurement of vapor pressure the design of the gage was altered from that originally described, by inverting the arrangement of

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[1] Rodebush and Walters, This Journal, **52**, 2654 (1930).

[2] Rodebush and Coons, *ibid.*, **49**, 1953 (1927).

disk and seat. The disk was constructed of quartz instead of graphite. The arrangement of the apparatus is shown in Fig. 1. The substance whose vapor pressure was to be determined was placed in the flask F. The temperature of the furnace was regulated by hand and temperatures were measured with a chromel–alumel thermocouple which had been carefully calibrated at a series of fixed points. The furnace was well insulated so that its temperature changed slowly. Temperatures were read immediately before and after each measurement and the two readings usually differed by less than 0.5°. In order to prevent condensation of the saturated vapor on the movable disk or its suspension, a special heating coil was placed at J.

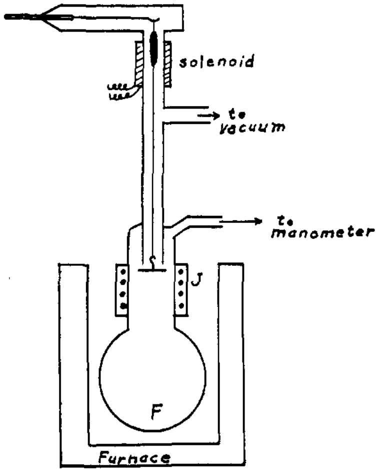

Fig. 1.

The mercury manometer shown in Fig. 1 was for the purpose of admitting air to the system at low pressure when the gage was calibrated against a McLeod gage. In addition the gage was calibrated by measuring the vapor pressure of mercury over the range 70–100°. The two calibrations were in excellent agreement.

The sodium was introduced into the apparatus by distillation with the customary precautions to avoid contamination. The results of the measurement are given in Table I and a plot of the data is shown in Fig. 2. The straight line in Fig. 2 is the graph of the equation

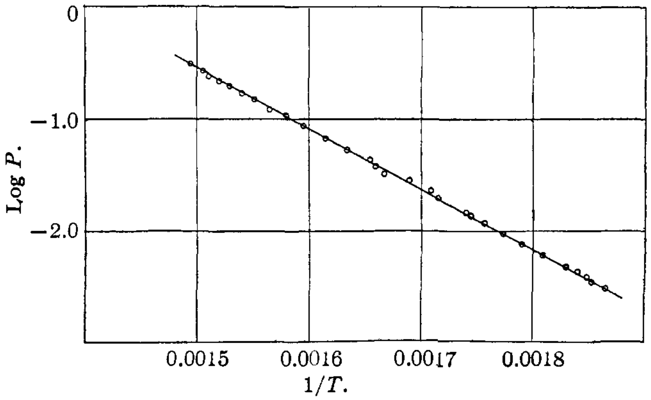

Fig. 2.

$$\log p_{\text{mm.}} = 7.551 - \frac{5400}{T}$$

TABLE I

VAPOR PRESSURE OF SODIUM

Temp., °C.	Pressure, mm.	Temp., °C.	Pressure, mm.	Temp., °C.	Pressure, mm.
396.5	0.3025	346.0	0.0677	296.5	0.01205
392.0	.2700	339.0	.0538	291.0	.00955
389.5	.2400	331.0	.0438	286.0	.00760
384.0	.2195	329.5	.0381	280.0	.00603
381.0	.1952	323.0	.0332	273.0	.00480
376.0	.1702	319.5	.0289	271.0	.00427
371.0	.1517	312.5	.0235	268.0	.00381
366.0	.1233	310.0	.02045	267.0	.00347
360.0	.1074	302.0	.01520	263.0	.00303
354.0	.0876	300.0	.01385		

given by Rodebush and Walters as the best representation of all previous data. It is evident from Fig. 2 that the new data confirm the correctness of the equation in a most satisfactory manner.

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[CONTRIBUTION FROM THE GEOPHYSICAL LABORATORY, CARNEGIE INSTITUTION OF WASHINGTON]

ISOTOPES AND THE PROBLEM OF GEOLOGIC TIME

BY CHARLES SNOWDEN PIGGOT

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Time can be estimated only by reference to some change, and geologic time is no exception. Any change demands a beginning and an ending condition, and a rate.

The phenomena which fulfil these conditions throughout the great lengths of geologic time are: (1) denudation and sedimentation, (2) the salting of the ocean and (3) radioactive disintegration of uranium into lead.

They are all of the hour-glass principle and if we could measure the amounts involved at the beginning and at the end—and ascertain the rate of change—the problem of geologic time would be a very simple one. But of the three, only the last can be measured with the accuracy necessary to inspire confidence in the result. We can well imagine what a difficult task it was to arrive at any accurate estimate of the amount of material that had been eroded from the highlands and deposited in the hollows to form sedimentary formations, particularly when it was known that these sedimentary formations often became, in turn, highlands from which further erosion took place.

It was not much easier to estimate the rate at which sodium was being leached from the igneous rocks and carried into the sea. It was easy to determine the sodium in a rock, and in a sample of sea water; but to decide on the amount of rock and the amount of sea was not so simple, nor did such