compare the last two differences in grams in the third column of figures above. Evidently the divergence is due primarily to the lead and not to the nitrate ion contained in the solution. Yet another way, of course, is to compare the molal solubilities of lead nitrate per 1000 g. of water, which are, respectively, 1.7993 for common lead nitrate and 1.7991 for uranio lead nitrate.

The outcome of this work, then, by finding no appreciable difference in either the refractive index or molal solubility of samples of lead nitrate containing isotopes of widely different atomic weights, confirms earlier work upon other properties of these interesting substances, and affords further support for the hypothesis due to Russell, Fleck, Soddy and Fajans. Evidently weight (or mass) is the prime distinguishing feature of the two kinds of lead here studied, as it was in other cases.

If this is found universally to be the case, weight (or mass) must, of course, be chosen as the basis for any method of separating the isotopes when they have been mixed. In view of these considerations, clearly the only reasonable hope of separating the isotopes of lead lies in the method of fractional diffusion, as has been already suggested by many other experimenters on this subject. Mr. Harold S. King, of this University, has made very promising preliminary experiments preparatory to such an undertaking, and expects to continue them (in collaboration with one of the present authors) when his time, now devoted to war work, is freed at the conclusion of the world conflict.

We are glad to acknowledge our indebtedness to the Carnegie Institution of Washington for financial assistance in this research.

Summary.

This paper recounts measurements of the refractive indices and molal solubilities of two samples of ordinary lead nitrate and uranio lead nitrate. No differences between the two samples within the limit of error of measurement were found, as regards either property. The indices of refraction of the crystalline nitrate (for the sodium lines) were found to be, respectively, 1.7815 and 1.7814, and the molal solubilities, respectively, 1.7993 and 1.7991 per thousand grams of water.

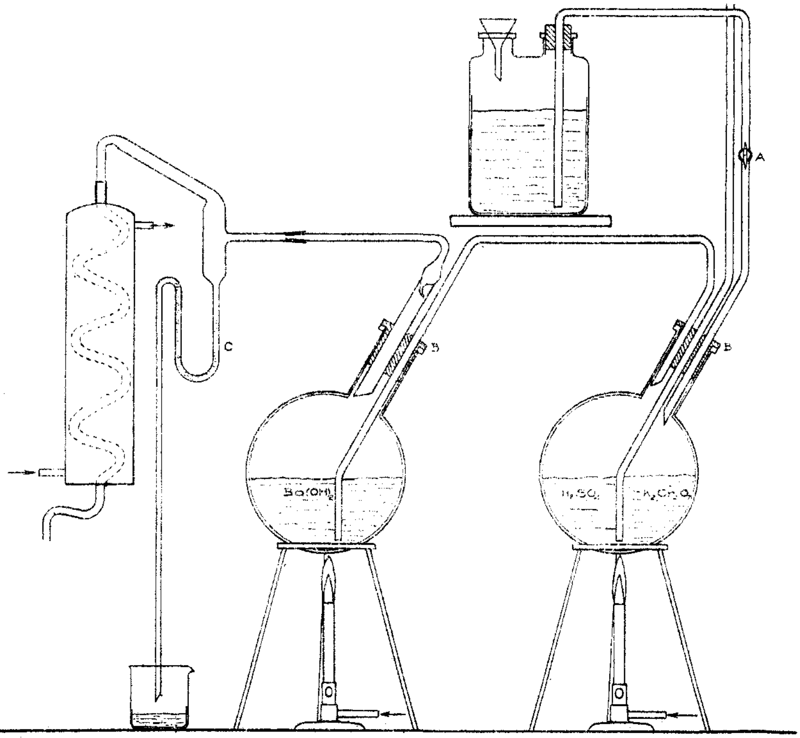
CAMBRIDGE, MASS.

NOTES.

A Still for the Continuous Preparation in Quantity of Water of High Purity.—Two 5-liter pyrex glass bulbs are set at an angle of about 60°. The first of these is equipped with a pressure tube, raw distilled water supply and delivery tubes, the second, with inlet tube and exit column. The latter is a tube 2 × 20 cm. The upper end of the exit column is blown in such a way as to form a trap device, which reduces the possibility of impurities being carried over into the condenser. The column finally connects to the adapter through a ground glass joint. The adapter is after the Findlay type,[1] but modified by blowing on a trap and increasing the length of the exit arm. The latter extends upward and then directly downward to the block tin worm condenser.

The still can be adjusted to work continuously by a little attention occasionally to the supply of raw distilled water from the siphon bottle above. It will furnish a liter an hour, although larger quantities could be obtained easily.

In the first bulb a 10% potassium dichromate solution in 5% sulfuric acid is used, in the second bulb a saturated solution of barium hydroxide.



To insure more even boiling, small pieces of pipe clay are placed in the bottom of each bulb.

The features of the apparatus which the authors believe are departures from the ordinary forms are: first, the use of portland cement stoppers which are molded to fit the flasks and made to fit tightly by means of asbestos cord, and which carry the delivery and exit tubes tightly and permanently; second, the modified adapter which automatically adjusts the drip water (water mechanically carried over); and third, the complete elimination of all rubber and cork parts from the apparatus.

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[1] Findlay, *Pract. Phys. Chem.*, 1915, pp. 179, 180.

It might be added that before use the cement stoppers were boiled in distilled water for 6 hours. The use of cement stoppers is not restricted to an apparatus like the above, but could be extended to other forms where rubber or cork is objectionable.

The accompanying figure will illustrate the apparatus. A, adjustable water supply; B, cement stoppers; C, automatic adapter.

HAL W. MOSELEY,
ROLLIN G. MYERS.

RICHARDSON CHEMICAL LABORATORY,
TULANE UNIVERSITY, NEW ORLEANS, LA.

A Fractional Distillation Tube.—A fractional distillation tube can be made by fastening together Kjeldahl connecting bulb tubes by means of rubber tubing as shown. A bent glass tube can be substituted for the fractional distillation tube connected to the uppermost bulb.

W. G. FRIEDEMANN.

OKLAHOMA AGRICULTURAL EXPERIMENT STATION,
STILLWATER, OKLA.

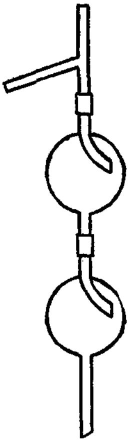

Fig. 1.

[CONTRIBUTION FROM THE CHEMICAL LABORATORY OF THE DAKOTA WESLEYAN UNIVERSITY.]

THE PREPARATION OF METHYLAMINE.

BY HILTON IRA JONES AND RUTH WHEATLEY.

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During a research on the commercial synthesis of adrenalin in 1907–1908, one of us had occasion to require large quantities of methylamine. We could not buy and were therefore forced to make what we needed. We at that time tried out all the methods we could find described in the literature for the production of methylamine, and found that described by Brochet and Cambier[1] was easily the best.

For some two years past we have been engaged in a study of certain organic reactions in which a gas is evolved. Among some score of reactions studied has been this old one we formerly used for methylamine. We had intended to submit our results altogether in a paper on "The Effects of Reduced Pressure on those Organic Reactions in which a Gas is Evolved" but the recent appearance of an article by Werner[2] has made us resolve to publish these results separate from the rest of the forthcoming series.

Since organic reactions are not ordinarily ionic, the direction they take must be determined by the relative concentrations of the reacting factors, many of which are no doubt the result of alkylidene dissociation of

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[1] *Bull. soc. chim.*, 13, III, 392 (1895).

[2] *J. Chem. Soc.*, 11, 844 (1917).