diameters. Since vibration frequency varies inversely as the diameter of gel column, tension must exert some influence on pitch.

4. Vibration frequency varies directly as the concentration of silicic acid, increases with excess of mineral acids, but decreases with excess of organic acids.

5. Syneresis increases with increases in concentration of silicic acid, increases with excess of mineral acids, and decreases with excess of organic acids. For acid gels the same factors that increase vibration frequency (by increasing tension and thus effective rigidity) also increase syneresis. Vibration and syneresis have a direct relation to tension. Basic gels are somewhat abnormal in this respect.

6. Syneresis (separation of water solution from gels) varies directly as the free surface. When gels contract in vaselined tubes far more liquid separates than from equal volumes of gel in plain tubes to which the gel adheres.

7. The extreme in syneresis was observed with moderately basic gels. The solution synerized was as much as 90% of the volume of the gel in some instances.

OBERLIN, OHIO.

THE VAPOR PRESSURE OF TETRANITRO-METHANE.[1]

BY ALAN W. C. MENZIES.

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The measurements in a portion of the range here reported were made in 1918 at the request of the Division of Chemistry and Chemical Technology of the National Research Council, and were desired for purposes connected with the war. Because such data have a permanent value, however, it was thought desirable to extend the measurements over a considerably wider range than was called for at that time.

The sample of tetranitro-methane furnished for the work, about two cc., was somewhat small for effective purification by fractionation. Its boiling point was found to be 125.7° under 760 mm. pressure, however, which is in close agreement with the reported values of Schischkow[2] and of Chattaway,[3] both of whom, from independent observations, obtained 126° as the normal boiling point. Berger[4] states that the boiling point of his, apparently less homogeneous, preparation was 124–125° under 750 mm. pressure; and this corresponds to temperatures 0.4° higher at 760 mm. In spite of this concordance in boiling point, the possibility of impurity remains the chief uncertainty in the data here recorded; and it is therefore superfluous to elaborate details of the measurements.

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[1] N. R. C. War Problem No. 142.

[2] *Ann.*, **119**, 248 (1861).

[3] *J. Chem. Soc.*, **97**, 2099 (1910).

[4] *Bull. soc. chim.*, [4] **9**, 26 (1911).

A modified form of the static isoteniscope method was used, with the precautions and corrections previously described.[1] The thermometry was in agreement to 0.1° with the 1914 scale of the Reichsanstalt. Chattaway and Berger both report slight decomposition at the boiling point. The behavior of the sample studied in the isoteniscope made it clear that such decomposition is appreciable even below 100°.

The values in the table below are given for every 5°, and were obtained graphically from the observed values.

TABLE I.

Vapor Pressure of Tetranitro-methane.

Temperature. Degrees.	Pressure in mm. Hg at 0°.	Temperature. Degrees.	Pressure in mm. Hg at 0°.
40	26.6	90	239
45	34.4	95	286
50	44.2	100	339
55	56.1	105	400
60	70.6	110	470
65	88.1	115	550
70	109	120	640
75	134	125	743
80	164	125.7	760
85	199		

Using the vapor-pressure curve thus defined to test the character of the liquid according to the criterion suggested by Hildebrand,[2] one obtains, using his units, a value of 13.9 for the entropy of vaporization divided by *R* at the temperature (near 70°) at which the concentration of the vapor is 0.00507 mole per liter. Assuming the vapor is normal, this would indicate slight, if any, association or abnormality in the liquid at this temperature.

PRINCETON, N. J.

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

ELECTROMETRIC TITRATIONS, WITH SPECIAL REFERENCE TO THE DETERMINATION OF FERROUS AND FERRIC IRON.[3]

BY J. C. HOSTETTER AND H. S. ROBERTS.

Received July 12, 1919.

Introductory.

In the study of the oxides of iron now in progress at the Geophysical Laboratory, it has become increasingly evident that the ordinary methods for determining small amounts of ferrous oxide in the presence of much ferric oxide are not susceptible of the precision attained in some of the

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[1] See THIS JOURNAL, 32, 1412 (1910).

[2] THIS JOURNAL, 37, 970 (1915).

[3] Read at the Buffalo Meeting of the American Chemical Society, April 9, 1919.