termined without a knowledge of their complexity in solution. The complex present in solution in equilibrium with the normal telluride has a composition corresponding with that of the formula Na_2Te_2. In a subsequent paper it will be shown that the properties of the complex telluride correspond with this formula.

Summary

1.   The reaction between sodium and tellurium in liquid ammonia has been studied and the composition of the resulting solutions has been determined under various conditions.

2.   The initial compound formed is the normal telluride, corresponding to the formula Na_2Te. In equilibrium with the normal telluride, the complex in solution has a composition corresponding to the formula Na_2Te_2. In equilibrium with free tellurium the solution has a composition which varies as a function of the concentration. The maximum amount of tellurium present corresponds approximately with the formula Na_2Te_4.

3.   The significance of the results obtained is briefly discussed.

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NOTE

The Stability of Phthalate Solutions as Standards in Hydrogen-ion Work.—Solutions of potassium hydrogen phthalate have long been used for the standardization of alkaline solutions. Clark[1] more recently has recommended their use as standards in hydrogen-ion work. Their value for the latter use has been questioned by Oakes and Salisbury[2] who found that solutions of the most carefully purified salt gave a progressive decrease in hydrogen-ion concentration when in contact with the hydrogen electrode. Merrill[3] also noted drifts in potential when phthalate solutions were used with the hydrogen electrode.

The potassium hydrogen phthalate used in our experiments was obtained from a manufacturer specializing in buffer salts for hydrogen-ion work and was not purified further by us. It was, however, tested by titration against sodium hydroxide solution with phenolphthalein as an indicator and found to give the theoretical value. A 0.2 M solution of the salt was prepared and from a portion of this solution another was made, as described by Clark,[1] to give a Sörensen value P_H 5.6. The hydrogen-electrode potentials of these solutions were obtained with a Bunker hydrogen electrode, a Leeds and Northrup Type "K" potentiometer and a Weston cell calibrated by the Bureau of Standards.

¹ Clark, "The Determination of Hydrogen Ions," Williams and Wilkins Co., Baltimore, **1920.**

² Oakes and Salisbury, THIS JOURNAL, **44,** 948 (1922).

³ Merrill, *ibid.,* **43,** 2688 (1921).

In these determinations the chain, Hg|HgCl.KCl (sat)|KCl(sat)|buffer solution |H$_2$, was used. The entire chain was kept in a water thermostat at 25° ± 0.05°. The system was standardized against a carefully prepared phosphate buffer solution (P_H 7.6) using the following formula in the calculation of the results: $P_H = (E_{obs.} - E_{calc.})/0.0002T$. By this method we obtained a value of 0.2437 volts for the saturated calomel electrode referred to the normal hydrogen electrode as zero.

Potentiometer readings were taken over a period of 48 hours with the 0.2 M potassium hydrogen phthalate solution and 33 hours with the P_H 5.6 buffer. Colorimetric determinations made before and after each run showed no change in value. The data obtained are given in Tables I and II.

TABLE I   TABLE II

DATA

0.2 M Potassium hydrogen phthalate   Phthalate buffer P_H 5.6

Time Hours	Obs. e.m.f.	P_H value	Time Hours	Obs. e.m.f.	P_H value
0.5	0.4741	3.86	0.5	0.5777	5.60
1.5	0.4743	3.86	1.0	0.5776	5.60
3.0	0.4740	3.86	3.0	0.5772	5.59
6.0	0.4739	3.86	6.0	0.5771	5.59
13.0	0.4748	3.87	14.0	0.5777	5.60
20.0	0.4751	3.88	21.0	0.5778	5.60
24.0	0.4750	3.88	24.0	0.5777	5.60
30.0	0.4747	3.87	27.0	0.5776	5.60
48.0	0.4748	3.87	33.0	0.5777	5.60

The data show a variation with the 0.2 M phthalate solution of slightly more than 1 millivolt and with the P_H 5.6 buffer of less than 1 millivolt. These variations agree closely with those mentioned by Clark.[4]

Our results indicate, therefore, that potassium hydrogen phthalate may be obtained in a sufficiently pure state to give constant potentials with the hydrogen electrode.

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4 Clark, THIS JOURNAL, 44, 1072 (1922).