In order to check the results obtained, determinations were repeated at a few of the higher temperatures, using Speyers' apparatus with slight modifications. The results obtained with this apparatus agreed closely with the first determinations. A comparison of Speyers' data and those obtained in this study is shown in Fig. 1 and Table I.

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Electrode Vessel for Liquids Heavier and Lighter than the Liquid Junction Potential Eliminator.—In the electrode vessel to be described the hydrogen-ion concentration of solutions having a density equal to or greater or less than that of the bridge solution can be measured. Sharp and reproducible liquid junctions or flowing junctions can also be conveniently and rapidly made between the electrode solution and the bridge solution by including the feature embodied in the apparatus of F. A. Elliott[1] and Elliott and Acree.[2]

The ground-glass joints and the intricate stopcocks of the Elliott-Acree apparatus, which can be made and repaired only by well equipped and highly skilled glass blowers, are not used, thus making the new apparatus less expensive and more durable. Furthermore, solutions containing suspended matter, such as quinhydrone in quinhydrone electrode work or soil suspensions which would settle down into the bridge liquid in the Elliott or Elliott-Acree apparatus, may be tested without developing this difficulty.

Electrode Vessel

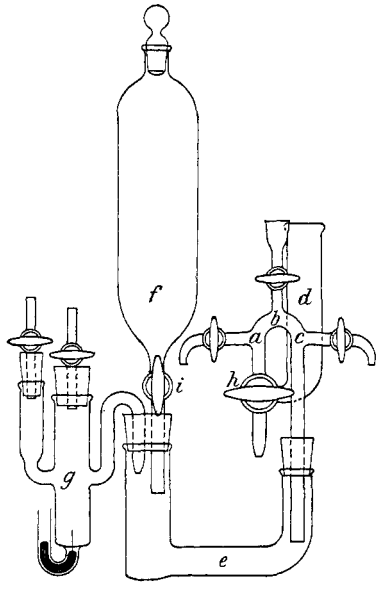
The tube *d* for holding the electrode solution is connected by a loop *a*, *b*, *c* to the bridge tube *e*, which contains the bridge solution, in such a way that the liquid junction can be made at either of two points in the loop, depending upon the densities of the two solutions making contact.

At *a* and *c* on the loop are connected horizontal branch tubes, with stopcocks for making liquid junctions at these points. At *b* is another branch tube, with a stopcock, through which air may be removed from the loop when the latter is being filled. For liquids denser than the bridge solution the junction contact is made at *a* by filling the empty loop *a*, *b*, *c* to the stopcock *h* with bridge solution and allowing the denser solution from *d* to rise from *h* to *a* by drawing off solution through Stopcock *a*. For liquids

[1] "Elliott Ion-O-Meter," The Will Corporation, Rochester, N. Y., Bulletin 100, **1921.**

[2] "Hydrogen-ion Determinations," *Pyrolectric Bi-monthly Bulletin*, **14,** September, 1920, pp. 3–8 (Pyrolectric Instrument Company, Trenton, N. J.). Slagle and Acree, *Abstracts of Bacteriology*, **5,** 5 (1921).

less dense than the bridge solution the junction is made at *c* by filling the empty loop *a*, *b*, *c* with the solution from *d* and drawing off solution through the stopcock *c* until sharp contact is made. A three-way, T-bore stopcock *h* is placed between the loop and the tube *d*, which is joined as closely as possible to the stopcock *h*, to minimize the distance between the liquid junction at *a* and the position for the platinum electrode, particularly when working with solutions of low conductivity, such as concentrated sugar solutions. The tube *d* connects in the horizontal position to Stopcock *h*, so that any suspended matter which may settle from the electrode solution does not interfere with the stopcock and is easily washed out through the bottom arm of the stopcock *h*.



To empty the loop for cleaning and changing solutions, the stopcock *h* is opened to bring all three branches together. Stopcocks *a*, *b* and *c* are opened and the solution is drained.

The electrode vessel is best made of Pyrex glass.

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A Sensitive Glass Manometer for Gases which Attack Mercury.[1]—Baume and Robert[2] constructed a manometer for use with gases that attack mercury, consisting essentially of a flat glass diaphragm exposed to the corrosive gas, whose motion was communicated to a superincumbent column of mercury. This liquid is not suitable for the thin diaphragms required for sensitive manometers, and we have therefore substituted for it a light paraffin oil.

The construction of such a manometer, using this liquid, is evident from Fig. 1. M is a thin, disk-shaped, glass membrane 5 to 6 cm. in diam-

[1] Translated from the German and abbreviated by A. L. Dixon.

[2] Baume and Robert, *Compt. rend.*, **168,** 1199 (1919). See also, for similar manometers, Ladenburg, *Verh. Deutsch. physik. Ges.*, **3,** 20 (1906). Bodenstein, *Z. physik. Chem.*, **69,** 26 (1909). Scheffer and Treub, *ibid.*, **81,** 308 (1913). Johnson, *ibid.*, **61,** 457 (1908). Particularly, Daniels and Johnston, THIS JOURNAL, **43,** 53 (1921).