Potential Measurements.—After three days moist air was introduced at the surface of the mercury, at first only a few bubbles and later as much as a liter. Initial values from 0.2 mv. to 0.4 mv. lower were obtained but in fifteen minutes the cells would be back to their normal voltage and remained constant as before for thirty days. Replacing the electrolyte produced no change in the potential.

The following values of the hydrogen–mercury–mercurous sulfate cell are shown in Table I.

TABLE I

VALUES OF THE HYDROGEN–MERCURY–MERCUROUS SULFATE CELL

Molality of sulfuric acid	0.1000	0.2101
Exptl. e.m.f., volts	0.73694	0.71858
Interp. e.m.f. (R. and C.)[6]	0.73697	0.71852

Summary

Mercury is dissolved by dilute sulfuric acid containing air.

The effect of air upon the potential of the mercury–mercurous sulfate electrode in moderately concentrated acid solution is negligible when the electrodes are prepared in the usual manner.

BERKELEY, CALIFORNIA

NOTE

Sodium Maleate—A Buffer for the *P*H Region of 5.2 to 6.8.—In the course of a research on autoxidation the author has found that the buffering range of sodium hydrogen maleate–sodium hydroxide mixtures extends from a *P*H of 5.2 to 6.8, giving maximum buffering power in the region where phthalate and phosphate buffers have the least. The lower valence of the ions results in a smaller salt effect than is the case with citrate buffers.

Sodium hydrogen maleate is easily prepared in pure form as $NaHC_4H_2O_4\cdot 3H_2O$.[1] The following method was found convenient. A liter of aqueous solution containing 250 g. of maleic acid was exactly halved. To the first half was added 6 *N* sodium hydroxide until the precipitate first formed had redissolved, then normal sodium hydroxide to the neutral point. The two halves were mixed, cooled in an ice-bath and the crystallized salt was filtered off. Recrystallization is very easy. One recrystallization was found sufficient for a product made from Kahlbaum acid. When dried in a warm place in the open room, the salt conforms exactly to the trihydrate formula and may be weighed as such. Preliminary tests indicated that it might even be used as a primary standard in acidimetry.

---

[6] Randall and Cushman, THIS JOURNAL, **40**, 393 (1918).

[1] Büchner, *Ann.*, **49**, 64 (1844); Weiss and Downs, THIS JOURNAL, **45**, 2342 (1923).

The following table gives the composition of mixtures for *P*H values from 5.2 to 6.8, as taken from a curve constructed from several titrations with a quinhydrone electrode against a saturated calomel cell at 25°.

TABLE I

COMPOSITIONS OF MIXTURES (TAKEN FROM CURVE)

Fifty cc. of *N*/5 sodium hydrogen maleate in each case; diluted to 200 cc.

*P*H	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8
N/5 NaOH, cc.	7.2	10.5	15.3	20.8	26.9	33.0	38.0	41.6	44.4

The base was added from a buret to a maleate solution containing 0.109 g. of quinhydrone. The region of each titration was small, so that the total volume could be kept within limits of 100 ± 3 cc. Potentiometric measurements of the cell

Au | buffer–quinhydrone | sat. KCl | sat. calomel cell

were used for calculation of *P*H according to the usual method,[2] ignoring salt effect and contact potentials. Results from several titrations over different regions, comprising twenty-five measurements, were united into a single curve, from which the above figures were interpolated.

CONTRIBUTION NO. 570 FROM THE
DEPARTMENT OF CHEMISTRY
COLUMBIA UNIVERSITY
NEW YORK, N. Y.

J. W. TEMPLE

RECEIVED FEBRUARY 26, 1929
PUBLISHED JUNE 5, 1929

[CONTRIBUTION FROM THE ROCKEFELLER PHYSICAL AND BAKER CHEMICAL LABORATORIES OF CORNELL UNIVERSITY]

THE ABSORPTION SPECTRA OF SOME PHTHALEINS OF THE TRIHYDROXYPHENOLS[1]

BY R. C. GIBBS AND C. V. SHAPIRO[2]

RECEIVED AUGUST 27, 1928 PUBLISHED JUNE 5, 1929

In several previous papers data have been presented on the absorption spectra of the benzeins and phthaleins derived from some of the mono- and dihydroxybenzenes, for example, phenol,[3] *o*-cresol,[3] resorcinol[4] and hydroquinol.[5] The present study of the trihydroxy derivatives includes

---

[2] Biilmann and Lund, *Ann. chim.*, 16, 321 (1921).

[1] The investigations upon which this article is based were supported by grants from the Heckscher Foundation for the Advancement of Research, established at Cornell University by August Heckscher.

[2] Heckscher Research Assistant in Physics and Chemistry, Cornell University, 1923–1928.

[3] Orndorff, Gibbs and co-workers, THIS JOURNAL, (a) **47**, 2767 (1925); (b) **48**, 1994 (1926); (c) **49**, 1545 (1927); (d) **49**, 1588 (1927); (e) **50**, 2798 (1928).

[4] Orndorff, Gibbs and Shapiro, *ibid.*, (a) **48**, 1327 (1926); (b) **50**, 819 (1928); (c) **50**, 1755 (1928).

[5] Shapiro, *ibid.*, **50**, 1772 (1928).