

NOTES

A Cell for the Observation of Colloidal Solutions for Use with Substage Ultra-condensers.—In laboratories where an ultramicroscope of the Siedentopf and Zsigmondy type is not available, one of the various types of substage dark field condensers, such as the paraboloid or cardioid, is usually employed for the examination of colloids.

It has been stated that such a means of ultramicroscopic observation is useless for direct quantitative work.¹

Burton² has, however, shown how a hemacytometer slide may be used for the estimation of the number of particles in a colloidal solution.

The method has the inconvenience that it is necessary to remove the slide and to readjust the optical arrangement in order to examine a fresh sample of solution. Extended counts become, therefore, somewhat tedious.

An apparatus has been constructed by means of which a series of solutions or of samples of the same solution may be passed through the cell without disturbing the adjustment.

The apparatus which is shown in plan and section in the figure consists principally of a brass block A which is bored at points diametrically opposite to receive two copper tubes of about 2 mm. internal diameter. The tubes fit closely into the holes and are further held by externally soldering. To the bottom of the brass block, which is ground perfectly flat, is cemented a carefully selected cover glass B. The writer used Canada balsam, though this is not an ideal cement to unite metal to glass. Whatever cement is used, the glass must approach closely and uniformly to the brass to ensure that the lower surface of the glass is perfectly flat.

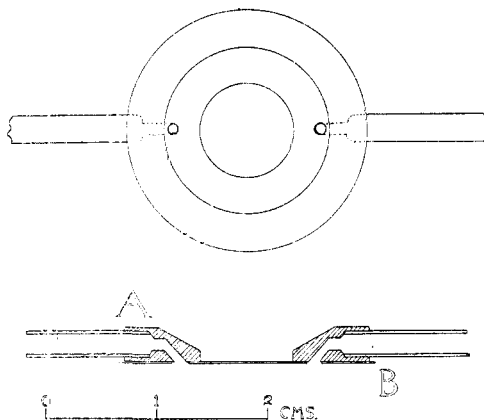


Fig. 1.

When the cover glass is cemented in position, two holes are bored through it to meet the holes in the brass block. This is a very easy operation if a piece of wood through which are bored two holes of the desired diameter and position is temporarily cemented to the glass with some water-soluble cement such as ordinary glue. The holes are bored by means of a copper tube charged at the end with carborundum and glycerine, the tube ro-

¹ King, "Third Rep. Brit. Assoc. Colloid Chemistry," p. 36.

² Burton, "Physical Properties of Colloidal Solutions," 1921, p. 124.

tating in the wooden block which can afterwards be removed by soaking in water.

It will thus be seen that the arrangement has the advantage of a reinforced cover glass and as both surfaces of cover glass and slide are flat it will be found unnecessary to cement the two together. The apparatus is held in position on the slide, while being fixed in the microscope by two lumps of plasticine, one on each copper tube, and is further held in position by the spring clips of the microscope stage which press on the tubes.

To the copper tubes are affixed a delivery funnel with a clip and an exit tube.

By opening the clip it will be found that the colloid solution passes through the cell. Since the hemacytometer slides contain a channel round the central portion, it was at first feared that the solution might go round this channel instead of over the graduated portion. By observing the motion through the microscope, it can be seen that this is not the case.

Moreover, it can be very easily seen when the liquid is running through the cell whether any particles are stuck to the bottom of the cell or on the cover glass. This is an important advantage, as such particles, which may be of foreign matter, may constitute a serious source of error in counting the number of particles in a solution.

It would be an additional advantage to gold-plate the whole of the metal portion.

Finally it may be stated that it is easy to obtain such hemacytometer slides of any specified thickness to suit the particular ultra-condenser, and of any desired depth of cell. The writer has used slides of thickness 1.1 to 1.2 mm. to suit a Zeiss Paraboloid, and of depth 0.1 mm. and 0.02 mm. made by Messrs. Hawksley of London.

FRED FAIRBROTHER

CONTRIBUTION FROM THE CHEMICAL DEPARTMENT,
VICTORIA UNIVERSITY,
MANCHESTER, ENGLAND
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Instability of Phthalate Potentials.—The note by Oakes and Salisbury on the instability of phthalate potentials, an instability which seems to have been observed by Merrill, is completely at variance with the author's experience. In the course of several years' work with the hydrogen electrode, 0.05 *M* potassium hydrogen phthalate solutions have been used as a "working standard" and have given no evidence of instability which could be considered convincing. It goes without saying that among hundreds of measurements there have occurred occasional potentials which could justly be called abnormal. Once on leaving an electrode, having an exceptionally light coating of iridium, in contact with a phthalate so-

lution, the potential drifted in a direction opposite to that noted by Oakes and Salisbury and entirely out of the range of any possible hydrogen concentration. Indicator measurements showed that no significant change in Sørensen value had taken place in the solution. However, the electrode had turned bright. Occasionally, "abnormal" potentials, suggesting a change of about 0.05 Sørensen units, have been noted.

Since the method used in almost every case permits the rapid attainment of equilibrium, it might be assumed that the period of the experiment was in no case sufficient to have detected drifts. However, Oakes and Salisbury record a rate of drift which would at once have been detected in the author's apparatus.

With the suspicion that previous observations might have been clouded by a slow and undetected drift where Oakes and Salisbury encountered a rapid one, I have recently set up an outfit not designed for accurate control of liquid-junction potential differences but better adapted for observations over long periods than the shaking electrode vessel. Duplicate vessels were used, holding in one case an electrode of iridium gray on gold-plated platinum and in the other case two electrodes, one of platinum black on gold-plated platinum and the second of palladium black on rhotanium alloy. The drifts over 24 hours were within one millivolt. For the last 18 hours no drift amounting to more than 0.000,05 volt (the limit of the potentiometer's adjustment) was detected. No change in the Sørensen value of the solution was detected with indicators.

I am at a loss to account for the radical difference in my observations and those of Oakes and Salisbury, and must say that after several years' use by others phthalate has not to my knowledge fallen under suspicion in the manner noted by Oakes and Salisbury.

WASHINGTON, D. C.

WM. MANSFIELD CLARK

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[CONTRIBUTION FROM THE LABORATORIES OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH]

SYNTHESES IN THE CINCHONA SERIES. VII. 5,8-DIAMINO-DIHYDROQUININE AND 5,8-DIAMINO-6-METHOXYQUINOLINE AND THEIR CONVERSION INTO THE CORRESPONDING AMINOHYDROXY AND DIHYDROXY BASES¹

BY WALTER A. JACOBS AND MICHAEL HEIDELBERGER

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In a former communication² amino-azo dyes prepared from 5-amino-dihydroquinine and the analogous 5-amino-6-methoxyquinoline were described. These substances were shown to be easily converted by acids into the corresponding hydroxyazo dyes. By reduction of 8-(*p*-sulfo-

¹ Presented at the Annual Meeting of the American Chemical Society, New York, September, 1921.

² THIS JOURNAL, 42, 2278 (1920).