

flames, even when the temperature of combustion was much reduced by dilution of the gas with carbon dioxide. The same author also found a slight formation of nitrous acid in the case of air burning in an atmosphere of illuminating gas, where a reducing atmosphere would always be present.

SUMMARY.

Oxides of nitrogen are always formed in explosion analysis in amount increasing with the violence of the explosion. The dilution recommended by Bunsen, when exploding in eudiometer tubes under reduced pressure, is not sufficient when working with the Hempel explosion pipette. If the explosive ratio is kept between four and three, the error is negligible in the technical analysis of gases almost entirely hydrogen. The presence of small amounts of methane increases the error and if large amounts of methane are present, the error may easily amount to a per cent. or more. The explosive ratio should be kept between four and three as in the case of hydrogen. The method of Dennis and Hopkins tends to give high results, and the errors may easily become of importance if care is not taken to avoid heating the spiral too hot and too long. Neither the explosion method nor any method involving active combustion can give strictly accurate results.

ANN ARBOR, MICHIGAN,
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[CONTRIBUTIONS FROM THE CHEMICAL LABORATORY OF BRYN MAWR COLLEGE.]

NOTE ON SOME MODIFIED FORMS OF PHYSICO-CHEMICAL MEASURING APPARATUS.

BY ALLERTON S. CUSHMAN.

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a. A CONVENIENT ARRANGEMENT OF THE KOHLRAUSCH-OSTWALD CONDUCTIVITY CELL.

IN working with the usual form of Kohlrausch-Ostwald conductivity cell the writer has experienced some difficulty in arranging the electrodes so that they may be easily adjusted at any required distance one from the other, while on the other hand, when once set to a position the constant for the cell may be depended upon. The growth of physico-chemical methods of investigation has been so sudden that the manufacturers of instruments of precision have not kept pace with the requirements of

modern research. The physical chemist therefore has been obliged to depend largely on "home-made," and too often very imperfect, apparatus. It is not uncommon in many laboratories to see this important and delicate measuring instrument arranged in such a way that the electrodes are most insecurely fastened into place by means of splashes of sealing-wax, or, as is the case with the cells ordinarily supplied by the dealers, the mere friction of the glass supports of the electrodes against the holes in the ebonite cover through which they pass, is depended upon to insure the constancy of the cell.

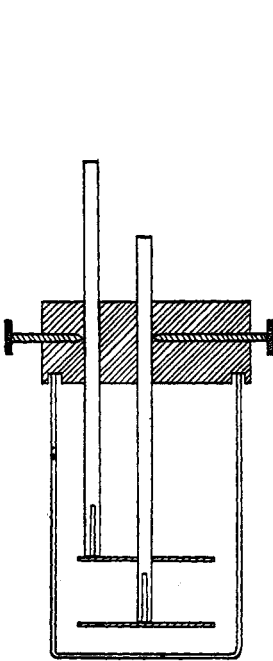


Fig. 1.

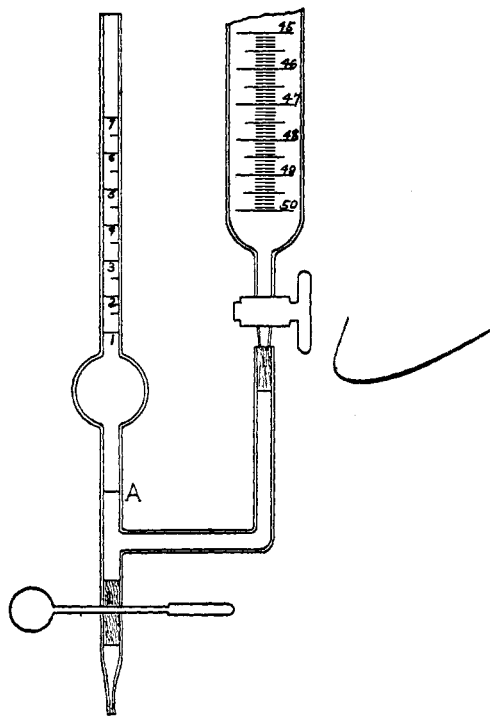


Fig. 2.

In Fig. 1 of the accompanying illustration is shown an arrangement of the cell which very admirably meets every requirement. The glass tubes into which the electrodes are fused, fit snugly, but without binding, the holes in the heavy ebonite cover, which is in cross-section in the cut. The brass set-screws as shown are

furnished with ebonite tips, which bear gently on the glass supports and remove the danger of contamination of the electrolyte by any accidental wetting of the screw points. A cell of this description which has been in frequent use for more than a year has not changed its constant. The electrodes are made of platinum, of nearly a millimeter in thickness and are secured to the glass supports with such care that they are quite immovable.

b. ON A MODIFIED FORM OF THE OSTWALD BURETTE-CALIBRATOR.

The usual Ostwald burette-calibrator has the general form shown in Fig. 2, without the etched scale upon the pipette stem. It is calibrated to deliver exactly 2 cc. between two etched marks and the deviations of the burette scale from the truth are then found by a series of deliveries from the pipette. The initial standardization of the pipette requires a number of careful and difficult weighings of water. In order to avoid this standardization the writer has used a pipette with a scale etched upon the stem as shown in the cut. It is only necessary to take care that when the pipette is filled to the etched mark at A that about 2 cc. more will put the meniscus somewhere near the middle of the pipette scale. Starting with the burette filled to the zero reading and the lower meniscus coinciding with the mark at A, the first 2 cc. of the burette scale are delivered into the pipette and the pipette-scale reading noted. The pipette is then emptied to A and the next 2 cc. of the burette delivered. This operation is repeated down the length of the burette. One set of readings can be made starting from the zero point of the burette and another set starting from the 1 cc. graduation mark. In order to apply the corrections it is only necessary to standardize the pipette scale against the burette scale by a few fractional fillings of the pipette. In applying the corrections any of the ordinary methods of calibration may be employed, such as assuming the first 2 cc. of the burette correct, and, then distributing the deviations from the truth. For most laboratory work exceedingly small deviations are negligible, but the fact that a serious deviation from the truth may introduce a constant error into a series of observations, makes a rapid and easy method of becoming acquainted with the variations of burette scales of great value. This instrument permits this to be done with but little expenditure of time and without the necessity of making a single weigh-

ing. Bad burettes can be immediately condemned and those of sufficient accuracy for the work in hand selected. In case absolute corrections are demanded the pipette can be standardized by the method of weighing much more easily than one that is not provided with an etched scale on the pipette stem. Of course the pipette must be made scrupulously clean with a chromic-sulphuric acid mixture before it is used.

May 20, 1901.

A RAPID METHOD FOR THE DETERMINATION OF ARSENIOUS OXIDE IN PARIS GREEN.

BY S. AVERY AND H. T. BEANS.

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THE authors have been working for some time on a method for determining the arsenic in Paris green, in the hope that one might be found that would be both more rapid and accurate than any thus far proposed. As a result we offer the following method, which we believe to be new and which has given most excellent results on a considerable number of samples of Paris green examined in this laboratory.

For the determination, sample the Paris green by quartering (as one would an ore for assaying) down to about 1 gram. Pulverize this small sample in an agate mortar and weigh out 0.2 to 0.3 gram into a beaker of about 300 cc. capacity. Add about 25 cc. of water and to the green suspended in water add, with constant stirring, concentrated hydrochloric acid till solution is just effected; from 6 to 10 drops are usually sufficient. Now add to the acid solution sodium carbonate solution till a slight permanent precipitate is formed, and at this point add 2 to 3 grams of sodium potassium tartrate in solution. The tartrate will at once dissolve the precipitated copper and prevent further precipitation during the subsequent titration. Dilute to about 200 cc., add solid sodium bicarbonate and starch solution, and titrate with iodine in the usual way.

The time required for the determination is about ten minutes. The end reaction is sharp and is not in the least obscured by the blue color of the copper solution.

Triplicate determinations on the same sample of a very uniform Paris green were as follows, taking 0.3 gram Paris green for analysis.