as will occur with dilution by different sized aliquots of the bisulfate solution, is small as indicated by the experiments of Lingane (3) in varying the ammonium chloride concentration in the NH_4Cl-NH_4OH medium. The saturated calomel electrode is used as the reference electrode for the nickel determination. It should be noted that a double wave of copper appears in the ammoniacal medium; the second wave can be used conveniently for analytical purposes (1), serving as a check on the previous determination.

The diffusion current for each ion should be measured at the point at which the current has reached a stable value. The diffusion current, *id,* is a net value obtained by subtracting the residual or blank current from the sample current at constant potential. If a more readily reducible ion is present, the blank current should be corrected by extrapolation for the current due to this ion.

The concentration of the reducible ion, C (millimoles per liter), is readily calculated from the condensed form of the Ilkovic equation as proposed by Lingane (4).

$$C = \frac{id}{I\, m^{2/3}\, t^{1/6}}$$

For each potential at which the diffusion current, *id* (microamperes), is measured the drop time, t (sec.), should be experimentally determined. The rate of flow of the mercury from the capillary, m (mg. per sec.), is determined in air and checked daily. The diffusion current constant, I, is evaluated experimentally with known concentrations of the substance to be determined under conditions identical to the analysis. These calibration polarograms serve also to locate the wave positions and the potentials at which the diffusion current can be satisfactorily measured. Theoretically, only a single calibration is necessary to establish the value of I, but this procedure should be applied with caution when the polarographic wave departs somewhat from the ideal form. In a recent article Taylor (5) has discussed ably the factors and calibration methods involved for accurate polarographic analyses.

Experimental Results

The accuracy of the overall method was checked by addition of known quantities of metal and by comparison with the time-consuming hand ashing technique.

To each of two 150-g. samples of filtered ash-free lard was added exactly 1 ml. of chloroform containing 1.026 milligram of copper propionate. The samples were ashed according to the above procedure. The ash was fused with 0.33 g. of potassium bisulfate and dissolved in 25 ml. of water solution. Polarographic analysis gave results of 0.36 and 0.38 milligram of copper (as CuO) compared to a calculated 0.40 milligram.

Two different unknown samples were analyzed after ashing by hand and by the "Dropolator" method. The first sample gave values of 7.4 p.p.m. ash and 0.1 copper by the hand method and 4 p.p.m. ash with 0.2 p.p.m. copper by the "Dropolator" procedure.[4] The second sample analyzed 18 p.p.m. ash and 1 p.p.m. iron by the "Dropolator" method compared with 17.5 p.p.m. ash and 1.4 p.p.m. iron by the hand method. (There appears to be no systematic error.)

An examination of the precision of the methods probably is more helpful in judging their relative merits. A duplicate analysis of lard by the hand ashing technique gave values of 40 and 44 p.p.m. ash; 0.1 and 0.2 p.p.m. copper; 3 and 2 p.p.m. iron and 11 and 9 p.p.m. nickel. Analyses in triplicate by the "Dropolator" method on another lard sample were 21, 23, and 18 p.p.m. ash; 0.2, 0.2, and 0.3 p.p.m. copper; 0.8, 0.9, and 1.0 p.p.m. iron; and 5, 6, and 6 p.p.m. nickel. When great care is exercised, the hand ashing method seems to have about the same precision as the more rapid "Dropolator" procedure. In the polarographic analyses for these metals, the generally accepted precision and accuracy of about ± 5% relative (1, 5) was verified in this laboratory.

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[4] The higher ash value by the hand method must have been due to the mechanical introduction of some inorganic "inert," since, in general, better recovery of ash has been obtained by the "Dropolator" technique.

Report of Journal Abstracts Committee

THIS committee has been selecting and abstracting literature to supplement the original communications which appear in the Journal of the American Oil Chemists' Society. We select for abstracting more or less those fat and oil contributions of other journals which we feel are of greatest interest to the members of the American Oil Chemists' Society. Accordingly, in the course of the last few years you have noticed an increase in the amount of abstracts on drying oils, biochemistry, and physiology of lipids.

Information on oils of limited commercial interest is not abstracted. General papers and reviews are usually entered only by title and sometimes the titles are annotated to give an indication of the scope of the original.

The committee would appreciate suggestions which would improve their work or make the work more useful. We will incorporate the improvements if they are within the limitation of the time we have for this work.

R. E. BEAL
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