change from the mean value of a few millivolts in the potential of the "buret electrode" is due to polarization in the process of balancing the potentiometer circuit. In some solutions (particularly 0.1 *N* sodium hydroxide) this polarization can become appreciable unless sufficient care is taken in balancing. A control experiment showed that this was concentration polarization.

A summary of the tests to which this method was subjected is shown in Table II. All solutions were carefully standardized and were approximately 0.1 *N*. The figures given represent the results of individual titrations.

In the case of permanganate, a trace of manganese dioxide forms on the platinum wire and at the tip of the buret, but the error is negligible.

TABLE II

COMPARISON OF "BURET ELECTRODE" AND AgCl ELECTRODE

| Subs. titrated | Titrating soln. | $\Delta E/\Delta v$ at e.-pt. mv./cc. "Buret electrode" | AgCl electrode | Calcd., cc. | Found, cc. |
|---|---|---|---|---|---|
| $K_2Cr_2O_7$ | $FeSO_4$ | 3850 | 3820 | 25.18 | 25.15 |
| $FeSO_4$ | $KMnO_4$ | 4270 | 4240 | 24.93 | 24.90 |
| $H_3AsO_3$ | $KBrO_3$ | 2900 | 2500 | 25.00 | 24.95 |
| HCl | NaOH | 1680 | 1820 | 18.55 | 18.55 |
| HCl | $AgNO_3$ | 490 | 510 | 25.08 | 25.10 |

## Summary

1. A simple reference electrode has been devised, consisting of a platinum wire fused into the tip of a buret.

2. The constancy of the potential of this electrode has been shown by titrations involving oxidation–reduction, neutralization and precipitation reactions.

ANN ARBOR, MICHIGAN

## NOTES

**A Micro Extraction Method.**—For the extraction of very small amounts of material the following method may prove helpful.

A capillary of about 1–2 mm. in inner diameter and 8–10 cm. in length is filled with the liquid material (1 drop) to be extracted and an equal amount of the non-miscible extraction medium. It is then sealed at both ends and centrifuged in such a manner, that the liquid layer with the higher specific gravity is forced through the liquid layer having the lower specific gravity by having the first one at the top in the centrifugal tube and the latter on the bottom. This operation is repeated several times.

The closed capillary is then cut apart under the microscope at the zone of contact. By opening the ends both liquids, the solvent and the extraction medium, become available for examination.

By using ammoniacal aqueous solutions of alkaloids and chloroform as the extraction medium, satisfactory results were obtained by this method.

CONTRIBUTION FROM THE
LABORATORY OF MICRO ANALYSIS
DEPARTMENT OF CHEMISTRY
WASHINGTON SQUARE COLLEGE
NEW YORK UNIVERSITY
NEW YORK, N. Y.
JOSEPH B. NIEDERL

RECEIVED AUGUST 17, 1928
PUBLISHED FEBRUARY 5, 1929

---

**A Brine Circulator for Cooling Condensers.**—In working with low-boiling compounds it has been found advisable at times to circulate cold brine through the jackets of the condensers. Such circulation may be made continuous by the use of a simple modification of the "air lift" pump used in some sulfuric acid plants. The system gives excellent cooling and requires no attention.

The pump consists of an old condenser jacket with the lower side arm plugged up. A piece of glass tubing of about 6 mm. diameter is passed through the stopper in the top of the jacket and reaches almost to the bottom. Through the stopper in the bottom of the jacket a piece of small glass tubing of such size that it will not plug up the 6-mm. tube is passed and reaches about 2 centimeters into the 6-mm. tube. This small tube is connected to an air blast tap by a rubber tube C with a pinchcock on it to regulate the flow of air. The top side arm of the jacket is connected by rubber tubing B to the outlet of the condenser to be cooled, and the 6-mm. tube is connected by a rubber tube D to a piece of bent glass tubing hooked over the edge of a pail. This tube D should be vertical or nearly so throughout its length. The pail is filled with concentrated brine and ice and the siphon A is connected to the inlet of the condenser to be cooled. The height of the water level in the pail should be about four feet above the bottom of the pump, which may be suspended vertically over the edge of the laboratory bench.

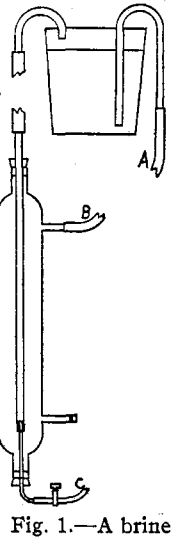

Fig. 1.—A brine circulator for condensers.

In order to start the circulation of the brine both the condenser to be cooled and the pump are filled with brine and the air is then regulated so that a steady stream of bubbles passes up the tube. The condenser jacket can be kept below zero in this manner without any difficulty whatsoever.

CONTRIBUTION FROM THE
DEPARTMENT OF CHEMISTRY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS
HAROLD T. GERRY

RECEIVED SEPTEMBER 5, 1928
PUBLISHED FEBRUARY 5, 1929