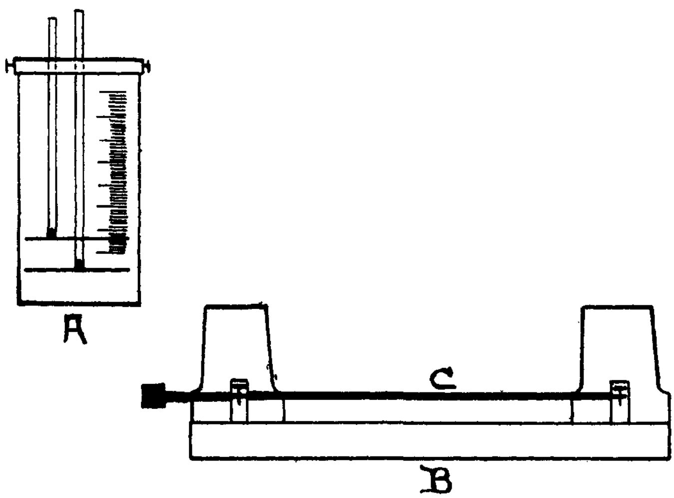
NOTES.

A Simple Method of Illustrating the Relative Conductance of Salts and Acids in Dilute Solutions.—The apparatus shown in the cut has been found useful in connection with the presentation of the ionic theory to first year students in chemistry. The relative conductance of salts in dilute solutions, the word "salts" being used in a general sense, can be readily shown on the lecture table before small classes or in the laboratory



by the students themselves. It affords a simple method of illustrating the relative strengths of acids and of bases, the effect of introducing sodium acetate into solutions acidified with stronger acids, and so on.

A is an ordinary conductivity cell with electrodes of movable platinum disks and on the outside of which is etched a millimeter scale from 0–50.

B is a small block 25 × 6 × 1 cm. on which is fastened two lamp sockets connected by the wires *C*. In one of the sockets is inserted an eight candle and in the other a sixteen candle lamp. The lamps are connected with an ordinary 110 volt lighting system (alternating current) and the solutions, made up to 0.01 *N*, introduced in the cell. One electrode is fixed at the zero mark and the other raised nearly to the top of the cell. The cell is now brought into the circuit and the upper electrode carefully lowered until the filament of the smaller lamp is faintly but distinctly luminous. By throwing a cloth over the larger lamp and partially surrounding the smaller one with a sheet of black paper fairly sharp readings can be obtained. If necessary the cell can be placed in a larger vessel of water to avoid change in temperature. For less dilute solutions a larger number of lamps must be used.

The distances between the electrodes for a series of solutions will represent the relative conductivities. This might also appear to represent relative ionizations, but this is not the case. Since the mobilities of the ions differ very considerably (318 for H^+, 43.6 for Na^+, 35.0 for $C_2H_3O_2^-$) the relative ionizations are not proportional to the relative conductivities of the solutions.

The following are some of the results obtained:

0.01 *N* concentration.	Dist. between electrodes.		
Hydrochloric acid	45.5	45.5	46.5
Nitric acid	44.5	44.5	45.0
Sulfuric acid	39.0	38.5	38.5
Oxalic acid	19.8	18.5	19.3
Acetic acid	2.5	2.5	2.5
Sodium hydroxide	26.7	26.5	26.3
Potassium hydroxide	27.5	28.0	28.0
Barium hydroxide	27.0	27.5	27.5
Ammonium hydroxide	2.5	2.0	2.5
Potassium nitrate	15.5	16.0	15.5
Ammonium chloride	16.5	16.5	16.0
Sodium acetate	10.5	10.5	10.0

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The Occurrence of Argon in Commercial Oxygen Made from Liquid Air.[1]—During the course of some calorimetric work it was noted that much more nitric acid was formed using an electrolytic oxygen containing 99.6% oxygen, than with an oxygen 96.9% pure, furnished by the Linde Air Products Company. After proving that neither product contained any other impurity which could account for the observed results, the Linde oxygen was tested for argon. A large sample was first treated with metallic copper to remove oxygen. The residue, consisting of argon and nitrogen, was treated with a mixture of magnesium powder and calcium oxide, according to the method of Maquenne.[2] The residue from this treatment, after sparking with oxygen to remove hydrogen formed during the reaction,[3] and removing the excess of oxygen with pyrogallol, was pure argon. Nitrogen was determined by difference. The composition of the Linde oxygen was thus found to be 96.9% oxygen, 2.8% argon, and 0.3% nitrogen. This confirms the work of Claude,[4] who has noted that argon to the extent of about 3% is the chief impurity in oxygen prepared by the Claude process, which he explains by the fact that the volatility of argon more closely resembles that of oxygen than that of nitrogen.

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[1] Published by permission of the Director of the Bureau of Standards.

[2] Maquenne, *Compt. rend.*, 121, 1147–8 (1895).

[3] Travers, "Experimental Study of Gases," p. 103.

[4] *Compt. rend.*, 151, 792–3 (1909).