Silver method	0.02 mg.
Treadwell method	0.23 mg.
Liebig-Gauhe method	0.09 mg.

These figures do not adequately convey the relative merits of the three methods, for it should be noted that the Liebig-Gauhe method requires a confirmatory test to make the result quite reliable; the Treadwell method failed to show the stated minimum amount of nickel when so little as 231 times as much cobalt as nickel was present; while the silver method appears to retain its full sensitiveness in presence of any amount of cobalt; moreover, it increases the sensitiveness of dimethylglyoxime about eight times and is able to detect within 24 hours less than 0.002 mg. of nickel in a volume of 50 cc.

Summary.

1. A modified method of using dimethylglyoxime for detecting traces of nickel in cobalt salts is proposed which (*a*) avoids the use of large amounts of this rather costly reagent; (*b*) makes possible the detection of considerably smaller quantities of nickel than has been possible heretofore.

2. The sensitiveness of the test is shown to be unaffected by the presence of cobalt even in large quantities. The proposed method increases the ordinary sensitiveness of dimethylglyoxime about eight times and is capable of detecting about one-fifth the amount of nickel detectable by any of the previously known methods.

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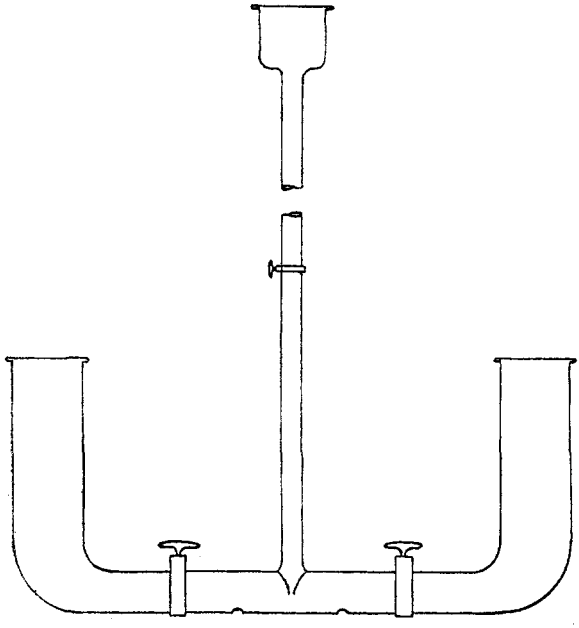
NOTE.

An Apparatus for Determining the Ions in a Solution.—In the course of certain work which was being conducted in this laboratory, the following apparatus for the determination of the ions into which a solution dissociates was found to work very satisfactorily. The idea is similar to that expressed by Prof. Stieglitz in his Qualitative Analysis, Vol. I, page 70.

The apparatus is simple and readily constructed, consisting essentially of a U-tube with a means for closing the two arms and for introducing the substance to be tested into the lowest part of the tube. The center part is made by blowing into a piece of glass tubing of about one-half inch diameter a piece of ordinary sized tubing which has previously been drawn out into a fine jet, and fusing to the other end of this latter a thistle tube carrying a small bore stopcock. The large tube is ridged on either side of the jet tube to prevent lateral flowing of the introduced liquid. The side tubes, which are adapters, are connected with the center tube through large bore stopcocks. If the stopcocks are not handy, the side arms may be connected through rubber tubing bearing pinchcocks, although the use of this necessitates the running of two determinations since closing one side may force the liquid over into the other. Platinum electrodes are used.



In use the apparatus is kept in a bath of continually flowing cold water, the container for which is preferably of glass so that the electrolysis may be more readily watched. The tube is filled with an electrolyte of suitable concentration (0.25 *N* for 110 v. current) and of such a nature that it will not interfere with the results and the electrolysis started. Two cc. or more of the substance to be tested are introduced through the thistle tube and the action allowed to run about one-half an hour when the side arms are closed and the contents tested.

For instance, with nitric acid as an electrolyte it can easily be shown after adding copper sulfate that the copper ion migrates to the cathode compartment and the sulfate ion to the anode, or, with calcium chloride that the calcium ion goes toward the cathode and the chloride ion toward the anode. With sodium hydrate as an electrolyte the complex ion of Fehling's solution, containing copper, or, the complex ion containing mercury of a solution of mercuric sulfide in sodium hydrate, probably HgS^{--}, migrates toward the anode. It was also used in the determination of the charge on inorganic colloids.

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[CONTRIBUTIONS FROM THE DEPARTMENT OF CHEMISTRY OF COLUMBIA UNIVERSITY, No. 270.]

STUDIES ON CATALYSIS. I. THE ADDITION COMPOUNDS OF ESTERS WITH ORGANIC ACIDS.[1]

BY JAMES KENDALL AND JAMES ELIOT BOOGE.

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CONTENTS.—1. Introduction. Purpose and Scope of Investigation. 2. Review of Previous Work: (*a*) The Mechanism of Acid Catalysis of Ester Hydrolysis; (*b*)

[1] For previous papers on addition compound formation see THIS JOURNAL, **36**, 1222, 1722, 2498 (1914); **37**, 149 (1915); **38**, 1309 (1916).