2. Additional results confirm the findings published in 1920, that magnesium in **Solution Magnesium Citrate** can be determined much more rapidly and with as great accuracy with the original solution, ignition of the material being unnecessary.

3. The quantity of magnesium as MgO, free citric acid and citric acid combined with bicarbonate being known it is easy by means of a factory to calculate the quantity of total acid per 100 cc. of **Solution of Magnesium Citrate.**

RESEARCH AND ANALYTICAL LABORATORY,
LOUIS K. LIGGETT CO.,
NEW YORK.

THE NEED OF GREATER ACTIVITY IN THE MAKING OF ANALYSES OF MEDICINAL PREPARATIONS FOUND IN THE OPEN MARKET AND OF A WIDER PUBLICITY OF THE ANALYSES.*

BY FREDERICK J. WULLING.

For many years Professor G. Bachman has been Chairman of the Committee on Drug Adulteration of the Minnesota State Pharmaceutical Association and, in that capacity has presented annually a comprehensive report setting forth the results of the analyses of many drugs and preparations found in the open market. These annual reports have been regarded as the most valuable, from a practical viewpoint, of all reports presented. They are actually used and consulted by members who constantly recognize their value. These reports are useful not only because of their value to the conscientious and careful pharmacist, but also because they, no doubt, discourage many of those who might otherwise make or use or sell drugs and preparations of inferior quality or strength. The work involved in the making of the many analyses reported upon annually, is very great and could not be done in volume except through the coöperation and assistance of many workers. Years ago, therefore, Dr. Bachman hit upon the idea of enlarging his course in the analysis and assay of drugs to include the practical application of his instruction to a larger number of U. S. P. and N. F. preparations and thus affording students increased practice in the application of the official tests for identity, purity and strength. This course has therefore not only increased the value of his instruction to students in the practical aspects involved, but has afforded opportunity, through the annual reports of the voluminous work done by himself, his faculty associates and students, to the pharmacists of the Northwest (for the reports are read and used in adjoining States) to learn the quality of medicines by the average pharmacists. Not only do pharmacists of the Northwest use and appreciate these reports but physicians and medical societies have recognized them and commented upon them most favorably.

To convey an idea of the scope of the analyses reported, let me say that the 1926 report (page 88 of the 1926 Proceedings of the M. S. P. A.) covered in all a total of 528 pharmaceutical preparations and chemicals. Samples were purchased from drug stores in various cities and sections of Minnesota. Dr. Bachman has made it a practice to purchase samples of drugs, chemicals and preparations recognized in the U. S. P. and N. F. whenever they are advertised at cut prices

* Scientific Section, A. PH. A., Philadelphia meeting, 1926.

and in about half of such purchases the analyses revealed the fact that the samples were below standard. A case is known where the knowledge thus revealed was used by a pharmacist against a cutter to the decided advantage of the conscientious pharmacist.

Here are a few random quotations or abstracts from Dr. Bachman's report:

"Our analyses of forty-one samples of Tincture of Iodine revealed the fact that eighteen were of official iodine and potassium iodide content, while the remaining twenty-three samples ranged from 6.3 per cent to 3.3 per cent of iodine. Several samples were minus potassium iodide.

"Thirty-three specimens of Cream of Tartar, purchased mostly in groceries but some in drug stores, were analyzed with the following results: twenty-six could be considered of proper purity while the others ranged from 94.8 to 87.6 per cent purity. Several gave positive tests for alum and starch.

"Thirty-five samples of Dilute Hydrochloric Acid varied in strength from 13.2 to 7.7 per cent of absolute acid. Five were above and two below the U. S. P. standard.

"Out of thirty samples of Dilute Sulphuric Acid analyzed, four were above standard, one assaying 16.9 and two below standard: 5.8 per cent. These results show that one sample contained nearly three times as much acid as another. Twenty-nine bottles of Solution of Magnesium Citrate were examined and only four were below the amount of magnesium oxide required.

"Out of thirty-five samples of Syrup Ferrous Iodide, five were somewhat below standard and all were clear and free from free iodine.

"Only one sample out of eight examined of Lugol's Solution was below strength.

"Thirty-six samples of Liquified Phenol were assayed. Practically all were several per cent stronger than standard. A package labeled 'Saturated Solution of Phenol' was purchased by a student in a country grocery store. On analysis it assayed 13.2 per cent phenol. This, we were told, was sold for full strength carbolic acid.

"Out of thirty-six samples of Hydrogen Peroxide examined, nine were below standard. One contained less than 2 per cent. Practically all of the thirty-nine samples of Fowler's Solution examined were found to contain the required per cent of arsenic trioxide in solution. The students who purchased the samples were instructed to note whether or not the pharmacists recorded the sales in the poison registers or asked any questions about the use of the solution. In only eight drug stores were questions asked as to the contemplated use of the solution and signatures on the poison registers required. The registration of the sale of Fowler's Solution is required by law in Minnesota.

"The examination of thirty-one samples of Spirit of Nitrous Ether, showed that seven were of required strength and the others from 2.6 to 1.1 per cent. It is no longer a theory but an established fact that this preparation if kept in completely filled small bottles in a cool and dark place, will keep for many months. This fact we have demonstrated to our satisfaction frequently at the College of Pharmacy.

"Five samples of 5-grain Aspirin Tablets out of thirty-three examined, contained less than four grains of the drug.

"Out of seven samples of Camphor Liniment examined, two were below standard (17.8 and 18 per cent) and one above (22.5 per cent).

"Eight samples of Spirit of Camphor bought from reliable drug stores were full strength.

"Two samples of Pure Lemon Extract assayed 3.4 and 5 per cent respectively. The Government requires not less than 5 per cent of oil.

"Six samples of Terpeneless Extract of Lemon were tested with amounts of citral found as follows: 0.24, 0.25, 0.30, 0.23, 0.20, 0.33. The Government requires the presence of not less than 0.20 per cent of citral.

"Eight samples of vanilla extracts and flavors were examined and all found to conform to the labeling."

The annual reports show a continual improvement in the quality of medicinal preparation, but the improvement is not what it should be. Medicines of inferior quality or strength should be unobtainable.

My thought is that all State associations and colleges of pharmacy could do work or more work along these lines and that greater publicity should be given to these reports and to similar ones from other sources. Some of the information thus brought to light should interest the boards of pharmacy who rightly are increasing their activities beyond the periodical examinations of candidates for licensure. There are sufficient instances of unfair competition based on inferior quality of drugs to justify interference in behalf of the public needing medicines and of the careful and conscientious pharmacists. I do not mean a too critical or meticulous restraint but a reasonable and fair one. If the unfair competitor is held to the observance of the right standard of his wares, he ceases to be an unfair competitor.

THE UNIVERSITY OF MINNESOTA.

THE QUALITY OF DRUG PRODUCTS.*

BY ROBERT L. SWAIN.[1]

I have made a study of 1300 individual drug products, collected for the most part from the retail drug stores of Maryland and subjected to analysis by the Bureau of Chemistry of the Maryland State Department of Health, with which division of the State Government I have had the honor to be connected, as Deputy Food and Drug Commissioner, for the past four years. Since the foundation of the Bureau of Food and Drugs in this Department, over 10,000 distinct drug products have been collected and analyzed, and out of this number I have chosen about the last 1300, inasmuch as this number represents our work in drugs and pharmaceuticals for the past two years, my thought being that this number would be of greater interest, as it would serve to show the conditions as they at present obtain. Incidentally, I might state that each of these products was purchased as any other purchase would be made, and in so far as I know none of them were sold with the knowledge that they were for official purposes. Also care was taken to secure, so far as possible, only such products as were manufactured or produced in the retail stores, so that an intelligent conception might be had of the care and skill which practicing pharmacists bring to bear upon their professional work. In this work, the official process of assay was used wherever offered, and in all other cases assay processes universally accepted were employed. Twenty-four pharmaceutical classifications are considered as follows:

Extracts (both powdered and solid)	Elixirs
Fluidextracts	Syrups
Tinctures	Magmas
Crude drugs	Antiseptics
Specially denatured alcohols	Ointments
Spirits	Powders
Solutions (Simple, complex, compound and concentrates)	Mixtures
	Digestive ferments
Tablets	Ampoules
Fixed and volatile oils	Filled capsules
Acids	Plasters
Liniments	Distilled waters

* Section on Practical Pharmacy and Dispensing, A. PH. A., Philadelphia meeting, 1926.

[1] Deputy Food and Drug Commissioner of Maryland.