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.

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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.

Ninety-one different preparations, coming under one of the foregoing headings, are represented and, as above stated, make a total of 1300 different and distinct specimens. While such a number is not especially large, it is perhaps larger than the number of drugs collected and analyzed by any other official State agency in the same length of time, and can be considered as fairly representing the quality of many drugs and medicines, the majority of which reach the public through the medium of the doctor's prescription.

Out of the total number of 1300 specimens, one hundred fifty-three were found to be more than ten per cent below the official or professed standard, representing a percentage deficiency of about 12%, which figure, I feel confident, is as low if not lower than reported by other States. This figure is all the more remarkable when it is considered that the list of products studied includes many of an unstable, or at least variable, composition, such as Hydrogen Peroxide, Aromatic Spirit of Ammonia, Chloroform Liniment, Spirit of Nitrous Ether and others. With such products eliminated and the percentage of deficiency based upon preparations more or less fixed and not subject to certain deterioration, the number of products showing a deviation from standard in excess of 10% is found to be 8.6%.

I have prepared a table showing the percentage of deficiency found for each item enumerated:

Aromatic Spirit of Ammonia	28.0%	Fowler's Solution of Arsenic	2.0%
Acetylsalicylic Acid	None	Tincture Iodine	10.0%
Camphorated Oil	8.2%	Lime Water	8.0%
Chloroform Liniment	30.0%	Solution Magnesium Citrate	16.0%
Tincture Ferric Chloride	1.3%	Tincture Nux Vomica	21.0%
Hydrogen Peroxide	17.0%	Essence of Peppermint	14.0%
Syrup Ferrous Iodide	18.0%	Spirit of Camphor	None

While the above headings comprise only a fraction of the different products studied, they make up by far the larger portion of the total, and in each instance, a sufficient number of products was analyzed to make a satisfactory statement. For instance, one hundred and ninety-five Camphorated Oils were collected, and can be considered as representing that many of the six hundred or more drug stores of the State, and of this number 92% were found to be in accordance with the official standard. Seventy-seven samples of Tincture Ferric Chloride were collected, and only one was found to be deficient in iron content. The figure for Hydrogen Peroxide is based upon ninety-three individual lots. Three hundred and fifty-six samples of Lime Water were collected and analyzed, and out of this large number 92% were found in keeping with the Pharmacopœial standard. Stated in another way, only twenty-seven out of the total of three hundred and fifty-six samples of Lime Water were ten per cent deficient in calcium hydroxide. Seventy-three specimens of Solution of Magnesium Citrate were studied, and eighty-six per cent of these were found up to the legal standard.

The study of Chloroform Liniment is based upon a total of one hundred and seventy-three samples, and of this number, forty-four were found deficient in chloroform; eleven deficient in both chloroform and camphor; five deficient in camphor alone. Of course, in a preparation composed almost entirely of volatile constituents, deviation from formula is to be expected at times. In this connection, I think it would have been well for the newly revised Pharmacopœia to have de-

manded not less than twenty-five per cent of chloroform as a standard for this product, basing this requirement upon the present formula. Such an act would have given official recognition to the volatile nature of the compound, and would also have set a limit of deviation. The Pharmacopœia sets no standard for this product other than the quantities in the formula, and the matter of legality is left to the judgment of the supervising agency. At all events, in preparations such as Chloroform Liniment, the customary toleration of ten per cent limitations, is manifestly impossible to maintain. Another point of interest in this product is found in the fact that, in making Chloroform Liniment from chloroform and soap liniment, an opportunity is afforded to gage the composition of the soap liniment so far as its alcoholic content is concerned. If the resulting product is perfectly clear, it can be accepted as indicating that the soap liniment is up to standard in alcohol. Any reduction in the alcohol content of Soap Liniment is sure to affect the solubility of chloroform, especially in such proportions demanded in the official Chloroform Liniment. In the total number of Chloroform Liniments considered here only one spurious sample was found. In one case the product was shown to consist of cotton seed oil to which a few drops of chloroform had been added.

During the two years covered by this study, no sub-standard lots of Acetylsalicylic Acid Tablets or Spirit of Camphor have been found.

Confessedly, the matter as presented here is inadequately covered, and in a sense superficially studied, as I have made no attempt to go into exhaustive details. However, I feel satisfied that the figures submitted are such as to reflect much credit upon the retail practicing pharmacists of my State, and they are sufficient in my judgment, to refute the statement, all too frequently made, that the products dispensed by the retail pharmacists are grossly adulterated or carelessly prepared My observations are based upon an experience covering the past four years, during which I have had unusual opportunity to study this matter, and I respectfully submit this brief study of several hundred drug products as showing that the official standards are met to an extent quite remarkable.

THEORETICAL STRUCTURE OF THE CORRECTION FACTOR AS APPLIED IN THE MENTHOL ASSAY OF PEPPERMINT OIL—WITH A NOTE ON THE ASSAY OF OIL OF ROSEMARY.

BY SIMON MENDELSOHN.

The present official assay procedure for the valuation of peppermint oil is a modification of the method originally proposed by Power and Kleber[1] in 1894. The formula for the final reduction of the results of an assay has in the U. S. P. X been rendered more complicated by the application of the correction factor $[1 - E \times 0.0021)]$ in accord with the newer requirements therein specified.

Example: (Specified indication of analytical results in the assay of oil of peppermint).

$$\text{U. S. P. IX } \frac{A \times 0.07808 \times 100}{B-(A \times 0.021)} = \frac{A \times 7.808}{B-(A \times 0.021)} = \text{percentage of menthol.}$$

[1] *Pharm. Rund.*, 157 (1894); *Z. anal. Chem.*, 33, 762 (1894).