

I accepted without verification the statement which I found in a book widely accepted as authoritative, *viz.*, that camphor dissolves in alcohol without change of volume; and on the strength of this statement I gave a table of the specific gravity (approximate) of solutions of camphor in official alcohol. The specific gravities given in this table are too high, and the error is the more serious from the fact that commercial alcohol in these days is apt to be above the official strength.

As a matter of fact, the specific gravity of spirit of camphor, U. S. P., is more near 0.832 than 0.8345, the 10 percent of camphor increasing the specific gravity of the alcohol by about 0.015 instead of 0.018, as would be the case if it dissolved without change of volume. Errors like this are hard to kill. This public statement should help to prevent perpetuation of the erroneous figure.

There is one way, certainly, in which we may gain information regarding the quantity of camphor in a sample of spirit, and that is by taking advantage of the fact that a saturated solution of camphor in diluted alcohol at any given temperature will have an invariable composition and therefore a constant specific gravity, while it is a simple matter to prepare from a sample of the spirit such a saturated solution by addition of water to incipient precipitation, at a fixed temperature. Here certainly is opportunity for constructing a useful empirical table.

A CRITICISM OF PART II IN THE U. S. P. IX.

BY HARRY L. THOMPSON.

In the pages devoted to Part II there is a great deal of unnecessary repetition, which increases the bulk of Part II. Pages 501 and 502 are necessary because they give an Index of the Contents of Part II.

On page 503 is the Table of Atomic Weights of the Elements. Why not add many of the important physical data often used in pharmaceutical assaying? On pages 504 to 519 are Elements and Pharmaceutical Chemicals. Why not enlarge the list to contain all chemicals known whether pharmacopoeial or not, or leave the list out entirely? The compends of physics and chemistry do a better job of it. Why not introduce logarithmic equivalents after the atomic and molecular weights or chemical equivalents? No chemist in the interest of speed and accuracy bothers with long mathematical calculations without using the short, quick processes of higher mathematics. Note the repetition of the elements and their atomic weights in heavy type.

On page 520, the Table of Multiples of Some Atomic and Molecular Weights might just as well be excluded entirely. Rarely four, five or more times of any element or radical is used in any chemical substance. I consider it a waste of printer's ink; and that it would be better to see it omitted entirely in the next U. S. P.

Why not adopt 20° C. as the standard? This conforms with the U. S. Government Bureau of Standards, and would bring about more uniformity. All accurately graduated volumetric apparatus is calibrated at 20° C. according to the U. S. Bureau of Standards. Why, then, does the U. S. P. persist in using 25° C. As a delegate to the pharmacopoeial convention I was opposed to the adoption of 25° C. Nearly every bit of graduated metric glassware used in manufacturing and

assaying is now graduated at 20° C. At least, I find it so out here in the West when it comes to purchasing any glassware of accuracy. To ask for 25° C. takes a matter of time and money. Since 20° C. is the U. S. Standard, why not adopt it?

Pages 521-554 treat of Reagents and Test Solutions. The arrangement is a good one. In some cases there are on the market reagent chemicals which are superior to those in the U. S. P.

With the exception of 25° C., the introductory paragraphs regarding Volumetric Solutions on pages 555 to 556 are very essential. *However*, why are there no methods of calibrations of balances, weights, measures and volumetric apparatus with proper corrections for temperature and pressure included in the U. S. P. under Volumetric Solutions? Such paragraphs would make clear many discrepancies and errors now existing in the processes of the U. S. P. Too much is assumed to be exactly accurate when practice shows it to be otherwise. Such errors are encountered in weights and measures and often vitiate results.

There should be a paragraph on sensibility of the balance under varying loads from the zero load to its maximum capacity. There should be a paragraph on the zero-point and its determination. A paragraph upon the testing of the balance for equality of arms should be inserted. The proper method of weighing should be given, and the proper use and care of the balance, for the U. S. P. is woefully lacking in this respect as can be seen in the statements made in many of the assay processes. There also should be a paragraph upon reducing weights to vacuo, with proper tables added thereto. No mention is made of limits of errors or tolerance in weighing and the calibration of weights; a very important factor in assaying. No mention is made of errors in reading burettes, producing a percentage of error of a measurement. Thus the accuracy acquired in practice in reading burettes is never greater than one-hundredth cubic centimeter, that is, the reading is doubtful to a tenth of a smallest division of the burette. As an error of this magnitude is possible at both of the readings, in measuring a given volume of liquid, the total error may be at least two-hundredths cubic centimeter. Careful experiments show that in careful work errors of three-hundredths cubic centimeter occur. The percentage of error of a measurement is greater, therefore, the smaller the volume of the liquid measured out, being 3 percent for 1 Cc., 0.3 percent for 10 Cc., and 0.1 percent for 30 Cc. This percentage of error is usually the controlling error, yet the U. S. P. says nothing about it. These very facts are what one often excuses as the personal factor, when really they are errors which can be accounted for in making final calculations and determining the accuracy of any assay method. Why not, then, introduce a chapter on calibration of balances, weights and volumetric apparatus, with tolerance, and percentage of error?

The statement regarding normal volumetric solutions should read 1.008 grammes of hydrogen instead of one gramme of hydrogen because the system of atomic weights has oxygen as 16 as the basis. The error in the statement as given is 0.8 percent.

The paragraph on Use of Empirical Solutions, pages 556 and 557, should be enlarged, because it is easier, quicker, and just as accurate to use empirical solutions, after the proper correction factor upon the normality used is determined.

In all laboratory work, I find that the proper conditions for keeping and using volumetric solutions cannot be kept constant. I likewise find that in the average laboratory, changes in temperature are unavoidable, and especially out here at a considerable higher altitude. By using empirical solutions and applying the properly determined correction factor at time of use saves time and gives just as accurate results, and speed with accuracy is vital.

The subject matter from pages 557 to 579 could be further condensed and much duplication avoided. Why not reduce the number of volumetric solutions? The normal and double normal volumetric solutions might as well be omitted, because the half normal volumetric solutions serve a greater number of purposes, and when once accurately standardized can be used where normal solutions are required, the proper amount of substance being assayed being taken. To make half normal volumetric solutions from normal volumetric solutions by dilution introduces too much error. Why not introduce half normal sodium hydroxide, and half normal sodium carbonate?

The list of tenth normal volumetric solutions should include tenth normal copper sulphate in place of Fehling's solution, and tenth normal barium chloride. Hundredth normal and two hundredth normal solutions might as well be omitted, and the fiftieth normal solutions kept. Then the factor of five enters in changing from $\frac{N}{2}$ to $\frac{N}{10}$ to $\frac{N}{50}$ and *vice versa*, rather than the factor of ten from $\frac{N}{1}$ to $\frac{N}{10}$ to $\frac{N}{100}$ and *vice versa*. However, the volumetric solutions of any normality should be standardized by other means than just by weighing out the solid and diluting up to a certain volume, as in the case of tenth normal potassium dichromate V. S., and tenth normal silver nitrate V. S. or with a dilution of a standard solution of different normality, as half normal hydrochloric acid from normal hydrochloric acid.

Why list the chemical equivalents of substances under each volumetric solution? Why not make a list of the chemical equivalents for half normal volumetric solutions in a table, alphabetically, and give the logarithmic equivalents after the respective equivalent? Then list under tenth normal and under fiftieth normal volumetric solutions the proper chemical equivalents. This certainly would save space, and be more convenient.

The chapter on Indications and Test Papers is very good.

Now for the General Tests. Here there is room for improvement. The chapter is a very important one to assayers and manufacturers especially. Why not enlarge it? Much of the material in Part I could still be condensed and put in Part II. Thus we have the arsenic and heavy metal tests, and assays of chlorides, bromides and iodides, etc., in Part II. Why not have the assays of the alkali and alkaline earth hydroxides, carbonates and bicarbonates, placed similarly? Why not the inorganic and organic acids; when the alkali salts are so placed? Many unsatisfactory results are obtained in assaying volatile chemical constituents. Why not use more residual titration methods which overcome this? It certainly would expedite matters. Many a time, as pharmaceutical chemist, I have radically departed from the uncertain assays of the U. S. P. and adopted the official government methods to get concordant results.

The chapters on Powders, Percolation and Sterilization should, I believe, be placed in Part I. Too few realize that they are in Part II.

If the list of Diagnostical Reagents is to be continued, why not enlarge, and increase it, and especially the clinical tests, if a pharmacist is to aid a physician? As it is, too much is dark and confusing, and the information needed must be obtained elsewhere.

The Tables of Thermometric Equivalents on pages 628 to 632 are nice to look at, but of no real value. Why not give boiling point tables, and the physical factors and corrections for altitude? Out here the boiling points of the U. S. P. are useless in determining substances, and identifying substances by distilling or melting them. One must always go to physical chemistry data and tables to know where he stands. If the U. S. P. is to serve us in the West in this respect, at an altitude from 5,000 to 7,000 feet, as it does those in the East at sea level, some vital changes must be made. If the U. S. P. is to serve the drug analyst and forensic chemist in matters pharmaceutical, changes in boiling points will be necessary for those in such high altitudes.

The tables of specific gravity of the acids and ammonia, and for the determining of the percentages of alcohol are good, and are very useful for quick assay. But what about the tables on pages 650, 651, 652 and 653? They are splendid, but too brief. To the average person too much is left to be interpreted or guessed at, and only experts know the value of them. Why not extend them to include more of similar tables, as is done in bulletins of the Bureau of Standards, so as to cover all the important apparatus used in pharmacy, with an added explanation as to their use? It certainly would be an improvement and show advancement of the scientific phase of pharmacy, which is the chief emphasis of Part II.

The Metric Equivalents and Tables for Converting Metric Quantities are good, and should be continued.

The above thoughts and questions are set forth with the idea of getting at the why of this and that in the U. S. P. Part II especially. It is time that the pharmacist be in the front line with the brother professions and not always trailing and taking their dust. Therefore the remarks are made with the idea that the U. S. P. become a scientific standard in Part II, especially along the chemical, pharmaceutical and pharmacological lines that are therein used in standardization and assaying.

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OINTMENT OF ZINC OXIDE.*

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Early in 1918 the Medical Department of the Army asked assistance from the Council on Pharmacy and Chemistry of the American Medical Association in the selection of medicaments for the use of the Army. Among these medicaments was ointment of zinc oxide and the Chemical Laboratory of the A. M. A. was called upon for suggestions in connection with this item. A number of questions were at once raised and work was started to decide upon the best practicable

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