part; and in alcohol determinations the observations should be made at such temperatures as may eventually be officially directed. In making weighings with the plummet immersed, equilibrium must be established with the needle of the balance stationary at zero and the wire immersed to the predetermined depth.

It is believed that the method just described is the most accurate method which could be recommended in the premises. It requires no special apparatus except the special Dewar cylinder.*

The Pycnometer Type of Dewar Vessel: This type is shown in the accompanying etching as No. 3. The pycnometer is best made from Jena thermometer glass, because in this case its capacity at stated temperatue once determined, remains fixed—which is not the case when ordinary glass is employed. The apparatus consists of a double-walled glass flask having a vacuous space between the walls and having an accurately ground glass stopper which is one piece with an inserted thermometer graduated from minus 4° to plus 35° C. by 1/5°. Capacity of inner vessel with stopper inserted, 25 cc. Total weight of apparatus empty, 40 grams. Dimensions in millimeters are: total height over all with thermometer inserted, 210; total height of flask, 100; greatest diameter, 44. In ordering such an apparatus care should be made to specify very accurate grinding of the stopper and the absence of any annular channel exteriorly between the stopper and the neck of the flask. Unless this specification is made the maker is apt to be a little careless and to leave an annular space which is somewhat troublesome to wipe dry before weighing.†

The advantage which the apparatus under discussion has over the usual pycnometer arises from the fact that temperature alterations of the investigated liquid, which are the bane of ordinary pycnometer measurements, are here eliminated because of the thermal insulating property of the vacuous envelope.

The apparatus is used like an ordinary pycnometer, but it is probably desirable to state that the liquid is brought to the specified temperature exactly as in the case of the hydrostatic balance method described above.

*This has been furnished from Germany to the Medico-Chirurgical College of Philadelphia at 56c. duty-free. It may further be interesting to note that the writer uses this Dewar cylinder also for pyrometric measurements by the principle of the water calorimeter pyrometer. It is only necessary to have a small lump of copper and an ordinary mercurial thermometer in addition to the Dewar cylinder in order to be enabled to make convenient, rapid and reasonably accurate measurements of temperatures up to 1000° C.

†Such an apparatus made in Germany, costs $1.12, duty-free.

GENERAL METHOD PROPOSED FOR THE ESTIMATION OF ALCOHOL IN PHARMACEUTICAL PREPARATIONS.

W. A. PEARSON.

It is with much timidity that I propose a general method for the estimation of alcohol in pharmaceutical preparations, because so much has been written on this subject and no two authors have agreed on any technic for the determina-

tion of alcohol in a single product, much less have they agreed on a general method for all pharmaceutical preparations.

The problem is made still more complex by the fact that the internal revenue officers demand that alcohol be determined at 60° F. (15.6° C), the Bureau of Standards desire to work at 20° C., while the Revision Committee of the United States Pharmacopœia have declared that specific gravity shall be taken at 25° C. Furthermore, many pharmaceutical products demand special treatment before the alcohol can be distilled from them unmixed with other volatile substances, even if the mechanical difficulties in the distillation have been eliminated. Unusual and expensive apparatus cannot be recommended unless such refinements will materially increase the accuracy of results; yet often the accuracy of the determinations are of so great commercial importance that every precaution must be taken to insure the best results. It is obvious that no general directions can be given that will be suitable for preparations where preliminary treatment is required before the distillation can be made; hence these directions must be specifically prescribed under each preparation in which the alcohol is to be determined, as is done in the United States Pharmacopœia, 8th Revision, in many cases preparatory to the carrying out of the tests for arsenic, and heavy metals.

General Method for Determination of Alcohol.

Adjust the temperature of the preparation in which the alcohol is to be determined to 25° C., then measure exactly 100 cc. of it into a 100-cc. graduated flask. Pour into a distilling flask having capacity of about 300 cc. and rinse the 100-cc. flask with several portions of distilled water, 30 cc. in all, and add rinsings to distilling flask. Add to the distilling flask any substances that may be especially prescribed, and connect the distilling flask with a suitable safety bulb, and this to a condenser. Distill nearly 100 cc. at the rate of about two cubic centimeters per minute into a narrow-necked pycnometer, which has been standardized and graduated to hold 100 grams of distilled water at 25° C.

Immerse the pycnometer to its graduation in water at 25° C. for one-half an hour and after that time fill to graduation with distilled water having a temperature of 25° C. Dry outside of pycnometer and inside of narrow neck nearly to graduation with a cloth and weigh. The weight of the contents of the flask, multiplied by 0.01, equals the specific gravity of the alcohol distillate. Compare this with U. S. P. tables showing specific gravity of alcohol at 25° C.

Acknowledgement.

Nothing original can be claimed for the method I have proposed and it will have served the purpose for which it was intended if its objectionable points are eliminated by criticism and suggestions so that a satisfactory general method for the estimation of alcohol in pharmaceutical preparations will be developed.

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