struum retarded extraction in yellow cinchona and hydrastis, although it aided in the extraction of red cinchona.

In the present experiments, the passage of the glycerinic Menstrua I through the drug could be observed due to the fact that the color became darker than that of Menstruum II. The glycerinic Menstruum B was apparently displaced entirely into the first percolate, while C was displaced into the second percolate, and D was not entirely displaced until the third percolate was being collected. It appears that the retardation of the extraction of the alkaloids of belladonna root with the use of glycerinic menstrua may be related to the difficulty of displacement by the non-glycerinic menstruum which follows.

SUMMARY.

Percolation experiments with glycerinic menstrua indicate that glycerin retards the extraction of alkaloids from belladonna root. The retardation is greater with increasing concentration of glycerin and with decreasing concentration of alcohol.

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ASSAY FOR PHENOL IN OFFICIAL PREPARATIONS.*[1]

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Numerous colorimetric and volumetric methods have been proposed for the determination of phenols in general (1, 2, 3, 4). The most widely accepted procedure is the well-known iodometric method used in the official assay (5) of phenol and liquefied phenol. Redman and Rhodes (6) have shown that the period of shaking after the addition of the Koppeschaar's Solution and acid, and also after the addition of the potassium iodide may be reduced to one minute if continuous shaking is employed. Olivier (7) had previously pointed out that the time period could be reduced to five minutes. Corfield and Mundy (8) stated that the iodometric method is readily applicable to the assay of phenol containing preparations such as lotions and gargles which do not contain ingredients that react with free bromine. Bauer (9) reported that the official method of assay for phenol could be applied to the assay of Aqua Phenolata N. F. V with accurate results. The assay of preparations containing ingredients that react with bromine necessitates the quantitative separation of the phenol either by distillation or extraction. Corfield and Mundy (8) and Smelt (10) recommend extraction with warm dilute sodium hydroxide solution or preferably distillation for preparations such as phenol ointment, gargle of potassium chlorate with phenol, glycerite of phenol, lozenges and suppositories.

The procedure employed for the estimation of phenol in the study here reported was as follows:

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A sample containing about 0.04 Gm. of phenol was weighed or measured, or a volume of dilution containing about 0.04 Gm. of phenol was measured into a glass-stoppered flask, diluted, 30 cc. 0.1*N* Koppeschaar's solution added, the neck of the flask rinsed down, 5 cc. hydrochloric acid quickly introduced, the stopper replaced and the flask shaken vigorously at intervals during five to ten minutes. Being careful to allow no bromine vapors to escape, 5 cc. of potassium iodide solution (1 to 5) was then added, and the flask shaken vigorously during three to five minutes. The liberated iodine was then titrated with 0.1*N* sodium thiosulphate solution, after the addition of 1 cc. of chloroform.

The phenol employed was purified by distillation. All reagents were made according to the methods of the U. S. Pharmacopœia X. The preparations were made by official methods except that the phenol was carefully weighed on an analytical balance and all liquid preparations were made to volume in calibrated volumetric apparatus.

GLYCERITE OF PHENOL.

Two lots of glycerite of phenol (11) were prepared to contain not less than 17.60 per cent w/v of phenol. Samples of 10 cc. were diluted to 100 cc., and 2-cc. portions of this dilution assayed with results as follows:

(1) 18.37; 18.32; 18.28; 18.51; 18.60; 18.57; 18.51 per cent phenol w/v.
(2) 17.83; 18.09; 18.16 per cent phenol w/v.

When 10-cc. portions of the glycerites were distilled in all glass apparatus, aliquots of the distillate on titration yielded:

(1) 18.57; 18.57 per cent phenol w/v.
(2) 17.94; 17.94 per cent phenol w/v.

A third lot of glycerite containing 15.67 per cent phenol by weight, prepared by incorporating a weighed quantity of crystalline phenol in the glycerin-sodium citrate mixture, yielded results as follows when weighed 10-cc. portions were diluted to 1000 cc., and 25-cc. samples titrated directly:

(3) 15.62; 15.65; 15.54; 15.65 per cent phenol w/w.

Blank determinations revealed that no bromine was consumed by the glycerin and the sodium citrate.

PHENOLATED SOLUTION OF IODINE.

A quantity of phenolated solution of iodine (12) prepared in a tightly stoppered flask to contain 0.59 per cent phenol w/v yielded:

0.56; 0.58; 0.59 and 0.58 per cent phenol w/v when samples corresponding to 6 cc. of the solution were titrated directly.

PHENOLATED OIL.

A quantity of phenolated oil (13) was prepared to contain 5.37 per cent by weight of phenol. Samples of four to five Gm. were accurately weighed, diluted with about 25 cc. petroleum benzin and shaken out with 25-cc. portions of distilled water until all of the phenol was extracted (usually five successive extractions were sufficient if the amount of phenol did not exceed 0.25 Gm.). The formation of emulsions was rather rare and offered no difficulty. The combined aqueous extractives were made up to 200 cc., and 30-cc. aliquots were titrated with results as follows:

5.30; 5.37; 5.34 and 5.29 per cent phenol w/w.

Distillation of the phenol from 2.5-Gm. samples and titration of an aliquot of the distillate yielded:

5.34 and 5.37 per cent phenol w/w.

CAMPHORATED PHENOL.

A sample of camphorated phenol (14) was prepared to contain 32.71 per cent phenol by weight. Suitable assay samples when extracted and assayed in the same manner as phenolated oil yielded:

32.49; 32.31; 32.46; 32.38 and 32.35 per cent phenol w/w.

PHENOL OINTMENT.

An ointment of phenol (15) prepared to contain 2.47 per cent phenol by weight yielded results as follows when samples were assayed as described under phenolated oil:

2.34; 2.32; 2.35 and 2.38 per cent phenol w/w.

Samples assayed by the method proposed for inclusion in the U. S. Pharmacopœia XI (16) which consists of heating weighed samples at 115° C. for $1^1/_2$ hours and calculating the loss in weight as per cent phenol yielded:

3.39; 3.16; 2.55 and 4.42 per cent phenol by weight.

Two samples heated for an additional hour at 115° C. continued to lose weight. Samples of ointment base heated under the same conditions lost weight as follows:

0.44; 0.075; 1.04 and 0.35 per cent.

It is evident that some of the base volatilized on heating, and that the method proposed for inclusion in the Pharmacopœia is unsatisfactory.

SUMMARY.

1. A number of official phenols containing preparations have been assayed by a modified Koppeschaar method.

2. Glycerite of phenol and phenolated solution of iodine can be assayed directly for phenol after dilution without separating the phenol.

3. Camphorated phenol, phenolated oil and ointment of phenol can be assayed satisfactorily after extraction of the phenol with water.

4. The method of assay for ointment of phenol proposed for inclusion in the U. S. Pharmacopœia XI is subject to variations due to the volatility of the constituents of the ointment base.

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