# THE ESTIMATION OF TERPIN HYDRATE IN ELIXIR OF TERPIN HYDRATE.*

BY A. G. MURRAY.

Terpin hydrate sublimes at about 100° C. and volatilizes with boiling water. In order to ascertain the conditions under which a solvent could be most satisfactorily removed from it the following experiment was carried out:

A solution of 0.8715 Gm. of terpin hydrate in sufficient alcohol to make 50 Cc. was prepared. Ten Cc. portions of this solution, containing 0.1743 Gm. of terpin hydrate, were evaporated in different ways from tared beakers. The weights of residues obtained were as follows:

| | Wt. of the residue Gm. | Error. |
|---|---|---|
| Evaporation on steam bath with aid of a gentle blast | 0.1565 | —10.3% |
| Evaporation with aid of a gentle blast, without heat | 0.1756 | + 0.8% |
| Evaporation in vacuo without heat | 0.1756 | + 0.8% |
| Spontaneous evaporation | 0.1747 | + 0.3% |

It was evident from this that heat should not be used in evaporating the solvent. Use of the blast without heat results in a rapid evaporation at a low temperature and was the method used in all subsequent experiments.

Terpin hydrate should not be dried in adesiccator. The Pharmacopoeia states that it is "efflorescent in dry air." It was found by experiment that the loss on drying in a desiccator over night is quite considerable.

For the purpose of extracting terpin hydrate from the elixir it is desirable to use an immiscible solvent in which it is freely soluble. With respect to the solubility of terpin hydrate the Pharmacopoeia states that 1 gramme dissolves in about 200 Cc. of water, 13 Cc. of alcohol, 135 Cc. of chloroform and 140 Cc. of ether. The solubility data given in Squire's "Companion to the British Pharmacopoeia" (19th Ed.) are as follows: 1 in 280 of water; 1 in 14 of alcohol (90%); 1 in 46 of alcohol 60%. Beilstein [1] states that terpin hydrate is insoluble in petroleum ether.

Since the solubility in ether or chloroform is only slightly greater than in water, quantitative extraction with one of these solvents would probably require long continued treatment. This conclusion is apparently confirmed by a description by Kay and Perkin[2] of the synthesis of terpin in which they speak of saturating the aqueous solution with ammonium sulphate and "extracting at least 20 times with large quantities of ether on the shaking machine."

It was thought that possibly acetone, which has a limited miscibility with water saturated with salt, might prove a suitable solvent. While the attempt to use acetone was finally abandoned some of the observations made may be recorded. It was found by experiment that 1 Gm. of terpin hydrate dissolves in about 27 Cc. of acetone at room temperature (25°). Terpin hydrate was not precipitated from this saturated solution in acetone by dilution with chloroform.

It was found easily possible to extract terpin hydrate from the elixir by diluting with water, saturating with salt and shaking out with a mixture of acetone and

*Contribution from the Bureau of Chemistry, U. S. Department of Agriculture.

[1] "Organische Chemie."

[2] *Jour. Chem. Soc. Trans.*, 19 (1907), I, 372.

chloroform or ether, but the solvents extracted also some glycerin and sodium chloride unless the proportion of acetone in the solvent was reduced to such an extent that it no longer possessed any advantage over alcohol.

In the following method which was found to yield the most satisfactory results it will be noted that no account is taken of the essential oil which the official elixir contains, as the error occasioned by it is too small to be significant. If, however, it is desired to avoid the presence of the volatile oil in the residue it can be readily removed by a preliminary extraction with petroleum ether in which terpin hydrate is insoluble. The method is as follows:

Dissolve 20 grammes of common salt in 100 Cc. of water, or if more convenient add 1 volume of water to 3 volumes of a saturated aqueous salt solution. To a convenient measured volume of the sample of elixir add the prepared salt solution until the alcohol content is from 10% to 15% by volume. Shake out with four portions, one-fourth volume each, of chloroform containing 5% to 7% alcohol by volume. Wash each portion of the solvent successively through 5 Cc. of the prepared salt solution. Filter through a pledget of purified cotton into a tared beaker or small crystallizing dish, finally rinsing the cotton and the tip of the funnel with a little alcohol. Evaporate with the aid of a blast and without the application of heat. Wipe off any moisture that may have collected on the outside of the dish and allow to stand fifteen minutes before weighing.

Ten Cc. of a sample of elixir of terpin hydrate prepared in accordance with the formula of the National Formulary with the exception of the essential oils when assayed by the proposed method yielded 0.1764 Gm. of terpin hydrate instead of 0.1750 Gm., an error of + 0.8%.

While the method was devised primarily for the assay of elixir of terpin hydrate it may perhaps be adapted to other preparations of this drug, which do not contain other ingredients extractable by the immiscible solvent used or which can be freed from interfering substances without loss of terpin hydrate.

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## TINCTURE OF DIGITALIS AND THE INFUSION IN THERAPEUTICS.*,[1]

BY SOMA WEISS AND ROBERT A. HATCHER, M.D., NEW YORK.

Our knowledge of the pharmacology of the digitalis group is increasing rapidly, and its therapeutic use now begins to approach an exact science more nearly, perhaps, than that of all excepting a few drugs. But there are still many minor points, and not a few major ones, that require further study.

Clinicians have long held the opinion that the action of the tincture of digitalis differs qualitatively as well as quantitatively from that of the infusion. This difference is usually explained on the ground that the several active principles found in the leaf are not extracted in the same relative amounts by the menstruum used in making the tincture and the water used in making the infusion.

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