Table I.—Pyrethrin Content of Pyrethrum Flowers

Species	Source	Crop Year	Grade	Pyrethrins Per Cent
C. cinerariæfolium	Kashmir	1938	Open	0.702
C. cinerariæfolium	Kashmir	1939	Open	0.741
C. cinerariæfolium	Murree	1939	Open	1.300
C. cinerariæfolium	Murree	1939	Half-open	1.030
C. roseum	Murree	1939	Open	0.247
C. cinerariæfolium (Kenya seeds)	Mayurbhanj	1940	Open	1.154
C. cinerariæfolium (Harpenden seeds)	Mayurbhanj	1940	Open	1.138
C. cinerariæfolium	Kashmir (Tangmarg)	1940	Open	0.962
C. cinerariæfolium	Kashmir (Baramulla)	1940	Open	0.904
C. cinerariæfolium	Palampur	1940	Open	0.904
C. cinerariæfolium	Palampur	1940	Half-open	0.834
C. cinerariæfolium	Palampur	1940	Closed	0.491
C. cinerariæfolium	Kulu	1940	Open	0.702
C. cinerariæfolium	Kulu	1940	Half-open	0.734

and the Russian flowers about 0.24% (1). The method followed in these assays was that of Gnadinger and Corl (2) and the same method has also been used by us with very slight modifications to suit our laboratory conditions.

EXPERIMENTAL

Ten to thirty-five grams of pyrethrum flowers, powdered and passed through a 40-mesh sieve, were extracted for five hours with petroleum ether (B. P. 40–60° C.) in a Soxhlet extraction apparatus. The petroleum ether extract, which was less than 100 cc., was allowed to stand over night at room temperature. The solvent was then driven off at a temperature not exceeding 75° C. and the residue was immediately transferred with five portions of boiling aldehyde-free alcohol to a 100-cc. volumetric flask, using sufficient boiling alcohol to make the volume 80–85 cc. To the hot solution, 15 cc. of basic lead acetate were added and the flask shaken vigorously for a few minutes. After allowing it to cool, the solution was made up to the mark with alcohol. It was filtered through a Büchner funnel and anhydrous sodium carbonate (2 Gm.) was added to the filtrate. The flask was shaken frequently and was allowed to stand for ten minutes. After filtration, 10 cc. of the clear filtrate were taken in a Folin tube and 6 cc. of alkaline copper solution added. In another Folin tube 10 cc. of a standard dextrose solution (2 mg. of dextrose) were taken and 6 cc. of the same alkaline copper solution added. The tubes were placed upright for 45 minutes in a constant temperature water bath, set at 78° C. and controlled within 0.5°. After removal of the tubes from the water bath and cooling, 10 cc. of Folin reagent were added to each. After shaking, the contents were transferred separately to 100-cc. volumetric flasks and the solutions were made up to the mark with water. The solution from the pyrethrum extract was filtered through a Gooch crucible fitted with a heavy asbestos pad. The solutions were compared in a Klett colorimeter and from the readings the percentage of the pyrethrins was calculated in the usual way.

CONCLUSIONS

The samples of the commercial variety (*C. cinerariæfolium*) grown in India show a high content of the active constituents compared to imported and foreign samples.

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The Effect of Alkalinity or Acidity on the Stability of Ether*

By A. W. Berry and E. S. Herlong†

The United States Pharmacopœia requires that anesthetic ether be free from aldehyde and peroxide when tested by tests of high sensitivity, thus justly limiting the possible presence of these substances to extremely minute amounts. Consequently ether cannot develop more than minute traces of these impurities upon aging, if the ether is to remain in compliance with pharmacopœial specifications.

A copper-lined can has been shown to be effective in preventing deterioration of ether (1). Notwithstanding this fact, it seemed worth while to determine whether or not very mild alkalinity or acidity would have any bearing on the stability of ether and perhaps provide still other means of

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avoiding the development of aldehydes and peroxides on aging.

EXPERIMENTAL

Preliminary work included the preparation of ether made slightly alkaline with ammonia, and of ether mildly acidulated with glacial acetic acid and also sulfuric acid; and the packaging of these ethers in glass bottles, copper-lined cans and tin-lined cans. These samples were examined after three months, eleven months and forty-one months. The acidified ether in all three types of containers showed the presence of aldehydes each time the ethers were tested, while the ammoniated ether did not. These experiments indicated that a condition of mild acidity is unfavorable and one of mild alkalinity favorable for the protection of ether.

In extending this work ethers containing 0.00176, 0.00088, 0.00044, 0.00022 and 0.00011 Gm. of ammonium hydroxide per 100 cc. of ether were prepared and packaged in copper-lined and tin-lined containers. These were stored at room temperature and also at elevated temperature for thirty-three months. Tests showed that 0.00022 Gm. of ammonium hydroxide per 100 cc. was the optimum amount and that, with the other concentrations, the results were not as good.

Subsequently, an ether containing this optimum concentration of ammonia was packaged in copper-lined containers and tin-lined containers. At the same time a normal anesthetic ether was packaged in the same types of containers. These ethers were stored both at room temperature and at elevated temperatures for thirty-three months. They were subjected to the U. S. P. XI tests and also to other still more sensitive tests for aldehydes and peroxides (2). No practical difference was found between the ammoniated ether and the normal ether when packaged in copper-lined containers, but in the tin-lined containers the ammoniated ether showed less development of aldehydes.

At the same time that we studied ethers made alkaline with ammonia, we also studied the effect of other alkalinizing agents, such as monoethanolamine, triethanolamine, alcoholic potassium hydroxide and alcoholic sodium hydroxide. These likewise were packaged in both types of containers and stored for thirty-three months at both room temperature and elevated temperatures. Of this group, monoethanolamine was found to be superior to the other members in the preservation of ether, but was not as good as ammonia.

SUMMARY

From the work carried out, it has been found that faintly alkaline ethers when stored in copper-free containers are superior in stability to regular U. S. P. XI ether and to those which have been faintly acidified. The ethers faintly alkalinized with ammonia are superior in keeping qualities to ether made faintly alkaline with other agents. Faintly ammoniated ethers are slightly more stable in copper-lined containers under adverse storage condition than in the other types of containers studied. The protective effect of tinned iron containers is more readily demonstrated than that of copper-lined containers, because of the difficulty of causing any appreciable aldehyde development, even under severely adverse storage conditions, when ether is stored in copper.

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Color Reactions of Some Aliphatic Acids

*By George Roeder**

In the course of some other research work, I made the unexpected observation that alkali citrates, heated in acetic anhydride, give deep red colored solutions. In using acetic acid instead of the anhydride the solutions remained colorless.

The first phase of this reaction probably is the formation of alkali acetate and a mixed anhydride of acetylated citric and acetic acid. Since citric acid dissolved in hot acetic anhydride gives a colorless solution, it is clear that the alkali acetate formed in the first phase of the above reaction brings about the condensation of the mentioned mixed anhydride into the colored compound. Therefore, a solution of citric acid in hot acetic anhydride, with the addition of alkali acetate, should give the coloration. This

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