

Let B equal the number of mils of potassium hydroxide consumed in the blank.

Let C equal the weight of mercuric oxide.

$$\text{Then } x = \frac{0.5181C}{(B-A) 0.0011222} \quad y = \frac{B x}{125}$$

Of course, if preferred the liberated potassium hydroxide may be directly titrated by the sulphuric acid and calculations made accordingly.

We have tested numerous alkaloidal salts with solutions standardized by the above methods, and in all cases we have found the results to be correct. We recommend the yellow mercuric oxide as an accurate substance for the standardization of the solutions used in the determination of alkaloids, particularly, as it is adapted for use with methyl red as indicator.

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OLEORESIN OF PINUS PONDEROSA.*

BY E. R. MILLER AND E. V. LYNN.

Inasmuch as Schorger had found the oil of western yellow pine to be an excellent source for beta-pinene or nopinene, a barrel of oleoresin was obtained through the coöperation of the Forest Products Laboratory from the U. S. District Forester of California. The steam fractionation resulted in a larger amount of volatile oil of this species than had heretofore been prepared. Hence, use was made of the opportunity to re-examine the oil for its constituents as well as to isolate the nopinene for the special work for which the material had been obtained. The results of the special work on nopinene will be reported elsewhere.

As pointed out by Schorger, the bulk of the oil consists of beta-pinene, however, the presence of alpha-pinene was definitely established by its crystalline derivatives. Attempts to identify other well known constituents of coniferous oils failed, though their presence seemed indicated. In spite of the care exercised in the fractionation, the large amount of beta-pinene present in the oil appears to render their purification by fractional distillation difficult, hence the negative results may be accounted for at least in part.

OZONIDES AND PEROXIDES OF THE TERPENES AS THERAPEUTIC AGENTS.*

BY A. V. LYNN.

For a long time the oxygenated constituents of the volatile oils have been looked upon as the bearers of the therapeutic properties of these products, whereas the terpenes were regarded as mere diluents, hence of little or no value. Thus, *e. g.*, the therapeutic, hence the commercial value of eucalyptus oil was determined, according to the U. S. Pharmacopoeia, by a cineol assay. The faith in this doctrine has, of late, been thoroughly shattered by the clearer recognition of the

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therapeutic importance of the products resulting from the oxidation of the terpenes with either atmospheric oxygen or ozone. What the effect of the pure terpene, devoid of any added oxygen, may be has apparently received less attention. Indeed, it might be difficult to ascertain such action, since these hydrocarbons are now known to possess a great avidity for this element, which constitutes an important part of the atmosphere in which the animal and human organisms live upon whom the experiments must be conducted.

For a rational consideration of the entire subject it is necessary to differentiate, first of all, between the ozonides, the products of the action of ozone on the terpenes, and the peroxides, the products of the action of atmospheric oxygen on these mostly unsaturated hydrocarbons. Secondly, it should be recalled that, in either case, the addition reactions are by no means simple, *i. e.*, they do not necessarily run their course in one direction. Thirdly, it must be remembered that these addition products are very unstable, on which property their therapeutic value largely depends, yielding other oxidation products with the excess of terpene, and that all of these reactions are readily modified by differences in temperature and other conditions.

As a matter of fact, we know as yet so little about the chemical products that result from the initial addition of oxygen to the terpenes and the subsequent rearrangements of the labile oxides, both ozonides and peroxides, that the literature on the entire subject is apt to prove confusing rather than enlightening. Hence, a survey of the entire field, pointing out the difficulties as well as those phases of the subject which may be comprehended, at least after a fashion, seems desirable at the present time. This would seem true if for no other reason than to guard against exploitation by those who are interested commercially rather than scientifically.

CAMPHENE IN HEMLOCK OIL.*

BY E. V. LYNN.

A pinene fraction obtained from commercial hemlock oil, which had been used several years ago by the class in phyto-chemistry for the purpose of isolating borneol after the saponification of the oil had been effected, had been submitted to the action of dilute potassium permanganate solution by Mr. Max Phillips in an attempt to prepare pinene glycol. The unoxidized portion had been recovered by steam distillation and was used in an attempt to prepare optically active pinene nitrosochloride. After the inactive nitrosochloride had been filtered off, the mother liquid was set aside to allow the optically active addition product to separate. However, in place of the active nitrosochloride, crystals were obtained which had a camphor-like odor and which melted at 42°. Borneol, however, melts at about 203° and camphor at about 175°, whereas camphene melts at about 49°. Its identity with this hydrocarbon was established by converting it into borneol, m. p. 204°, by the Bertram-Walbaum hydration reaction. Camphene had not previously been identified in hemlock oil.

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