leaves nothing on the filter. The compound has not been obtained in a crystalline form.

When the various precipitates discarded in the preceding preparation subsequent to the chlorate precipitation are collected and extracted with large volumes of boiling water, a second mercury compound can be salted out of the extracts by sodium chloride. The yield is extremely small, about 0.5% or less, of the weight of methylene blue used. This substance can be washed on the filter free from chlorides and unmercurated methylene blue. The compound gives a strong qualitative test for mercury. Only enough for two analyses has been obtained.

Anal. Subs., 0.3230: CO_2, 0.4069; H_2O, 0.0986. Subs., 0.2325: 16.2 cc. of dry N_2 (25°, 721 mm.). Calcd. for $C_{16}H_{16}N_3SClHg$: C, 37.06; H, 3.11; N, 8.11. Calcd. for $C_{16}H_{16}N_3SClHg.2H_2O$: C, 34.63; H, 3.63; N, 7.58. Found: C, 34.64; H, 3.44; N, 7.47.

The combustions were carried out with lead chromate; any oxygen was removed from the nitrogen by means of sodium hydrosulfite. The samples were dried over phosphorus pentoxide at room temperature.

The formulas suggested for these compounds in the introduction are no more than possibilities. The work so far done is inadequate to establish formulas, and the problem is, moreover, complicated by the ease with which methylene blue can be converted into other dyes. In the course of the work small quantities of mercury derivatives of dyes other than methylene blue were, in fact, isolated. One of these had the color and reactions of a methylene-azure derivative.

I wish here to thank Dr. Stieglitz for his kindness to me and for his encouragement during this work.

Summary

1. The work upon the mercuration of methylene blue prior to that described in this paper is reviewed.

2. The mercuration of the benzoyl derivative of leuco methylene blue is described, and it is shown that this reaction, in contrast to most mercurations, does not go to completion except in the presence of a considerable excess of mercuric acetate.

3. An account is given of the preparation of small quantities of two mercury derivatives from methylene blue.

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NOTES

Liberation of Hydrogen from Carbon Compounds.—Under this heading Fry, Schulze and Weitkamp[1] have recently published a paper in which they describe the action of fused alkali upon acetylene, methyl alcohol and formaldehyde, and further propose to investigate the action of alkali on various carbon compounds from the point of view of the more or less general reaction in which, under the influence of fused alkali, hydrogen is liberated and the carbon compound oxidized.

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[1] Fry, Schulze and Weitkamp, THIS JOURNAL, **46**, 2268 (1924).

In this paper no mention is made of work by Boswell and the writer[2] in which investigation was made of the action of fused alkali on a long series of compounds, both organic and inorganic. Some of the results obtained may well be of interest to Professor Fry and his collaborators, and in particular their attention is called to the results of the fusion with resorcinol, which are contrary to their description of this reaction. The experimental results showed that, like a number of other compounds, resorcinol does not take part in this general reaction and does not give off hydrogen until it has first absorbed atmospheric oxygen, and has thus presumably been oxidized to some compound which does take part in the general reaction.

The writer will not touch on the theoretical interpretations of this general reaction (to which it is possible that Professor Boswell may later have something to add) but at present merely wishes to call attention to the previous work in this field.

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Preparation of Alkyl Sulfides.—This Laboratory has recently had occasion to use several alkyl sulfides. These sulfides were the purest obtainable. Without exception they all showed the presence of appreciable quantities of mercaptans with the so-called "doctor test" (sodium plumbite solution and free sulfur). It is customary to shake the sulfides repeatedly with sodium hydroxide solution in the final stages of their preparation. This treatment is to remove the impurities including the mercaptans. Due to the ease with which the sodium salts of mercaptans dissociate in aqueous solutions, their removal is never complete with the alkali wash. The complete removal of the mercaptans can be readily accomplished by distilling (preferably under reduced pressure) the alkyl sulfide over finely divided copper. The copper mercaptide is thereby formed and may remain in the residue as such; or if the temperature of distillation is in the neighborhood of 125°, the mercaptide will decompose, in part at least, forming copper sulfide and the corresponding alkyl sulfide. In either case the mercaptans are completely decomposed.

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[2] Boswell and Dickson, This Journal, 40, 1773, 1779, 1786 (1918).

The Optical Properties of Coniine Hydrochloride.—The purpose of this note is to call the attention of chemists again to the value of optical identification of crystalline compounds. The outstanding appeal of the optical method to the chemist rests in the fact that it may be used as a means of identification of a compound, not only when the compound is isolated, but in many cases also when it is associated with other substances. Once the indices of refraction of a pure crystalline material are determined they stand for all time a positive, characteristic, physical constant for that compound, just as much as its optical rotation, its melting and its boiling points.

Prof. E. C. C. Baly, in an address upon the subject of photosynthesis before the Washington Section of the American Chemical Society, mentioned the difficulty of directly identifying coniine as one of the end products of photochemical reaction. The method he finally adopted included a somewhat involved melting-point determination on hydrochlorides.

In order to obtain an additional means of identification, we have studied the optical properties of coniine hydrochloride. The melting point of the substance we used agrees with that given in the literature [namely, 207°, Engler and Bauer, *Ber.*, **27**, 1775 (1894)]. Upon treatment with alkali it gave an oil which gave addition compounds with mercuric chloride and chloroplatinic acid. Only the first was analyzed and it corresponded in nitrogen content to a substance $C_8H_{17}N.2HgCl_2$. Its refractive indices were determined by the successive suspension of small quantities of the material in liquids having known refractive indices until the boundary between crystal and liquid disappeared when examined in plane-polarized light.[1]

Anal. (Kjeldahl-Gunning Arnold method.) Calcd. for $C_8H_{18}NCl$: N, 8.56. Found: 8.63.

The values obtained were $\alpha = 1.535$ and $\gamma = 1.540$, both ± 0.002. The extinction is parallel and the sign of elongation is negative. In convergent polarized light, biaxial interference figures are common, and the optic axial angle was found to be 30–35°. Dispersion is very marked, red being greater than violet. In parallel-polarized light many of the fragments show yellow interference colors (first order), but some show peculiar and characteristic blues or purples, of the type known to petrologists as anomalous interference colors. Perhaps the simplest plan for identification is to immerse the fragments in a liquid, the refractive index of which is equal to one of their indices. Methyl salicylate (oil of wintergreen) is such a liquid, its index being 1.535. In it the grains practically disappear, although their outlines can be faintly seen as blue

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[1] Wherry, *U. S. Dept. Agric. Bull.*, **679** (1918). Keenan, *J. Biol. Chem.*, **62**, 163 (1924).

and orange lines because of the difference in dispersion of the crystal and the liquid.

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NEW BOOKS

Walthère Spring, Oeuvres complètes de. (Complete Works of Walthère Spring.) Published by the Chemical Society of Belgium. Hayez, Brussels, 1914 and 1923. Vol. I, iv + 900 pp. Frontispiece. Vol. II, iv + 960 pp. Frontispiece. 16.5 × 25 cm. Price 40 francs.

These volumes, published under the auspices of the Chemical Society of Belgium, were edited by a Committee composed of G. Chavanne, L. Crismer and J. Wauters. The first volume appeared three years after the death of Spring; the second, delayed by the World War, has but recently been issued.

The numerous publications of Spring have been assembled under ten heads, as follows: The Effect of High Pressure on Solids, and the Diffusion of Solids; Physico-chemical Dynamics; Color and Transparency of Fluids; Inorganic Chemistry; Colloids; Geology and Meteorology; Miscellaneous Reviews, etc. The separate articles number 131. These titles and this large number are eloquent in showing the versatility of Spring and the scope of his work, the excellence and originality of which are well recognized.

There is also a biography of Spring by Crismer, giving a careful summary of his scientific achievements and an appreciative depiction of his personality. The Editors acknowledge the generous assistance of E. Solvay in the publication of the first volume, and of the University Foundation in the publication of the second.

This collection of the many scattered and inaccessible papers of Spring will surely be valuable and is a fitting memorial to a great investigator.

ARTHUR B. LAMB

Cinq Questions d'Actualité. (Five Questions of the Day.) Reports and Discussions of the First Council of Chemistry, held at Brussels on April 21–27 1922, under the auspices of the Solvay International Institute of Chemistry. Gauthier-Villars and Company, 55, Quai des Grands-Augustins, Paris, 1925. xvi + 336 pp. Illustrated. 25.5 × 16.5 cm. Price, unbound, 30 francs.

This volume contains eight addresses on important current problems of chemistry, as follows:

Isotopes, a General Introduction to the Discussion on Atomic Structure, by Frederick Soddy.

The Determination of Atomic Weights by the Method of Positive Rays, by F. W. Aston.