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A NOTE ON THE DETECTION OF ARCHIL, CUDBEAR, AND OTHER LICHEN COLORS.

BY L. M. TOLMAN.

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ARCHIL, orseille or orchil, as it is variously called, and cudbear, coloring materials produced from lichens, are being used to a considerable extent for coloring medicines and foods where colors of coal-tar origin are prohibited.

The methods of analysis now employed to detect coal-tar dyes are liable to lead the analyst to an erroneous decision in the presence of these lichen colors, and it is for this reason that this note is written. The methods most often employed for the detection of coal-tar colors in foods and medicines are those of Sostegni and Carpentieri and Arata, as given in the "Provisional Methods for the Analysis of Foods."[1] These depend on the dyeing of wool in an acid-bath, then extracting the color with ammonia, acidifying this solution and dyeing a second piece of wool.

This process eliminates the natural colors of the fruits and wines and collects the coal-tar color on the wool where it can be tested with various reagents. If, however, lichen colors, such as archil are present, they will be mistaken for coal-tar dyes, if these tests alone are used, as these colors dye wool readily in acid-bath, and are extracted by dilute ammonia, and on making this solution acid again, wool will be readily dyed. It is necessary, after having applied these dyeing tests, to make further tests before deciding that the dye present is of coal-tar origin.

It is, however, comparatively easy to distinguish the lichen colors from those of coal-tar origin.

These colors can be extracted from ammoniacal solution by amyl alcohol, which separates them from the natural colors of the fruits and wines.[2] This amyl alcohol extract, of a purplish red color, is evaporated on the steam-bath to drive off the amyl alcohol, and the purified color tested.

[1] U. S. Department of Agriculture, Bureau of Chemistry, Bull. 65, pp. 111 and 112.
[2] *Ibid.*, p. 113.

A water solution of this color is readily reduced by tin and hydrochloric acid, and reoxidized by ferric chloride. This at once eliminates all the azo dyes and magenta, which are by far the most common dyes used, and leaves only dyes of Class II of the scheme proposed by Rota.[1] All the coal-tar dyes used as archil substitutes and which resemble it in color are azo dyes, and can be readily distinguished from the archil color. If it is desired still farther to identify the color, it can be treated as described by Allen.[2] If it is found by the wool dyeing tests that some added color is present and that amyl alcohol extracts a reddish purple color from an ammoniacal solution, which is readily reduced by tin and hydrochloric acid and reoxidized by ferric chloride, we may be certain that the color is one of the lichen colors, archil, cudbear or litmus, all of which act in a similar way.

These colors are on the market in a number of different forms, as extracts or pastes, as ground-up lichens, or as sulphonated orceïne. This latter form might be readily mistaken for a coal-tar dye on account of its appearance and solubility, but it gives all the reactions of the non-sulphonated colors and can be identified as described above.

THE BASIC PROPERTIES AND THE QUADRIVALENCE OF OXYGEN.

By D. McIntosh.

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In a paper[3] on the basic properties of oxygen, Archibald and McIntosh, continuing the work on the chemistry of low temperatures begun by Walker, McIntosh and Archibald[4] have described additive compounds of organic substances containing oxygen with the halide acids, and have shown that the constitutions of these compounds can be satisfactorily represented by assuming oxygen to have a valency higher than two. Such a supposition was almost imperative in the case of the compounds investigated containing only hydrogen, carbon and oxygen, since

[1] *Chem. Ztg.*, **22**, 437-442; 1898, U. S. Department of Agriculture, Bureau of Chemistry, Bull. 65, pp. 115-118.

[2] Vol. III, part 1, pp. 525 to 541.

[3] *J. Chem. Soc.* (London), **85**, 919 (1904).

[4] *Ibid.*, **85**, 1098 (1904).