

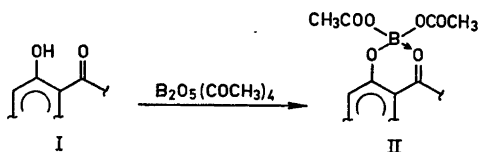
## Chemical Studies on Lichens

### 13.\* A Spot Test for Lichen Xanthones

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In 1921 Dimroth reported<sup>1</sup> that aromatic compounds of the type I reacted with "boron acetate" (tetraanhydride of acetic acid with pyroboric acid) to give boracetates of the type II. One of the type I compounds tried was 1-hydroxy-xanthone, which yielded an intensely coloured yellow boracetate.



Dimroth's reagent (this name is proposed for a saturated solution of "boron acetate" in acetic anhydride) is very useful for spot test detection of lichen xanthones (all xanthones yet known from lichens are hydroxylated in the 1 position). The spot test is based on two facts. The xanthone boracetates are surprisingly stable towards hydrolysis compared to other boracetates and show a very intense yellowish fluorescence in UV light (365 nm). Thus, if the spot test is carried out according to the "filter paper method",<sup>2</sup> or if a drop of Dimroth's reagent is applied directly on a lichen specimen, the appearance of a brilliant yellow fluorescence in UV light indicates the presence of a xanthone.

The spot test has been tried with all compounds listed in Ref. 2. Only two other types of lichen compounds seem to interfere. The chromone sordidone<sup>3</sup> (=rupicolin<sup>2</sup>) gives a similar reaction as do the

amino acid derivatives of pulvic acid, rhizocarpic acid, and epanorin. In the latter cases, however, the fluorescence disappears within 10–15 sec (probably because of rapid hydrolysis due to moisture in the air), whereas the fluorescence of xanthone and chromone boracetates persists for at least one minute.

*Experimental.* Dimroth's reagent was prepared by adding boric acid (10 g) in small portions to hot (100°C) acetic anhydride (100 ml) and allowing the solution to cool.

*Spot tests.* A drop of an acetone solution of the lichen substance (sources for the compounds are given in Ref. 2) was applied to a filter paper. After the acetone had evaporated, a drop of Dimroth's reagent was added and the filter paper examined under a UV lamp (365 nm). A brilliant yellow fluorescence, lasting at least 1 min, was obtained with the xanthones lichexanthone, arthothelin (=deschlorothiophanic acid), thuringin, thiophanic acid, and thiophanic acid (=flavicanon), and with the chromone sordidone (=rupicolin).

A drop of Dimroth's reagent was applied to specimens of *Lecanora straminea*, *L. pinguis*, *L. novomexicana*, *L. reuteri*, *Lecidea quornea*, *Pertusaria flavicunda*, and *P. lutescens* (all known to contain 1-hydroxylated xanthones<sup>2,4-6</sup>) and the specimens were observed under UV light (365 nm). In all cases a brilliant yellowish fluorescence appeared.

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