

attached; (2) heating a mixture of the alcohol and antimony trioxide in a sealed tube at  $150^{\circ}$ ; (3) shaking a mixture of the alcohol and antimony trioxide with anhydrous copper sulphate in the cold; (4) heating a mixture of the alcohol and antimony trioxide in a flask with a Soxhlet tube, filled with anhydrous copper sulphate, attached; (5) heating a mixture of the alcohol, antimony trioxide, and calcium turnings in a flask with reflux condenser. A comparison of the yields obtained is given in the sequel. By means of these methods, and more particularly the last two, esters were formed with methyl, ethyl, propyl, isobutyl, amyl, and isoamyl alcohols; also with phenol, *o*-, *m*-, and *p*-cresols. The esters were found to correspond with the general formula  $R_3SbO_3$ . In all cases the yields obtained with antimony trioxide were very much lower than the corresponding arsenites previously described.

#### EXPERIMENTAL.

(i) *Heating with reflux condenser only.*—Weighed quantities of methyl, ethyl, propyl, isobutyl, amyl, and isoamyl alcohols were mixed with an excess of antimony trioxide, and heated for different periods of time in a flask to which a reflux condenser was attached. After five hours' heating not a trace of ester could be detected in any of the reacting mixtures; but, after fifteen hours' heating, evidence was obtained that, in the case of isobutyl and isoamyl alcohols, esters were formed, but not in quantities sufficient to permit of their being isolated. That an ester was formed was shown by pouring the clear liquid into water-free benzene,\* in which antimony trioxide is very sparingly soluble, and filtering. By this means any antimony trioxide merely dissolved in the alcohol was separated, and, if antimony were found in the above filtrate, it must have been present in the form of an ester. The filtrate gave a distinct precipitate of antimony sulphide when acidified, treated with hydrogen sulphide, and warmed; thus, whilst there is no doubt that both isobutyl and isoamyl antimonites are formed under these conditions, the yields are so small that it is impossible to isolate them by fractional distillation.

(ii) *Heating in sealed tubes.*—Quantities of the various alcohols were mixed with antimony trioxide and heated for six hours in sealed tubes at  $150^{\circ}$ , but in no case could the presence of any ester be detected.

(iii) *Using a dehydrating agent in the cold.*—Weighed quan-

\* Great difficulty was found in obtaining benzene absolutely free from water. The samples of benzene at hand were found to contain enough water to decompose partly the esters formed. It was necessary to heat the benzene with calcium turnings for about forty-eight hours.