Synthesis of 2-Hydroxyethyl Methanesulfonate

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In a series of investigations of mutagenic alkylating agents,[1] mainly alkyl alkanesulfonates, 2-hydroxyethyl methanesulfonate was required. This compound, like ethylene oxide, will introduce a hydroxyethyl group. If such a group is introduced into DNA, *e.g.* on a phosphate oxygen, it may be expected to induce secondary changes because of phosphate ester migration to the hydroxyl function of the 2-hydroxyethyl group (*cf.* Ref. 2).

2-Hydroxyethyl methanesulfonate was readily prepared from 2-bromoethanol by reaction with silver methanesulfonate in acetonitrile solution, following the general method of Emmons and Ferris.[3] The ester was distilled *in vacuo* and could be stored in the refrigerator without decomposition. It is only slowly hydrolysed at room temperature in neutral aqueous solutions but was, as expected, rapidly hydrolysed at high pH-values with the intermediate formation of ethylene oxide. A detailed kinetic investigation of its reactions with various nucleophiles will be published elsewhere.

The mutagenic and chromosome breaking effects of 2-hydroxyethyl methanesulfonate have been studied with *Arabidopsis* and barley, respectively.[4] Further *in vivo* and *in vitro* studies concerning its mode of action are in progress.[5]

Experimental. Dry acetonitrile (Fisher certified reagent) was used. IR-spectrum was measured on a Perkin-Elmer 221 spectrophotometer.

Silver methanesulfonate (70 g) and freshly distilled 2-bromoethanol (37.5 g) were added to acetonitrile (300 ml). The reaction mixture, protected from light and moisture, was refluxed for 6 h. Silver bromide was filtered off and washed with acetonitrile. The combined solutions were evaporated *in vacuo* to a small volume and remaining silver salts were precipitated by the addition of dry acetone (200 ml). The solution was filtered and freed from traces of acid by treatment for a few hours with moist sodium bicarbonate. This was removed and the solution was dried and evaporated to give the crude ester (80 %). Small portions (1—7 g) were distilled from a distillation flask containing glass beads and dry calcium carbonate to give 2-hydroxyethyl methanesulfonate, b.p. 124—128°/1 mm, n_D^{25} 1.4488. $\nu_{max}^{CHCl_3}$ 3500 (broad), 1340, 1160 cm^{-1}. (Found: C 25.9; H 5.78; S 22.0. $C_3H_8O_4S$ (140.16) requires C 25.7; H 5.75; S 22.9).

The partition coefficient of the ester between chloroform and water at 20° was estimated to be *ca.* 0.05 by chromatography on moist paper.[6]

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