Reaction of the Sterilant, Ethylene Oxide, on Plastics

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Ethylene oxide (ETO) in the form, "Cryoxcide," is used to sterilize surfaces and objects that cannot be treated with heat or corrosive chemicals. Cryoxcide is a gaseous formulation consisting of 11 per cent of ethylene oxide, 44.5 per cent of trichloromonofluoromethane (Freon 11), and 44.5 per cent of dichlorodifluoromethane (Freon 12). Cryoxcide is used at this laboratory to sterilize sensitive equipment that might be contaminated with foot-and-mouth disease virus.

Sterilization was performed in the following manner. The contaminated equipment was placed in a gas autoclave at 78 F for 30 min at 40 per cent relative humidity. Cryoxcide was admitted into the chamber to a pressure of 11 lb per sq in. and the equipment was maintained for a 5-hr exposure under these conditions.

An office calculating machine from a contaminated area was exposed to gaseous ETO, and some of the plastic parts were badly damaged and softened. Samples of the thermoplastics used in the machine were obtained from the manufacturer. The plastics were Tenite, a cellulose acetate butyrate; Styron 480, a polystyrene resin; and Zytel 101, a nylon resin plastic. Samples of these plastics were placed in the gas autoclave and subjected to the gaseous sterilization procedure described above. The Styron and Tenite samples were damaged, but the Zytel sample was not. Plastic samples were also placed in pure Freon 11 for 5 hr at 37 C; the Styron sample was the only one damaged by such treatment. Pure Freon 12 was not tested on these samples. Other plastic samples were immersed in liquid ETO at 25 C for 4 hr. The Styron and Tenite samples were damaged severely, but again the Zytel plastic was undamaged.

This information shows the need for testing the effects of ETO and Freon 11 before using Cryoxcide on plastic materials.

Preservation of Microorganisms by Freeze-drying

II. The Destructive Action of Oxygen. Additional Stabilizers for Serratia marcescens. Experiments with Other Microorganisms


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In an earlier paper (Benedict et al., 1958) experiments were presented on cell supernatant, Naylor-Smith solution, and salts of various organic acids as stabilizers for Serratia marcescens subjected to freeze-drying. In this paper, we report the contribution of atmospheric oxygen to the death of dried S. marcescens cells when exposed to air before rehydration as opposed to rehydration under vacuum. We also report on a variety of other substances as stabilizers for S. marcescens. These include urea and related compounds, dextran, mucin, and bovine serum. Upon completion of experiments with S. marcescens, we proceeded to apply some of the more effective stabilizers to cells of more sensitive organisms: Two yeasts, Saccharomyces capsularis strain no. NRRL Y-676 and Eremothecium ashbyii strain no. NRRL Y-1363, and two bacteria, Pseudomonas aureofaciens strain no. NRRL B-1543P and Leucomostoc mesenteroides strain no. NRRL B-512F.

1 "Cryoxcide" is the trade name of a product made by American Sterilizer Company, Erie, Pennsylvania.
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LITERATURE CITED


Erratum

In Scientific Articles, "Reaction of the Sterilant, Ethylene Oxide, on Plastics," J. Tessler, Appl. Microbiol. 9: 1961, errors appear on page 256. The corrections are as follows:

The "Cryoxcide" is a trade name of a product supplied by the American Sterilizer Company, but is not manufactured by them. In addition to ethylene oxide, the product contains 79 per cent Freon 11 and 10 per cent Freon 12, and not 44.5 per cent of each Freon as reported. The sterilization procedure used was developed for Foot-and-Mouth Disease Virus inactivation and should not be construed as the recommended conditions stipulated by the American Sterilizer Co. for sterilization of plastic materials.