

FEM 03006

Utilization of 1-chloromethylsilatrane by *Rhodotorula mucilaginosa*

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Received 15 July 1987

Accepted 13 August 1987

Key words: Silatrane; Organosilicon compound

1. SUMMARY

The imperfect yeast, *Rhodotorula mucilaginosa* utilized nitrogen of 1-chloromethylsilatrane (CMS) as a sole nitrogen source when grown on glucose, glycerol, methanol, ethanol and succinate. Under such conditions and at concentrations from 0.45 to 4.5 mM, CMS was a growth-limiting factor. Atomic absorption spectrometry revealed the accumulation of silicon compounds in the cultural liquid which were chloroform-insoluble in contrast to CMS. The following pathway of the partial decomposition of CMS is proposed: CMS → chloromethylsilanethryol → bis(chloromethyl)disiloxane)tetraol.

2. INTRODUCTION

Some silatranes, which are cyclic organosilicon tris-(2-oxyalkyl) amine esters, are efficient plant and animal growth stimulators. The possibility of their wide application, specifically of 1-chloromethylsilatrane, as a plant growth stimulator, an active biostimulator, and adaptogen, and an animal drug [1,2], generated a need for an extensive study of its biological properties and metabolism in organisms of different evolutionary levels [2]. Until recently, much attention has been paid

to the transformation of silatranes in higher animals [2], while microorganisms remained neglected in this respect. It has been the purpose of the present work to study the possibility of the microbial utilization and metabolism of CMS.

3. MATERIALS AND METHODS

3.1. Microorganism

The yeast strain *Rh. mucilaginosa* BKIIM Y-706 (USCPM Y-706), isolated from active sludge of a sewage-treatment works was used.

3.2. Compound

1-Chloromethylsilatrane [1-(chloromethyl) 2,8,9-trioxa-aza-tricyclo-3,3,3,0^{1,5}undecane] was synthesized according to Voronkov and Diyakov [2], 99.5% purity, 213–216 °C m.p.

3.3. Growth conditions

The cells were grown on a shaker (180 rev./min) at 30 °C in medium consisting of (g/l): MgSO₄ · 7H₂O—0.25; MnSO₄—0.2; FeSO₄—0.02; CaCl₂—0.05; KH₂PO₄—1.1; Na₂HPO₄ · 2H₂O—1.42; H₃BO₃—0.005; Na₂MoO₄—0.005; NaBr—0.0005; ZnSO₄—0.0005; Al₂(SO₄)₃—0.0003; CuSO₄ · 5H₂O—0.0002; CoCl₂—0.0002; 1 mM glucose or equivalent on