



HANDBOOK *of* MICROBIOLOGY

Volume III Microbial Products

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HANDBOOK OF MICROBIOLOGY

Volume III: Microbial Products

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PREFACE

The pages of the third volume of the CRC Handbook of Microbiology are dedicated to the tabulation of data on substances known to be formed by microorganisms. Since microbes are hectic and versatile synthesizers, many of the products they form will not be covered. This may be due partly to lack of the most recent information and partly to our failure in finding an author to cover a given group of compounds. However, we feel that the present volume is the most complete compilation of this type, and it is our hope that microbiologists will find it useful. We are urging the users of this Handbook to draw all its shortcomings to our attention. Only with their cooperation can we hope to make subsequent editions of this Handbook increasingly more useful.

We thank all the authors for contributing so generously their time and expertise. Our gratitude also goes to the members of our Advisory Board, who have helped with the planning of this volume. In this case, we are especially indebted to Drs. Nancy N. Gerber and L. C. Vining.

The editorial skill of Mrs. Lisbeth Hammer and the painstaking efforts of the CRC production staff have made our task light, as did the intelligent clerical assistance of Mrs. Verna Lepping.

A. I. Laskin
H. A. Lechevalier
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SUBSTANCES RELATED TO CARBOHYDRATES

SIMPLE ALIPHATIC SUBSTANCES, HYDROCARBONS, ESTERS, ALDEHYDES, KETONES, AND ALCOHOLS

DR. NANCY N. GERBER

The following list has been compiled primarily from References 1 and 2. No claim is made for its completeness. Substances reported from wine, sherry, fusel oil, etc. are not included. However, a list of compounds identified in whisky, wine and beer has been published (see Reference 3).

Name	Producing Organisms	Properties	Reference
Ethylene	<i>Penicillium digitatum</i> , <i>Blastomyces dermatitidis</i> , <i>B. brasiliensis</i> , <i>Histoplasma capsulatum</i>	BP: -103°C	1, 2
2-Methyl-2-butene	<i>Puccinia graminis</i>	BP: 38°C	1, 2
Octacosane	<i>Amanita phalloides</i>	MP: 61°C	1, 2
Methyl formate	<i>Streptomyces odorifer</i>	BP: 31°C	4
Methyl acetate	<i>Streptomyces odorifer</i>	BP: 59°C	4
Ethyl acetate	<i>Streptomyces odorifer</i>	BP: 77°C	4
Propyl acetate	<i>Ceratocystis fimbriata</i>	BP: 102°C	2
Isopropyl acetate	<i>Streptomyces odorifer</i>	BP: 89°C	4
Isobutyl acetate	<i>Endoconidiophora coerulescens</i>	BP: 61°C	1, 2
Methyl heptenyl acetate	<i>Ceratocystis coerulescens</i>		5
Actinomycin J ₂ (dodecyl 5-keto-octadecanoate)	<i>Actinomyces (Streptomyces) flavus</i>	MP: 81.5°C	1
Formaldehyde	<i>Chlamydomonas globosa</i>	BP: -20°C	6
Acetaldehyde	<i>Chlamydomonas globosa</i>	BP: 21°C	6, 8
Propionaldehyde	<i>Chlorella pyrenoidosa</i>	BP: 49°C	7
Valeraldehyde	<i>Cryptomonas ovata</i> , <i>Synura petersenii</i>	BP: 103°C	8
Heptanal	<i>Cryptomonas ovata</i> , <i>Synura petersenii</i>	BP: 153°C	8
Acetone	<i>Cryptomonas ovata</i> , <i>Synura petersenii</i>	BP: 56°C	8
2-Butanone (methyl ethyl ketone)	<i>Chlamydomonas globosa</i>	BP: 80°C	6
Diacetyl (2,3-butanedione)	Various bacteria	BP: 88°C	9
5-Methyl-3-heptanone	<i>Streptomyces cinnamoneus</i> -like		10
2-Methyl-2-heptene-6-one	<i>Endoconidiophora coerulescens</i> , <i>E. virescens</i>	BP: 172-174°C	1, 2
3-Octanone	<i>Aspergillus flavus</i>		11
Methyl heptenyl ketone	<i>Ceratocystis coerulescens</i>		5

Name	Producing Organisms	Properties	Reference
Palmitone (dipentadecyl ketone)	<i>Corynebacterium diphtheriae</i>	MP: 82°C	1
<i>cis</i> -Palmitenone (pentadecyl pentadec-7-enyl ketone)	<i>Corynebacterium diphtheriae</i>	MP: 40°C	1
Ethanol	Yeasts, fusaria, mucors, penicillia, aspergilli, etc.	BP: 78°C	1
Dihydroxyacetone	<i>Acetobacter suboxydans</i>	MP: 75–80°C	1
Glycerol	Yeasts, <i>Bacillus subtilis</i> , <i>Aspergillus wentii</i> , <i>Clasterosporia</i> , <i>Helminthosporia</i> , penicillia, etc.	MP: 18°C BP: 290°C (dec.)	1
<i>n</i> -Butanol	<i>Clostridium acetobutylicum</i> , <i>C. propylbutylicum</i> , <i>C. saccharobutylicum</i>	BP: 117°C	1
Isobutanol	<i>Ceratocystis moniliformis</i> , <i>C. coerulescens</i> , <i>C. major</i> , <i>C. fugacearum</i> , <i>Streptomyces odorifer</i>	BP: 108°C	2, 4, 12
2,3-Butanediol	<i>Aerobacter aerogenes</i> , <i>Serratia marcescens</i> , <i>Bacillus polymyxa</i> , <i>B. subtilis</i> , <i>B. mesentericus</i> , <i>Pseudomonas hydrophila</i> , yeasts	BP: 180°C	1
Acetoin (3-hydroxy-2-butanone)	Various bacteria	BP: 148°C	9
3-Methylbutanol	<i>Aspergillus flavus</i>		11
1-Octanol	<i>Aspergillus flavus</i>		11
3-Octanol	<i>Aspergillus flavus</i>	BP: 195°C	11
1-Octen-3-ol	<i>Aspergillus flavus</i>		11
<i>cis</i> -2-Octen-1-ol	<i>Aspergillus flavus</i>		11
Cetyl alcohol	<i>Amanita phalloides</i>	MP: 50°C	1, 2
Stearyl alcohol	<i>Penicillium notatum</i>	MP: 59°C	1, 2
<i>d</i> -2-Octadecanol	<i>Mycobacterium tuberculosis</i> , <i>M. avium</i> , <i>M. phlei</i>	MP: 56°C	1
<i>d</i> -3-Octadecanol	<i>Corynebacterium diphtheriae</i>	MP: 56°C	1
Phthiocerol (a 32 and 34 carbon chain, each with a methoxy, a methyl and 2 hydroxy substituents)	<i>Mycobacterium tuberculosis</i>	MP: 73°C	1

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