Gmelin Handbuch

der Anorganischen Chemie

Gmelin Handbuch der Anorganischen Chemie

Achte, völlig neu bearbeitete Auflage
8th Edition

Sn
Organotin Compounds

Part 7

Organotin Bromides

with 5 illustrations

by Herbert Schumann and Ingeborg Schumann

AUTHORS — Herbert Schumann, Ingeborg Schumann
Technische Universität Berlin

FORMULA INDEX — Ursula Hettwer, Gmelin-Institut, Frankfurt am Main

EDITOR — Hubert Bitterer, Gmelin-Institut, Frankfurt am Main

Springer-Verlag
Berlin · Heidelberg · New York 1980

LITERATURE CLOSING DATE: 1978

Die vierte bis siebente Auflage dieses Werkes erschien im Verlag von Carl Winter's Universitätsbuchhandlung in Heidelberg

Library of Congress Catalog Card Number: Agr 25-1383

ISBN 3-540-93424-3 Springer-Verlag, Berlin · Heidelberg · New York
ISBN 0-387-93424-3 Springer-Verlag, New York · Heidelberg · Berlin

LN-Druck Lübeck

Gmelin Handbuch der Anorganischen Chemie

Achte völlig neu bearbeitete Auflage

8th Edition

Organometallic Compounds in the Gmelin Handbook

The following listing indicates in which volumes these compounds are discussed or are referred to:

Ag	Silber B 5 (1975)
Au	Organogold Compounds* (1980)
Bi	Bismut-Organische Verbindungen (Erg.-Werk, Bd. 47, 1977)
Co	Kobalt-Organische Verbindungen 1 (Erg.-Werk, Bd. 5, 1973), 2 (Erg.-Werk, Bd. 6, 1973) and Kobalt Erg.-Bd. A (1961), B 1 (1963), B 2 (1964)
Cr	Chrom-Organische Verbindungen (Erg.-Werk, Bd. 3, 1971)
Fe	Eisen-Organische Verbindungen A 1 (Erg.-Werk, Bd. 14, 1974), A 2 (Erg.-Werk, Bd. 49, 1977), A 3 (Erg.-Werk, Bd. 50, 1978), A 6 (Erg.-Werk, Bd. 41, 1977), B 1° (Erg.-Werk, Bd. 36, 1976), B 2* (1978), B 3° (1979), B 4 (1978), B 5 (1978), C 1 (1979), C 2 (1979), C 3* (1980) and Eisen B (1929–1932)
Hf	Organohafnium Compounds* (Erg.-Werk, Bd. 11, 1973)
Nb	Niob B 4 (1973)
Ni	Nickel-Organische Verbindungen 1 (Erg.-Werk, Bd. 16, 1975), 2 (Erg.-Werk, Bd. 17, 1974), Register (Erg.-Werk, Bd. 18, 1975) and Nickel B 3 (1966) and C (1968–1969)
Np, Pu	Transurane C° (Erg.-Werk, Bd. 4, 1972)
Pt	Platin C (1939) and D (1957)
Ru	Ruthenium Erg.-Bd. (1970)
Sn	Zinn-Organische Verbindungen 1 (Erg.-Werk, Bd. 26, 1975), 2 (Erg.-Werk, Bd. 29, 1975), 3 (Erg.-Werk, Bd. 30, 1976), 4 (Erg.-Werk, Bd. 35, 1976), 5 (1978), 6 (1979), 7* (1980) (present volume)
Ta	Tantal B 2 (1971)
Ti	Titan-Organische Verbindungen 1 (Erg.-Werk, Bd. 40, 1977), 2 (1980)
V	Vanadium-Organische V dungen (Erg.-Werk, Bd. 2, 1971) and Vanadium B (1967)
Zr	Organozirconium Compounds° (Erg.-Werk, Bd. 10, 1973)

* Completely or ° in part in English

Gmelin Handbuch der Anorganischen Chemie

Achte völlig neu bearbeitete Auflage

BEGRÜNDET VON

Leopold Gmelin

ACHTE AUFLAGE BEGONNEN

im Auftrag der Deutschen Chemischen Gesellschaft
von R. J. Meyer

FORTGEFÜHRT VON

E. H. E. Pietsch und A. Kotowski
Margot Becke-Goehring

HERAUSGEGEBEN VOM

Gmelin-Institut für Anorganische Chemie
der Max-Planck-Gesellschaft zur Förderung der Wissenschaften
Direktor: Ekkehard Fluck

Springer-Verlag
Berlin · Heidelberg · New York 1980

Preface

The first six volumes on organotin compounds appeared between 1975 and 1979 in German as a part of the eighth edition of the Gmelin Handbook. This seventh volume of the series, issued in 1980, is in English. By writing in English, we hope to make the information in this volume readily available to an even larger circle of scientists in colleges, universities, institutes, and industrial laboratories around the world.

This third installment of Chapter 1.3 describes the mononuclear organotin bromides. It covers the literature through the end of 1978. The six earlier volumes presented Chapter 1.1 with its literature coverage through the end of 1973, Chapter 1.2 with its literature coverage through the end of 1974, Chapter 1.3.1 with its literature coverage through the end of 1975, and Chapter 1.3.2 with its literature coverage through the end of 1976. The overall plan for the series and the content of each chapter are thoroughly described in the preface to the first volume.

At the beginning of this volume, there is a list of general literature for organotin compounds—books, monographs, reviews, and special publications—covering the period up to the end of 1978. This is a supplement to the lists in Part I and Part V. This list is followed by a list of general literature specially for the organotin bromides.

The abbreviations used to describe the intensity of the bands in the IR spectra are vs for very strong, s for strong, m for moderate, w for weak, vw for very weak, and sh for shoulder. German abbreviations were used in the earlier volumes. In the description of NMR spectra, the chemical shifts are given in as the literature as δ, τ, or $\Delta\nu$. A positive sign for δ or $\Delta\nu$ indicates a shift to higher frequency, or lower field strength, in respect to the reference. This convention follows a recommendation of IUPAC, which has been generally accepted by those working in the field. The opposite convention was used in the earlier volumes.

We thank Dr. Margot Becke, the former director who only recently retired, Dr. Ekkehard Fluck, her successor, and their co-workers at the Gmelin Institute for their excellent cooperation. In particular, we thank Dr. Hubert Bitterer for his sympathetic editing and Dr. James Rounsaville for checking our English. We again thank Mrs. E. Redlinger for her meticulous handling of the literature index and the members of the chemistry department of the library at the Technische Universität Berlin for their assistance in procuring the literature.

Berlin-Lichtenrade
The Ice Saints, 11–13 May 1980

Herbert Schumann
Ingeborg Schumann

Table of Contents

Organotin Compounds

General Literature

See also the comments under the General Literature in "Zinn-Organische Verbindungen" 1, p. 1.

The General Literature concerning organotin compounds, e.g., monographs and reviews which deal with more than a specific class of organotin compounds, annual surveys, or special comprehensive publications, published to the end of 1973 is given in "Zinn-Organische Verbindungen" 1, to the end of 1976 in "Zinn-Organische Verbindungen" 5. Additional papers published to the end of 1978 are summarized in the following list.

Organometallic Compounds

D. J. Cardin, K. R. Dixon, Organometallic Compounds, Ann. Rept. Progr. Chem. [Chem. Soc. London] A **73** [1976] 211/59.

K. Smith, Organometallic Chemistry. Main Group Elements, Ann. Rept. Progr. Chem. [Chem. Soc. London] B **73** [1976] 121/36.

J. L. Davidson, Metal-alkyl, -aryl, and -allyl Bond Formation and Cleavage, Inorg. React. Mech. **5** [1977] 333/45.

O. M. Nefedov, A. I. Dyachenko, A. K. Prokofev, Arynes and Carbenes Derived from Organoelement Compounds, Usp. Khim. **46** [1977] 1787/843; Russ. Chem. Rev. **46** [1977] 941/66.

O. A. Reutov, K. P. Butin, Equilibria of Redistribution Reactions of Organometallic Compounds, Rev. Roumaine Chim. **22** [1977] 733/7.

P. J. Smith, Conference on Organometallic Chemistry in Poland, Tin Its Uses No. 112 [1977] 8.

P. L. Timms, T. W. Turney, Metal Atom Synthesis of Organometallic Compounds, Advan. Organometal. Chem. **15** [1977] 53/112.

C. E. Carraher, E. J. Sheats, C. U. Pittman, Organometallic Polymers, Academic Press, New York 1978, 353 pp.

C. J. Cardin, D. J. Cardin, R. J. Norton, K. R. Dixon, Organometallic Compounds, Ann. Rept. Progr. Chem. [Chem. Soc. London] A **74** [1977/78] 215/73.

M. G. Hutchings, Organometallic Chemistry. Main Group Elements, Ann. Rept. Progr. Chem. [Chem. Soc. London] B **74** [1977/78] 136/52.

M. L. Khidekel, E. I. Zhilyaeva, Organometallics, Zh. Vses. Khim. Obshchestva **23** [1978] 506/23.

O. A. Reutov, Some Aspects of Organometallic Chemistry of Nontransition Metals, Tetrahedron **34** [1978] 2827/55.

Chi-Tao Wang, Organometallic Chemistry, Hua Hsueh Tung Pao **1978** No. 2, p. 70/2.

F. E. Brinckman, J. M. Bellama, Organometals and Organometalloids. Occurrence and Fate in the Environment, ACS Symp. Ser. No. 82 [1978] 447 pp.

Z. M. Rzaev, S. G. Mamedova, F. B. Rustamov, Coordination Effect in Polymerization Reactions of Organotin Monomers, 13th Vses. Chugaev. Soveshch. po Khim. Kompleks Soedin. 1978, p. 335.

D. J. Thompson, K. Smith, Organometallics in Synthesis, Gen. Syn. Methods **1** [1978] 324/81.

Organometallic Compounds of Main Group IV Elements

F. B. Rustanov, Z. M. Rzaev, R. A. Sultanov, Synthesis of Mixed Organosilicon and Organotin Epoxides, Sovrem. Sostoyanie i Perspektivy Razvitiya NIR i Proiz-va Epoksid. Smol i Materialov na ikh Osnove **1975** 36/7; C.A. **87** [1977] No. 118494.

P. D. Seemuth, H. Zimmer, Germanium, Tin, and Lead, Ann. Rept. Inorg. Gen. Syn. **5** [1976/77] 49/63.

D. A. Armitage, The Silicon Group in Organometallic Chemistry, Organometal. Chem. **6** [1976/78] 102/61.

R. Livingstone, Six-membered Ring Compounds with One Hetero Atom. Sulfur, Selenium, Tellurium, Silicon, Germanium, Tin, Lead, or Iodine, in: S. Coffey, M. F. Ansell, Rodd's Chemistry of Carbon Compounds, 2nd Ed., Vol. 4, Amsterdam 1977, p. 347/426.

N. V. Fomina, N. I. Sheverdina, K. A. Kocheshkov, Radiation Effects in the Chemistry of Group IV B Elements [Silicon Germanium Tin and Lead], Usp. Khim. **47** [1978] 428/43; Russ. Chem. Rev. **47** [1978] 238/46.

P. G. Harrison, Elements of Group IV, Inorg. Chem. Main Group Elem. **5** [1978] 109/72.

V. I. Proshutinskii, I. I. Lapkin, V. A. Dumler, Study of the Effect of the Fourth Substituent on the Chemical Shifts in Trimesityl-containing Organogermanium and Organotin Compounds, Radiospektroskopiya [Perm] **1978** 34/41.

Organotin Compounds

M. A. Porai-Koshits, Disproportionation of Bonds in Organotin Compounds, Tezisy Dokl. 1st Vses. Soveshch. Org. Kristallokhim., Riga 1974 [1975], p. 29/30.

V. I. Shiryaev, E. M. Stepina, V. F. Mironov, Direct Synthesis of Organotin Compounds, Elementoorg. Soedin. **1976** No. 3, p. 8/82; C.A. **89** [1978] No. 24407.

M. Gielen, Synthesis and Properties of Optical Active Organotin Compounds, Ann. Rept. Inorg. Gen. Syn. **5** [1976/78] 337/49.

P. G. Harrison, Tin, Annual Survey Covering the Year 1975, J. Organometal. Chem. Libr. **4** [1977] 367/494.

S. Sakai, Tin and Organic Synthesis, Kagaku [Kyoto] **32** [1977] 451/8.

E. Boboli, W. L. Malasnicki, O. Pietraszkiewicz, Industrial Methods of Producing Butyltin Compounds, Przemysl Chem. **57** [1978] 338/40.

P. G. Harrison, Tin, Annual Survey Covering the Year 1976, J. Organometal. Chem. Libr. **6** [1978] 373/493.

R. C. Poller, Free Radical Reactions of Organotin Compounds, Rev. Silicon Germanium Tin Lead Compounds **3** [1978] 243/77.

G. J. M. van der Kerk, The Organic Chemistry of Tin, Chem. Technol. **8** [1978] 356/65; C.A. **89** [1978] No. 75383.

Physical Properties

A. N. Rodionov, O. P. Syutkina, S. G. Smirnov, E. M. Panov, K. A. Kocheshkov, Vibrational Spectra and Structure of Certain Aromatic Derivatives of Mercury, Tin, and Lead, Izv. Akad. Nauk SSSR Ser. Khim. **1974** 1299/302; Bull. Acad. Sci. USSR Div. Chem. Sci. **1974** 1222/5.

N. N. Greenwood, Spectrosc. Prop. Inorg. Organometal. Compounds **8** [1975].

N. N. Greenwood, E. J. F. Ross, Index of Vibrational Spectra of Inorganic and Organometallic Compounds, Vol. 3, Butterworth, Sevenoaks 1976.

T. B. Brill, Application of the Additive Electric Field Gradient Model to Nuclear Quadrupole Resonance Data in Indium(III) Compounds and the Relation to Tin(IV) Parameters, Inorg. Chem. **15** [1976] 2558/60.

W. F. Edgell, Organometallic Compounds. Vibrational Analysis, Pract. Spectrosc. **1** [1976/77] 207/77.

A. Redhouse, Diffraction Studies of Organometallic Compounds, Organometal. Chem. **6** [1976/78] 408/60.

J. A. Connor, XPS Studies of Inorganic and Organometallic Compounds, Handbook X Ray Ultraviolet Photoelectron Spectry. **1977** 183/209.

E. A. V. Ebsworth, Spectrosc. Prop. Inorg. Organometal. Compounds **10** [1977].

J. E. Hoffman, K. C. Kappel, L. M. Frenzel, M. L. Good, Infrared and Nuclear Magnetic Resonance Analysis of Organotin Toxicants for Marine Antifouling Coatings, AD-A041176 [1977]; C.A. **87** [1977] No. 186142.

M. B. Hursthouse, Carbon, Silicon, Germanium, Tin, and Lead, Mol. Struct. Diffr. Methods **5** [1977] 391/9.

V. S. Petrosyan, NMR Spectra and Structures of Organotin Compounds, Progr. Nucl. Magn. Resonance Spectry. **11** [1977] 115/48.

G. K. Semin, V. P. Kazakov, E. V. Bryukhova, Field Constants of NQR Frequencies and Nature of the Taft σ^*-Constant of Substituents, Teor. Eksperim. Khim. **13** [1977] 77/8.

T. R. Spalding, Organometallic, Coordination, and Inorganic Compounds, Mass Spectrom. **4** [1977] 268/330.

M. C. R. Symons, Inorganic and Organometallic Radicals [Electron Spin Resonance], Electron Spin Resonance **4** [1977] 84/100.

L. Vogel, H. Kehlen, Excess Enthalpies of Binary Liquid Systems of Symmetrical Tetraalkyls of Silicon, Tin, and Lead, 1st Czech. Conf. Calorim. [Lect. Short Commun.], Liblice, Czech., 1977, p. C4/1-C4/4.

M. G. Voronkov, V. P. Feshin, Progress in Nuclear Quadrupole Resonance Investigations of Halogen-containing Organic and Organometallic Compounds, Org. Magn. Resonance **9** [1977] 665/87.

C. Glidewell, Anomalous Geometry in μ-Oxo and μ-Nitrido Compounds of Silicon, Phosphorus, Sulfur, and Their Heavier Congeners. Stereochemical Inactivity of Lone Pairs in the Presence of Ligands of Low Electronegativity, Inorg. Chim. Acta **29** [1978] L283/L284.

J. A. Zubieta, J. J. Zuckerman, Structural Tin Chemistry, Progr. Inorg. Chem. **24** [1978] 251/476.

Y. Kawasaki, NMR Spectra. Its Application to the Organometallic Compounds, Kagaku To Kogyo [Osaka] **52** [1978] 247/56.

O. Kennard et al., Molecular Structures and Dimensions, Bibliography 1976 – 1977, Organic and Organometallic Crystal Structures, Vol. 9, International Union of Crystallography, Utrecht 1978, p. 1/467; C.A. **90** [1979] No. 196019.

A. D. Redhouse, Diffraction Studies of Organometallic Compounds, Organometal. Chem. **7** [1978] 415/73.

Analysis

Y. Gohshi, A. Ohtsuka, The Application of Chemical Effects in High Resolution X-Ray Spectrometry, Spectrochim. Acta B **28** [1973] 179/88.

N. G. Molchanova, V. E. Zhuravlev, M. V. Moshkovskaya, Separation of a Series of Phenyl Compounds of Tin on Silufol, Tr. Estestvennonauchn. Inst. Perm. Univ. **13** No. 3 [1975] 214/5.

Y. K. Chau, P. T. S. Wong, An Element- and Speciation-specific Technique for the Determination of Organometallic Compounds, Environ. Anal. [Papers 3rd Ann. Meet. Fed. Anal. Chem. Spectrosc. Soc.], Philadelphia 1976 [1977], p. 215/25.

H. Shino, N. Yanagisawa, Thin Layer Chromatography for Organotin Compounds, Tokyo-Toritsu Kogyo Gijutsu Senta Kenkyu Hokoku No. 6 [1976] 123/7.

F. E. Brinckman, W. R. Blair, K. L. Jewett, W. P. Iverson, Application of a Liquid Chromatograph Coupled with a Flameless Atomic Absorption Detector for Speciation of Trace Organometallic Compounds, J. Chromatog. Sci. **15** [1977] 493/503.

V. V. Glazov, V. M. Glazov, Determination of the Most Effective Radioisotopic Source for the X-Ray Fluorescence Determination of Tin in Organotin Polymers, Fiz. Khim. Osn. Sint. Pererab. Polim. No. 2 [1977] 94/6.

J. Kumpulainen, P. Koivistoinen, Advances in Tin Compound Analysis with Special Reference to Organotin Pesticide Residues, Residue Rev. **66** [1977] 1/18.

J. W. Price, Tin in the World of Today, Z. Anal. Chem. **288** [1977] 257/61.

V. S. Solomatin, T. I. Zakharova, L. S. Dzhupii, L. G. Shatalina, G. I. Vlasova, N. I. Lakeeva, G. V. Krasnikova, S. N. Nikolina, Determination of the Trace Impurities in the Alkyl and Alkoxyl Compounds of Group II – VI Elements by a Spectrochemical Method, Poluch. Anal. Veshchestv Osoboi Chist. Dokl. 5th Vses. Konf., Gorkiy 1976 [1978], p. 240/7.

C. J. Riggle, D. L. Sgontz, A. P. Graffeo, The Analysis of Organotins in the Environment, 4th Joint Conf. Sens. Environ. Pollut. Conf. Proc., New Orleans 1977 [1978], p. 761/4.

W. A. Aue, C. G. Flinn, A Photometric Tin Detector for Gas Chromatography. Comments, J. Chromatog. **153** [1978] 305/6; C.A. **89** [1978] No. 84345.

J. W. Price, R. Smith, Zinn, in: W. Fresenius, G. Jander, Handbuch der Analytischen Chemie, Tl. 3, Vol. 4a/8, Berlin 1978, p. 1/265.

R. Litan, J. Basters, A. Martijn, T. van der Molen, P. Pasma, B. Rabenort, J. Smink, Potentiometric Method for Determining Triphenyltin Compounds in Formulations. Collaborative Study, J. Assoc. Offic. Anal. Chem. **61** [1978] 1504/6.

N. Simon, A. J. Welebir, M. H. Aldridge, Trace Organometallics in Water, AD-A058566 [1978] 1/54; C.A. **90** [1979] No. 156857.

Hsin-Yung Chin, Concentration Method for Organic Tin, Huan Ching K'o Hsueh **1978** 64.

Toxicology and Biocidal Use

S. Kubota, Toxicity of Organic Tin Compounds, Yuki Gosei Kagaku Kyokai Shi **16** [1958] 94/5.

J. S. Thayer, Organometallic Compounds and Living Organisms, J. Organometal. Chem. **76** [1974] 265/95.

Anonym Publication, Service Experience with Self-polishing Copolymer Antifouling, Tanker Bulker Intern. **1975** No. 12, p. 11/4.

T. M, Vinokurskaya, V. G. Lappo, Toxicological Assessment of Four Poly(vinylchloride) Compositions Containing Different Amounts of Organotin Stabilizer, Sostoyanie Perspekt. Razvit. Med. Tekhn. Tezisy Dokl. 1st S'ezda VNMTO, Moscow 1975, Vol. 2, p. 154/7.

R. D. O'Brien, Acetylcholinesterase and Its Inhibition, Insectic. Biochem. Physiol. **1976** 271/96.

E. P. Oshchepkova, D. A. Kochkin, Effect of Organotin Compounds and Their Mixtures with Quaternary Ammonium Salts on Mold Fungi, Biokorroziya Biopovrezhdeniya Obrastaniya **1976** 99/102.

Public Health Service, Criteria for a Recommended Standard Occupational Exposure to Organotin Compounds, DHEW – NIOSH Publ. [U.S.] No. 77-115 [1976] 187 pp.

Stanford Research Institute, Criteria for a Recommended Standard. Occupational Exposure to Organotin Compounds, U.S. Natl. Tech. Inform. Serv. PB-274766 [1976] 198 pp.

V. V. Yankov, V. I. Shiryaev, O. N. Tsvetkov, Synthesis and Biocidal Properties of Organotin Materials, Biokorroziya Biopovrezhdeniya Obrastaniya **1976** 94/8.

V. V. Yankov, V. I. Shiryaev, Biocidal Organotin Compounds, Practical Properties and Synthesis [Literature Review], Biokorroziya Biopovrezhdeniya Obrastaniya **1976** 103/19.

S. Amemiya, S. Matsuoka, Y. Shoji, M. Inoue, S. Suzuki, Stake Test at Asakawa Experiment Forest. Inspection of Treated Stakes During Eighteen Years, Ringyo Shikenjo Kenkyu Hokoku **297** [1977] 133/55.

R. W. Drisko, T. B. O'Neill, L. K. Schwab, Fungal-resistent Organotin Paints, AD-A043366 [1977].

J. G. Horsfall, Fungicides – Past, Present, and Future, Chem. Technol. **7** [1977] 302/5.

A. S. Igumnov, V. N. Tsei, Biocidal Properties of Organotin Compounds, Gig. Aspekty Okhr. Zdorov'ya Naseleniya **1977** 23/4.

D. A. Kochkin, Relationship of Biological Activity of Organotin (or -lead) Compounds from Chemical Structures (Including cis and trans-Isomerism), Compt. Rend. 4th Congr. Intern. Corrosion Marine Salissures, Antibes/Juan-les-Pines 1976 [1977], p. 281/4.

F. Kuzuo, H. Yoshikowa, Tin Compounds, Kankyo Hoken Repoto No. 43 [1977] 105/23.

C. P. Monaghan, J. F. Hoffman, E. J. O'Brien, L. M. Frenzel, M. L. Good, An Evaluation of Leaching Mechanisms for Organotin Containing Antifouling Coatings, AD-A042511 [1977].

S. D. Taktakishvili, T. A. Nadirashvili, Experimental Study of the Biological Activity of Poly(vinyl-chloride) Materials Stabilized with Organotin Compounds Used for Food [Packaging], Sanit. Khig. Sametsnierokvleviti Inst. Sakart. SSR Shromata Krebuli Sb. Tr. Nauchn. Issled. Inst. Sanit. Gig. Gruz.SSR **1977** No. 13, p. 191/204; C.A. **89** [1978] No. 22406.

U. Thust, H. Wigert, H. D. Pfeiffer, H. Schwotzer, Chemistry and Technology of Organotin Compounds. The Level of the Using of Biological Active Organotin Compounds in the DDR, Chem. Tech. [Leipzig] **29** [1977] 671/4.

G. J. M. van der Kerk, Metallo-organic Fungicides, ACS Symp. Ser. No. 37 [1977] 123/52.

K. P. Zabotin, A. N. Shmeleva, E. N. Myakova, G. Ya. Kiryanova, Synthesis of Latexes of Biocidal Organotin Copolymers, Fiz. Khim. Osn. Sint. Pererab. Polim. **1977** No. 2, p. 31/4.

Z. A. Zagulyaeva, V. V. Yankov, N. A. Ivanova, Some Organotin Compounds and the Fungus Resistance of Paper, Probl. Sokhrannosti Dokument. Materialov **1977** 77/8; C.A. **88** [1978] No. 193080.

A. Dostal, The Occurrence of Tin in Various Constituents of the Environment, Cesk. Hyg. **23** [1978] 231/4.

P. J. Smith, Toxicological Data on Organotin Compounds, Tin Res. Inst. Publ. No. 538 [1978].

W. N. Aldridge, The Biological Properties of Organogermanium, -tin, and -lead Compounds, Rev. Silicon Germanium, Tin Lead Compounds Spec. Issue **1978** 9/31.

J. J. Zuckerman, R. P. Reisdorf, H. V. Ellis, R. R. Wilkinson, Organotins in Biology and the Environment, ACS Symp. Ser. No. 82 [1978] 388/424.

J. J. Zuckerman, Organotins in Biology and the Environment, AD-A058620 [1978] 1/40; C.A. **90** [1979] No. 180927.

Uses

T. E. Lipatova, Catalysis of Reactions in Polyurethane Systems, Tezisy Dokl. 4th Vses. Soveshch. Khim. Fiz. Khim. Poliuretanov, Kiev 1975, p. 6.

V. Z. Annenkova, A. K. Khaliullin, L. G. Bugun, N. G. Dianova, A. E. Klets, Stereospecific Polymerization of Vinyl Ethers in the Presence of Aluminium Chloride and Organotin Compounds, Sint. Vysokomol. Produkt. Osn. Sapropelit. Kremniiorgan. Soedin. **1976** Chapter 1, p. 56/62; C.A. **87** [1977] No. 39920.