Monobutyltin alkyl mercaptoacetates: Human health tier II assessment

12 December 2019

Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
Acetic acid, 2,2',2''-[(butylstannylidyne)tris(thio)]tris-,triisooctyl ester	25852-70-4
8-Oxa-3,5-dithia-4-stannaeicosanoic acid, 4-butyl-4-[[2-(dodecyloxy)-2-oxoethyl]thio]-7-oxo-, dodecyl ester	26292-98-8
8-Oxa-3,5-dithia-4-stannatetradecanoic acid, 4-butyl-10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-7-oxo-, 2-ethylhexyl ester	26864-37-9
Acetic acid, 2,2',2''-[(butylstannylidyne)tris(thio)]tris-,tritetradecyl ester	72259-65-5

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:**www.nicnas.gov.au**

Disclaimer

ACRONYMS & ABBREVIATIONS

Grouping Rationale

The chemicals in this group are structurally similar organostannic mercaptoacetates and are expected to have similar physicochemical and toxicological properties (OECD, 2006a; OECD, 2006b):

- monobutyltin tris(isooctylmercaptoacetate) (MBT(IOMA), CAS No. 25852-70-4);
- monobutyltin tris(dodecylmercaptoacetate) (MBT(DDMA), CAS No. 26292-98-8);
- monobutyltin tris(2-ethylhexyl mercaptoacetate) (MBT(2-EHMA), CAS No. 26864-37-9); and
- tritetradecyl 2,2',2''-[(butylstannylidyne)tris(thio)]triacetate (MBT(TDMA), CAS No. 72259-65-5).

The two chemicals MBT(2-EHMA) and MBT(IOMA) are isomers which differ only in the structure of the C8 alcohol of the mercaptoester ligand, and can be considered toxicologically equivalent (OECD, 2006a).

The chemical contains a monobutyl (BuSn-) group and three labile ligands (X). In general the toxicity of organotin compounds depends largely on the organotin moiety (R group), with the anionic ligand (X) mostly influencing physicochemical properties

and local toxicity. The chemicals are grouped together for risk assessment due to their similar end uses and expected toxicity profiles.

Import, Manufacture and Use

Australian

No specific Australian use, import, or manufacturing information has been identified.

The National Pollutant Inventory (NPI) holds data for all sources of organotin compounds in Australia.

The following site-limited uses were identified as sources of organotin compounds by the NPI in 2017–18:

- glass and glass product manufacturing; and
- polymer product manufacturing.

International

The following international uses have been identified through the Organisation for Economic Cooperation and Development Screening information data set data set (SIDS) dossiers (OECD, 2006a; OECD, 2006b); the World Health Organization (WHO) Concise International Chemical Assessment Document 73 (WHO, 2006); and the Substances and Preparations in Nordic countries (SPIN) database.

Mono-substituted organotins, specifically the chemicals MBT(2-EHMA) and MBT(IOMA), have reported site-limited use as stabilisers in polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC), but to a lesser extent compared with the di-substituted organotins (OECD, 2006a; OECD, 2006b; WHO, 2006).

Monobutyltin compounds are also used as catalysts (approximately 0.001 % and 0.5 % of the finished polymer for both mono- and di-substituted organotins) and in glass coating applications (OECD, 2006a; WHO, 2006). Historically, MBT(IOMA) was the primary commercial product in stabilisers; however, current products are manufactured predominantly using MBT(2-EHMA) (OECD, 2006b).

The chemicals are always manufactured as a mixture with their dibutyl equivalents (i.e. dibutyltin(isooctylmercaptoacetate) (DBT(IOMA)), CAS No. 25168-24-5 or dibutyltin bis(2-ethylhexyl mercaptoacetate) (DBT(2-EHMA)), CAS No. 10584-98-2). The monobutyltin content is dependent on the starting material, with a range of 20 to 80 % (by weight) monobutyltin in the final mixture. Mixtures with greater than 50 % monobutyltin are considered to be monobutyltin substances, whereas mixtures with less than 50 % monobutyltin are considered to be dibutyltin substances (OECD, 2006a).

No specific use information were identified for MBT(DDMA) and MBT(TDMA).

Restrictions

Australian

Tin and its compounds are listed in Schedule 10 of the Model Work Health and Safety Regulations as restricted hazardous chemicals—the restricted use is 'abrasive blasting at a concentration of greater than 0.1 % as tin' (Safe Work Australia, 2019).

International

Organotin compounds—which includes the chemicals in this assessment—are listed on the following (Galleria Chemica):

- Council of Europe Resolution AP (92) 2 on control of aids to polymerisation for plastic materials and articles intended to come into contact with foodstuffs—Limits for finished articles—a limit of 0.05 mg/kg (as Sn) applies to tin compounds organic;
- Europe Directive 2009/48/EC of the European Parliament and of the Council on the safety of toys—Maximum Migration Limits—limits of 0.2, 0.9 and 12 mg/kg of organic tin applies in liquid or sticky toy material, dry or brittle or powder-like or pliable toy material, and scraped-off toy material, respectively; and
- Council of Europe Resolution ResAP(2008)1 on requirements and criteria for the safety of tattoos and permanent make-up (PMU)—Table 3 Maximum allowed concentrations of impurities in products for tattoos and PMU—a limit of 50 ppm tin (Sn) applies.

Organotin compounds—which includes the chemicals in this assessment—are listed in Annex XVII to the REACH regulations with restrictions relating to biocide and water treatment uses (ECHA).

Existing Worker Health and Safety Controls

Hazard Classification

The chemicals are not listed on the Hazardous Chemical Information System (HCIS) (Safe Work Australia).

Exposure Standards

Australian

'Tin, organic compounds (as Sn)' have an exposure standard of 0.1 mg/m^3 time weighted average (TWA) and 0.2 mg/m^3 short-term exposure limit (STEL) (Safe Work Australia, 2019).

International

The following exposure standards are identified for tin, organic compounds (as Sn) (Galleria Chemica):

An exposure limit of 0.1 mg/m^3 TWA and 0.2 mg/m^3 STEL in different countries such as Bulgaria, Canada (Alberta, British Columbia, Ontario, Quebec, Saskatchewan, Yukon), Chile, Denmark, Egypt, Estonia, France, Greece, Malaysia, Mexico, Norway, Philippines, Singapore, South Africa, Spain, Sweden, Taiwan, the United Kingdom and the United States of America (California, Hawaii, Minnesota, Tennessee, Vermont).

The American Conference of Government Industrial Hygienists (ACGIH) recommends a threshold limit value (TLV) of 0.1 mg/m^3 TWA for Tin, organic compounds, as Sn 'to minimize the potential for adverse effects on immune function and the central nervous system', and 0.2 mg/m^3 STEL 'to minimize acute symptoms such as eye and upper respiratory tract irritation, headache, and nausea' (ACGIH, 2011).

Health Hazard Information

Limited data are available for MBT(2-EHMA). Data available indicate that the chemicals are hydrolysed to release mercaptoacetate moieties when placed in a simulated mammalian gastric environment (see **Toxicokinetics** section). Two of the mercaptoacetate hydrolysis products 2-ethylhexyl mercaptoacetate (EHMA, CAS No. 7659-86-1) or isooctyl mercaptoacetate (IOMA, CAS No. 25103-09-7) are isomers and have similar physicochemical and toxicological properties (NICNASb). Although no toxicological data were identified for dodecylmercaptoacetate (DDMA, CAS No. 3746-39-2) and tetradecylmercaptoacetate (TDMA, CAS No. 57414-16-1), they are expected to be toxicologically similar to the other mercaptoacetates.

Although there is uncertainty if the chemicals are hydrolysed to monobutyltin trichloride (MBTC, CAS No. 1118-46-3), in general the toxicity of organotin compounds depends largely on the organotin moiety (R group), with the anionic ligand (X) mostly influencing physicochemical properties and local toxicity.

Therefore when data for the chemicals being assessed are not available, health hazard information for EHMA, IOMA and for monobutyltin compounds including MBTC and monobutyltin tris(ethylhexanoate) (CAS No. 23850-94-4) has been included in this report for read-across for systemic toxicity endpoints. The Human Health Tier II assessment reports for these chemicals (NICNASa; NICNASb; NICNASc) are available at **https://www.nicnas.gov.au**. These reports should be read in conjunction with this Human Health Tier II assessment.

Toxicokinetics

The chemicals in this group are expected to be readily hydrolysed under acidic conditions to form the corresponding alkyltin chloride and free mercaptoacetate ligands (OECD, 2006a).

In a study under simulated mammalian gastric conditions, MBT(2-EHMA):DBT(2-EHMA) mixture in 0.07 M HCl (pH 1–2, 37 °C) rapidly converted (approximately 98 %) to MBTC and released the EHMA ligand within 0.5 hours (OECD, 2006a). The same is expected to occur for MBT(IOMA) (OECD, 2006b). However, there is some uncertainty in the characterisation of the tin species using gas chromatography (KEMI, 2018).

No hydrolysis studies using ^{119}Sn NMR spectroscopy are available for the chemicals. Hydrolysis studies using this analytical technique with other organotins including monbutyltin tris(ethylhexanoate) and monooctyltin alkyl merptoactetates indicate that instead of the complete loss of the mercaptoacetate ligand from the tin, some ligands remain attached forming a mono-chloro ester (NICNASc; NICNASd).

The high molecular weight and low volatility of the monobutyltin alkyl mercaptoacetates are expected to minimise dermal and inhalation exposure. The tin and mercaptoacetate metabolites will be distributed, metabolised and excreted separately. Mercaptoacetates are expected to be initially hydrolysed in several tissues by carboxylesterases to mercaptoacetatic acid and the corresponding alcohols (2-ethylhexanol for EHMA and isooctanol for IOMA) (NICNASb).

Acute Toxicity

Oral

Based on the available data for MBT(2-EHMA), the chemicals in this group are expected to have moderate acute oral toxicity — warranting hazard classification (see **Recommendations** section).

The following oral median lethal dose (LD50) values were reported for MBT(2-EHMA) (OECD, 2006a; Galleria Chemica):

- 1520 mg/kg bw in male and female white mice (strain H) using a 'pure sample' of the chemical (according to the non-guideline 'standard acute method');
- 1053 mg/kg bw in rats using a 82:18 % MBT(2-EHMA):DBT(2-EHMA) mixture (non-guideline);
- 303–334 mg/kg bw in male and female rats using a >98 % pure MBT(2-EHMA) (OECD TG 401); and
- 1063 mg/kg bw in rats (chemical composition, animal sex and strain not specified; non-guideline study).

Observed sub-lethal effects in mice after 4 hours included muscular weakness, reduced movement, and disinterest in their surroundings. At 24 hours, most of the test animals were not responsive to sound and light stimuli and exhibited decreased activity. Brittle coats, loss of appetite, laboured respiration and cyanosis of the acral parts of limbs and tail were also observed (OECD, 2006a).

Dermal

No data are available.

Inhalation

No data are available.

Corrosion / Irritation

Corrosivity

No data are available for the chemicals. Based on data for monobutyltin tris(ethylhexanoate), the chemicals are likely to be corrosive. In the absence of data, hazard classification is warranted.

Monobutyltin tris(ethylhexanoate) was corrosive in a guideline in vitro study with in vivo data also indicating corrosive effects (NICNASc).

In a summary of unpublished industry studies in animals, monobutyltins were reported to show conflicting results in two studies; one showed slight irritation and the other showed severe irritation results. Mixtures of mono- and dibutyltins were reported to be markedly to extremely irritating. No further details are available (WHO, 2006).

In a summary of unpublished studies, monobutyltin and mixtures with dibutyltin were reported to be minimal to extreme eye irritants. No further details are available (WHO, 2006).

Sensitisation

Skin Sensitisation

No data are available for the chemicals. The hydrolysis product 2-EHMA is a skin sensitiser (NICNASb). Other alkyltin alkyl mercaptoacetates are sensitisers including monomethyltin alkyl mercaptoacetate and dibutyltin alkyl mercaptoacetates (NICNASe; NICNASf). Although data are not sufficient for classification, the potential for sensitisation cannot be ruled out.

Repeated Dose Toxicity

Oral

No data are available for the chemicals. Based on available data for MBTC and the mercaptoacetates, the chemicals are not expected to cause serious health effects following repeated oral exposure. Adverse effects on the thymus, typical of other alkyltin compounds, were not observed.

The chemical MBTC is not considered to cause serious damage to health from repeated oral exposure. The chemical was reported to have a no observed adverse effect level (NOAEL) of 96 mg/kg bw/day and 101 mg/kg bw/day in male and female rats, respectively (NICNASb). At the highest dose level (521 mg/kg bw/day and 533 mg/kg bw/day in males and females, respectively) treatment-related effects included changes in haematology, clinical chemistry and liver weights indicating liver damage. Adverse effects on the thymus were not observed (NICNASa).

Limited data indicate that the mercaptoacetates metabolites (2-EHMA and IOMA) did not cause damage to health from repeated oral exposure (NICNASb).

Dermal

No data are available.

Inhalation

No data are available for the chemicals. Based on available data for the metabolites MBTC and the mercaptoacetate IOMA, the chemicals are not expected to cause serious health effects following repeated inhalation exposure.

In a 4-week study, Sprague Dawley (SD) rats (n=35/sex/dose) were exposed to MBTC as a vapour/aerosol at concentrations of 0, 2.4, 23.8 or 71.3 mg/m^3 for 6 hours/day, 5 days/week. The no observed adverse effect concentration (NOAEC) was determined as 23.8 mg/m^3 based on clinical signs and mortalities at the highest dose. Observed effects were consistent with the corrosive nature of the chemical and are not considered relevant for classification for this endpoint (NICNASa).

Limited data for IOMA did not indicate serious damage to health following repeated inhalation exposure (whole-body) to vapours at up to 3.2 ppm (0.38 mg/m^3) in a 14-day study (NICNASb).

Genotoxicity

Based on available data for MBT(2-EHMA) and for the metabolites MBTC and mercaptoacetates, the chemicals in this group are not likely to be genotoxic.

The chemical MBT(2-EHMA) was not genotoxic in an in vitro bacterial reverse mutation assay (OECD TG 471) in strains of *Salmonella typhimurium* (TA98, TA100, TA1535 and TA1537) and *Escherichia coli* (strain WP2 *uvr*A) at up to 5000 µg/plate, conducted with or without metabolic activation (OECD 2006a).

Based on the weight of evidence from available in vitro and in vivo genotoxicity studies, MBTC was not considered to be genotoxic. MBTC was negative in most in vitro assays including a bacterial reverse mutation assay, chromosomal aberration assay in Chinese hamster ovary (CHO) cells and a mammalian gene mutation assay in CHO cells. In vivo, MBTC was negative in a mouse micronucleus assay at doses up to 250 mg/kg bw (NICNASa). The mercaptoacetates metabolites (2-EHMA and IOMA) were not considered to be genotoxic (NICNASb).

Carcinogenicity

No data are available for the chemicals. The limited data for the mercaptoacetates metabolites (2-EHMA and IOMA) do not indicate a concern for carcinogenicity (NICNASb).

Reproductive and Developmental Toxicity

No data are available for the chemicals in this group. Although the metabolite 2-EHMA showed evidence of effects on fertility and development at 150 mg/kg bw/day, MBTC was not observed to be a reproductive or developmental toxicant at doses of approximately 500 mg/kg bw/day. Available data are insufficient to warrant hazard classification.

It was noted in general that developmental toxicity observed in di-substituted alkyltins is not shown by the corresponding mono-substituted compound (WHO, 2006).

The chemical MBTC was not considered to be a reproductive toxicant. Developmental effects were observed secondary to materal toxicity and were consistent with the corrosivity of the chemical (NICNASa).

The chemical 2-EHMA was reported to be toxic to development (NICNASb).

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include:

- local effects (corrosivity).
- systemic acute effects (acute toxicity from oral exposure).

The potential for developmental effects at high doses and skin sensitisation cannot be ruled out.

Public Risk Characterisation

Given the uses identified for these chemicals, it is unlikely that the public will be exposed. Hence, the public risk from these chemicals is not considered to be unreasonable.

This group of chemicals with their identified uses are not considered to significantly contribute to the overall public exposure via the environment to organotin compounds. The dominant contribution to human intake of organotins (mainly tributyltin compounds) is via the consumption of fish. Although the public could be exposed to the chemicals by release from articles at low levels, based on their use as a PVC stabiliser and catalyst for various products, the chemicals are considered to have low systemic toxicity. In addition, based on the available data, monobutyltin compounds are of lower toxicity compared to dialkyl- and trialkyl- tin compounds. Hence, the public risk from the chemicals are not considered to be unreasonable.

If data becomes available indicating specific uses in Australia that could significantly contribute to the overall tolerable daily intake (TDI) for organotins, further evaluation of the chemicals may be required.

Occupational Risk Characterisation

During product formulation, exposure might occur, particularly where manual or open processes are used. These could include transfer and blending activities, quality control analysis, and cleaning and maintaining equipment. Worker exposure to the chemicals at lower concentrations could also occur while using formulated products containing the chemicals. The level and route of exposure will vary depending on the method of application and work practices employed.

Given the critical local and systemic acute health effects, the chemicals could pose an unreasonable risk to workers unless adequate control measures to minimise exposure are implemented. The chemicals should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) at a workplace (such as an employer) has adequate information to determine the appropriate controls. The controls expected to be in place due to the corrosivity classification are expected to be sufficient to protect workers from any potential developmental and sensitisation effects.

The data available support an amendment to the hazard classification in the Hazardous Chemical Information System (HCIS) (Safe Work Australia) (refer to **Recommendation** section).

NICNAS Recommendation

Assessment of these chemicals is considered to be sufficient, provided that the recommended amendment to the classification is adopted, and labelling and all other requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Regulatory Control

Work Health and Safety

These chemicals are recommended for classification and labelling aligned with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as below. This does not consider classification of physical hazards and environmental hazards.

From 1 January 2017, under the model Work Health and Safety Regulations, chemicals are no longer to be classified under the Approved Criteria for Classifying Hazardous Substances system.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Not Applicable	Harmful if swallowed - Cat. 4 (H302)
Irritation / Corrosivity	Not Applicable	Causes severe skin burns and eye damage - Cat. 1 (H314)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for consumers

Advice for industry

Control measures

Control measures to minimise the risk from exposure to the chemicals should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate, or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemicals are used. Examples of control measures that could minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemicals from entering the breathing zone of any worker;
- air monitoring to ensure control measures in place are working effectively and continue to do so;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemicals.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to help meet obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;
- ensuring that (material) safety data sheets ((M)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemicals are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (M)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals—Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of practice are available from the Safe Work Australia website.

A review of the physical hazards of these chemicals has not been undertaken as part of this assessment.

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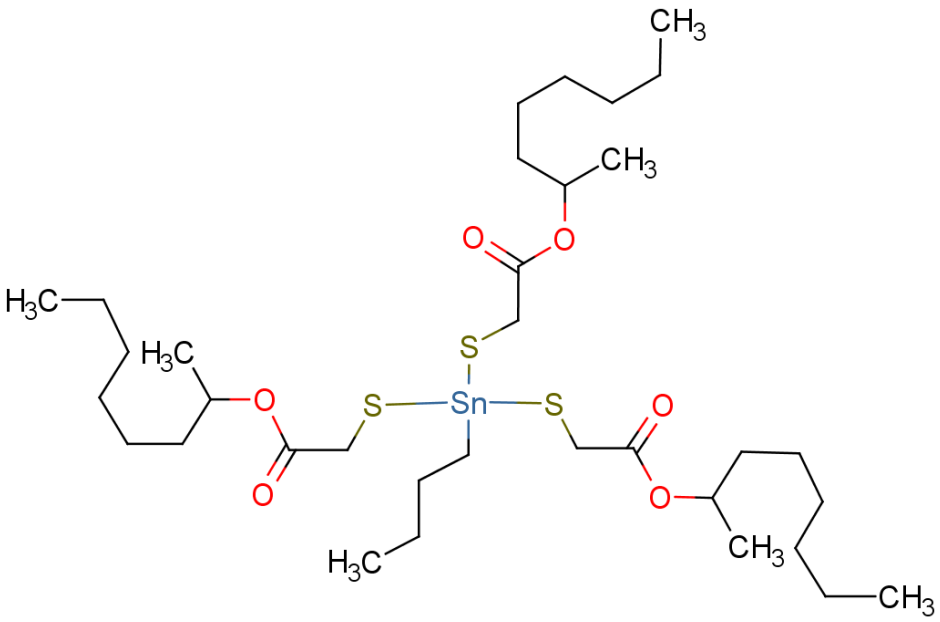
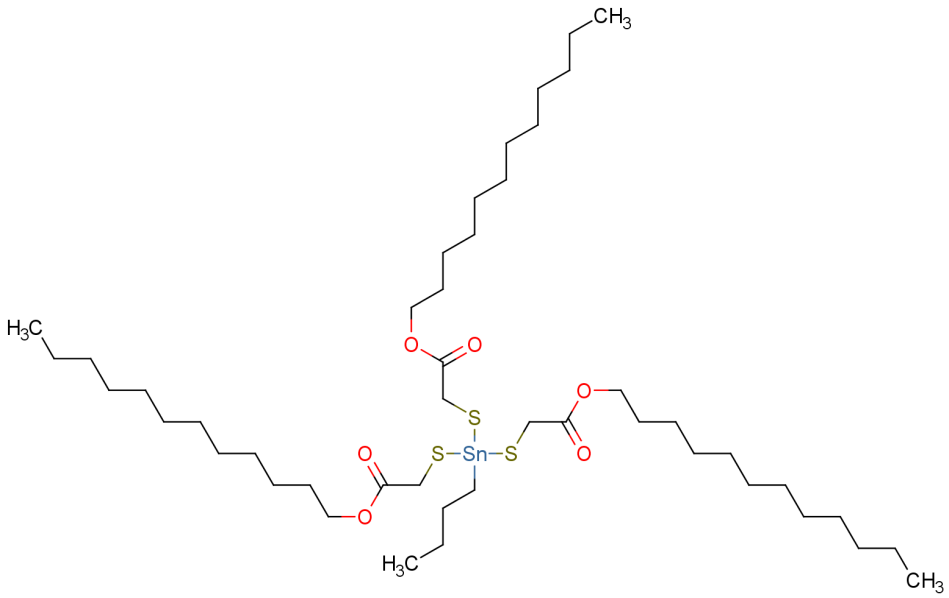
Last Update 12 December 2019

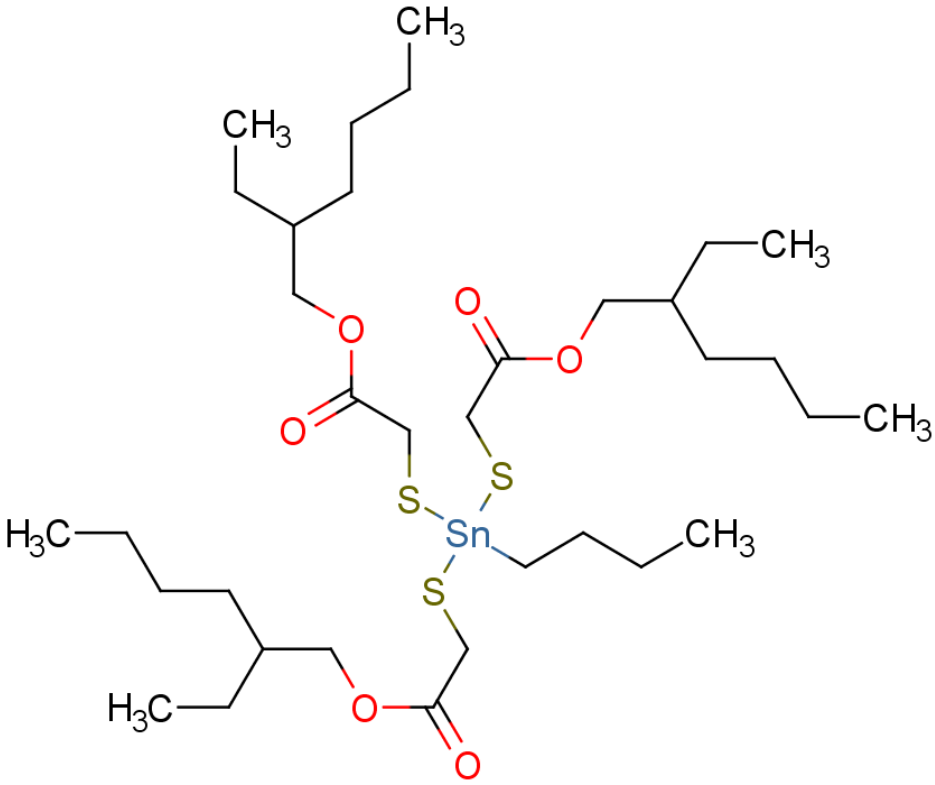
Chemical Identities

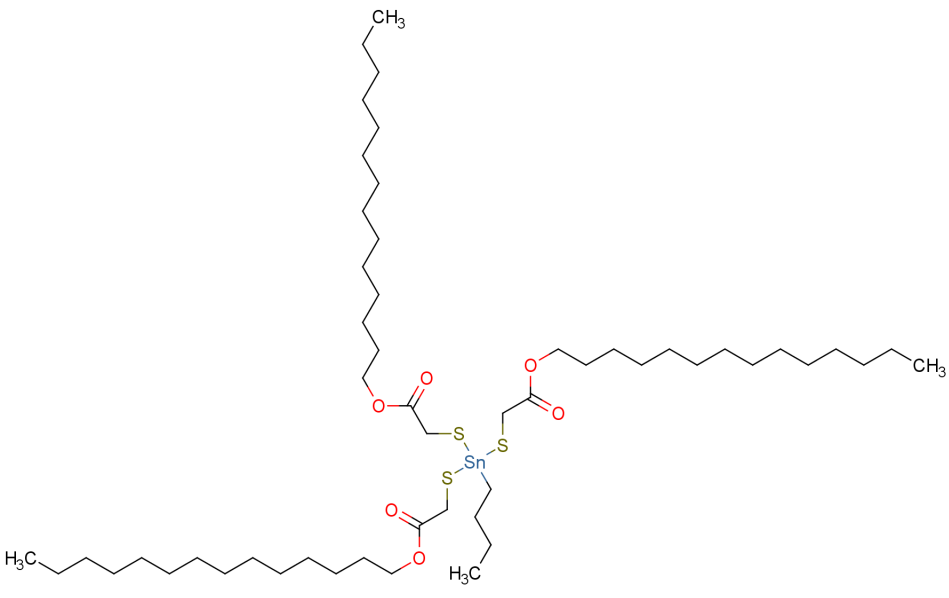
Chemical Name in the Inventory and Synonyms	**Acetic acid, 2,2',2''-[(butylstannylidyne)tris(thio)]tris-,triisooctyl ester** monobutyltin tris(isooctylmercaptoacetate) (MBT(IOMA)) monobutyltin tris(isooctyl thioglycolate) stannane, n-butyltris(carboisooctoxymethylthio)-
CAS Number	25852-70-4
Structural Formula	

Molecular Formula	C34H66O6S3Sn
Molecular Weight	785.797

Chemical Name in the Inventory and Synonyms	**8-Oxa-3,5-dithia-4-stannaeicosanoic acid, 4-butyl-4-[[2-(dodecyloxy)-2-oxoethyl]thio]-7-oxo-, dodecyl ester** monobutyltin tris(dodecylmercaptoacetate) (MBT(DDMA)) monobutyltin tris(laurylmercaptoacetate)
CAS Number	26292-98-8
Structural Formula	
Molecular Formula	C46H90O6S3Sn
Molecular Weight	954.119

Chemical Name in the Inventory and Synonyms	**8-Oxa-3,5-dithia-4-stannatetradecanoic acid, 4-butyl-10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-7-oxo-, 2-ethylhexyl ester** monobutyltin tris(2-ethylhexyl mercaptoacetate) (MBT(2-EHMA)) stannane, monooctyl tris(carboisooctoxymethylthio)- monobutyltin tris(2-ethylhexyl thioglycolate)
CAS Number	26864-37-9
Structural Formula	

	
Molecular Formula	C34H66O6S3Sn
Molecular Weight	785.797

Chemical Name in the Inventory and Synonyms	**Acetic acid, 2,2',2''-[(butylstannylidyne)tris(thio)]tris-,tritetradecyl ester** tritetradecyl 2,2',2''-[(butylstannylidyne)tris(thio)]triacetate (MBT(TDMA)) monobutyltin tris(myristylmercaptoacetate)
CAS Number	72259-65-5
Structural Formula	

Molecular Formula	C52H102O6S3Sn
Molecular Weight	1038.28

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