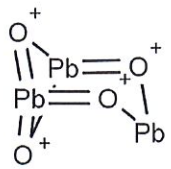
Orange lead

Substance identity

EC / List no.: 215-235-6

CAS no.: 1314-41-6

Mol. formula: O4Pb3



Hazard classification & labelling

Danger! According to the classification provided by companies to ECHA in **REACH registrations** this substance may damage fertility or the unborn child, causes damage to organs through prolonged or repeated exposure, is very toxic to aquatic life, is very toxic to aquatic life with long lasting effects, is harmful if swallowed, is harmful if inhaled, is suspected of causing cancer and may cause harm to breast-fed children.

Properties of concern

R

Regulatory activities

Substance of very high concern (SVHC) and included in the candidate list for authorisation.

About this substance

This substance is manufactured and/or imported in the European Economic Area in 10 000 - 100 000 tonnes per year.

This substance is used by consumers, in articles, by professional workers (widespread uses), in formulation or re-packing, at industrial sites and in manufacturing.

Consumer Uses

ECHA has no public registered data indicating whether or in which chemical products the substance might be used. ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment.

Article service life

ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment. ECHA has no public registered data indicating whether or into which articles the substance might have been processed.

Widespread uses by professional workers

ECHA has no public registered data indicating whether or in which chemical products the substance might be used. ECHA has no public registered data on the types of manufacture using this substance. ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment.

Formulation or re-packing

ECHA has no public registered data indicating whether or in which chemical products the substance might be used. ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment.

Uses at industrial sites

ECHA has no public registered data indicating whether or in which chemical products the substance might be used. ECHA has no public registered data on the types of manufacture using this substance. ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment.

Manufacture

ECHA has no public registered data on the routes by which this substance is most likely to be released to the environment.

The InfoCard summarises the non-confidential data on substances as held in the databases of the European Chemicals Agency (ECHA), including data provided by third parties. The InfoCard is automatically generated. Information requirements under different legislative frameworks may therefore not be up-to-date or complete. Substance manufacturers and importers are responsible for consulting official publications. This InfoCard is covered by the ECHA Legal Disclaimer.

ECHA EUROPEAN CHEMICALS AGENCY

about INFOCARD - Last updated: 24/11/2017

The Brief Profile summarizes the non-confidential data on substances as it is held in the databases of the European Chemicals Agency (ECHA), including data provided by third parties. The Brief Profile is automatically generated; note that it does not currently distinguish between harmonised classification and minimum classification; information requirements under different legislative frameworks may therefore not be fully up to date or complete. For accuracy reasons, substance manufacturers and imports have the responsibility to consult official sources, e.g. the electronic edition of the Official Journal of the European Union.
This Brief Profile is covered by the ECHA Legal Notice.

Orange lead

Brief Profile - Last updated: 24/11/2017

Substance Description

Substance identity

EC / List name: Orange lead

IUPAC name: bicyclo[3.1.1]triplumboxan-1-yl

Other names

EC / List no.:	215-235-6
CAS no.:	1314-41-6
Index number:	
Molecular formula:	O4Pb3

SMILES:	O1[Pb]2O[Pb]1O[Pb]O2
InChI:	InChI=1S/4O.3Pb AuxInfo=1/0/N:1;3;5;7;2;4;6/rA:7OPbOPb3OPb3O/rB:s1;s2;s3;s4;s1s5;s4s6;/rC:2.2888,-1.7391,0;3.2501,-2.5374,0;2.9927,-1.0153,0;1.2634,-1.0442,0;.2193,-.2251,0;.4795,-1.7391,0;.3289,-3.0386,0;
Type of substance:	Mono constituent substance
Origin:	Inorganic
Registered compositions:	5
Of which contain:	0 impurities relevant for classification
	0 additives relevant for classification
Substance Listed:	EINECS (European INventory of Existing Commercial chemical Substances) List

Hazard classification & labelling

Danger! According to the classification provided by companies to ECHA in **REACH registrations** this substance may damage fertility or the unborn child, causes damage to organs through prolonged or repeated exposure, is very toxic to aquatic life, is very toxic to aquatic life with long lasting effects, is harmful if swallowed, is harmful if inhaled, is suspected of causing cancer and may cause harm to breast-fed children.

Additionally, the classification provided by companies to ECHA in **CLP notifications** identifies that this substance is suspected of causing genetic defects.

Breakdown of all 147 C&L notifications submitted to ECHA

Repr. 1A	H360	
Aquatic Chronic 1	H410	
Acute Tox. 4	H302	
Acute Tox. 4	H332	
Aquatic Acute 1	H400	
STOT RE 2	H373	
STOT RE 1	H372	
Carc. 2	H351	
Muta. 2	H341	
Lact.	H362	
Not Classified		

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

✔ Harmonised Classification
REACH registration dossiers notifications
CLP notifications

ℹ At least one notifier has indicated that an impurity or an additive present in the substance impacts the notified classification.

Properties of concern

R

Regulatory activities

Registration, Evaluation, Authorisation & Restriction of Chemicals (REACH)

Registration

Pre-registration:	Substance pre-registered under REACH.
Registration:	This substance has 9 active registrations under REACH, 1 Joint Submission(s) and 0 Individual Submission(s).

Evaluation

Dossier Evaluation:

Substance Evaluation:

Authorisation

Candidate List:	Substance of very high concern (SVHC) and included in the candidate list for authorisation.
Annex XIV (Authorisation List):	

Restriction

Annex XVII (Restriction List):

Classification Labelling & Packaging (CLP)

Harmonised C&L:

Notification:	Classification & Labelling has been notified by Industry to ECHA for this substance.

Biocidal Products Regulation (BPR)

Active Substance:

Biocidal Products:

Prior Informed Consent (PIC)

Annex I:	This substance is subject to the Prior Informed Consent regulation and to export notification procedure from 03-Dec-2015
Annex V:	

About this substance

General

This substance is manufactured and/or imported in the European Economic Area in 10 000 - 100 000 tonnes per year.

This substance is used by consumers, in articles, by professional workers (widespread uses), in formulation or re-packing, at industrial sites and in manufacturing.

Consumer Uses

This substance is used in the following products: coating products and fillers, putties, plasters, modelling clay.

Other release to the environment of this substance is likely to occur from: outdoor use in long-life materials with low release rate (e.g. metal, wooden and plastic construction and building materials) and indoor use in long-life materials with low release rate (e.g. flooring, furniture, toys, construction materials, curtains, foot-wear, leather products, paper and cardboard products, electronic equipment).

Article service life

This substance is used in the following activities or processes at workplace: the low energy manipulation of substances bound in materials or articles, potentially closed industrial processing with minerals/metals at elevated temperature (e.g. smelters, furnaces, refineries, coke ovens), production of mixtures or articles by tabletting, compression, extrusion or pelletisation, high energy work-up of substances bound in materials or articles (e.g. hot rolling/forming, grinding, mechanical cutting, drilling or sanding) and open transfer and processing with minerals/metals at elevated temperature.

Release to the environment of this substance can occur from industrial use: manufacturing of the substance, formulation in materials, formulation of mixtures and as an intermediate step in further manufacturing of another substance (use of intermediates). Other release to the environment of this substance is likely to occur from: outdoor use in long-life materials with low release rate (e.g. metal, wooden and plastic construction and building materials), indoor use in long-life materials with low release rate (e.g. flooring, furniture, toys, construction materials, curtains, foot-wear, leather products, paper and cardboard products, electronic equipment), indoor use in close systems with minimal release (e.g. cooling liquids in refrigerators, oil-based electric heaters), outdoor use in close systems with minimal release (e.g. hydraulic liquids in automotive suspension, lubricants in motor oil and break fluids) and indoor use.

This substance can be found in complex articles, with no release intended: electrical batteries and accumulators and machinery, mechanical appliances and electrical/electronic products (e.g. computers, cameras, lamps, refrigerators, washing machines). This substance can be found in products with material based on: metal (e.g. cutlery, pots, toys, jewellery), stone, plaster, cement, glass or ceramic (e.g. dishes, pots/pans, food storage containers, construction and isolation material), rubber (e.g. tyres, shoes, toys) and plastic (e.g. food packaging and storage, toys, mobile phones).

Widespread uses by professional workers

This substance is used in the following products: coating products, laboratory chemicals and adsorbents.

This substance is used for the manufacture of: chemicals, electrical, electronic and optical equipment, mineral products (e.g. plasters, cement), rubber products and machinery and vehicles.

This substance is used in the following activities or processes at workplace: industrial spraying, roller or brushing applications, laboratory work, closed processes with no likelihood of exposure, closed, continuous processes with occasional controlled exposure and transfer of chemicals at dedicated facilities.

Release to the environment of this substance can occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates). Other release to the environment of this substance is likely to occur from: indoor use in long-life materials with low release rate (e.g. flooring, furniture, toys, construction materials, curtains, foot-wear, leather products, paper and cardboard products, electronic equipment), outdoor use in long-life materials with low release rate (e.g. metal, wooden and plastic construction and building materials), indoor use in close systems with minimal release (e.g. cooling liquids in refrigerators, oil-based electric heaters) and outdoor use in close systems with minimal release (e.g. hydraulic liquids in automotive suspension, lubricants in motor oil and break fluids).

Formulation or re-packing

This substance is used in the following products: explosives and polymers.

This substance is used in the following activities or processes at workplace: handling of solid inorganic substances (e.g. ores and raw metal oxides, packaging/mixing/blending and weighing of metal powders), transfer of chemicals at dedicated facilities, closed processes with no likelihood of exposure, mixing in open batch processes, production of mixtures or articles by tabletting, compression, extrusion or pelletisation, the low energy manipulation of substances bound in materials or articles, closed batch processing in synthesis or formulation, batch processing in synthesis or formulation with opportunity for exposure, transfer of substance into small containers, potentially closed industrial processing with minerals/metals at elevated temperature (e.g. smelters, furnaces, refineries, coke ovens), high energy work-up of substances bound in materials or articles (e.g. hot rolling/forming, grinding, mechanical cutting, drilling or sanding) and manual maintenance (cleaning and repair) of machinery.

Release to the environment of this substance can occur from industrial use: formulation of mixtures, formulation in materials, manufacturing of the substance and as an intermediate step in further manufacturing of another substance (use of intermediates).

Uses at industrial sites

This substance is used in the following products: polymers and adsorbents. This substance has an industrial use resulting in manufacture of another substance (use of intermediates).

This substance is used in the following areas: formulation of mixtures and/or re-packaging. This substance is used for the manufacture of: mineral products (e.g. plasters, cement), chemicals, electrical, electronic and optical equipment, machinery and vehicles and plastic products.

This substance is used in the following activities or processes at workplace: the low energy manipulation of substances bound in materials or articles, closed batch processing in synthesis or formulation, potentially closed industrial processing with minerals/metals at elevated temperature (e.g. smelters, furnaces, refineries, coke ovens), transfer of chemicals at dedicated facilities, handling of solid inorganic substances (e.g. ores and raw metal oxides, packaging/mixing/blending and weighing of metal powders), batch processing in synthesis or formulation with opportunity for exposure, high energy work-up of substances bound in materials or articles (e.g. hot rolling/forming, grinding, mechanical cutting, drilling or sanding), treatment of articles by dipping and pouring, open transfer and processing with minerals/metals at elevated temperature, closed processes with no likelihood of exposure, industrial spraying, roller or brushing applications, mixing in open batch processes, transfer of substance into small containers, production of mixtures or articles by tabletting, compression, extrusion or pelletisation, manual maintenance (cleaning and repair) of machinery, closed, continuous processes with occasional controlled exposure and hot work operations with metals (e.g. welding, soldering, gouging, brazing, flame cutting).

Release to the environment of this substance can occur from industrial use: as an intermediate step in further manufacturing of another substance (use of intermediates), manufacturing of the substance, of substances in closed systems with minimal release, formulation of mixtures and formulation in materials. Other release to the environment of this substance is likely to occur from: indoor use, indoor use in close systems with minimal release (e.g. cooling liquids in refrigerators, oil-based electric heaters) and outdoor use in close systems with minimal release (e.g. hydraulic liquids in automotive suspension, lubricants in motor oil and break fluids).

Manufacture

This substance is used in the following activities or processes at workplace: the low energy manipulation of substances bound in materials or articles, handling of solid inorganic substances (e.g. ores and raw metal oxides, packaging/mixing/blending and weighing of metal powders), transfer of chemicals at dedicated facilities, closed processes with no likelihood of exposure, potentially closed industrial processing with minerals/metals at elevated temperature (e.g. smelters, furnaces, refineries, coke ovens), closed batch processing in synthesis or formulation, batch processing in synthesis or formulation with opportunity for exposure, production of mixtures or articles by tabletting, compression, extrusion or pelletisation, mixing in open batch processes, transfer of substance into small containers, high energy work-up of substances bound in materials or articles (e.g. hot rolling/forming, grinding, mechanical cutting, drilling or sanding), open transfer and processing with minerals/metals at elevated temperature and manual maintenance (cleaning and repair) of machinery.

Release to the environment of this substance can occur from industrial use: manufacturing of the substance, formulation in materials, formulation of mixtures and as an intermediate step in further manufacturing of another substance (use of intermediates). Other release to the environment of this substance is likely to occur from: indoor use in close systems with minimal release (e.g. cooling liquids in refrigerators, oil-based electric heaters) and outdoor use in close systems with minimal release (e.g. hydraulic liquids in automotive suspension, lubricants in motor oil and break fluids).

Precautionary Measures and safe use

ECHA has no data from registration dossiers on the precautionary measures for using this substance. Guidance on the safe use of the substance provided by manufacturers and importers of this substance.

Registrants/suppliers

Active

- C.S.B. GmbH, Düsseldorfer Strasse 113 47809 Krefeld Germany
- colorobbia italia spa, via Pietramarina 53 via Pietamarina 123 50053 Sovigliana - Vinci Firenze Italy
- COPLOSA, zona franca, sector E, calle L 10-20 08040 Barcelona Spain
- Glass Service, a.s., Rokytnice 60 75501 Vsetin Czech Republic
- PENOX GmbH, 173 Deutz Muelheimer Strasse 51063 COLOGNE Germany
- SYSTEMS SUNLIGHT S.A., 2 Ermou & Nikis Street, Syntagma Square Neo Olvio 67 200 Xanthi Greece 105 63 Athens Attica Greece
- TAB d.d., Polena 6 2392 Mezica Slovenia
- UAB "APLINKOS VADYBA", Vilkpėdės g. 22 03151 Vilnius Lithuania
- ZM "Silesia" S.A. Ul. Konduktorska 8, 40-155 Katowice, Konduktorska 8 40-155 Katowice Poland

Inactive

- Johnson Controls Recycling GmbH, Am Leineufer 51 30419 Hannover Germany
- Spraylat GmbH (OR for Spraylat Boya), Krantzstrasse 7 52070 Aachen Germany

Other names

IUPAC names

- -
- bicyclo[3.1.1]triplumboxan-1-yl
- Lead oxide (Pb3O4)
- Lead Tetraoxide
- Lead tetroxide
- lead(II,IV)oxide
- Orange Lead
- tetraoxo triplumbane

Regulatory processes names

- Orange lead
- Orange lead (lead tetroxide)

Trade names

- Lead tetraoxide; Lead oxide red; Lead orthoplumbate; Lead oxide (3:4); Gold satinobre; Heuconin 5; Mennige; Mineral orange; Mineral red; Minium; Minium red; Paris lead; Pigment red 105; Plumboplumbic oxide; Red lead; Red lead oxide
- Name Lead tetraoxide; Lead oxide red; Lead orthoplumbate; Lead oxide (3:4); Gold satinobre; Heuconin 5; Mennige; Mineral orange; Mineral red; Minium; Minium red; Paris lead; Pigment red 105; Plumboplumbic oxide; Red lead; Red lead oxide
- Red Lead
- Red Lead Pigment Grades

Other names

- lead tetroxide

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Note that the brief profile is an automatically generated summary and that not all available data may be displayed. The content is subject to change without prior notice. The information has not been reviewed or verified by ECHA or any other authority. The Agency thus cannot guarantee the correctness of the information displayed. The identification of applicable legislative frameworks is done automatically and without manual verification. Therefore this does not constitute official and legally binding information. To confirm if a substance is covered by a specific legislative framework the official publication should be consulted.
Reproduction or further distribution of this information may be subject to copyright protection. Use of the information without obtaining the permission from the owner(s) of the respective information might violate the rights of the owner. The Agency does not take any responsibility whatsoever for any copyright or other infringements that may be caused by using the information. This brief profile is covered by the ECHA Legal Notice.

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Orange lead

Brief Profile - Last updated: 24/11/2017

Substance Description

Scientific properties

Physical and chemical properties

This section provides physicochemical information compiled from all automatically processable data from REACH registration dossiers that is available to ECHA at the time of generation. The quality and correctness of the information remains the responsibility of the data submitter. The Agency thus cannot guarantee the correctness of the information displayed.

Appearance/physical state / colour

Study results: 1 study submitted, 1 study processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

C **Physical state at 20°C and 1013 hPa**
Solid (100%) [1]

C **Form**
Powder (100%) [1]

C **Substance type**
Inorganic (100%) [1]

Studies with data				
Key study				1

Data waiving: no waivers

No data available

Melting/freezing point

Study results: 1 study submitted, 1 study processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

R **Melting / freezing point**
550 °C @ 101.3 kPa [1]

Studies with data				
Key study	1			

Data waiving: no waivers

No data available

Boiling point

Study results: 1 study submitted, 1 study processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

R **Boiling point**
550 °C @ 101.3 kPa [1]

Studies with data				
Key study	1			

Data waiving: no waivers

No data available

Density

Study results: 1 study submitted, 1 study processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

R **Relative density**
8.93 @ 23.8 °C [1]

Studies with data				
Key study	1			

Data waiving: no waivers

No data available

Vapour pressure

Study results: 1 study submitted, 0 studies processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

No automatically processable data submitted

Studies with data				
Other	1			

Data waiving

No data available

Partition coefficient

Study results: 1 study submitted, 0 studies processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

No automatically processable data submitted

Studies with data				
Other	1			

Data waiving

No data available

Water solubility

Study results		Type of Study provided			Summaries
1 study submitted 1 study processed					0 summaries submitted 0 summaries processed
R Water solubility (mass/vol.) 67.3 mg/L @ 20 °C and pH 10.75 [1]	Studies with data	Key study	1	Data waiving no waivers	⚠ No data available

Solubility in organic solvents / fat solubility — ⚠ Data not provided by the registrant

Surface tension

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Other	1
					⚠ No data available

Flash point

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Other	1
					⚠ No data available

Auto flammability

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Sci. unjustified	1
					⚠ No data available

Flammability

Study results		Type of Study provided			Summaries
3 studies submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Sci. unjustified	3
					⚠ No data available

Explosiveness

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Sci. unjustified	1
					⚠ No data available

Oxidising

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data	Key study	1	Data waiving no waivers	⚠ No data available

Oxidation reduction potential — ⚠ Data not provided by the registrant

pH — ⚠ Data not provided by the registrant

Dissociation constant

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Sci. unjustified	1
					⚠ No data available

Viscosity

Study results		Type of Study provided			Summaries
1 study submitted 0 studies processed					0 summaries submitted 0 summaries processed
⚠ No automatically processable data submitted	Studies with data			Data waiving Sci. unjustified	1
					⚠ No data available

Environmental fate and pathways

This section provides environmental fate and pathways information compiled from all automatically processable data from REACH registration dossiers that is available to ECHA at the time of generation. The quality and correctness of the information remains the responsibility of the data submitter. The Agency thus cannot guarantee the correctness of the information displayed.

Phototransformation in air

⚠ Data not provided by the registrant

Hydrolysis

Study results: 1 study submitted, 0 studies processed

⚠ Study data not processed for brief profile

Type of Study provided

Studies with data				

Data waiving	
Sci. unjustified	1

Summaries: 0 summaries submitted, 0 summaries processed

⚠ No data available

Phototransformation in water

⚠ Data not provided by the registrant

Phototransformation in soil

⚠ Data not provided by the registrant

Biodegradation in water - screening tests

Study results: 1 study submitted, 0 studies processed

⚠ No automatically processable data submitted

Type of Study provided

Studies with data				

Data waiving	
Sci. unjustified	1

Summaries: 0 summaries submitted, 0 summaries processed

⚠ No data available

Biodegradation in water & sediment - simulation tests

⚠ Data not provided by the registrant

Biodegradation in soil

Study results: 1 study submitted, 0 studies processed

⚠ Study data not processed for brief profile

Type of Study provided

Studies with data				

Data waiving	
Sci. unjustified	1

Summaries: 0 summaries submitted, 0 summaries processed

⚠ No data available

Bioaccumulation: aquatic / sediment

Study results: 47 studies submitted, 0 studies processed

⚠ Study data not processed for brief profile

Type of Study provided

Studies with data				
Weight of evidence	47			

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

⚠ No data available

Bioaccumulation: terrestrial

Study results: 14 studies submitted, 0 studies processed

⚠ Study data not processed for brief profile

Type of Study provided

Studies with data				
Weight of evidence	13			1

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

⚠ No data available

Adsorption/desorption

Study results: 42 studies submitted, 0 studies processed

⚠ No automatically processable data submitted

Type of Study provided

Studies with data				
Key study				2
Supporting study	1			
Weight of evidence	18		2	19

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

⚠ No data available

Henrys law constant (H)

⚠ Data not provided by the registrant

Distribution modelling

⚠ Data not provided by the registrant

Ecotoxicological information

This section provides ecotoxicological information compiled from all automatically processable data from REACH registration dossiers that is available to ECHA at the time of generation. The quality and correctness of the information remains the responsibility of the data submitter. The Agency thus cannot guarantee the correctness of the information displayed.

Predicted No-Effect Concentration (PNEC)

R Summaries

1 summary submitted
1 summary processed

The Predicted No-Effect Concentration (PNEC) value is the concentration of a substance below which adverse effects in the environment are not expected to occur. Please note that when more than one summary is provided, PNEC values may refer to constituents of the substance and not to the substance as a whole. More detailed information is available in the dossiers.

Hazard for Aquatic Organisms	
Freshwater	3.1 µg/L (1)
Intermittent releases (freshwater)	-
Marine water	3.5 µg/L (1)
Intermittent releases (marine water)	-
Sewage treatment plant (STP)	100 µg/L (1)
Sediment (freshwater)	174 mg/kg sediment dw (1)
Sediment (marine water)	164 mg/kg sediment dw (1)

Hazard for Air	
Air	-
Hazard for Terrestrial Organism	
Soil	212 mg/kg soil dw (1)
Hazard for Predators	
Secondary poisoning	10.9 mg/kg food (1)

Short-term toxicity to fish

Study results: 44 studies submitted, 36 studies processed

P/R Results
LC50 (4 days) 40.8 - 3 597.9 µg/L [37]
LC50 (48 h) 114 - 610 µg/L [4]

Type of Study provided

Studies with data	
Key study	1
Supporting study	8
Weight of evidence	35

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

No data available

Long-term toxicity to fish

Study results: 40 studies submitted, 24 studies processed

P/R Results
NOEC (3 months) 48 µg/L [1]
NOEC (84 days) 39.4 - 176.3 µg/L [2]
NOEC (62 days) 87 µg/L [1]
NOEC (60 days) 70 - 136 µg/L [2]
NOEC (32 days) 107.7 µg/L [2]

Type of Study provided

Studies with data	
Key study	24
Supporting study	16

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

No data available

Short-term toxicity to aquatic invertebrates

Study results: 73 studies submitted, 41 studies processed

P/R Results
LC50 (4 days) 590.94 µg/L [1]
LC50 (48 h) 26 - 3 115.8 µg/L [40]
EC10 (72 h) 111.2 - 252.3 µg/L [4]
EC10 (48 h) 9.2 - 1 409.6 µg/L [7]
NOEC (72 h) 57.1 - 2 173.8 µg/L [6]

Type of Study provided

Studies with data	
Key study	8
Supporting study	32
Weight of evidence	33

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

No data available

Long-term toxicity to aquatic invertebrates

Study results: 62 studies submitted, 37 studies processed

P/R Results
NOEC (4.2 months) 143.3 - 757.2 µg/L [2]
NOEC (4 months) 12 µg/L [1]
NOEC (34 days) 109 µg/L [1]
NOEC (30 days) 31 µg/L [1]
NOEC (25 days) 20 - 153.8 µg/L [2]

Type of Study provided

Studies with data	
Key study	37
Supporting study	25

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

No data available

Toxicity to aquatic algae and cyanobacteria

Study results: 31 studies submitted, 9 studies processed

P/R Results
EC50 (72 h) 20.5 - 364 µg/L [15]
EC50 (48 h) 21.7 - 388 µg/L [8]
NOEC (4 days) 22.7 - 192.3 µg/L [2]
LOEC (4 days) 44.3 - 298.1 µg/L [2]
EC10 (4 days) 29.4 - 1 231.8 µg/L [4]

Type of Study provided

Studies with data	
Key study	9
Supporting study	22

Data waiving: no waivers

Summaries: 0 summaries submitted, 0 summaries processed

No data available

Toxicity to aquatic plants other than algae

Study results 2 studies submitted
1 study processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
IC10 (7 days) 85 - 1 025 µg/L [6]

Type of Study provided

Studies with data				
Key study	1			
Supporting study	1			

Data waiving
no waivers

No data available

Toxicity to microorganisms

Study results 28 studies submitted
3 studies processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
IC50 (9 h) 180 mg/L [1]
EC10 (24 h) 7 mg/L [1]
IC10 (24 h) 1 - 2.79 mg/L [3]
IC10 (60 min) 2.92 - 9.59 mg/L [2]

Type of Study provided

Studies with data				
Key study	2			
Supporting study	15			1
Weight of evidence	9			
Other	1			

Data waiving
no waivers

No data available

Sediment toxicity

Study results 12 studies submitted
9 studies processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
NOEC (35 days) 1 699 mg/kg sediment dw [2]
NOEC (28 days) 503 - 4 719 mg/kg sediment dw [12]
NOEC (21 days) 1 126 - 2 903 mg/kg sediment dw [3]
NOEC (20 days) 3 390 - 5 230 mg/kg sediment dw [2]
LOEC (35 days) 2 734 mg/kg sediment dw [2]

Type of Study provided

Studies with data				
Key study	9			
Supporting study	3			

Data waiving
no waivers

No data available

Toxicity to terrestrial macroorganisms except arthropods

Study results 17 studies submitted
10 studies processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
NOEC (3.733 months) 130 - 564 mg/kg soil dw [3]
NOEC (56 days) 468 - 2 202 mg/kg soil dw [4]
NOEC (28 days) 400 - 6 078 mg/kg soil dw [6]
NOEC (21 days) 608 mg/kg soil dw [1]
EC10 (84 days) 2.03 g/kg soil dw [1]

Type of Study provided

Studies with data				
Key study	4			6
Supporting study	2			5

Data waiving
no waivers

No data available

Toxicity to terrestrial arthropods

Study results 8 studies submitted
7 studies processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
NOEC (42 days) 400 - 3 000 mg/kg soil dw [3]
NOEC (36 days) 750 mg/kg soil dw [1]
NOEC (28 days) 34 - 7 020 mg/kg soil dw [6]
EC10 (35 days) 360 - 1 200 mg/kg soil dw [2]
EC10 (28 days) 193 - 4 718 mg/kg soil dw [19]

Type of Study provided

Studies with data				
Key study	2			5
Supporting study	1			

Data waiving
no waivers

No data available

Toxicity to terrestrial plants

Study results 20 studies submitted
15 studies processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
NOEC (4.433 months) 150 mg/kg soil dw [1]
NOEC (42 days) 150 - 287 mg/kg soil dw [2]
NOEC (30 days) 527 - 722 mg/kg soil dw [2]
NOEC (21 days) 374 - 7 190 mg/kg soil dw [8]
NOEC (5 days) 89 - 169 mg/kg soil dw [4]

Type of Study provided

Studies with data				
Key study	4			11
Supporting study				3
Other				2

Data waiving
no waivers

No data available

Toxicity to soil microorganisms

Study results 25 studies submitted
12 studies processed

Summaries 0 summaries submitted
0 summaries processed

P/R Results
NOEC (1.726 years) 8.042 g/kg soil dw [1]
NOEC (1.534 years) 8.13 g/kg soil dw [1]
NOEC (10.033 months) 163 mg/kg soil dw [1]
NOEC (28 days) 100 - 810 mg/kg soil dw [2]
NOEC (21 days) 500 - 3 800 mg/kg soil dw [2]

Type of Study provided

Studies with data				
Key study	2			10
Supporting study	1			11
Other				1

Data waiving
no waivers

No data available

Toxicity to birds

Study results 14 studies submitted
14 studies processed

Type of Study provided

Studies with data				
Weight of evidence	2			12

Data waiving
no waivers

Summaries 0 summaries submitted
0 summaries processed

⚠ No data available

P/R **Results**
NOEC (7 months) 50 mg/kg diet [3]
NOEC (84 days) 25 - 2 000 mg/kg diet [7]
NOEC (75 days) 100 mg/kg diet [4]
NOEC (70 days) 200 mg/kg diet [1]
NOEC (60 days) 264 mg/kg diet [2]

Toxicity to mammals

Study results 13 studies submitted
13 studies processed

Type of Study provided

Studies with data				
Weight of evidence	1			12

Data waiving
no waivers

Summaries 0 summaries submitted
0 summaries processed

⚠ No data available

P/R **Results**
NOEC (1.227 years) 550 mg/kg diet [2]
NOEC (1.159 years) 64 mg/kg diet [1]
NOEC (11.1 months) 512 mg/kg diet [1]
NOEC (6.3 months) 1 000 mg/kg diet [3]
NOEC (84 days) 1 000 mg/kg diet [3]

Toxicological information

This section provides toxicological information compiled from all automatically processable data from REACH registration dossiers that is available to ECHA at the time of generation. The quality and correctness of the information remains the responsibility of the data submitter. The Agency thus cannot guarantee the correctness of the information displayed.

Derived No- or Minimal Effect Level (DN(M)EL) ⚠ No data available

Toxicokinetics, metabolism, and distribution

Study results

Study data: basic toxicokinetics 1 studies submitted
0 studies processed

⚠ Study data not processed for brief profile

Type of Study provided

Study data: basic toxicokinetics

Studies with data				
Supporting study	2			
Weight of evidence	2			

Data waiving
no waivers

Summaries 0 summaries submitted
0 summaries processed

⚠ No data available

Study data: dermal absorption 2 studies submitted
0 studies processed

⚠ Study data not processed for brief profile

Study data: dermal absorption

Studies with data				
Key study	1			
Weight of evidence	1			

Data waiving
no waivers

Acute toxicity

Study results		Type of Study provided		Summaries	0 summaries submitted 0 summaries processed

oral — 8 studies submitted, 8 studies processed

P/R **Results**
rat 84 days () [1]
LD50 2 000 - 5 000 mg/kg bw (rat) [7]

M/C **Interpretations of results**
Practically nontoxic [8]

oral

Studies with data					Data waiving
Weight of evidence	8				no waivers

⚠ No data available

inhalation — 1 study submitted, 1 study processed

P/R **Results**
LC50 (4 h) 5.05 mg/L air (rat) [1]

M/C **Interpretations of results**
Practically nontoxic [1]

inhalation

Studies with data					Data waiving
Key study	1				no waivers

dermal — 3 studies submitted, 3 studies processed

P/R **Results**
LD50 2 000 mg/kg bw (rat) [3]

M/C **Interpretations of results**
Practically nontoxic [3]

dermal

Studies with data					Data waiving
Weight of evidence	3				no waivers

other routes — 0 studies submitted, 0 studies processed

⚠ No data available

other routes

Studies with data					Data waiving
					no waivers

Irritation / corrosion

Study results		Type of Study provided		Summaries	0 summaries submitted 0 summaries processed

Study data: skin — 2 studies submitted, 0 studies processed

⚠ Study data not processed for brief profile

Study data: skin

Studies with data					Data waiving
Weight of evidence	3				no waivers

⚠ No data available

Study data: eye — 3 studies submitted, 0 studies processed

⚠ Study data not processed for brief profile

Study data: eye

Studies with data					Data waiving
Weight of evidence	3				no waivers

Sensitisation

Study results		Type of Study provided		Summaries	0 summaries submitted 0 summaries processed

Study data: skin — 2 studies submitted, 0 studies processed

⚠ Study data not processed for brief profile

Study data: skin

Studies with data					Data waiving
Key study	3				no waivers

⚠ No data available

Study data: respiratory — 0 studies submitted, 0 studies processed

⚠ Study data not processed for brief profile

Study data: respiratory

Studies with data					Data waiving
					no waivers

Repeated dose toxicity

Study results

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

Study data: oral — 2 studies submitted, 2 studies processed

Study data: oral

⚠ No data available

P/R **Results**

LOAEL (rat): 200 ppm [1]

NOEL (rat): 0.002 mg/kg bw/day [1]

LOEL (rat): 0.005 mg/kg bw/day [1]

Studies with data				
Weight of evidence	2			

Data waiving: no waivers

Study data: inhalation — 1 study submitted, 0 studies processed

Study data: inhalation

⚠ No automatically processable data submitted

Studies with data				
Key study	1			

Data waiving: no waivers

Study data: dermal — 1 study submitted, 0 studies processed

Study data: dermal

⚠ No automatically processable data submitted

Studies with data				
Key study	1			

Data waiving: no waivers

Genetic toxicity

Study results

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

Study data: in vitro — 18 studies submitted, 0 studies processed

Study data: in vitro

⚠ No data available

⚠ Study data not processed for brief profile

Studies with data				
Supporting study	12			1
Weight of evidence	5			

Data waiving: no waivers

Study data: in vivo — 17 studies submitted, 0 studies processed

Study data: in vivo

⚠ Study data not processed for brief profile

Studies with data				
Key study	5			
Supporting study	12			

Data waiving: no waivers

Carcinogenicity

Study results — 12 studies submitted, 0 studies processed

Type of Study provided

Summaries: 0 summaries submitted, 0 summaries processed

⚠ Study data not processed for brief profile

Studies with data				
Key study	9			
Supporting study	3			

Data waiving: no waivers

⚠ No data available

Toxicity to reproduction

Study results

Type of Study provided

Summaries

0 summaries submitted
0 summaries processed

Study data: reproduction

3 studies submitted
0 studies processed

⚠ Study data not processed for brief profile

Studies with data				
Key study	1			
Weight of evidence	2			

Data waiving

no waivers

⚠ No data available

Study data: developmental

2 studies submitted
0 studies processed

⚠ Study data not processed for brief profile

Studies with data				
Key study	2			

Data waiving

no waivers

Study data: other studies

0 studies submitted
0 studies processed

⚠ Study data not processed for brief profile

Studies with data				

Data waiving

no waivers

Neurotoxicity

⚠ Data not provided by the registrant

Immunotoxicity

⚠ Data not provided by the registrant

Legend

Type of study

- Experimental results
- Read across based on grouping of substance (category approach) or Read-across from supporting substance (structural analogue or surrogate)
- Estimated by calculation or (Q)SAR
- Experimental study planned, other or unspecified

Type of aggregation

- C — Concatenated distinct values
- R — Range of values
- P/R — Prioritisation (Eco)Toxicology AND Range of values
- M/C — Most Conservative of values

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