

Safety data sheet

According to 1907/2006/EC, Article 31

Printing date 29.11.2017

Version number 1

Revision: 29.11.2017

SECTION 1: Identification of the substance/mixture and of the company/undertaking

- 1.1 Product identifier
- Trade name: **Monolithic Perovskite Solar Cell Precursor Solution**
- 1.2 Relevant identified uses of the substance or mixture and uses advised against
No further relevant information available.
- Application of the substance / the preparation : Reagent
- 1.3 Details of the supplier of the safety data sheet
- Manufacturer/Supplier:
SOLARONIX SA
Rue de l'Ouriette 129, CH-1170 Aubonne, Switzerland
info@solaronix.com
T +41 21 821 22 80
www.solaronix.com
F +41 21 821 22 89
info@solaronix.com
- 1.4 Emergency telephone number:
France (INRS 24h/24) - Tel : +33 (0)1 45 42 59 59
Ireland - Tel : 00 353 1 8092568 - 00 353 1 8379964 (24h/24) EU Tel: 112
Belgique - Tel : 32 070/245 245
UK : +44 (0)-870-190-6777 (CARECHEM24)

SECTION 2: Hazards identification

- 2.1 Classification of the substance or mixture
- Classification according to Regulation (EC) No 1272/2008 :



GHS08 health hazard

Repr. 1A H360Df May damage the unborn child. Suspected of damaging fertility.
STOT RE 2 H373 May cause damage to organs through prolonged or repeated exposure.



GHS09 environment

Aquatic Acute 1 H400 Very toxic to aquatic life.
Aquatic Chronic 1 H410 Very toxic to aquatic life with long lasting effects.



GHS07

Acute Tox. 4 H302 Harmful if swallowed.
Skin Irrit. 2 H315 Causes skin irritation.
Eye Irrit. 2 H319 Causes serious eye irritation.

- 2.2 Label elements
- Labelling according to Regulation (EC) No 1272/2008
The product is classified and labelled according to the CLP regulation.

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· Hazard pictograms



GHS07 GHS08 GHS09

· Signal word Danger

· Hazard-determining components of labelling:

Butyrolactone

lead diiodide

Methanamine hydriodide

· Hazard statements

H302 Harmful if swallowed.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H360Df May damage the unborn child. Suspected of damaging fertility.

H373 May cause damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

· Precautionary statements

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P264 Wash hands thoroughly after handling.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P312 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.

P302+P352 IF ON SKIN: Wash with plenty of water.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313 IF exposed or concerned: Get medical advice/attention.

P314 Get medical advice/attention if you feel unwell.

P330 Rinse mouth.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P391 Collect spillage.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· Additional information:

Restricted to professional users.

· Labelling of packages where the contents do not exceed 125 ml

· Hazard pictograms



GHS07 GHS08 GHS09

· Signal word Danger

· Hazard-determining components of labelling:

Butyrolactone

lead diiodide

Methanamine hydriodide

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- Hazard statements
H360Df May damage the unborn child. Suspected of damaging fertility.
- Precautionary statements
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P308+P313 IF exposed or concerned: Get medical advice/attention.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
- 2.3 Other hazards
- Results of PBT and vPvB assessment
- PBT: Not applicable.
- vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

- 3.2 Chemical characterisation: Mixtures
- Description: Mixture: consisting of the following components.

· Dangerous components:

| | | |
|--|---|--------|
| CAS: 96-48-0 EINECS: 202-509-5 RTECS: LU 3500000 | Butyrolactone ----- ⚠ Acute Tox. 4, H302; Eye Irrit. 2, H319 | 25-50% |
| CAS: 10101-63-0 | lead diiodide ----- ⚠ Repr. 1A, H360Df; STOT RE 2, H373; ⚠ Aquatic Acute 1, H400; Aquatic Chronic 1, H410; ⚠ Acute Tox. 4, H302; Acute Tox. 4, H332 | 25-50% |
| CAS: 14965-49-2 | Methanamine hydriodide ----- ⚠ Acute Tox. 4, H302; Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335 | 10-25% |

- SVHC No
- Additional information: For the wording of the listed risk phrases, refer to section 16.

SECTION 4: First aid measures

- 4.1 Description of first aid measures
- General information:
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
- After excessive inhalation: Provide fresh air; consult a doctor in case of medical complaints.
- After skin contact: Generally the product does not irritate the skin.
- After eye contact:
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- After swallowing:
Do not induce vomiting; call for medical help immediately.
Call for a doctor immediately.
- 4.2 Most important symptoms and effects, both acute and delayed :
No further relevant information available.
- 4.3 Indication of any immediate medical attention and special treatment needed :
No further relevant information available.

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SECTION 5: Firefighting measures

- 5.1 Suitable extinguishing agents: Use fire extinguishing methods suitable to surrounding conditions.
 - 5.2 Special hazards arising from the substance or mixture : No further relevant information available.
 - 5.3 Advice for firefighters
 - Protective equipment: No special measures required.
-

SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures : Not required.
 - 6.2 Environmental precautions:
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow the product to enter sewers/ surface water or ground water.
 - 6.3 Methods and material for containment and cleaning up:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
 - 6.4 Reference to other sections :
See Section 7 for information on safe handling.
See Section 8 for information on personal protective equipment.
See Section 13 for disposal information.
-

SECTION 7: Handling and storage

- 7.1 Precautions for safe handling :
Ensure good ventilation/exhaustion at the workplace.
Prevent formation of aerosols.
 - Information about fire - and explosion protection: No special measures required.
 - 7.2 Conditions for safe storage, including any incompatibilities
 - Storage:
Requirements to be met by storerooms and receptacles: No special requirements.
 - Information about storage in one common storage facility: Not required.
 - Further information about storage conditions: Keep container tightly sealed.
 - 7.3 Specific end use(s) : No further relevant information available.
-

SECTION 8: Exposure controls/personal protection

- Additional information about design of technical facilities: No further data; see section 7.
- 8.1 Control parameters
- Ingredients with limit values that require monitoring at the workplace:
The product does not contain any significant quantities of materials with critical values that have to be monitored at the workplace.
- Additional information:
The most current valid lists have been used as a basis for the production of this document.
- 8.2 Exposure controls
- Personal protective equipment:
- General protective and hygienic measures:
Keep away from food, beverages and petfood.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Avoid all contact with the eyes.

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Avoid contact with the eyes and skin.

- Respiratory protection: Not required.
- Protection of hands:



Protective gloves

- Gloves material : Butyl rubber, BR
- Eye protection:



Tightly sealed goggles

SECTION 9: Physical and chemical properties

| | |
|--|---|
| · 9.1 Information on basic physical and chemical properties | |
| · General Information | |
| · Appearance: | |
| Form: | Liquid |
| Colour: | Yellow |
| · Odour: | Characteristic |
| · Odour threshold: | Not determined. |
| · pH-value: | Not determined. |
| · Change in condition | |
| Melting point/freezing point: | Undetermined. |
| Initial boiling point and boiling range: | 205 °C |
| · Flash point: | 100 °C |
| · Flammability (solid, gas): | Not applicable. |
| · Ignition temperature: | 445 °C |
| · Decomposition temperature: | Not determined. |
| · Auto-ignition temperature: | Product is not self igniting. |
| · Explosive properties: | Product does not present an explosion hazard. |
| · Explosion limits: | |
| Lower: | 2,7 Vol % |
| Upper: | 15,6 Vol % |
| · Vapour pressure at 20 °C: | >1 hPa |
| · Density: | Not determined. |
| · Relative density : | Not determined. |
| · Vapour density : | Not determined. |
| · Evaporation rate : | Not determined. |
| · Solubility in / Miscibility with water: | Not miscible or difficult to mix. |
| · Segregation coefficient (n-octanol/water): Not determined. | |

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- | | |
|---------------------------|--|
| · Viscosity: | |
| Dynamic: | Not determined. |
| Kinematic: | Not determined. |
| · 9.2 Other information : | No further relevant information available. |

SECTION 10: Stability and reactivity

- 10.1 Reactivity No further relevant information available.
- 10.2 Chemical stability
- Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- 10.3 Possibility of hazardous reactions : No dangerous reactions known.
- 10.4 Conditions to avoid : No further relevant information available.
- 10.5 Incompatible materials: No further relevant information available.
- 10.6 Hazardous decomposition products: No dangerous decomposition products known.

SECTION 11: Toxicological information

- 11.1 Information on toxicological effects
- Acute toxicity
Harmful if swallowed.

· LD/LC50 values relevant for classification:

CAS: 96-48-0 Butyrolactone

| | | |
|--------|------|-------------------|
| Oral | LD50 | 1,540 mg/kg (rat) |
| Dermal | LD50 | 5,000 mg/kg (gui) |

CAS: 10101-63-0 lead diiodide

| | | |
|------------|----------|-----------------|
| Oral | LD50 | 500 mg/kg (ATE) |
| Inhalative | LC50/4 h | 11 mg/l (ATE) |

CAS: 14965-49-2 Methanamine hydriodide

| | | |
|------|------|-----------------|
| Oral | LD50 | 500 mg/kg (ATE) |
|------|------|-----------------|

- Primary irritant effect:
- On the skin:
Causes skin irritation.
- On the eyes:
Causes serious eye irritation.
- Respiratory or skin sensitization Based on available data, the classification criteria are not met.
- CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction)
- Germ cell mutagenicity Based on available data, the classification criteria are not met.
- Carcinogenicity Based on available data, the classification criteria are not met.
- Reproductive toxicity
May damage the unborn child. Suspected of damaging fertility.
- STOT-single exposure Based on available data, the classification criteria are not met.
- STOT-repeated exposure
May cause damage to organs through prolonged or repeated exposure.
- Aspiration hazard Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

- 12.1 Toxicity
- Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability : No further relevant information available.

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- 12.3 Bioaccumulative potential : No further relevant information available.
- 12.4 Mobility in soil : No further relevant information available.
- Ecotoxicological effects:
- Remark: Very toxic for fish
- Additional ecological information:
- General notes:
 Water hazard class 3 (German Regulation) (Self-assessment): extremely hazardous for water
 Do not allow product to reach ground water, water course or sewage system, even in small quantities.
 Danger to drinking water if even extremely small quantities leak into the ground.
 Also poisonous for fish and plankton in water bodies.
 Very toxic for aquatic organisms
- 12.5 Results of PBT and vPvB assessment
- PBT: Not applicable.
- vPvB: Not applicable.
- 12.6 Other adverse effects : No further relevant information available.

SECTION 13: Disposal considerations

- 13.1 Waste treatment methods
- Recommendation :



Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

| | |
|----------------------------|---|
| · European waste catalogue | |
| HP 4 | Irritant - skin irritation and eye damage |
| HP 5 | Specific Target Organ Toxicity (STOT)/Aspiration Toxicity |
| HP 6 | Acute Toxicity |
| HP 10 | Toxic for reproduction |
| HP 14 | Ecotoxic |

- Uncleaned packaging:
- Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

| | |
|--|---|
| · 14.1 UN-Number · ADR, ADN, IMDG, IATA | Not classified as hazardous for transport |
| · 14.2 UN proper shipping name · ADR, ADN, IMDG, IATA | Not classified as hazardous for transport |
| · 14.3 Transport hazard class(es) · ADR, ADN, IMDG, IATA · Class | Not classified as hazardous for transport |
| · 14.4 Packing group · ADR, IMDG, IATA | Not classified as hazardous for transport |
| · 14.5 Environmental hazards: | Not applicable. |
| · 14.6 Special precautions for user | Not applicable. |

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| | |
|---|---|
| · 14.7 Transport in bulk according to Annex II of Marpol and the IBC Code | Not applicable. |
| · UN "Model Regulation": | Not classified as hazardous for transport |

SECTION 15: Regulatory information

- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
- Directive 2012/18/EU
- Named dangerous substances - ANNEX I None of the ingredients is listed.
- Seveso category E1 Hazardous to the Aquatic Environment
- Qualifying quantity (tonnes) for the application of lower-tier requirements 100 t
- Qualifying quantity (tonnes) for the application of upper-tier requirements 200 t
- REGULATION (EC) No 1907/2006 ANNEX XVII Conditions of restriction: 3, 63
- 15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- Relevant phrases
- H302 Harmful if swallowed.
- H315 Causes skin irritation.
- H319 Causes serious eye irritation.
- H332 Harmful if inhaled.
- H335 May cause respiratory irritation.
- H360Df May damage the unborn child. Suspected of damaging fertility.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting effects.

- Classification according to Regulation (EC) No 1272/2008

| | |
|---|--|
| Acute toxicity - oral Skin corrosion/irritation Serious eye damage/eye irritation Reproductive toxicity Specific target organ toxicity (repeated exposure) Hazardous to the aquatic environment - short-term (acute) aquatic hazard Hazardous to the aquatic environment - long-term (chronic) aquatic hazard | The classification of the mixture is generally based on the calculation method using substance data according to Regulation (EC) No 1272/2008. |
|---|--|

- Abbreviations and acronyms:
 - ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
 - IMDG: International Maritime Code for Dangerous Goods
 - IATA: International Air Transport Association
 - GHS: Globally Harmonised System of Classification and Labelling of Chemicals
 - EINECS: European Inventory of Existing Commercial Chemical Substances
 - ELINCS: European List of Notified Chemical Substances
 - CAS: Chemical Abstracts Service (division of the American Chemical Society)
 - LC50: Lethal concentration, 50 percent
 - LD50: Lethal dose, 50 percent
 - PBT: Persistent, Bioaccumulative and Toxic
 - SVHC: Substances of Very High Concern
 - vPvB: very Persistent and very Bioaccumulative
 - Acute Tox. 4: Acute toxicity – Category 4

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Skin Irrit. 2: Skin corrosion/irritation – Category 2

Eye Irrit. 2: Serious eye damage/eye irritation – Category 2

Repr. 1A: Reproductive toxicity – Category 1A

STOT SE 3: Specific target organ toxicity (single exposure) – Category 3

STOT RE 2: Specific target organ toxicity (repeated exposure) – Category 2

Aquatic Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1

Aquatic Chronic 1: Hazardous to the aquatic environment - long-term aquatic hazard – Category 1

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