

SAFETY DATA SHEET

according to OSHA HCS Hazcom 2012,

Version 2.1

Revised Date 14/05/2020

SECTION 1: Identification

1.1 Product identifiers

Product name: Perovskite MAPbBr₃ powder or single crystal

Product number: MAPbBr₃ powder or SC-MAPbBr₃

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Scientific research and development

1.3. Details of the supplier of the safety data sheet

Company: QUANTUM SOLUTIONS
1 Venture Road, Southampton Science Park,
SO16 7NP, Southampton, UK
www.quantum-solutions.com
info@quantum-solutions.com

Phone +44 7389826941

1.4 Emergency telephone number

Emergency phone: +44 7389826941 (Monday to Friday 08:00 to 18:00 GMT)

Emergency Action: In the event of a medical enquiry involving this product, please contact your doctor or local hospital accident or emergency department and show this SDS.

SECTION 2 Hazards identification

2.1. Classification of the substance or mixture (GHS Classification in accordance with 29 CFR 1910 (OSHA HCS):

Repr. 1A, Reproductive toxicity (Category 1A), H360

STOT RE 2, Specific target organ toxicity - repeated exposure (Category 2), H373

Acute Tox. 4, Acute Toxicity (Category 4), H302, H332

2.2. GHS Label elements, including precautionary statements:



GHS07

GHS08

– Signal word: Danger

Hazard statements

H302 + H332 - Harmful if swallowed or if inhaled

H360 - May damage fertility or the unborn child

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

Precautionary statements

P201 - Obtain special instructions before use.

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

P233 - Keep container tightly closed.

P240 - Ground/bond container and receiving equipment.

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

P264 - Wash skin thoroughly after handling.

P271 - Use only outdoors or in a well-ventilated area.

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

P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.

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

P331 - Do NOT induce vomiting.

P362 - Take off contaminated clothing and wash before reuse.

P405 - Store locked up.

P501 - Dispose of contents/ container to an approved waste disposal plant.

2.3. Hazards not otherwise classified (HNOC) or not covered by GHS

None

SECTION 3 Composition/Information on ingredients

3.1. Substances:

Perovskite MAPbBr₃ powder or single crystal:

| Methylammonium Lead Bromide | Classification | Concentration |
|--|---|---------------|
| Synonyms: MAPbBr ₃ , CH ₃ NH ₃ PbBr ₃ , Methylammonium tribromoplumbate(II) CAS: 69276-13-7 | Repr. 1A (H360), Acute Tox. 4 (H332), STOT RE 2 (H373), Aquatic Acute 1 (H400), Aquatic Chronic 1 (H410) | > 99 % |

SECTION 4 First-aid measures

4.1. Description of first aid measures

| | |
|--------------------|---|
| General advice | Immediately remove any clothing soiled by the product. Consult a doctor. |
| After inhalation | Supply fresh air. If required, provide artificial respiration. Consult a doctor. |
| After skin contact | Immediately rinse with water and wash skin with soap. Consult a doctor. |
| After eye contact | Rinse opened eye for several minutes under running water. Consult a doctor. |
| After swallowing | Rinse mouth with water. Do not induce vomiting. Immediately call a doctor. |

4.2. Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3. Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5 Fire-fighting measures

5.1 Extinguishing media

| | |
|------------------------------|---|
| Suitable extinguishing media | Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide |
|------------------------------|---|

5.2. Special hazards arising from the substance or mixture

No

5.3. Advice for firefighters

| | |
|--------------------------------|--|
| Firefighting instructions | Cool tanks/drums with water spray/remove them into safety. Do not move the load if exposed to heat |
| Protection during firefighting | Use respiratory protective device compressed or air/oxygen apparatus |

SECTION 6 Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures:

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition.

6.2. Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3. Methods and material for containment and cleaning up

Contain spillage and then with an electrically protected vacuum cleaner or by wet-brushing or absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust) and place in container for disposal according to local regulations.

SECTION 7 Handling and storage

7.1. Precautions for safe handling

Avoid eye and skin contact. Avoid inhalation of vapour or mist. Keep away from sources of ignition. No smoking. Take measures to prevent the build up of electrostatic charge. Keep respiratory protective device available.

7.2. Conditions for safe storage, including any incompatibilities

Storage: Keep container tightly closed in a dry and well-ventilated place

7.3. Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8 Exposure controls/personal protection

8.1. Control parameters

Components with workplace control parameters

8.2. Exposure controls

| | |
|--------------------------|---|
| Respiratory protection | Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU) |
| Hand protection | The selected protective gloves have to satisfy the specification of EU Directive 89/686/EEC and the standard EN 374 derived from it. Handle with gloves. |
| Eye protection | Safety glasses with side-shields conforming to NIOSH (US) or EN166 (EU) |
| Skin and body protection | Choose body protection according to the amount and concentration of the dangerous substance at the work place. Handle with gloves. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and standard EN 374 derived from it |
| Hygiene measures | Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday |

SECTION 9 Physical and chemical properties

9.1. Information on basic physical and chemical properties

| | |
|-----------------|-------------------------------|
| Appearance | Form: Solid Colour: Orange |
| Odour | No data available |
| Odour threshold | No data available |
| pH | No data available |
| Melting point | No data available |

| | |
|--|---------------------------------|
| Boiling point | No data available |
| Flash point | No data available |
| Evaporation rate | No data available |
| Flammability (solid, gas) | No data available |
| Upper/lower flammability or explosive limits | No data available |
| Vapor pressure | No data available |
| Vapour density | No data available |
| Relative density | No data available |
| Solubility | Dissolves in water and alcohols |
| Partition coefficient: n-octanol/water | No data available |
| Auto-ignition temperature | No data available |
| Decomposition temperature | No data available |
| Viscosity | No data available |
| Explosive properties | No data available |
| Oxidizing properties | No data available |

9.2 Other information

No data available

SECTION 10 Stability and reactivity

10.1. Reactivity

No data available

10.2. Chemical stability

Stable under recommended storage conditions

10.3. Possibility of hazardous reactions

No data available

10.4. Conditions to avoid

No data available

10.5. Incompatible materials

Strong oxidizing agents

10.6. Hazardous decomposition products:

No data available.

SECTION 11 Toxicological information

11.1. Information on toxicological effects

| | |
|---------------------------|---|
| Acute toxicity | No data available |
| Irritation | No data available |
| Corrosivity | No data available |
| Sensitisation | No data available |
| Repeated dose toxicity | Specific target organ toxicity - repeated exposure (Category 2) |
| Carcinogenicity | IARC (International Agency for Research on Cancer) – 2A NTP (National Toxicology Program) – R EPA (Environmental Protection Agency) – B2 TLV (Threshold Limit Value established by ACGIH) - A3 OSHA-Ca (Occupational Safety & Health Administration) - Substance is not listed |
| Mutagenicity | No data available |
| Toxicity for reproduction | Reproductive toxicity (Category 1A) |

SECTION 12 Ecological information

12.1. Toxicity

Acute aquatic toxicity (Category 2)

Chronic aquatic toxicity (Category 3)

12.2. Persistence and degradability

No data available

12.3. Bioaccumulative potential

No data available

12.4. Mobility in soil

No data available

12.5. Results of PBT and vPvB assessment

No data available

12.6. Other adverse effects

No data available

SECTION 13 Disposal considerations

13.1. Waste treatment methods

Must not be disposed of together with household garbage. Do not allow product to reach sewage system. Observe all federal, state, and local environmental regulations. Contact a licensed professional

SECTION 14 Transport information

14.1. UN number

DOT: 2291
IMDG: 2291
IATA: 2291

14.2 UN proper shipping name

DOT: Lead compound, soluble, n.o.s.
(Methylammonium lead bromide)
IMDG: Lead compound, soluble, n.o.s.
(Methylammonium lead bromide)
IATA: Lead compound, soluble, n.o.s.
(Methylammonium lead bromide)

14.3 Transport hazard class(es)

DOT: 6.1
IMDG: 6.1
IATA: 6.1

14.4 Packing group

DOT: III
IMDG: III
IATA: III

14.5 Environmental hazards

DOT: No
IMDG marine pollutant: Yes
IATA: No

14.6 Special precautions for user

No data available

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15 Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

No data available

15.2. Chemical safety assessment

No data available

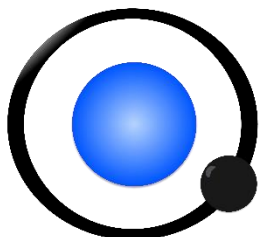
SECTION 16 Other information

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.

Preparation Information:

Version 2.1

Revised date: 14/05/2020



QUANTUM SOLUTIONS

Address: 1 Venture Road, Southampton Science Park, SO16 7NP, Southampton, UK

Web: www.quantum-solutions.com

E-mail: info@quantum-solutions.com

Tel.: +44 73 89826941