

SAFETY DATA SHEET

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SECTION 1. IDENTIFICATION

Product Name: Black Phosphorus

CAS #: 7723-14-0

Relevant identified uses of the substance: Scientific research and development

Supplier details:

Stanford Advanced Materials

E-mail: sales@samaterials.com

Tel: (949) 407-8904

Address: 23661 Birtcher Dr., Lake Forest, CA 92630 U.S.A.

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 2), H228

Acute aquatic toxicity (Category 3), H402

Chronic aquatic toxicity (Category 3), H412

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H228 Flammable solid.

H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.P273 Avoid release to the environment.

P280 Wear protective gloves/ eye protection/ face protection.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

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

Synonyms : Phosphorus

Formula : P

Molecular weight : 30.97 g/mol

CAS-No. : 7723-14-0

EC-No. : 231-768-7

Index-No. : 015-002-00-7

Hazardous components

Component Classification Concentration

Red phosphorus

Flam. Sol. 2; Aquatic Acute 3;

Aquatic Chronic 3; H228,

H412

<= 100 %

SECTION 4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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. FIREFIGHTING 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

Oxides of phosphorus

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

Use water spray to cool unopened containers.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing Vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas.

For personal protection see section 8.

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 materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wetbrushing

and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed

containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing

and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation

of combustible

dusts. The potential for combustible dust formation should be taken into consideration before

additional processing

occurs.

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of

ignition - No

smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

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

Air-, heat-, and moisture-sensitive. Keep in a dry place. Handle and store under inert gas.

Storage class (TRGS 510): Flammable solid hazardous materials

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

Component CAS-No. Value Control

parameters

Basis

Red phosphorus 7723-14-0 TWA 0.100000

mg/m³

USA. Occupational Exposure Limits

(OSHA) - Table Z-1 Limits for Air

Contaminants

TWA 0.1 mg/m³ USA. Occupational Exposure Limits

(OSHA) - Table Z-1 Limits for Air

Contaminants

TWA 0.100000

mg/m³

USA. NIOSH Recommended

Exposure Limits

TWA 0.1 mg/m³ USA. NIOSH Recommended

Exposure Limits

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved

under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without

touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves

after

use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection

Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to

the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type

N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the

sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and

approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

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

environment must be avoided.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: crystalline

Colour: grey

b) Odor No data available

c) Odor Threshold No data available

d) pH ca.3 at 10 g/l at 37 °C (99 °F)

e) Melting point/freezing

point

Melting point/range: 416 °C (781 °F)

f) Initial boiling point and

boiling range

No data available

g) Flash point N/A

h) Evaporation rate No data available

i) Flammability (solid, gas) The substance or mixture is a flammable solid with the category 2.

j) Upper/lower

flammability or

explosive limits

No data available

k) Vapor pressure 0.04 hPa (0.03 mmHg) at 21 °C (70 °F)

l) Vapor density No data available

m) Relative density 2.340 g/cm³

n) Water solubility 0.3 g/l at 20 °C (68 °F) - slightly soluble

o) Partition coefficient: noctanol/

water

No data available

p) Auto-ignition

temperature

>300 °C (> 572 °F) at 1,013 hPa (760 mmHg)

q) Decomposition

temperature

No data available

r) Viscosity No data available

s) Explosive properties No data available

t) Oxidizing properties No data available

9.2 Other safety 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

Heat

Heat, flames and sparks.10.5 Incompatible materials

Sulphur compounds, Oxidizing agents, Copper, Oxygen, Bases

10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - female - > 15,000 mg/kg

(OECD Test Guideline 401)

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation - 24 h

(OECD Test Guideline 404)

Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation - 24 h

(OECD Test Guideline 405)

Respiratory or skin sensitisation

Buehler Test - Guinea pig

Result: Does not cause skin sensitisation.

(OECD Test Guideline 406)

Germ cell mutagenicity

Hamster

fibroblast

Result: negative

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

Depending on the intensity and duration of exposure, effects may vary from mild irritation to severe destruction of

tissue., Vomiting, Diarrhoea, To the best of our knowledge, the chemical, physical, and toxicological properties havenot been thoroughly investigated.

SECTION 12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish static test LC50 - Danio rerio (zebra fish) - 33.2 mg/l - 96 h

(OECD Test Guideline 203)

Toxicity to daphnia and
other aquatic

invertebrates

static test EC50 - Daphnia magna (Water flea) - 10.5 mg/l - 48 h

(OECD Test Guideline 202)

Toxicity to algae static test EC50 - Desmodesmus subspicatus (green algae) - 18.3 mg/l - 72 h

(OECD Test Guideline 201)

Toxicity to bacteria Respiration inhibition EC50 - Sludge Treatment - > 1,000 mg/l - 3 h

(OECD Test Guideline 209)

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

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life with long lasting effects.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging

Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

DOT (US)

UN number: 1338 Class: 4.1 Packing group: III

Proper shipping name: Phosphorus, amorphous

Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1338 Class: 4.1 Packing group: III EMS-No: F-A, S-G

Proper shipping name: PHOSPHORUS, AMORPHOUS

Marine pollutant:yesIATA

UN number: 1338 Class: 4.1 Packing group: III

Proper shipping name: Phosphorus, amorphous

SECTION 15. REGULATORY INFORMATION

SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

Red phosphorus

CAS-No.

7723-14-0

Revision Date

1991-07-01

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

Red phosphorus

CAS-No.

7723-14-0

Revision Date

1991-07-01

SARA 311/312 Hazards

Fire Hazard

Massachusetts Right To Know Components

Red phosphorus

CAS-No.

7723-14-0

Revision Date

1991-07-01

Pennsylvania Right To Know Components

Red phosphorus

CAS-No.

7723-14-0

Revision Date

1991-07-01

New Jersey Right To Know Components

Red phosphorus

CAS-No.

7723-14-0

Revision Date

1991-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other

reproductive harm.

SECTION 16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product.