

Electroless CoWBP Plating Solution

Safety Data Sheet

Section 1: Identification

1.1 Identification

Product Name : Electroless CoWBP Plating Solution

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

Use of the substance/mixture : Cobalt-Tungsten-Boron-Phosphorous Plating

1.3 Details of the supplier of the safety data sheet

Nano3D Systems LLC
1110 NE Circle Blvd., ATAMI/Bldg. 11
Corvallis, OR 97330

1.4 Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300

Section 2: Hazard(s) identification

2.1 Classification of the substance or mixture

Classification (GHS-US)

| | |
|--|------|
| Acute toxicity, Oral (Category 3) | H301 |
| Acute toxicity, Dermal (Category 3) | H311 |
| Skin sensitization (Category 1) | H317 |
| Respiratory sensitization (Category 1) | H334 |
| Carcinogenicity (Category 1B) | H350 |
| Reproductive toxicity (Category 1B) | H360 |
| Reproductive toxicity (Category 2) | H361 |
| Acute aquatic toxicity (Category 1) | H400 |
| Chronic aquatic toxicity (Category 1) | H410 |

2.2 Label elements

GHS-US labeling

Hazard pictogram (GHS-US)



Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : H301 + H311 – Toxic if swallowed or in contact with skin
: H317 – May cause an allergic skin reaction.
: H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
: H350 – May cause cancer.
: H360 – May damage fertility or the unborn child.
: H361 – Suspected of damaging fertility or the unborn child
: H410 – Very toxic to aquatic life with long lasting effects

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- Precautionary statements (GHS-US)
- : P201 – Obtain special instructions before use.
 - : P202 – Do not handle until all safety precautions have been read and understood.
 - : P261 – Avoid breathing dust/fume/gas/mist/vapors/spray.
 - : P264 – Wash skin thoroughly after handling.
 - : P270 – Do not eat, drink or smoke when using this product.
 - : P272 – Contaminated work clothing should not be allowed out of the workplace
 - : P273 – Avoid release to the environment.
 - : P280 – Wear protective gloves/protective clothing/ eye protection/face protection.
 - : P285 – In case of inadequate ventilation wear respiratory protection.
 - : P301 + P310 – If swallowed: Call a Poison center or doctor/physician if you feel unwell. Rinse mouth.
 - : P302 + P352 – If on skin: Wash with plenty of soap and water.
 - : P304 + P341 – If inhaled: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
 - : P308 + P313 – If exposed or concerned: Get medical advice/attention.
 - : P312 - Call a POISON CENTER or doctor/ physician if you feel unwell.
 - : P330 – Rinse mouth.
 - : P333 + P313 – If skin irritation or rash occurs: Get medical advice/attention.
 - : P361 - Remove/Take off immediately all contaminated clothing.
 - : P363 – Wash contaminated clothing before reuse.
 - : P391 – Collect spillage.
 - : P405 – Store locked up.
 - : P501 – Dispose of contents/container to an approved waste disposal plant.

2.3 Other Hazards

No additional information available

2.4 Unknown acute toxicity (GHS US)

No additional information available

Section 3: Composition/information on ingredients

3.1 Substance

Not applicable

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3.2 Mixture

| Name | Product Identifier | % | Classification (GHS-US) |
|---------------------------------|----------------------|--------------|---|
| Cobalt(II) Sulfate Heptahydrate | (CAS-No.) 10026-24-1 | Trade Secret | Acute Tox. 4; Resp. Sens. 1; Skin Sens. 1; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H302, H317, H334, H350, H360, H410 |
| Boric acid | (CAS-No.) 10043-35-3 | Trade Secret | Repr. 2; H361 |
| Tungstic acid | (CAS-No.) 7783-03-1 | Trade Secret | Not a hazardous substance |
| Dimethylamine-Borane | (CAS-No.) 74-94-2 | Trade Secret | Flam. Sol. 1; Acute Tox. 3; H228, H301 + H311 |
| Ammonium Hypophosphite | (CAS-No.) 7803-65-8 | Trade Secret | Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H315; H319, H335 |
| Citric Acid Monohydrate | (CAS-No.) 5949-29-1 | Trade Secret | Eye Irrit. 2A; H319 |

Section 4: First Aid Measures

4.1 Description of first aid measures

| | |
|--------------|---|
| General | : Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area. |
| Inhalation | : If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. |
| Skin contact | : Wash off with soap and plenty of water. Consult a physician. |
| Eye contact | : Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. |
| Ingestion | : 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

| | |
|--------------|---|
| Inhalation | : May cause allergy or asthma symptoms or breathing difficulties if inhaled |
| Skin contact | : May cause an allergic reaction |

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Eye contact : Causes serious eye damage

Ingestion : Harmful if swallowed

4.3 Indication of any immediate medical attention and special treatment needed

No further information available

Section 5: Firefighting measures

5.1 Extinguishing media

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

Unsuitable extinguishing media : None

5.2 Special hazards arising from the substance or mixture

Fire hazard : Cobalt oxide, sulfur oxides, boron oxides, sodium oxides, tungsten oxides, phosphorous oxides, carbon oxides, nitrogen oxides (NOx), Borane/boron oxides

Explosion hazard : No information available

5.3 Advice for firefighters

Protection during firefighting : Wear self-contained breathing apparatus for firefighting if necessary.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel : Use personal protective equipment. Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

6.1.2 For emergency personnel : No additional information available

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

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

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6.4 Reference to other sections

For disposal see section 13.

Section 7: Handling and storage

7.1 Precautions for safe handling

Precautions for safe handling : Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions : Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Air sensitive. hygroscopic Handle and store under inert gas.

Section 8: Exposure controls/personal protection

8.1 Control parameters

Cobalt Sulfate Heptahydrate (CAS-No.) 10026-24-1

| | | |
|-----|------------------------|---|
| TWA | 0.02 mg/m ³ | USA. ACGIH Threshold Limit Values (TLV) |
|-----|------------------------|---|

Boric acid (CAS-No.) 10043-35-3

| | | |
|-----|------------------------|---|
| TWA | 2.00 mg/m ³ | USA. ACGIH Threshold Limit Values (TLV) |
|-----|------------------------|---|

Tungstic Acid (CAS-No.) 7783-03-1

No exposure limit values

Ammonium Hypophosphate (CAS-No.) 7803-65-8

No exposure limit values

Citric Acid Monohydrate (CAS-No.) 5949-29-1

No exposure limit values

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.

Hand 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.

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Wash and dry hands.

Eye 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 and body protection

: Complete suit protecting against chemicals, the type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

| | |
|---|----------------------------|
| Physical state | : Liquid |
| Color | : Red |
| Odor | : No information available |
| Odor threshold | : No information available |
| pH | : 9 |
| Melting point | : No information available |
| Freezing point | : No information available |
| Boiling point | : No information available |
| Flash point | : No information available |
| Relative evaporation rate (butyl acetate = 1) | : No information available |
| Flammability (solid, gas) | : No information available |
| Explosion limits | : No information available |
| Explosive properties | : No information available |
| Vapor pressure | : No information available |
| Relative density | : No information available |
| Relative vapor density at 20 ° | : No information available |
| Solubility | : Miscible |
| Log Pow | : No information available |
| Auto-ignition temperature | : No information available |
| Viscosity | : No information available |
| Viscosity, kinematic | : No information available |
| Viscosity, dynamic | : No information available |

9.2 Other information

No further information available

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Section 10: Stability and reactivity

10.1 Reactivity

No information available

10.2 Chemical Stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No information available

10.4 Conditions to avoid

No information available

10.5 Incompatible materials

Strong oxidizing agents, Potassium, Acid anhydrides

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Cobalt oxides, Tungsten oxides, Sodium Oxides, Carbon oxides

Section 11: Toxicological information

11.1 Control parameters

Acute toxicity

Cobalt Sulfate Heptahydrate (CAS-No.) 10026-24-1

LD50 Oral - Rat - 582 mg/kg

Boric acid (CAS-No.) 10043-35-3

LD50 Oral - Rat - 2,660 mg/kg

Dimethylamine-borane (CAS-No.) 74-94-2

LD50 Oral – rat – 59 mg/kg

Inhalation: no data available

LD50 Dermal – rabbit – 210 mg/kg

Citric Acid Monohydrate (CAS-No.) 10043-35-3

LD50 Intraperitoneal - Rat - 375 mg/kg

| | |
|-----------------------------------|---|
| Serious eye damage/irritation | : Risk of serious damage to eyes |
| Respiratory or skin sensitization | : Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals. |
| Germ cell mutagenicity | : Hamster, Embryo, Micronucleus test |
| Carcinogenicity | : This is or contains a component that has been |

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reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

Reproductive toxicity

: Presumed human reproductive toxicant

Reproductive toxicity - Mouse – Inhalation

Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Specific target organ toxicity (single exposure)

: No information available

Specific target organ toxicity (repeated exposure)

: No information available

Aspiration hazard

: No information available

Additional information

Toxicity reported for borates in humans: ingestion or absorption may cause nausea, vomiting, diarrhea, abdominal cramps, and erythematous lesions on the skin and mucous membranes. Other symptoms include: circulatory collapse, tachycardia, cyanosis, delirium, convulsions, and coma. Death has been reported to occur in infants from less than 5 grams and in adults from 5 to 20 grams.

Section 12: Ecological information

12.1 Toxicity

Cobalt Sulfate Heptahydrate (CAS-No.) 10026-24-1

No information available

Boric acid (CAS-No.) 10043-35-3

Toxicity to fish

LC50 - *Ptychocheilus lucius* - 279 mg/l - 96 h

LC0 - *Lepomis macrochirus* (Bluegill) - > 1,021 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates

LC50 - *Daphnia magna* (Water flea) - 53.2 mg/l - 21 d

EC50 - *Daphnia magna* (Water flea) - 133 mg/l - 48 h

12.2 Persistence and degradability

Cobalt Sulfate Heptahydrate (CAS-No.) 10026-24-1

Not readily biodegradable

12.3 Bioaccumulative potential

No information available

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12.4 Mobility in soil

No information available

12.4 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life. May be harmful to aquatic organisms due to the shift of the pH. Avoid release to the environment.

Section 13: Disposal considerations

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

Section 14: Transportation information

14.1 Transportation information

Department of Transportation (DOT)

UN Number: 2810 Class: 6.1 Packing group: II
Proper shipping name: toxic liquids, organic, n.o.s. (dimethylamine-borane and cobalt sulfate mixture)
Marine pollutant: Yes
Poison Inhalation Hazard: No

IMDG

IMDG UN number: 2810 Class: 6.1 Packing group: II EMS-No: F-A, S-G
Proper shipping name: toxic liquids, organic, n.o.s. (dimethylamine-borane and cobalt sulfate mixture)
Marine pollutant: yes

IATA

UN number: 2810 Class: 6.1 Packing group: II
Proper shipping name: toxic liquids, organic, n.o.s. (dimethylamine-borane and cobalt sulfate mixture)

Section 15: Regulatory information

15.1 US Federal regulations

Cobalt Sulfate Heptahydrate (CAS-No.) 10026-24-1

SARA Title III, Section 313

SARA 311/312 Hazards Acute Health Hazard, Chronic Health Hazard

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Boric acid (CAS-No.) 10043-35-3

SARA 311/312 Hazards Chronic Health Hazard

Ammonium Phosphinate (CAS-No.) 7803-65-8

SARA 311/312 Acute Health Hazards

Citric Acid Monohydrate (CAS-No.) 5949-29-1

SARA 311/312 Acute Health Hazard

15.2 US State regulations

Cobalt Sulfate Heptahydrate (CAS-No.) 10026-24-1

Pennsylvania Right To Know

New Jersey Right To Know

California Prop 65

Boric acid (CAS-No.) 10043-35-3

Pennsylvania Right To Know

New Jersey Right To Know

Tungstic Acid (CAS-No.) 7783-03-1

Pennsylvania Right To Know

Ammonium Phosphinate (CAS-No.) 7803-65-8

Pennsylvania Right To Know

New Jersey Right To Know

Citric Acid Monohydrate (CAS-No.) 5949-29-1

Pennsylvania Right To Know

New Jersey Right To Know

Dimethylamine-Borane (CAS-No.) 74-94-2

Pennsylvania Right To Know

New Jersey Right To Know

Section 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

| | |
|-----------------|--------------------------|
| Acute Tox. | Acute toxicity |
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |
| Eye Irrit. | Eye irritation |
| Flam Sol. | Flammable solids |
| H228 | Flammable solid |
| H301 | Toxic if swallowed |

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| | |
|-------------|---|
| H301+H311 | Toxic if swallowed or in contact with skin |
| H302 | Harmful if swallowed |
| H311 | Toxic in contact with skin |
| H315 | Causes skin irritation |
| H317 | May cause an allergic skin reaction |
| H319 | Causes serious eye irritation |
| H334 | May cause allergy or asthma symptoms or breathing difficulties if inhaled |
| H335 | May cause respiratory irritation |
| H350 | May cause cancer |
| H360 | May damage fertility or the unborn child |
| H400 | Very toxic to aquatic life |
| H410 | Very toxic to aquatic life with long lasting effects |
| Skin Irrit. | Skin irritation |
| STOT SE | Specific target organ toxicity - single exposure |

HMIS Rating

| | |
|----------------|---|
| Health | 2 |
| Chronic Health | * |
| Flammability | 0 |
| Physical | 3 |

NFPA Rating

| | |
|------------|---|
| Health | 2 |
| Fire | 0 |
| Reactivity | 3 |

SDS Preparation date: March 1, 2017 **Supersedes previous version:** New SDS

This SDS contains revisions in the following sections(s): Not applicable. New SDS.

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