SAFETY DATA SHEET

Product name: Cesium Carbonate Solution, Caesium Carbonate Solution
Product code: CESCARBSOL
Synonyms: Cs2CO3, Dicesium carbonate, Caesium Carbonate
Recommended use: Catalyst, Industrial Products
Restrictions on use: Not Applicable.
Supplier:
Tantalam Mining Corporation of Canada, Ltd. (TANCO)
Bernic Lake
Box 2000
Lac du Bonnet, MB R0E 1A0
CANADA
Tel: 1-204-884-2400
Fax: 1-204-884-2211

E-mail:
fine.cesium.chemicals@cabotcorp.com

Emergency Telephone Number: 24H/7d service
US: CHEMTREC: 1-800-424-9300 or 1-703-527-3887
Canada: CANUTEC 1-613-996-6666
International CHEMTREC: +1 703-741-5970 or +1-703-527-3887

2. HAZARDS IDENTIFICATION

Classification
OSHA Regulatory Status: This chemical is considered hazardous by the United States 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).
Serious eye damage/eye irritation: Category 1
Reproductive Toxicity: Category 2
Specific target organ toxicity (repeated exposure) Category 2
**Product code:** CESCARBGSOL  
**Product name:** Cesium Carbonate Solution, Caesium Carbonate Solution  
**Revision date:** 18-Apr-2017

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**Label Elements:**

**Signal Word:** DANGER

**Hazard statements:**
- Causes serious eye damage
- Suspected of damaging fertility
- May cause damage to organs (kidneys, adrenals) through prolonged or repeated exposure

**Precautionary Statements - Prevention**
- Obtain special instructions before use
- Do not handle until all safety precautions have been read and understood
- Do not breathe mist/spray
- Wear protective gloves/protective clothing/eye protection/face protection

**Precautionary Statements - Response**
- IF exposed or concerned: Get medical advice/attention
  - Eyes: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
  - Immediately call a POISON CENTER or doctor/physician

**Precautionary Statements - Storage**
- Store locked up

**Precautionary Statements - Disposal**
- Dispose of contents/container in accordance with local, regional, national, and international regulations

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**Hazards not otherwise classified (HNOC)**

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**Potential health effects**

**Principle Routes of Exposure:** Eye contact, Skin Contact

**Skin Contact:** None expected based on component data.

**Inhalation:** Due to its liquid state, this material is not expected to be a significant inhalation hazard. Aerosols or dried product may be irritating to respiratory tract.

**Ingestion:** May be harmful if swallowed.

**Reproductive Effects:** Male Reproductive System. See Section 11.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Cs2CO3, Dicesium carbonate, Caesium Carbonate.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS No</th>
<th>weight-%</th>
<th>Trade secret</th>
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<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>50</td>
<td>-</td>
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<tr>
<td>Cesium Carbonate</td>
<td>534-17-8</td>
<td>50</td>
<td>-</td>
</tr>
</tbody>
</table>

Other Information:
The hyphen (-) means "not applicable"

4. FIRST AID MEASURES

FIRST AID MEASURES

Skin Contact      Wash thoroughly with soap and water. Remove contaminated clothing and shoes. Seek medical attention if symptoms develop.

Eye contact       Flush eyes immediately with large amounts of water for 15 minutes. Seek medical attention if redness, swelling, itching, burning or visual disturbances occur.

Inhalation         If cough, shortness of breath or other breathing problems occur, move to fresh air. Seek medical attention if symptoms persist. If necessary, restore normal breathing through standard first aid measures.

Ingestion          Do not induce vomiting. If conscious, give several glasses of water. Never give anything by mouth to an unconscious person. Seek medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms: The most important known symptoms and effects are described in Section 2 and/or in Section 11.

Indication of any immediate medical attention and special treatment needed
5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment: Carbon dioxide (CO2). Foam. Dry chemical. Water.

Unsuitable Extinguishing Media: None.

Specific hazards arising from the chemical: None.


Protective equipment and precautions for firefighters: In the event of fire, wear self-contained breathing apparatus. Wear suitable protective equipment.

Risk of Dust Explosion: Not Applicable: This product is an aqueous solution

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions: Avoid formation of mist and aerosols. Ensure adequate ventilation. Use personal protective equipment. See also Section 8.

Environmental Precautions:

Environmental Precautions: Contain spilled material on land, if safe to do so. Local authorities should be advised if significant spillages cannot be contained. See also Section 13.

Methods and material for containment and cleaning up

Methods for containment: Prevent further leakage or spillage if safe to do so.

Methods for cleaning up: Soak up with inert absorbent material. Pick up and transfer to properly labeled containers. See Section 13.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling: Avoid contact with skin and eyes. Avoid formation of mist and aerosols. Do not breathe aerosols or dust from dried material. Provide appropriate exhaust ventilation at machinery and at places where dust, aerosol, or mist can be generated. Avoid ingestion. Avoid prolonged or repeated exposure.

General hygiene considerations: Handle in accordance with good industrial hygiene and safety practice

Conditions for safe storage, including any incompatibilities

Storage Conditions: Keep containers tightly closed in a cool, well-ventilated place. Keep in properly labeled containers. Do not store together with strong oxidizing agents.
Incompatible materials: Strong acids. Strong oxidizing agents.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Exposure guidelines:**

There are no exposure limits identified for this product.

**Engineering Controls:**

Ensure adequate ventilation to minimize exposures. Provide appropriate exhaust ventilation at machinery and at places where dust, aerosol, or mist can be generated.

**Personal protective equipment [PPE]**

**Respiratory Protection:** Approved respirator may be necessary if local exhaust ventilation is not adequate. Respiratory protection in accordance with EN 149 and OSHA 1910.134.

**Hand Protection:** Wear suitable gloves (in accordance with EN 374 and OSHA 1910.138): Impervious gloves. Neoprene gloves. Nitrile rubber gloves. PVC or rubber gloves.

**Eye/face Protection:** Eye / face protection in accordance with EN 166 and OSHA 1910.133: Wear eye/face protection. Wear safety glasses with side shields (or goggles). Wear face-shield if splashes are likely to occur.

**Skin and Body Protection:** Wear chemical impervious protective clothing if skin contact may occur.

**Other:** Handle in accordance with good industrial hygiene and safety practice. Emergency eyewash and safety shower should be located nearby.

**Environmental exposure controls:** In accordance with all local legislation and permit requirements.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
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<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
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<tr>
<td><strong>Physical State:</strong></td>
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<td><strong>Appearance:</strong></td>
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<td><strong>Color:</strong></td>
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<tr>
<td><strong>pH:</strong></td>
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<tr>
<td>Melting point/freezing point:</td>
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<td>Cesium carbonate: DSC; According to OECD 102/EU Method A.1</td>
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<tr>
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<tr>
<td>Decomposition temperature:</td>
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</table>
End point is listed “not applicable” due to the inherent properties of the substance: The product is an aqueous solution

“No information available” indicates testing has not been performed

DSC: Differential Scanning Calorimetry

10. STABILITY AND REACTIVITY

Reactivity: Reacts with strong oxidizers, Strong acids.

Stability: Stable under recommended handling and storage conditions.

Possibility of hazardous reactions: None under normal processing.

Hazardous polymerization: Catalyst in ethylene oxide polymerization.

Conditions to avoid: Avoid contact with incompatible materials. Heating can release hazardous gases.

Incompatible materials: Strong acids. Strong oxidizing agents.

Explosion data See also Section 9.

Sensitivity to Mechanical Impact: None.

Sensitivity to Static Discharge: Not Applicable.

11. TOXICOLOGICAL INFORMATION

Information given is based on data on the components and the toxicology of similar products.

Acute toxicity


Inhalation LC50: Not determined

Dermal LD50: No data are available on the product itself.

Based on the results of an acute dermal toxicity study (OECD 402) on similar substances (cesium nitrate and cesium iodide), this product is not classified for acute dermal toxicity.

Skin corrosion/irritation: This product has been tested in vitro on human skin (OECD 431) and is considered not corrosive to skin

This product has been tested on rabbit skin (0/24) (OECD 404) and is considered a non-irritant to skin

Serious eye damage/eye irritation: Corrosive. This product has been tested in vitro BCOP test (OECD 437) and is classified as eye damage category 1 (irreversible effects on the eye).

Sensitization: No data are available on the product itself.

Based on the results of a sensitization study (OECD 429) on a similar substance (cesium nitrate), this product is not classified as a sensitizer.

Mutagenicity: This product is considered non-mutagenic in the bacterial reverse mutation assay (OECD 471). Based on the results of an in vitro mammalian cell gene mutation test (OECD 476) on similar substances (cesium hydroxide and cesium iodide), this product is considered non-mutagenic.

Carcinogenicity: Does not contain any substances listed by IARC (International Agency for Research on Cancer), NTP (National Toxicology Program), OSHA (Occupational Safety and Health Administration), ACGIH (American Conference of Governmental Industrial Hygienists) or EU (European Union).

Reproductive Toxicity: Based on a 90-day oral repeated dose toxicity study (OECD 408) on a similar substance (cesium chloride), this product is classified as Reproductive Toxicity Category 2 - suspected of damaging fertility. Male and female rats were used in the study. Effects on reproductive organs and reproductive cycles were seen only in males. The reproductive effects were generally secondary to other toxic effects on adrenals and kidneys. The No Observed Adverse Effect Level (NOAEL) for reproductive effects is equivalent to 10 mg Cs/kg bodyweight/day.

Developmental toxicity: Based on the results of a Prenatal Developmental Toxicity Study (OECD 414) on a similar substance (cesium hydroxide), this product is not considered a developmental toxicant.

STOT - single exposure: Not conclusive for classification.

STOT - repeated exposure: Based on a 90-day oral repeated dose toxicity study (OECD 408) on a similar substance (cesium chloride), this product is classified as STOT-RE Category 2 - may cause damage to multiple organs (kidneys and adrenals) through prolonged or repeated exposure. The No
Observed Adverse Effect Level (NOAEL) for kidney and adrenal effects is equivalent to 10 mg Cs/kg bodyweight/day.

Aspiration Hazard: No information available.

12. ECOLOGICAL INFORMATION

Information given is based on data on the components and the toxicology of similar products.

Aquatic Toxicity:

ACUTE TOXICITY.
Fish: Based on the results of the OECD 203 acute fish toxicity study on cesium hydroxide monohydrate, the calculated values of LC50 (96h), LOEC (96h), and NOEC (96h) for cesium are greater than or equal to 79 mg/L and for cesium carbonate are greater than or equal to 97 mg/L.

Daphnia: Daphnia magna (OECD 202) - cesium carbonate: EC50 (48h) = 91.6 mg/L; NOEC (48h) = 24.3 mg/L.

CHRONIC TOXICITY.
No data are available on the product itself.

Fish: Based on the results of the Fish Early-Life Stage Toxicity Test (OECD 210) on cesium hydroxide monohydrate (Zebrafish (Danio rerio)), the calculated NOEC for cesium was 34.0 mg/L and the LOEC was greater than 34.0 mg/L. For cesium carbonate, the calculated NOEC was 41.7 mg/L and the LOEC was greater than 41.7 mg/L.

Daphnia: Based on the results of the OECD 211 Daphnia magna reproduction test on cesium hydroxide monohydrate, the calculated NOEC (21d) for cesium was 12.5 mg/L, the EC50 (21d) was greater than 12.5 mg/L and the LOEC was 23.7 mg/L. For cesium carbonate, the calculated NOEC (21d) was 15.3 mg/L, the EC50 (21d) was greater than 15.3 mg/L, and the LOEC was 39.2 mg/L.

Algae: Based on the results of the OECD 201 acute algal growth inhibition test on Pseudokirchneriella subcapitata - cesium hydroxide monohydrate, the EC50 (72h) calculated for cesium was 106.1 mg/L, the LOEC (72h) was 19.8 mg/L, and the NOEC (72h) was 9.9 mg/L. For cesium carbonate, the calculated EC50 (72h) value was 130.0 mg/L, the LOEC (72h) was 24.4 mg/L, and the NOEC (72h) was 12.1 mg/L.

Microorganism: Based on the results of the OECD 209 activated sludge respiration inhibition test - cesium hydroxide monohydrate, the calculated EC10 and EC50 values for cesium were greater than 792 mg/L and the NOEC was 792 mg/L. For cesium carbonate, the calculated values were as follows: EC10 and EC50 were greater than 970 mg/L and NOEC was 970 mg/L.

ENVIRONMENTAL FATE
Persistence and degradability No information available

Bioaccumulation No information available.

Mobility: No information available.
13. DISPOSAL CONSIDERATIONS

Disclaimer: Information in this section pertains to the product as shipped in its intended composition as described in Section 3 of this SDS. Contamination or processing may change waste characteristics and requirements. Regulations may also apply to empty containers, liners or rinsate. State/provincial and local regulations may be different from federal regulations.

RCRA: Unused product would be considered a hazardous waste under U.S. RCRA, 40 CFR 261.

Unused and Uncontaminated Product:

Waste codes should be assigned by the user based on the application for which the product was used. The unused material would be considered a hazardous waste.

Disposal considerations: Product, as supplied, should be disposed of in accordance with the regulations issued by the appropriate federal, state and local authorities. Same consideration should be given to containers and packaging.

14. TRANSPORT INFORMATION

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IMDG

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</table>
**15. REGULATORY INFORMATION**

**Hazard Classification**


Canada - WHMIS Classification (HPR, SOR/2015-17): Hazardous. See Section 2 for Hazard Classification.

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the M/SDS contains all the information required by the Hazardous Products Regulations

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>WHMIS - Ingredient Disclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cesium Carbonate</td>
<td>1</td>
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</table>

**GHS Classification:** Acute Toxicity Category 5 is used for mixtures which are of relatively low toxicity but which, under certain circumstances, may pose a hazard to vulnerable populations. Category 5 mixtures are anticipated to have an oral or dermal LD50 value in the range 2000-5000 mg/kg bodyweight. Based on data on the components, the Oral LD50 for this mixture has been estimated to be between 2000-5000 mg/kg bodyweight

**International Inventories**

- TSCA - United States Toxic Substances Control Act Section 8(b) Inventory: Complies
- DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List: Complies
- EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances: Complies
- ENCS - Japan Existing and New Chemical Substances: Complies
- IECSC - China Inventory of Existing Chemical Substances: Complies
- KECL - Korean Existing and Evaluated Chemical Substances: Complies
- PICCS - Philippines Inventory of Chemicals and Chemical Substances: Complies
- AICS - Australian Inventory of Chemical Substances: Complies
- NZIoC - New Zealand Inventory of Chemicals: Complies
- TCSI - Taiwan Chemical Substance Inventory: Complies
US Federal Regulations

SARA 311/312 Hazard Categories

- Acute Health Hazard: YES
- Chronic Health Hazard: YES
- Fire hazard: NO
- Sudden release of pressure hazard: NO
- Reactive Hazard: NO

Clean Air Act Amendments of 1990
(CAA, Section 112, 40 CFR 82):
CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations
This product does not contain any substances regulated by state right-to-know regulations.

16. OTHER INFORMATION

References:
Anon et al., 1978, Vest Akad. Meditisin. Nauk SSSR 8, 10

Contacts: See Section 1

Disclaimer:
The information set forth is based on information that Cabot Corporation believes to be accurate. No warranty, expressed or implied, is intended. The information is provided solely for your information and consideration and Cabot assumes no legal responsibility for use or reliance thereon. In the event of a discrepancy between the information on the non-English document and its English counterpart, the English version shall supersede.

Prepared by: Cabot Corporation - Safety, Health and Environmental Affairs
Revision date: 18-Apr-2017
Previous Revision Date: 7/August/2015
Reason for Revision: Hazard classification change. Revisions throughout

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End of Safety Data Sheet