

## Section 1. Identification

**Product identifier** : AL-MNR-006-1

**Other means of identification**

| Product name<br>Blueshield                                           | Classification<br>CSA | Classification<br>AWS |
|----------------------------------------------------------------------|-----------------------|-----------------------|
| MNR BUILDERMN<br>BUILDER38<br>HARD58<br>HARD60<br>KROME62<br>KROME68 | -                     | -                     |

**Product type** : Solid.

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

**Product use** : Covered electrodes for electric arc welding.  
SMAW - Hardfacing alloyed electrode MNR.

**Area of application** : Industrial applications, Professional applications.

**Supplier/Manufacturer** : Air Liquide Canada Inc.  
1250, René-Lévesque West, Suite 1700  
Montreal, QC  
H3B 5E6  
www.airliquide.ca  
1-800-817-7697

**Emergency telephone number** : (514) 878-1667

## Section 2. Hazard identification

**Classification of the substance or mixture** : H315 SKIN IRRITATION - Category 2  
H319 EYE IRRITATION - Category 2A  
H317 SKIN SENSITIZATION - Category 1  
H351 CARCINOGENICITY - Category 2  
H361 TOXIC TO REPRODUCTION (Fertility) - Category 2  
H372 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (bones, central nervous system (CNS), lungs, respiratory tract and teeth) - Category 1

**GHS label elements**

These hazards relate to welding fumes (electrodes in use) and not to the electrodes as sold.

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : H319 - Causes serious eye irritation.  
H315 - Causes skin irritation.  
H317 - May cause an allergic skin reaction.  
H361 - Suspected of damaging fertility.  
H351 - Suspected of causing cancer.  
H372 - Causes damage to organs through prolonged or repeated exposure. (bones, central nervous system (CNS), lungs, respiratory tract, teeth)

**Precautionary statements**

**Prevention** : P201 - Obtain special instructions before use.  
P202 - Do not handle until all safety precautions have been read and understood.  
P280 - Wear protective gloves. Wear eye or face protection: Recommended: Face shield with radiation shielding.. Wear protective clothing: Recommended: Full suit. Fire resistant..  
P260 - Do not breathe dust.  
P270 - Do not eat, drink or smoke when using this product.  
P264 - Wash hands thoroughly after handling.  
P272 - Contaminated work clothing should not be allowed out of the workplace.

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## Section 2. Hazard identification

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Response</b>                                            | : P314 - Get medical attention if you feel unwell.<br>P308 + P313 - IF exposed or concerned: Get medical attention.<br>P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse.<br>P333 + P313 - If skin irritation or rash occurs: Get medical attention.<br>P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.<br>P337 + P313 - If eye irritation persists: Get medical attention. |
| <b>Storage</b>                                             | : P405 - Store locked up.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Disposal</b>                                            | : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Supplemental label elements</b>                         | : Percentage of the mixture consisting of ingredient(s) of unknown toxicity: 45.3%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Other hazards which do not result in classification</b> | : ELECTRIC SHOCK can kill. FUMES AND GASES can be dangerous to your health. ARC RAYS can injure eyes and burn skin.                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Section 3. Composition/information on ingredients

|                                     |                   |
|-------------------------------------|-------------------|
| <b>Substance/mixture</b>            | : Mixture         |
| <b>CAS number/other identifiers</b> |                   |
| <b>CAS number</b>                   | : Not applicable. |
| <b>Product code</b>                 | : AL-MNR-006-1    |

| <b>Ingredient name</b>                       | <b>% (w/w)</b> | <b>CAS number</b> |
|----------------------------------------------|----------------|-------------------|
| iron                                         | 40 - 70        | 7439-89-6         |
| chromium                                     | 1 - 34         | 7440-47-3         |
| titanium dioxide                             | 1 - 20         | 13463-67-7        |
| molybdenum                                   | 0.01 - 15      | 7439-98-7         |
| Natural graphite                             | 0.01 - 15      | 7782-42-5         |
| Silicic acid, potassium salt                 | 0.01 - 13      | 1312-76-1         |
| manganese                                    | 0.01 - 13      | 7439-96-5         |
| niobium                                      | 0.01 - 12      | 7440-03-1         |
| Nickel                                       | 0.01 - 11      | 7440-02-0         |
| silicon dioxide                              | 0.01 - 11      | 7631-86-9         |
| calcium fluoride                             | 0.01 - 11      | 7789-75-5         |
| Silicic acid, sodium salt                    | 0.01 - 11      | 1344-09-8         |
| Aluminium lithium silicate                   | 0.01 - 11      | 12068-40-5        |
| calcium carbonate                            | 0.01 - 11      | 471-34-1          |
| Cellulose                                    | 0.01 - 10      | 9004-34-6         |
| Feldspar-group minerals                      | 0.01 - 10      | 68476-25-5        |
| tungsten                                     | 0.01 - 5       | 7440-33-7         |
| Vanadium alloy, base, V,C,Fe (Ferrovanadium) | 0.01 - 3.5     | 12604-58-9        |
| silicon                                      | 0.01 - 1       | 7440-21-3         |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

The fumes emitted by the electrodes, in use, are hazardous. This SDS is written for workers using these electrodes.

Occupational exposure limits, if available, are listed in Section 8.

## Section 4. First-aid measures

### Description of necessary first aid measures

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.                                                                                                                                                                                                                                                                                                                |
| <b>Inhalation</b>   | : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |
| <b>Skin contact</b> | : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.                                                                                                                                                  |

## Section 4. First-aid measures

- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Causes skin irritation. May cause an allergic skin reaction.
- Ingestion** : No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:  
irritation  
redness  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations
- Ingestion** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : Do not use water jet.
- Specific hazards arising from the chemical** : No specific fire or explosion hazard.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds  
metal oxide/oxides
- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

- Small spill** : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities** : Store between the following temperatures: 15 to 30°C (59 to 86°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

| Occupational exposure limits |                 | TWA (8 hours) |                   |       | STEL (15 mins) |                   |       | Ceiling |                   |       | Notations |
|------------------------------|-----------------|---------------|-------------------|-------|----------------|-------------------|-------|---------|-------------------|-------|-----------|
| Ingredient                   | List name       | ppm           | mg/m <sup>3</sup> | Other | ppm            | mg/m <sup>3</sup> | Other | ppm     | mg/m <sup>3</sup> | Other |           |
| iron                         | US ACGIH        | -             | 10                | -     | -              | -                 | -     | -       | -                 | -     | [a]       |
| chromium, measured as Cr     | US ACGIH 3/2015 | -             | 0.5               | -     | -              | -                 | -     | -       | -                 | -     | [b]       |
| chromium, as Cr              | AB 4/2009       | -             | 0.5               | -     | -              | -                 | -     | -       | -                 | -     | [3]       |
| chromium                     | BC 5/2015       | -             | 0.5               | -     | -              | -                 | -     | -       | -                 | -     |           |
| chromium, as Cr              | ON 7/2015       | -             | 0.5               | -     | -              | -                 | -     | -       | -                 | -     | [b]       |
| chromium                     | QC 1/2014       | -             | 0.5               | -     | -              | -                 | -     | -       | -                 | -     |           |
| chromium, measured as Cr     | SK 7/2013       | -             | 0.5               | -     | -              | 1.5               | -     | -       | -                 | -     |           |
| titanium dioxide             | US ACGIH 3/2015 | -             | 10                | -     | -              | -                 | -     | -       | -                 | -     |           |
|                              | AB 4/2009       | -             | 10                | -     | -              | -                 | -     | -       | -                 | -     | [3]       |
|                              | BC 5/2015       | -             | 3                 | -     | -              | -                 | -     | -       | -                 | -     | [c]       |
|                              |                 | -             | 10                | -     | -              | -                 | -     | -       | -                 | -     | [d]       |
|                              | ON 7/2015       | -             | 10                | -     | -              | -                 | -     | -       | -                 | -     | [e]       |

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## Section 8. Exposure controls/personal protection

|                                              |                 |   |      |   |   |     |   |   |   |   |     |
|----------------------------------------------|-----------------|---|------|---|---|-----|---|---|---|---|-----|
| molybdenum, as Mo                            | QC 1/2014       | - | 10   | - | - | -   | - | - | - | - | [f] |
|                                              | SK 7/2013       | - | 10   | - | - | 20  | - | - | - | - |     |
|                                              | US ACGIH 3/2015 | - | 10   | - | - | -   | - | - | - | - | [g] |
|                                              | US ACGIH 3/2015 | - | 3    | - | - | -   | - | - | - | - | [h] |
| molybdenum                                   | AB 4/2009       | - | 3    | - | - | -   | - | - | - | - | [i] |
|                                              |                 | - | 10   | - | - | -   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 10   | - | - | -   | - | - | - | - | [j] |
|                                              | BC 5/2015       | - | 3    | - | - | -   | - | - | - | - | [i] |
| molybdenum, as Mo                            | ON 7/2015       | - | 10   | - | - | -   | - | - | - | - | [k] |
|                                              | ON 7/2015       | - | 3    | - | - | -   | - | - | - | - | [l] |
|                                              | SK 7/2013       | - | 10   | - | - | 20  | - | - | - | - | [g] |
|                                              | SK 7/2013       | - | 3    | - | - | 6   | - | - | - | - | [m] |
| molybdenum, measured as Mo                   | US ACGIH 3/2015 | - | 2    | - | - | -   | - | - | - | - | [h] |
|                                              | AB 4/2009       | - | 2    | - | - | -   | - | - | - | - | [n] |
|                                              | BC 5/2015       | - | 2    | - | - | -   | - | - | - | - | [i] |
|                                              | ON 7/2015       | - | 2    | - | - | -   | - | - | - | - | [l] |
| Natural graphite                             | QC 1/2014       | - | 2    | - | - | -   | - | - | - | - | [o] |
|                                              | SK 7/2013       | - | 2    | - | - | 4   | - | - | - | - | [m] |
|                                              | US ACGIH 3/2015 | - | 0.1  | - | - | -   | - | - | - | - | [g] |
|                                              | US ACGIH 3/2015 | - | 0.02 | - | - | -   | - | - | - | - | [h] |
| manganese, as Mn                             | AB 4/2009       | - | 0.2  | - | - | -   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 0.2  | - | - | -   | - | - | - | - |     |
|                                              | ON 7/2015       | - | 0.2  | - | - | -   | - | - | - | - |     |
|                                              | QC 1/2014       | - | 0.2  | - | - | -   | - | - | - | - | [f] |
| manganese, measured as Mn                    | SK 7/2013       | - | 0.2  | - | - | 0.6 | - | - | - | - |     |
|                                              | US ACGIH 3/2015 | - | 1.5  | - | - | -   | - | - | - | - | [g] |
|                                              | AB 4/2009       | - | 1.5  | - | - | -   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 0.05 | - | - | -   | - | - | - | - |     |
| Nickel                                       | ON 7/2015       | - | 1    | - | - | -   | - | - | - | - | [k] |
|                                              | QC 1/2014       | - | 1    | - | - | -   | - | - | - | - |     |
|                                              | SK 7/2013       | - | 1.5  | - | - | 3   | - | - | - | - | [g] |
|                                              | US ACGIH 3/2015 | - | 2.5  | - | - | -   | - | - | - | - |     |
| Nickel, as Ni                                | AB 4/2009       | - | 2.5  | - | - | -   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 2.5  | - | - | -   | - | - | - | - |     |
|                                              | ON 7/2015       | - | 2.5  | - | - | -   | - | - | - | - |     |
|                                              | QC 1/2014       | - | 2.5  | - | - | -   | - | - | - | - |     |
| Nickel                                       | AB 4/2009       | - | 2    | - | - | -   | - | - | - | - |     |
|                                              |                 | - | 2    | - | - | -   | - | - | - | - |     |
|                                              | SK 7/2013       | - | 2    | - | - | 4   | - | - | - | - |     |
|                                              | SK 7/2013       | - | 2    | - | - | -   | - | - | - | - |     |
| calcium fluoride, as F                       | AB 4/2009       | - | 10   | - | - | -   | - | - | - | - | [3] |
|                                              |                 | - | 10   | - | - | -   | - | - | - | - | [f] |
|                                              | BC 5/2015       | - | 10   | - | - | -   | - | - | - | - |     |
|                                              | ON 7/2015       | - | 10   | - | - | -   | - | - | - | - |     |
| Aluminium lithium silicate, as Al            | QC 1/2014       | - | 10   | - | - | -   | - | - | - | - |     |
|                                              | AB 4/2009       | - | 10   | - | - | -   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 3    | - | - | -   | - | - | - | - | [c] |
|                                              | ON 7/2015       | - | 10   | - | - | -   | - | - | - | - | [d] |
| Aluminium lithium silicate, measured as Al   | QC 1/2014       | - | 10   | - | - | -   | - | - | - | - | [f] |
|                                              | SK 7/2013       | - | 10   | - | - | 20  | - | - | - | - | [p] |
|                                              | US ACGIH 3/2015 | - | 5    | - | - | 10  | - | - | - | - | [q] |
|                                              | AB 4/2009       | - | 5    | - | - | 10  | - | - | - | - |     |
| tungsten                                     | BC 5/2015       | - | 5    | - | - | 10  | - | - | - | - |     |
|                                              | ON 7/2015       | - | 5    | - | - | 10  | - | - | - | - |     |
|                                              | SK 7/2013       | - | 5    | - | - | 10  | - | - | - | - |     |
|                                              | US ACGIH 3/2015 | - | 1    | - | - | 3   | - | - | - | - | [r] |
| tungsten, as W                               |                 | - | 1    | - | - | 3   | - | - | - | - | [r] |
|                                              | BC 5/2015       | - | 1    | - | - | 3   | - | - | - | - | [r] |
|                                              | ON 7/2015       | - | 1    | - | - | 3   | - | - | - | - | [s] |
|                                              | QC 1/2014       | - | 1    | - | - | 3   | - | - | - | - | [f] |
| tungsten, measured as W                      | SK 7/2013       | - | 1    | - | - | 3   | - | - | - | - | [t] |
|                                              | US ACGIH 3/2015 | - | 1    | - | - | 3   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 1    | - | - | 3   | - | - | - | - |     |
|                                              | ON 7/2015       | - | 1    | - | - | 3   | - | - | - | - |     |
| Vanadium alloy, base, V,C,Fe (Ferrovanadium) | QC 1/2014       | - | 1    | - | - | 3   | - | - | - | - |     |
|                                              | SK 7/2013       | - | 1    | - | - | 3   | - | - | - | - |     |
|                                              | BC 5/2015       | - | 1    | - | - | 3   | - | - | - | - |     |
|                                              | ON 7/2015       | - | 1    | - | - | 3   | - | - | - | - |     |

[3]Skin sensitization

**Form:** [a]Inhalable particle. [b]Inorganic [c]Respirable dust [d]Total dust [e]total dust [f]Total dust. [g]Inhalable fraction [h]Respirable fraction [i]

Respirable [j]Inhalable [k]Inhalable fraction. [l]Respirable fraction. [m]respirable fraction [n]Respirable (all forms except graphite fibres) [o]Respirable dust. [p]fibre [q]Insoluble [r]Dust [s]dust [t]Metal dust

**Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

## Section 8. Exposure controls/personal protection

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Environmental exposure controls</b> | : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.                                                                                                                                                                                                                                                                                                          |
| <b>Individual protection measures</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hygiene measures</b>                | : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.                                                                                                                                                                    |
| <b>Eye/face protection</b>             | : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles. Recommended: Face shield with radiation shielding.                                                                                                                                                                                                                                 |
| <b>Skin protection</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hand protection</b>                 | : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.<br>Gloves. Fire resistant. |
| <b>Body protection</b>                 | : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Full suit. Fire resistant.                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Other skin protection</b>           | : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Metal cap, safety boots.                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Respiratory protection</b>          | : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Recommended: Dust respirator.                                                                                                                                                                                                                                                                                                                        |

## Section 9. Physical and chemical properties

### Appearance

|                                                     |                                                                   |
|-----------------------------------------------------|-------------------------------------------------------------------|
| <b>Physical state</b>                               | : Solid.                                                          |
| <b>Color</b>                                        | : Reddish-brown. Grayish-white.                                   |
| <b>Odor</b>                                         | : Odorless.                                                       |
| <b>Odor threshold</b>                               | : Not available.                                                  |
| <b>pH</b>                                           | : Not available.                                                  |
| <b>Melting point</b>                                | : 1540 to 2030°C (2804 to 3686°F)                                 |
| <b>Boiling point</b>                                | : Not available.                                                  |
| <b>Flash point</b>                                  | : Not available.                                                  |
| <b>Evaporation rate</b>                             | : Not available.                                                  |
| <b>Flammability (solid, gas)</b>                    | : Emits toxic fumes when heated.                                  |
| <b>Lower and upper explosive (flammable) limits</b> | : Not available.                                                  |
| <b>Vapor pressure</b>                               | : Not available.                                                  |
| <b>Vapor density</b>                                | : Not available.                                                  |
| <b>Relative density</b>                             | : Weighted average: 4.71 [Water = 1]                              |
| <b>Solubility</b>                                   | : Insoluble in the following materials: cold water and hot water. |
| <b>Partition coefficient: n-octanol/ water</b>      | : Not available.                                                  |
| <b>Auto-ignition temperature</b>                    | : Not available.                                                  |
| <b>Decomposition temperature</b>                    | : Not available.                                                  |
| <b>Viscosity</b>                                    | : Not available.                                                  |

## Section 10. Stability and reactivity

|                                           |                                                                                                                                                                                  |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reactivity</b>                         | : No specific test data related to reactivity available for this product or its ingredients.                                                                                     |
| <b>Chemical stability</b>                 | : The product is stable.                                                                                                                                                         |
| <b>Possibility of hazardous reactions</b> | : Under normal conditions of storage and use, hazardous reactions will not occur.<br>Under normal conditions of storage and use, hazardous polymerization will not occur.        |
| <b>Conditions to avoid</b>                | : No specific data.                                                                                                                                                              |
| <b>Incompatible materials</b>             | : Reactive or incompatible with the following materials: acids.                                                                                                                  |
| <b>Hazardous decomposition products</b>   | : Under normal conditions of storage and use, hazardous decomposition products should not be produced.<br>Arc radiation can support the production of ozone and nitrogen oxides. |

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/ingredient name      | Result                          | Species      | Dose        | Exposure |
|------------------------------|---------------------------------|--------------|-------------|----------|
| titanium dioxide             | LD50 Dermal                     | Rabbit       | >5000 mg/kg | -        |
|                              | LD50 Oral                       | Rat          | >5000 mg/kg | -        |
| Silicic acid, potassium salt | LD50 Dermal                     | Rat          | >5000 mg/kg | -        |
|                              | LD50 Oral                       | Rat - Female | >5000 mg/kg | -        |
| manganese                    | LC50 Inhalation Dusts and mists | Rat          | 5.14 mg/l   | 4 hours  |
|                              | LD50 Oral                       | Rat          | 9 g/kg      | -        |

**Conclusion/Summary** : Not available.

#### Irritation/Corrosion

| Product/ingredient name | Result               | Species | Score | Exposure                | Observation |
|-------------------------|----------------------|---------|-------|-------------------------|-------------|
| manganese               | Eyes - Mild irritant | Rabbit  | -     | 24 hours 500 milligrams | -           |
|                         | Skin - Mild irritant | Rabbit  | -     | 24 hours 500 milligrams | -           |

#### Conclusion/Summary

**Skin** : Not available.

**Eyes** : Not available.

**Respiratory** : Not available.

#### Sensitization

##### Conclusion/Summary

**Skin** : Not available.

**Respiratory** : Not available.

#### Mutagenicity

**Conclusion/Summary** : Not available.

#### Carcinogenicity

##### Classification

| Product/ingredient name | ACGIH | OSHA | IARC | NTP                                              | EU            |
|-------------------------|-------|------|------|--------------------------------------------------|---------------|
| titanium dioxide        | A4    | -    | 2B   | -                                                | -             |
| nickel                  | A5    | -    | 2B   | Reasonably anticipated to be a human carcinogen. | Carc. 2, H351 |
| calcium fluoride        | A4    | -    | 3    | -                                                | -             |

#### Reproductive toxicity

**Conclusion/Summary** : Not available.

#### Teratogenicity

**Conclusion/Summary** : Not available.

#### Specific target organ toxicity (single exposure)

## Section 11. Toxicological information

| Name                         | Category   | Route of exposure | Target organs                |
|------------------------------|------------|-------------------|------------------------------|
| Silicic acid, potassium salt | Category 3 | Not applicable.   | Respiratory tract irritation |

### Specific target organ toxicity (repeated exposure)

| Name             | Category   | Route of exposure | Target organs                          |
|------------------|------------|-------------------|----------------------------------------|
| Natural graphite | Category 1 | Inhalation        | lungs                                  |
| manganese        | Category 2 | Not determined    | central nervous system (CNS) and lungs |
| Nickel           | Category 1 | Inhalation        | respiratory tract                      |

### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Routes of entry anticipated: Oral, Dermal, Inhalation.

### Potential acute health effects

**Eye contact** : Causes serious eye irritation.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Causes skin irritation. May cause an allergic skin reaction.

**Ingestion** : No known significant effects or critical hazards.

### Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness

**Inhalation** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations

**Skin contact** : Adverse symptoms may include the following:  
irritation  
redness  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations

**Ingestion** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

#### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

**Conclusion/Summary** : Not available.

**General** : Causes damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

**Carcinogenicity** : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : Suspected of damaging fertility.

## Section 11. Toxicological information

### Numerical measures of toxicity

#### Acute toxicity estimates

| Route | ATE value     |
|-------|---------------|
| Oral  | 21363.2 mg/kg |

## Section 12. Ecological information

### Toxicity

| Product/ingredient name | Result                                | Species                                                                      | Exposure |
|-------------------------|---------------------------------------|------------------------------------------------------------------------------|----------|
| titanium dioxide        | Acute LC50 3 mg/l Fresh water         | Crustaceans - Ceriodaphnia dubia - Neonate                                   | 48 hours |
| manganese               | Acute LC50 6.5 mg/l Fresh water       | Daphnia - Daphnia pulex - Neonate                                            | 48 hours |
|                         | Acute LC50 >1000000 µg/l Marine water | Fish - Fundulus heteroclitus                                                 | 96 hours |
|                         | Acute EC50 31000 µg/l Fresh water     | Aquatic plants - Lemna minor                                                 | 4 days   |
|                         | Acute LC50 29000 µg/l                 | Daphnia - Daphnia magna                                                      | 48 hours |
|                         | Acute LC50 28 mg/l Fresh water        | Fish - Pimephales promelas                                                   | 96 hours |
|                         | Chronic NOEC 1.7 mg/l Fresh water     | Daphnia - Water Flea- Ceriodaphnia dubia                                     | 8 days   |
| Nickel                  | Acute EC50 2 ppm Marine water         | Algae - Macrocystis pyrifera - Young                                         | 4 days   |
|                         | Acute EC50 450 µg/l Fresh water       | Aquatic plants - Lemna minor                                                 | 4 days   |
|                         | Acute EC50 1000 µg/l Marine water     | Daphnia - Daphnia magna                                                      | 48 hours |
|                         | Acute IC50 0.31 mg/l Marine water     | Crustaceans - Americamysis bahia - Juvenile (Fledgling, Hatchling, Weanling) | 48 hours |
|                         | Acute LC50 47.5 ng/L Fresh water      | Fish - Heteropneustes fossilis                                               | 96 hours |
|                         | Chronic NOEC 100 mg/l Marine water    | Algae - Glenodinium halli                                                    | 72 hours |
|                         | Chronic NOEC 3.5 µg/l Fresh water     | Fish - Cyprinus carpio                                                       | 4 weeks  |
|                         |                                       |                                                                              |          |

**Conclusion/Summary** : Not available.

### Persistence and degradability

**Conclusion/Summary** : Not available.

### Bioaccumulative potential

Not available.

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                            | TDG Classification | DOT Classification | ADR/RID        | IMDG           | IATA           |
|----------------------------|--------------------|--------------------|----------------|----------------|----------------|
| UN number                  | Not regulated.     | Not regulated.     | Not regulated. | Not regulated. | Not regulated. |
| UN proper shipping name    | -                  | -                  | -              | -              | -              |
| Transport hazard class(es) | -                  | -                  | -              | -              | -              |
| Packing group              | -                  | -                  | -              | -              | -              |
| Environmental hazards      | No.                | No.                | No.            | No.            | No.            |
| Additional information     | -                  | -                  | -              | -              | -              |

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL and the IBC Code** : Not available.

## Section 15. Regulatory information

### Canadian lists

**Canadian NPRI** : The following components are listed: Chromium (and its compounds); Manganese (and its compounds); Nickel (and its compounds); Calcium fluoride; Chromium (and its compounds)

**CEPA Toxic substances** : The following components are listed: Inorganic fluorides

**Canada inventory** : Not determined.

### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A, B, C, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

## Section 16. Other information

### History

**Date of issue/Date of revision** : 16/08/2016  
**Date of previous issue** : No previous validation  
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**Prepared by** : IHS

## Section 16. Other information

### Key to abbreviations

: ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations  
 HPR = Hazardous Products Regulations  
 ACGIH=American Conference of Governmental Industrial Hygiene.  
 ACGIH-A1-Confirmed Human Carcinogen.  
 ACGIH-A2-Suspected Human Carcinogen.  
 ACGIH-A3-Animal Carcinogen.  
 ACGIH-A4-Not Classifiable as a Human Carcinogen.  
 ACGIH-A5-Not suspected as a Human Carcinogen.  
 IARC=International Agency for Research on Cancer  
 IARC 1: Proven.  
 IARC 2A: Probable for human.  
 IARC 2B: Possible for human.  
 IARC 3: Not classifiable for human.  
 EU= European Union  
 Carc. 1A : May cause cancer (Known)  
 Carc. 1B : May cause cancer (Presumed)  
 Carc. 2 : Suspected of causing cancer  
 NTP=National Toxicology program.

### Procedure used to derive the classification

| Classification                                                                                                                                                                                                                                                                                                                    | Justification                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| SKIN IRRITATION - Category 2<br>EYE IRRITATION - Category 2A<br>SKIN SENSITIZATION - Category 1<br>CARCINOGENICITY - Category 2<br>TOXIC TO REPRODUCTION (Fertility) - Category 2<br>SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE)<br>(bones, central nervous system (CNS), lungs, respiratory tract and teeth) - Category 1 | Calculation method<br>Calculation method<br>Calculation method<br>Calculation method<br>Calculation method<br>Calculation method |

### References

: HPR = Hazardous Products Regulations

Indicates information that has changed from previously issued version.

### Notice to reader

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