1 Identification

- Product name
  - Trade name: Cobalt carbonyl (Dicobalt octacarbonyl) (Stabilized with 1-5% hexanes)
  - Item number: 27-0400

- Details of the supplier of the safety data sheet
  - Manufacturer/Supplier: Strem Chemicals, Inc.
    7 Mulliken Way
    NEWBURYPORT, MA 01950
    USA
    info@strem.com
  - Information department: Technical Department
  - Emergency telephone number:
    EMERGENCY: CHEMTREC: +1 (800) 424-9300
    During normal opening times: +1 (978) 499-1600

2 Hazard(s) identification

- Classification of the substance or mixture
  - GHS02 Flame
    Self-heat. 1  H251 Self-heating: may catch fire.
  - GHS08 Health hazard
    Carc. 2  H351 Suspected of causing cancer.
    STOT RE 2  H373 May cause damage to organs through prolonged or repeated exposure.
  - GHS07
    Acute Tox. 4  H302 Harmful if swallowed.
    Acute Tox. 4  H332 Harmful if inhaled.
    Skin Sens. 1  H317 May cause an allergic skin reaction.

- Label elements
  - GHS label elements The product is classified and labeled according to the Globally Harmonized System (GHS).
  - Hazard pictograms

- Signal word Danger

- Hazard-determining components of labeling:
  octacarbonyldicobalt

- Hazard statements
  H251 Self-heating: may catch fire.
  H302+H332 Harmful if swallowed or if inhaled.
Trade name: Cobalt carbonyl (Dicobalt octacarbonyl) (Stabilized with 1-5% hexanes)

H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H373 May cause damage to organs through prolonged or repeated exposure.

### Precautionary statements

- **P231** Handle under inert gas.
- **P210** Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- **P301+P310** IF SWALLOWED: Immediately call a POISON CENTER/doctor.
- **P305+P351+P338** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- **P422** Store contents under inert gas.
- **P403+P235** Store in a well-ventilated place. Keep cool.
- **P501** Dispose of contents/container in accordance with local/regional/national/international regulations.

### Classification system:

- **NFPA ratings (scale 0 - 4)**
  - Health = 3
  - Fire = 3
  - Reactivity = 2

- **HMIS-ratings (scale 0 - 4)**
  - HEALTH 3
  - FIRE 3
  - REACTIVITY 2

### Other hazards

- Results of PBT and vPvB assessment
  - **PBT:** Not applicable.
  - **vPvB:** Not applicable.

### Composition/information on ingredients

- **Chemical characterization:** Mixtures
- **Description:** Mixture of the substances listed below with nonhazardous additions.
- **Dangerous components:**
  - 10210-68-1 octacarbonyldicobalt 95.0%
  - 73513-42-5 hexane 5.0%

### First-aid measures

- **Description of first aid measures**
- **General information:**
  - Immediately remove any clothing soiled by the product.
  - Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
- **After inhalation:**
  - Supply fresh air and to be sure call for a doctor.
  - In case of unconsciousness place patient stably in side position for transportation.
- **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
- **After swallowing:** Immediately call a doctor.
5 Fire-fighting measures

· Extinguishing media
  · Suitable extinguishing agents: CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· Special hazards arising from the substance or mixture During heating or in case of fire poisonous gases are produced.
· Advice for firefighters
  · Protective equipment: Mouth respiratory protective device.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures
  · Mount respiratory protective device.
  · Wear protective equipment. Keep unprotected persons away.
· Environmental precautions: No special measures required.
· Methods and material for containment and cleaning up:
  · Dispose contaminated material as waste according to item 13.
  · Ensure adequate ventilation.
· Reference to other sections
  · See Section 7 for information on safe handling.
  · See Section 8 for information on personal protection equipment.
  · See Section 13 for disposal information.

7 Handling and storage

· Handling: Handle under inert gas.
· Precautions for safe handling
  · Thorough dedusting.
  · Ensure good ventilation/exhaustion at the workplace.
  · Open and handle receptacle with care.
· Information about protection against explosions and fires:
  · Keep ignition sources away - Do not smoke.
  · Keep respiratory protective device available.
· Conditions for safe storage, including any incompatibilities
· Storage:
  · Keep cool.
  · Store contents under inert gas.
· Requirements to be met by storerooms and receptacles: No special requirements.
· Information about storage in one common storage facility: Not required.
· Further information about storage conditions: Keep receptacle tightly sealed.
· Recommended storage temperature: Store at temperatures not exceeding -18 °C.
· Specific end use(s) No further relevant information available.

(Contd. on page 4)
8 Exposure controls/personal protection

· Additional information about design of technical systems: No further data; see item 7.

· Control parameters

· Components with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>10210-68-1 octacarbonyldicobalt</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL Long-term value: 0.1 mg/m³</td>
</tr>
<tr>
<td>as Co</td>
</tr>
<tr>
<td>TLV Long-term value: 0.1 mg/m³</td>
</tr>
<tr>
<td>as Co</td>
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</tbody>
</table>

· Additional information: The lists that were valid during the creation were used as basis.

· Exposure controls

· Personal protective equipment:

· General protective and hygienic measures:
  Keep away from foodstuffs, beverages and feed.
  Immediately remove all soiled and contaminated clothing.
  Wash hands before breaks and at the end of work.
  Store protective clothing separately.

· Breathing equipment:
  In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.

· Protection of hands:

  Protective gloves

  The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
  Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
  Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

· Material of gloves
  The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

· Penetration time of glove material
  The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· Eye protection:

  Tightly sealed goggles

9 Physical and chemical properties

· Information on basic physical and chemical properties

· General Information

· Appearance:
  Form: Crystalline
Trade name: Cobalt carbonyl (Dicobalt octacarbonyl) (Stabilized with 1-5% hexanes)

- Color: Dark orange color
- Odor: Acetone-like
- Odor threshold: Not determined.
- pH-value: Not applicable.
- Change in condition
  - Melting point/Melting range: 51 °C (124 °F)
  - Boiling point/Boiling range: Undetermined.
- Flash point: Not applicable.
- Flammability (solid, gaseous): Flammable.
- Ignition temperature:
  - Decomposition temperature: Not determined.
  - Auto igniting: Product is not selfigniting.
  - Danger of explosion: Not determined.
- Explosion limits:
  - Lower: Not determined.
  - Upper: Not determined.
- Vapor pressure at 20 °C (68 °F): 1 hPa (1 mm Hg)
- Density at 20 °C (68 °F): 1.73 g/cm³ (14.437 lbs/gal)
- Relative density: Not determined.
- Vapor density: Not applicable.
- Evaporation rate: Not applicable.
- Solubility in / Miscibility with Water: Insoluble.
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity:
  - Dynamic: Not applicable.
  - Kinematic: Not applicable.
- Solvent content:
  - Organic solvents: 0.0 %
  - VOC content: 0.0 g/l / 0.00 lb/gl
- Solids content: 100.0 %
- Other information: No further relevant information available.

10 Stability and reactivity

- Reactivity: No further relevant information available.
- Chemical stability
  - Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
  - Possibility of hazardous reactions: No dangerous reactions known.
  - Conditions to avoid: No further relevant information available.
  - Incompatible materials: No further relevant information available.
  - Hazardous decomposition products: No dangerous decomposition products known.
Trade name: Cobalt carbonyl (Dicobalt octacarbonyl) (Stabilized with 1-5% hexanes)

11 Toxicological information

· Information on toxicological effects
  · Acute toxicity:
    · LD/LC50 values that are relevant for classification:
      | 10210-68-1 octacarbonyldicobalt |
      | Oral LD50 | 754 mg/kg (rat) |
      | Inhalative LC50/4 h | 0.02 mg/l (mouse) |
    · Primary irritant effect:
      · on the skin: No irritant effect.
      · on the eye: No irritating effect.
    · Sensitization: Sensitization possible through skin contact.
  · Additional toxicological information:
    The product shows the following dangers according to internally approved calculation methods for preparations:
    Harmful
    Irritant

· Carcinogenic categories
  · IARC (International Agency for Research on Cancer)
    | 10210-68-1 octacarbonyldicobalt | 2B |
  · NTP (National Toxicology Program)
    None of the ingredients is listed.
  · OSHA-Ca (Occupational Safety & Health Administration)
    None of the ingredients is listed.

12 Ecological information

· Toxicity
  · Aquatic toxicity: No further relevant information available.
  · Persistence and degradability: No further relevant information available.
  · Behavior in environmental systems:
    · Bioaccumulative potential: No further relevant information available.
    · Mobility in soil: No further relevant information available.
  · Additional ecological information:
    · General notes: Not known to be hazardous to water.
  · Results of PBT and vPvB assessment
    · PBT: Not applicable.
    · vPvB: Not applicable.
  · Other adverse effects: No further relevant information available.

13 Disposal considerations

· Waste treatment methods
  · Recommendation:
    Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
### Trade name: Cobalt carbonyl (Dicobalt octacarbonyl) (Stabilized with 1-5% hexanes)

- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to official regulations.

### 14 Transport information

<table>
<thead>
<tr>
<th><strong>UN-Number</strong></th>
<th>UN3190</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOT, IMDG, IATA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>UN proper shipping name</strong></td>
<td>Self-heating solid, inorganic, n.o.s.</td>
</tr>
<tr>
<td><strong>DOT, IATA</strong></td>
<td>SELF-HEATING SOLID, INORGANIC, N.O.S.</td>
</tr>
<tr>
<td><strong>IMDG</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **Transport hazard class(es)**
  - **DOT**
    - **Class** 4.2 Substances liable to spontaneous combustion
    - **Label** 4.2
  - **IMDG, IATA**
    - **Class** 4.2 Substances liable to spontaneous combustion
    - **Label** 4.2

- **Packing group**
  - **DOT, IMDG, IATA** II

- **Environmental hazards:**
  - **Marine pollutant:** No

- **Special precautions for user**
  - **EMS Number:** F-A.S-J
  - **Stowage Category** E

- **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**
  - Not applicable.

- **Transport/Additional information:**
  - **DOT**
    - **Quantity limitations**
      - On passenger aircraft/rail: 15 kg
      - On cargo aircraft only: 50 kg
  - **IMDG**
    - **Limited quantities (LQ)** 0
    - **Excepted quantities (EQ)**
      - Code: E2
      - Maximum net quantity per inner packaging: 30 g
      - Maximum net quantity per outer packaging: 500 g

(Contd. on page 8)
Safety Data Sheet
according to OSHA HCS

Trade name: Cobalt carbonyl (Dicobalt octacarbonyl) (Stabilized with 1-5% hexanes)

UN "Model Regulation":
UN 3190 SELF-HEATING SOLID, INORGANIC, N.O.S., 4.2, II

15 Regulatory information

- Safety, health and environmental regulations/legislation specific for the substance or mixture
  - Sara
    - Section 355 (extremely hazardous substances):
      10210-68-1 octacarbonyldicobalt
    - Section 313 (Specific toxic chemical listings):
      10210-68-1 octacarbonyldicobalt
    - TSCA (Toxic Substances Control Act):
      10210-68-1 octacarbonyldicobalt
    - Proposition 65
      - Chemicals known to cause cancer:
        None of the ingredients is listed.
      - Chemicals known to cause reproductive toxicity for females:
        None of the ingredients is listed.
      - Chemicals known to cause reproductive toxicity for males:
        None of the ingredients is listed.
      - Chemicals known to cause developmental toxicity:
        None of the ingredients is listed.
    - Carcinogenic categories
      - EPA (Environmental Protection Agency)
        None of the ingredients is listed.
      - TLV (Threshold Limit Value established by ACGIH)
        None of the ingredients is listed.
      - NIOSH-Ca (National Institute for Occupational Safety and Health)
        None of the ingredients is listed.
    - GHS label elements
      The product is classified and labeled according to the Globally Harmonized System (GHS).
    - Hazard pictograms
      GHS02  GHS07  GHS08
  - Signal word Danger
  - Hazard-determining components of labeling:
    octacarbonyldicobalt
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    H251 Self-heating: may catch fire.
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(Contd. on page 9)
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P422 Store contents under inert gas.
P403+P235 Store in a well-ventilated place. Keep cool.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Department issuing SDS: Technical Department.
Contact: Technical Director
Date of preparation / last revision 07/30/2016 / -

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Self-heat. 1: Self-Heating Substances and Mixtures, Hazard Category 1
Acute Tox. 4: Acute toxicity, Hazard Category 4
Skin Sens. 1: Sensitisation - Skin, Hazard Category 1
Carc. 2: Carcinogenicity, Hazard Category 2
STOT RE 2: Specific target organ toxicity - Repeated exposure, Hazard Category 2