Attachment 3: Safety Data Sheets (SDS) for Phase Change Materials

The use of personal protective equipment (PPE) described within this attachment is only required in the event of breakage and a leak of the contents of a phase change material plate. PPE are not required when handling intact PCM plates although gloves are required to handle frozen Series 20M plates that may be as cold as -50°C.
Section 1, Identification

Product Name: 22C PCM
Product Number: 46-00003-xx
Chemical family: Mixture
Material Use of Occurrence: Eutectic Solution
HMIS: Health: 1 Flammability: 1 Reactivity: 0 Personal Protection: X
Emergency Contact: Pelican BioThermal (877) 537 9800

Section 2, Hazard(s) Identification

Carcinogen Status: No known components present in excess of 0.1% by weight are listed as carcinogens by IARC, NTP or OSHA.

Inhalation: Repeated or excessive inhalation of dust, mist or spray can cause irritation, chemical pneumonia, dizziness and nausea.

Skin: Skin contact with product is not likely to cause significant irritation.

Eyes: Eye contact with product may cause severe irritation.

Ingestion: Ingestion can cause digestive system upset, irritation, nausea, stomach distress, blood disorders and even death.

Section 3, Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>ID</th>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>OSHA /PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Blend of Heavy Cut Hydrocarbons</td>
<td>Proprietary*</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*The exact composition for this mixture is considered to be a Trade Secret withheld in accordance to 29 CFR.1910.1200

Section 4, First-Aid Measures

Inhalation: Remove to fresh air. Use artificial respiration and oxygen if needed. If irritation persists, seek medical attention.

Skin: Wash with soap and water. If irritation persists, seek medical attention.

Eyes: Flush with water for 15 minutes while holding eyelids open. If irritation persists, get medical attention promptly.

Ingestion: If swallowed, do not induce vomiting. Call physician immediately. Never give anything by mouth to an unconscious person.

Section 5, Fire-Fighting Measures

Flash Point: >210° C

Flammable Limits: LEL: 1.1 UEL: 10.6

Unusual Fire and Explosion Hazards: None
Special Fire Fighting Procedures: None
Unusual Fire and Explosion Hazards: None
Extinguishing Media: As Appropriate for Surrounding Fire; Water Spray, Alcohol Foam, Carbon Dioxide, Dry Chemical

Section 6, Accidental Release Measures

Steps to be taken in case material is released or spilled: Do not allow escape into natural water or sanitary sewers. Absorb liquid material with inert absorbent and shovel into containers.

Waste disposal method: Dispose of in accordance with local, state and federal authorities.
Precautions to be taken in handling and storing: Keep containers closed tightly. Keep out of reach of children. Do not take internally. Keep in a well ventilated area. Keep away from heat and possible ignition sources.

Section 7, Handling and Storage

NA

Section 8, Exposure Controls/Personal Protection

Respiratory Protection: Use NIOSH approved equipment suitable for nuisance dust when airborne exposure is excessive. Provide ventilation to minimize exposure.

Protective Clothing: Eyes: Wear splash proof goggles where exposure is possible. Skin: Wear chemical resistant gloves, boots and clothing.

Section 9, Physical and Chemical Properties

Specific Gravity: 0.765 @ 25°C
pH: neutral
Boiling Point: 500-600°F
Vapor Pressure: < 1.0 mm Hg @25°C
Vapor Density (air = 1): Greater than 1
Evaporation Rate (butyl acetate = 1): less than 1
Melting Point: 22°C
Solubility in Water: Not soluble
Appearance: Clear Liquid
Odor: waxy odor

Section 10, Stability and Reactivity

Chemical Stability: Stable
Hazardous Polymerization: Does not occur.
Incompatibility: Strong Oxidizers. Heat and open flame
Hazardous Decomposition Products: CO₂, CO, HCL, NOₓ, Hydrocarbons
Section 11, Toxicological Information
NA

Section 12, Ecological Information
NA

Section 13, Disposal Consideration
NA

Section 14, Transport Information

Proper Shipping Name: Not Regulated
Hazard Class: NA
ID Number: NA
Packaging Group: NA
Label Requirements: NA
Reportable Quantity: None

Section 15, Regulatory Information
NA

Section 16, Other Information
NA

Disclaimer

The information contained herein has been compiled from sources believed to be reliable and is accurate to the best of our knowledge at this date. It is provided without warranty, expressed or implied, as to the results of use of this information or to the product to which it relates. Recipient assumes all responsibility for the use of this information and the use, storage, or disposal of the product, including any resultant personal injury or property damage.
Section 1, Identification
Product Trade Name: 4C PCM
Emergency Contact: Pelican BioThermal (877) 537-9800

Section 2, Hazard(s) Identification
No specific hazards anticipated under normal product use

Section 3, Composition/Information on Ingredients
Composition: Chemical Blend of Heavy Cut Hydrocarbons
The exact composition for this mixture is considered to be a Trade Secret and is withheld in accordance to 29 CFR.1910.1200

Section 4, First-Aid Measures
Inhalation: Expose to fresh air.
Skin: Wash affected parts thoroughly with water.
Eyes: Irrigate thoroughly with water for at least 10 minutes, keeping eyes open.
Ingestion: Administer a suspension of activated charcoal in water. Do not induce vomiting as this may result in obstruction of the trachea. Obtain medical advice immediately.

Section 5, Fire-Fighting Measures
Suitable extinguishing agents: Use extinguisher suitable to cause of fire.
Dangerous combustion products: The material is combustible with certain mixtures in the air.
Special safety equipment: Wear fire brigade clothing.
Special danger caused by the substance itself, or during its production; by its combustion products or the gases thus generated: See above.

Section 6, Accidental Release Measures
Personal protective measures: Avoid skin and eye contact, remove contaminated clothing and wash down body thoroughly with water.
Environmental protection measures: Do not discharge into natural water courses without pre-treatment.
Cleaning Methods: Wash away smaller amounts thoroughly with large quantities of water. Contain larger volumes with absorbent material and dispose of safely.

Section 7, Handling and Storage
Handling: Avoid contact with skin and eyes, do not eat or drink while working.
Storage: Store in polyethylene or stainless steel containers in a cool, well ventilated area.
Section 8, Exposure Controls/Personal Protection

General protective and hygienic measures: Remove all soiled and contaminated clothing.

Breathing equipment: Not required.

Eye protection: Protective goggles.

Hand protection: Protective gloves are advisable.

Body protection: Observe the usual protection measures for handling chemicals.

Section 9, Physical and Chemical Properties

Form: Liquid.

Color: Colorless.

Odor: None.

Boiling point: 235-245 °C.

Freezing point: 4 °C.

Density: 0.766 g/cm³.

Vapor pressure: <0.046 hPa.

Viscosity at 20 °C: 3.1.

Solubility in water: <0.01 mg/l.

pH value: n/a.

Flash point: 102 °C.

Ignition temperature: not available.

Section 10, Stability and Reactivity

Chemical Stability: Stable with usual handling and storage

Materials to be avoided: No specific materials

Section 11, Toxicological Information

LD₅₀ (oral, rat): >5,000 mg/kg.

Contact with eyes: Not an irritant.

Contact with skin: Not an irritant.

Inhalation: Under normal conditions inhalation of vapor is not a hazard.

Swallowing: May act as a laxative.

Mutagenicity: No mutagenic effects observed.

Carcinogenicity: Not carcinogenic.
Section 12, Ecological Information

Aquatic toxicity:
LC50, fish, 96h > saturated concentration.
EC50, Daphnia, 48h > saturated concentration.
EC50, alga, 48h > saturated concentration.

Ultimate biodegradability: Readily biodegradable.

Section 13, Disposal Consideration

Disposal: Recover if possible. Otherwise dispose of in accordance with local or national regulations.

Contaminated packaging: May be re-used after thorough cleansing. Packaging that cannot be cleaned should be disposed of in the same manner as the contents.

Section 14, Transport Information

Not classified for special transport regulations. Not dangerous goods in the sense of the transport regulations

Section 15, Regulatory Information

Labeling according to EEC directives

Section 16, Other Information

NA

Disclaimer

The information contained herein has been compiled from sources believed to be reliable and is accurate to the best of our knowledge at this date. It is provided without warranty, expressed or implied, as to the results of use of this information or to the product to which it relates. Recipient assumes all responsibility for the use of this information and the use, storage, or disposal of the product, including any resultant personal injury or property damage.
Section 1: Identification of the substance/mixture and of the company

1.1 Product Identifier
   Trade Name: Series 20M PCM
   Product Form: Mixture
   Product Code: 46-00005

1.2 Relevant Identified uses of the substance or mixture and uses advised against
   Uses of the substance/mixture: Thermal Storage

1.3 Details of the supplier of the safety data sheet
   Pelican BioThermal
   3020 Niagara Lane N
   Plymouth, MN 55447

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

Section 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification (GHS-US)
   Hazard Code: H319
   Hazard Class: Serious eye damage/eye irritation
   Hazard Category: 2A

Handle in accordance with Good Industrial Hygiene and Safety Procedure

2.2 Label elements
   GHS-US labeling
   Hazard Pictogram (GHS-US)

Signal Word (GHS-US): WARNING
   Hazard Statements (GHS-US):
   H319: Causes serious eye irritation
   Precaution Statements (GHS-US):
   P264: Wash thoroughly after handling
   P280: Wear protective gloves/protective clothing/eyes protection/face protection
   P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
P337+313: If eye irritation persists get medical advice/attention

2.3 Other Hazards
No additional information available

2.4 Unknown acute toxicity (GHS-US)
No data available

Section 3: Composition/information on ingredients

3.1 Unknown acute toxicity (GHS-US)
Not applicable

3.2 Mixture

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Chloride</td>
<td>7647-14-5</td>
<td>20 – 30</td>
</tr>
</tbody>
</table>

Section 4: First aid measures

4.1 Description of first aid measures

First-aid measures general: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible)

First-aid measures after inhalation: IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing Use artificial respiration and oxygen if needed. Seek medical attention

First-aid measures after skin contact: IF ON SKIN: Immediately rinse with plenty of water (for at least 15 minutes). If irritation persists, seek medical attention.

First-aid measures after eye contact: IF IN EYES: Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Consult a physician

First-aid measures after ingestion: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Dilute stomach contents by drinking water. If vomiting occurs spontaneously, keep head below hips to prevent breathing vomit into lungs. Call physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms/injuries: Causes skin irritation. Causes eye irritation.

Symptoms/injuries after inhalation: May cause headache, nausea and irritation of respiratory tract

Symptoms/injuries after skin contact: May cause skin irritation.

Symptoms/injuries after eye contact: Causes serious eye damage.

Symptoms/injuries after ingestion: May cause gastrointestinal irritation, nausea, vomiting, and diarrhea if swallowed.

Chronic symptoms: No data available.

4.3 Indication of any immediate medical attention and special treatment needed
No additional information available
Section 5: Firefighting measures

5.1 Extinguishing media
   Suitable extinguishing media: Alcohol-resistant foam. Carbon dioxide. Dry powder. Water spray

5.2 Extinguishing media
   Fire hazard: Flash Point > 200 F
   Explosion hazard: Product is not explosive.
   Reactivity: No dangerous reactions known under normal conditions of use.

5.2 Advice for firefighters
   Firefighting instructions: Do not dispose of fire-fighting water in the environment. Exercise caution when fighting any chemical fire. Use water spray or fog for cooling exposed containers.
   Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
   General measures: Evacuate area. Keep upwind. Ventilate area. Spill should be handled by trained clean-up crews properly equipped with respiratory equipment and full chemical protective gear (see Section 8).

6.1.1 For non-emergency personnel
   Protective equipment: Wear Protective equipment as described in Section 8.
   Emergency procedures: Evacuate unnecessary personnel.

6.1.2 For emergency responders
   Protective equipment: Approved supplied-air respirator, in case of emergency. Wear suitable protective clothing, gloves and eye or face protection.

6.2 Environmental precautions
   Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3 Methods and material for containment and cleaning up
   For containment: Prevent entry to sewers and public waters. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.
   Methods for cleaning up: Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Place in a suitable container for disposal in accordance with the waste regulations (see Section 13).

6.3 Reference to other sections
   No additional information available

Section 7: Handling and Storage

7.1 Precautions for safe handling
   Precautions for safe handling: Do not handle until all safety precautions have been read and understood. Keep away from sources of ignition - No smoking. Do not breathe mists. Provide good ventilation in process area to prevent formation of vapor. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.
7.2 Conditions for safe storage, including any incompatibilities

**Storage conditions**: Keep only in the original container in a cool, well ventilated place away from: heat sources. Keep container tightly closed.

7.3 Specific end use(s)

No additional information available

**Section 8: Exposure controls/personal protection**

8.1 Control parameters

<table>
<thead>
<tr>
<th>Calcium Chloride, CAS# 7647-14-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA PEL (TWA) ppm - if units not stated</td>
</tr>
<tr>
<td>Not Established</td>
</tr>
</tbody>
</table>

8.1 Exposure controls

**Personal protective equipment**: Chemical resistant gloves. Protective clothing. Safety glasses or goggles

**Hand protection**: Chemical resistant gloves.

**Eye protection**: Safety glasses or goggles.

**Skin and body protection**: Wear long sleeves. Wear suitable protective clothing.

**Respiratory protection**: Where excessive vapor, mist, or dust may result, use approved respiratory protection equipment.

**Section 9: Physical and chemical properties**

9.1 Information on basic physical and chemical properties

- **Physical state**: Liquid
- **Appearance**: Dyed liquid
- **Color**: No data available
- **Odor**: No data available
- **Odor Threshold**: No data available
- **pH**: 5.5 – 6.5
- **Relative evaporation rate (butyl acetate=1)**: No data available
- **Melting point**: ~ -20 °C
- **Freezing point**: ~ -20 °C
- **Boiling point**: > 100 °C
- **Flash point**: > 200 F
- **Self-ignition temperature**: No data available
- **Decomposition temperature**: No data available
Flammability (solid, gas): No data available
Vapor pressure: No data available
Relative vapor density at 20 °C: No data available
Relative density: ~ 1.178 g/ml
Solubility: Soluble in water.
Log Pow: No data available
Log Kow: No data available
Viscosity, kinematic: No data available
Viscosity, dynamic: No data available
Explosive properties: No data available
Oxidizing properties: No data available
Explosive limits: No data available

9.2 Other information
No additional information available

Section 10: Stability and reactivity

10.1 Reactivity
No dangerous reactions known under normal conditions of use.

10.2 Chemical stability
Stable under recommended handling and storage conditions (see section 7).

10.3 Possibility of hazardous reactions
None known

10.4 Conditions to avoid
None known

10.5 Incompatible materials

10.6 Hazardous decomposition products
Thermal decomposition generates: Carbon oxides (CO, CO₂). No other decomposition products are known.

Section 11: Toxicological information

10.1 Information on toxicological effects
Oral LD₅₀: > 2,000 mg/kg (rat) Calculated
Dermal LD₅₀: > 2,000 mg/kg (rabbit) Calculated
Inhalation LC₅₀: No Data
Skin corrosion/irritation: Causes skin irritation.
Serious eye damage/irritation: Causes serious eye irritation.
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified
Reproductive toxicity: Not classified
Specific target organ toxicity (single exposure): Not classified
Specific target organ toxicity (repeated exposure): Not classified
Aspiration hazard: Not classified
Symptoms/injuries after inhalation: May cause headache, nausea and irritation of respiratory tract.
Symptoms/injuries after skin contact: May cause skin irritation.
Symptoms/injuries after eye contact: Causes serious eye damage.
Symptoms/injuries after ingestion: May cause gastrointestinal irritation, nausea, vomiting, and diarrhea if swallowed.
Chronic symptoms: No data available

Section 12: Ecological information

12.1 Toxicity
No Data.

12.2 Persistence and degradability
No Data.

12.3 Bio accumulative potential
No Data.

12.4 Mobility in soil
No Data.

12.5 Other adverse effects
No Data.

Section 13: Disposal consideration

13.1 Waste treatment methods
Waste treatment methods: Do not discharge to public wastewater systems without permit of pollution control authorities. No discharge to surface waters is allowed without an NPDES permit.

Waste disposal recommendations: Dispose in a safe manner in accordance with local/national regulations. Do not allow the product to be released into the environment.

Section 14, Transport information

14.1 UN number, proper shipping name, class and packaging group
Domestic Ground Shipments
Not Regulated Material

14.2 Additional information
No additional information available

Section 15: Regulatory information

15.1 US Federal regulations

TSCA Inventory: The components of this product are listed.

SARA Section 311/312, Hazard Category (40CFR 370.2): Acute health hazard.

SARA Section 313, Toxic Release Reporting (40CFR Part372): No listed substances known over 1.0%. (No known carcinogens over 0.1%).

SARA Section 302, EHS Emergency Planning (40CFR Part 355): No listed substances known over 1.0%.

SARA Section 304, EHS Release Reporting (40CFR Part 355): No listed substances known over 1.0%.

CERCLA Section 102-103 HS Release Reporting (40 CFR par302-102a): No listed substances known over 1.0%.

15.2 International regulations
No Data.

15.2.1 National regulations
No Data.

15.3 US State regulations

California Prop. 65: No known ingredients.

Section 16: Other information

NFPA health hazard : 1

NFPA fire hazard : 0

NFPA reactivity : 1

HMIS III Rating

Health : 1

Flammability : 0

Physical : 1

Personal Protection : X

Disclaimer

The information contained herein has been compiled from sources believed to be reliable and is accurate to the best of our knowledge at this date. It is provided without warranty, expressed or implied, as to the results of use of this information or to the product to which it relates. Recipient assumes all responsibility for the use of this information and the use, storage, or disposal of the product, including any resultant personal injury or property damage.