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OPERATORS MANUAL

SEMI-AQUEOUS WAX REMOVAL PROCESS

BIOACT[®] 280 Precision Cleaner

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BIOACT is a registered trademark of Petroferm Inc.

Version 1
April 4, 2009



TABLE OF CONTENTS

OVERVIEW	PAGE 3
EQUIPMENT CONFIGURATION	PAGE 4
DESCRIPTION OF STEPS	PAGE 5-7
GENERAL PROCESS GUIDELINES	
Bath Temperature	PAGE 8
Bath Agitation	PAGE 8-9
Drying of Parts	PAGE 10
Plumbing Precautions	PAGE 10-11
Bath Life	PAGE 11
Emission Concerns	PAGE 12
Waste Disposal	PAGE 12
DESCRIPTION OF PRODUCT	PAGE 13
FILLING INSTRUCTIONS	PAGE 14
CHEMICAL CONTROL INSTRUCTIONS	PAGE 15
ANALYZING BATH CONDITION	
BIOACT 280 Precision Cleaner	PAGE 16
CleanSafe 787C Aqueous Cleaner	PAGE 17
MATERIAL SAFETY DATA SHEETS	
BIOACT 280 Precision Cleaner	PAGE 18-20
CleanSafe 787C Aqueous Cleaner	PAGE 21-23

OVERVIEW

The objective of this operating manual is to establish the appropriate controls and operating parameters for semi-aqueous wax removal operations.

The information enclosed describes the primary function of **BIOACT 280 Precision Cleaner** and provides detailed operating parameters for each step. It also provides a method for analyzing bath concentration and wax loading.

Implementation of the following controls and parameters is designed to provide optimum wax removal/cleaning results. We recommend maintaining a copy of this operating manual near the cleaning equipment for quick reference by its operators. If you have any questions, please contact your Petroferm Regional Sales Manager.

EQUIPMENT CONFIGURATION

Semi-aqueous wax removal processes consist of the following basic steps: wax removal, water or alkaline rinses and drying (*optional*). Figures below depict common configurations for semi-aqueous systems designed for wax removal.

Figure1 - Wax Removal with Pre-Wash Options for Gross Wax Removal

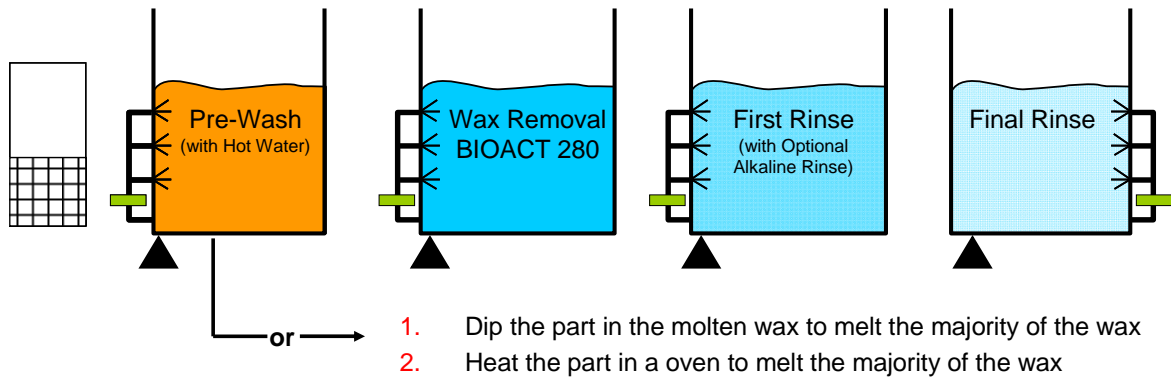


Figure 2 - Wax Removal with Two BIOACT 280 Tanks

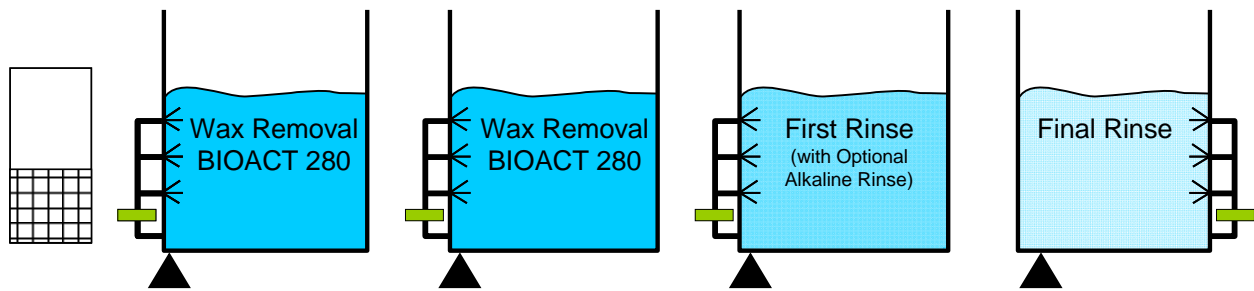
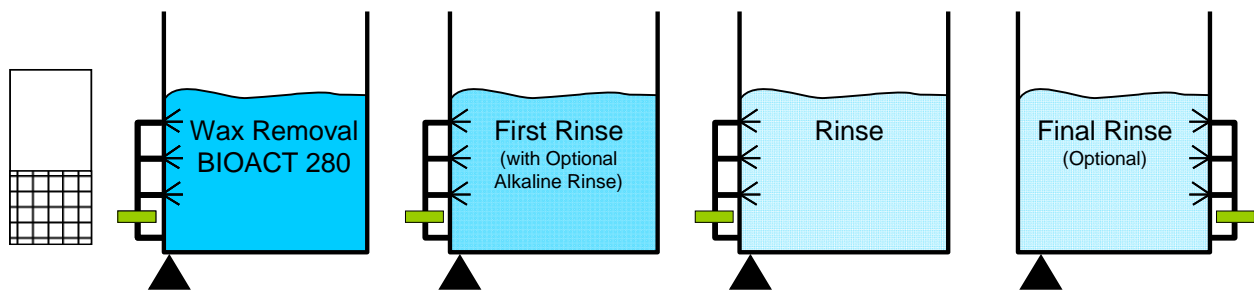


Figure 3 - Wax Removal with One BIOACT 280 Tank



DESCRIPTION OF STEPS

Step 1 – Pre-Wash (*Optional*)

It is recommended that a pre-wash step for gross wax removal be used. This can be done in several ways: by dipping the parts back in the wax tank to dissolve build-up, by dipping parts in hot water (180°F or 82°C), or by melting in an oven. With most of these methods wax can be captured and recycled. This step serves to reduce wax consumption and prolong cleaning agent life.

Step 2 – Wax Removal

The purpose of this step is to provide wax removal by immersing the parts in bath containing BIOACT 280. Immerse the part in the cleaning agent at 180 to 205°F (82 to 96°C) for five to 20 minutes. Mechanical agitation is recommended. The optimal time/temperature combination will depend on variables such as the melting point of the wax, the size, complexity, and thermal mass of the part being cleaned, and the presence and effectiveness of any agitation.

Step 3 – [Water Rinse] or [Alkaline Rinse]

This purpose of this step is to remove the residual cleaning agent/wax mixture. Immerse the part in mechanically agitated hot water for one to five minutes as required. Water should be slightly overflowing to skim removed wax residues. The temperature of the water should be 140 to 212°F (60 to 100°C).

The use of an alkaline solution as a rinse aid in the first rinse will typically improve rinsibility, decrease rinsing time, and will allow BIOACT 280 to perform at higher levels of wax loading. Immerse the part in the alkaline solution for one to five minutes as required. The temperature of the bath should be 140 to 180°F (60 to 82°C). Petroferm's **CleanSafe™ 787C Aqueous Cleaner** is excellent for use as an alkaline rinse in the BIOACT 280 process. Typical concentrations are 5 to 10%. Mechanical agitation is recommended.

Special Note: *Operating the water or alkaline rinse baths at or near the melting point of the wax will improve rinsibility of the cleaning agent/wax mixture as the concentration of wax increases in the wash bath.*

Step 4 – Final Water Rinse

A second, final rinse should be configured much like the first rinse with heat and agitation. If an alkaline rinse is used, water from the second rinse must not be allowed to overflow, diluting the concentration of the alkaline rinse. A small stream of fresh water can supply this rinse bath with an overflow to drain.

Special Note: *Final, spray-in-air rinses have also been used with excellent results.*

CleanSafe is a trademark of Petroferm Inc.

Step 5 – Drying (*optional*)

Because the final water rinse is typically very hot, most parts will begin to flash dry. In cases where faster and more complete drying is needed, hot air chambers can be used. Dry compressed air can also be used to blow parts off by hand.

GENERAL PROCESS GUIDELINES

Bath Temperatures

For optimal cleaning performance, the temperature of the cleaning bath should be at or above the melting point of the wax being removed. Cleaning agents with closed-cup flashpoints exceeding 248°F (120°C) allow for a comfortable margin of safety when operating at the typical melting points of popular waxes (less than 82°C or 180°F).

Rinse bath temperature requirements are governed primarily by the concentration of wax in the cleaning agent bath. As the wax load increases to 10 percent weight or more, higher rinse temperatures may be required to effectively rinse the cleaning agent/wax mixture from the parts. Rinse water temperatures at or above the melting point of the wax will yield maximum rinse effectiveness and allow the longest possible bath life. When an alkaline solution is used as a rinse aid, the operating temperature of the bath should be determined from the use instructions for that particular cleaner.

Bath Agitation

Aggressive agitation in the bath will speed the cleaning process and may be essential for parts with complex geometries. Agitation in the rinse bath is necessary for optimal performance if no alkaline rinse aid is used.

The easiest and simplest is a single-source agitator, such as a propeller-type turbulator or a recirculating pump, returning fluid to the bath through a single discharge tube. This method works well in the cleaning and rinse stages in systems where an alkaline rinse is used.

Another method is via a manifold system fed by a high-volume pump. If the process operates without a rinse aid, the pump and manifold system is required in the rinse stage. Properly designed systems have proven to provide effective agitation when the pump's gallons-per-minute capacity is equal to approximately one-half of the tank volume and induction type nozzles are used.

In addition to spray-under-immersion rinse baths, some users have installed spray-in-air final rinses. Typically, a hand-held spray wand is fed either by fresh water or with water from the final rinse. With this type of rinse process, care should be taken to direct the spray into any hard-to-reach areas of the part.

Ultrasonic bath agitation is very effective but may be prohibitively expensive in applications where very large parts such as jet engine component assemblies necessitate large bath volumes. More importantly, ultrasonics may not be feasible with some smaller, more delicate parts.

Platform-lift agitators are usually satisfactory for the wash bath but may not be sufficiently vigorous to yield effective rinsing in systems operating without a rinse aid.

Air agitation is not recommended in this application due to its lack of aggression and tendency to generate waxy bubbles in the initial rinse stage.

Drying of Parts

Parts cleaned in aqueous or semi-aqueous processes with final rinses in hot water will usually flash dry as a result of heat retention in the part. In cases where drying assistance is needed, forced air is most often used, but the parts can be dried by a variety of other methods including oven, vacuum chamber, or centrifugal force. Appropriate drying methods are chosen based upon the particular parts involved and the specific needs of the application.

Plumbing Precautions

As the cleaning agent becomes loaded with wax or pitch, the viscosity of the solution increases, which is noticeable at room temperature but of no real consequence at normal operating temperatures. With most waxes, the solution is no longer pourable at 77°F (25°C) once the wax loading reaches approximately 20 percent by weight.

In systems that incorporate a pump, spray-under-immersion manifold, and the associated plumbing network, the viscosity increase must be addressed. If a loaded system is shut down and allowed to cool to a temperature below the solidification point of the solution, restarting the system may be difficult.

One way to address the potential of solidified material is to install steam traces or heat tape around the plumbing network that is exterior to the cleaning bath. (The bath itself is not of concern since the heating elements, once activated, will liquefy the bath.) An alternative method is to install valves and drain cocks at the

appropriate points in the plumbing network so draining is possible prior to cool-down and whenever the system is shut down. This method should be suitable for systems that operate continuously, but could become labor-intensive for those that are shut down frequently.

Bath Life

The bath life of the cleaning agent is governed largely by the effectiveness of the rinse process. In a properly designed system, a cleaning bath can normally be used until it is loaded with wax to approximately 40 percent by weight. Because the cleaning agent does not evaporate significantly, it can be used until it is loaded, regardless of how long loading takes.

Bath life of the rinse baths is determined primarily by the level of cleanliness required. For example, if the wax removal process also serves as the final cleaning step, the water-quality requirement for the final rinse will be higher since it will become progressively contaminated as parts are processed through the cleaning and rinse stages. Rinse processes are usually configured so that water is metered into the final rinse bath at a rate sufficient to keep the bath adequately purged of contamination.

In applications where wastewater discharge must be kept to a minimum, water from the cleaning process can be recycled through distillation. Any cleaning agent/wax mixture that has accumulated in the rinse water will be concentrated in the still bottoms.

Emission Concerns

The vapor pressure of the most widely used semi-aqueous wax cleaning agent, BIOACT 280 Precision Cleaner, is less than 0.001 mm Hg at 20°C. At normal operating temperatures, very little vapor or odor is produced and minimal (if any) ventilation is required. Many waxes produce an odor when heated, which may originate when they are loaded into the cleaning bath. Adequate ventilation can be achieved with lip vents around the cleaning tank or by a hood above or behind the bath. Steam from the rinse baths can be vented to the atmosphere in most jurisdictions.

Due to its very low vapor pressure, volatile emissions of BIOACT 280 are exceptionally low. The volatile organic compound (VOC) content of the cleaning agent has been measured at 63 grams per liter when tested in accordance with EPA Method 24.

Waste Disposal

The most common method of disposal for the cleaning agent/wax solution is fuel blending. BIOACT 280 is not considered hazardous waste in the United States according to 40CFR261, and it has a fuel value greater than 15,000 BTU per pound.

Other options include in-plant waste treatment and evaporation, which is an especially good method of reducing wastewater volume as the cleaning agent/wax mixture will remain in the evaporator and can be disposed of through fuel blending or incineration.

DESCRIPTION OF PRODUCT(S)

A). **BIOACT 280 Precision Cleaner**

BIOACT 280 is a bio-based, semi-aqueous cleaner designed to operate in heated immersion applications. It quickly dissolves paraffinic and microcrystalline masking waxes and thermoplastic fixturing compounds. BIOACT 280 also effectively removes pitches, greases, buffing compounds, metalworking fluids and lubricating oils. It has a very high flash point, low odor and high wax loading capability (up to 40%).

B). **CleanSafe 787C Aqueous Cleaner**

CleanSafe 787C is a high performance aqueous cleaning agent specially designed for agitated immersion, spray-in-air, and ultrasonic cleaning equipment. It is selected when a non-foaming cleaner with excellent substrate compatibility and low levels of volatile organic compounds (VOCs) is required. It is a phosphate-free cleaner and does not contain nonylphenol ethoxylates (NPEs) or alkyphenol ethoxylates (APEs).

FILLING INSTRUCTIONS

No	Step	Product	Tank Capacity (Liters)	Starting Conc. (%)	Starting Volume (Liters)	Starting Volume (Kg.)
1	Pre-Wash					
2	Wax Removal	BIOACT 280		100		
3	Alkaline Rinse	CleanSafe 787C		5 to 10		
	Water Rinse	Deionized or Demineralized				
4	Water Rinse	Deionized or Demineralized				
5	Drying	N/A				

- 1) For Wax Removal step using BIOACT 280
 - a. Before the initial fill, make sure the wax removal tank has been thoroughly cleaned and descaled (if applicable).
- 2) For Alkaline Rinse step using CleanSafe 787C
 - a. Before the initial fill, make sure the alkaline rinse tank has been thoroughly cleaned and descaled (if applicable).
 - b. Fill the alkaline rinse tank with $\frac{3}{4}$ the required volume of deionized or demineralized water.
 - c. Heat the tank to approximately 20°F (10°C) less than the recommended operating temperature.
 - d. Add the appropriate volume of CleanSafe 787C.
 - e. Add sufficient deionized or demineralized water so that the total liquid level reaches the working height of the alkaline rinse tank.
 - f. Heat the alkaline rinse tank to the recommended operating temperature.
 - g. Turn on the recirculating pump and air agitation for 10 -15 minutes.

CHEMICAL CONTROL INSTRUCTIONS

Step: Wax Removal

Material: BIOACT 280 Precision Cleaner

Cleaner Concentration: 100%

Temperature: 180 to 205°F (82 to 96°C)

Bath Monitoring Method: Wax Loading Analysis

- Maximum percent of wax loading with water rinse: 7 to 10%
- Maximum percent of wax loading with alkaline rinse: 40%

Step: Alkaline Rinse

Material: CleanSafe 787C Aqueous Cleaner

Cleaner Concentration: 5 to 10%

Temperature: 140 to 180°F (60 to 82°C)

Bath Monitoring Method: Titrating for Alkalinity

Step: Water Rinse(s)

Material: Deionized or Demineralized Water

Cleaner Concentration: N/A

Temperature: 140 to 212°F (60 to 100°C)

Analytical Procedure

BIOACT 280 Series*

Wax Loading Analysis

Materials

- 4 oz. open mouth jars with lids
- Acetone
- Analytical balance
- Oven
- Subzero chilling bath
- Watch Glass
- Vacuum filtration apparatus
 - Buchner funnel
 - Type 2, 5, or 6 Whatman filter papers
 - Side-arm Erlenmeyer flask

Procedure

1. Obtain a bath sample from a well-agitated wash sump, place in a clean 4 oz jar, and close with a lid. Inspect the bath sample obtained. If the wax is falling out of solution, heat the sample gently (or no greater than the operating temperature of the process) to obtain a homogenous (or one phase) mixture.
2. Place 95.0 grams of acetone into a clean 4 oz. jar, and add 5.0 grams of the bath sample. Seal the jar with a lid and shake gently.
3. Place in a glycol/water chilling bath to -24°C/-11°F for five to ten minutes.
4. While the sample is chilling, set up the vacuum filtration apparatus. Weigh the filter paper before filtration on an analytical balance.
5. Inspect the sample again. If wax is present, the sample should have large flakes within in the solution. **Note:** DO NOT shake or agitate the sample.
6. Filter the sample while cold using the vacuum filtration apparatus.
7. Remove the filter paper gently from the Buchner funnel without removing the wax residues on the surface of the paper.
8. Place the filter paper on the watch glass and dry in an oven at 110°C/230°F for 2 minutes. Remove from the oven and allow the sample to cool to room temperature.
9. Reweigh the filter paper on the analytical balance to determine the amount of wax material filtered.
10. Calculate wax content by:

$$\text{Wax loading (wt \%)} = \frac{(\text{Mass of filter paper after filtration} - \text{Mass of filter paper before filtration})}{5.0 \text{ g of bath sample}} \times 100\%$$

* Includes BIOACT 280 and BIOACT 280E Precision Cleaners

Analytical Procedure

CleanSafe 787C

Bath Monitoring by Titration

Materials

- Phenolphthalein Indicator Powder Pillows or 1% phenolphthalein indicator solution
- Burette
- N Sulfuric Acid (H₂SO₄) solution
- Erlenmeyer flask
- DI water

Procedure

1. Obtain a 100ml sample from the bath and dilute to 200ml with DI Water in an Erlenmeyer flask.
2. Add the contents of one Phenolphthalein Indicator Powder Pillow or add 5-10 drops of 1% phenolphthalein indicator and swirl into solution. Solution should turn pink.
3. Using a burette begin adding 0.1 N H₂SO₄ to the flask while swirling. Continue to add 0.1 N H₂SO₄ until the solution remains clear for 30 seconds. Record the number of milliliters required. Use the equation below to determine the volume of CleanSafe 787C needed to return to the bath to its starting concentration.

Chart #1

CleanSafe 787C Concentration (Wt %)	Number of Milliliters
2	12
4	20
6	28
8	36
10	44
12	52
14	60

Note: The following equation can be used to determine the gallons of CleanSafe 787C needed to return the wash bath to its original starting concentration.

$$\text{Tank Volume} \times \frac{(\text{Starting Concentration} - \text{Measured Concentration})}{(100 - \text{Starting Concentration})}$$

$$= \text{Gallons to Add (CleanSafe 787C)}$$

MATERIAL SAFETY DATA SHEET

PETROFERM INC.

Lambent Technologies Plant
3938 Porett Drive
Gurnee, IL 60031
(800) 432-7187
www.petroferm.com

CHEMTREC 24-HOUR EMERGENCY RESPONSE
TOLL FREE NUMBER: (800) 424-9300
INTERNATIONAL CALLS: COLLECT (703) 527-3887
CHEMTREC should only be contacted in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals.

1. PRODUCT NAME

BIOACT® 280 Precision Cleaner

2. HAZARDOUS INGREDIENTS

None applicable

3. HAZARDS IDENTIFICATION

SYMPTOMS/EFFECTS OF OVEREXPOSURE

Inhalation: Very low vapor pressure. Harmful effects not expected.

Ingestion: Low order of toxicity. May cause mild nausea and abdominal discomfort.

Skin: Repeated or prolonged contact with skin may cause very mild irritation.

Eyes: Contact with eyes may cause very mild irritation.

Listed Carcinogens: None

4. FIRST AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

Ingestion: Do not induce vomiting. Seek medical attention.

Skin: Remove contaminated clothing. Thoroughly wash affected area with soap and water.

Eyes: Immediately flush eyes with water for 15 minutes. Call a physician if signs of irritation appear.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry chemical, chemical foam, carbon dioxide. Class BC, ABC fire extinguisher.

Special Fire Fighting Procedures: Self-contained positive pressure breathing apparatus and protective clothing should be worn in fighting fires involving chemicals..

Unusual Fire and Explosions Hazard: None known.

6. ACCIDENTAL RELEASE MEASURES

Absorb spill with inert material, then place in chemical waste container. For large spills, dike for later disposal. Observe government regulations.

BIOACT is a registered trademark of Petroferm Inc.

7. HANDLING AND STORAGE

Store in original container, preferably in a cool, ventilated, fire-resistant building. Avoid overheating or freezing. Since empty containers may retain product residues (vapor, liquid, or solid) all label precautions must be observed.

8. EXPOSURE CONTROLS – PERSONAL PROTECTION

Respiratory: Use NIOSH/MSHA approved respirator if ventilation is not sufficient and if mists are generated.

Ventilation: Local exhaust can be effective in minimizing odor. Mechanical (general) ventilation should have an airflow of 55 CFM.

Clothing/Glove: Chemically resistant gloves should be used with all industrial chemicals.

Eye Protection: Safety glasses/goggles are recommended. Provide eye bath near work site.

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (760 mm Hg):	> 500°F (260°C)	Vapor Density (Air = 1):	> 1
% Volatile (By Weight):	None	Evaporation Rate (BUAC = 1):	< 1
Specific Gravity (H ₂ O = 1):	0.85 @ 77°F (25°C)	Solubility in Water:	Negligible
Vapor Pressure (20°C):	< 0.001mm Hg	Appearance and Odor:	Water-white to light yellow liquid with practically no odor.
Flash Point:	285°F (141°C) (ASTM D93-85, Pensky-Martens Closed Cup)	Flammable Limits (% By Volume in Air):	Not determined.

10. STABILITY AND REACTIVITY

Stability: BIOACT 280 Precision Cleaner is stable.

Conditions to Avoid: Temperatures above 500°F (260°C).

Incompatibility: Strong mineral acids and strong oxidizing agents.

Hazardous Decomposition Products: None, other than normal products of combustion.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Not available.

12. ECOLOGICAL INFORMATION

Not available.

13. DISPOSAL CONSIDERATIONS

Waste treat or incinerate used material in compliance with all applicable government regulations.

14. TRANSPORT INFORMATION

Non-regulated.

15. REGULATORY INFORMATION

None of the components of BIOACT 280 Precision Cleaner appears on any of the EPA's lists of toxic or hazardous substances, or on the SARA 313 toxic chemicals list (40 CFR 372.65).

None of the components of this product is listed in California's Safe Drinking Water and Toxic Enforcement Act of 1986 – Proposition 65 as a chemical known to cause cancer, birth defects, or other reproductive harm.

None of the components of this product is listed in the Threshold Limit Values and Biological Exposure Indices compiled by the American Conference of Governmental Industrial Hygienists .

Canadian WHMIS Classification: This is not a controlled product.

16. OTHER INFORMATION

NFPA Codes: Health: 1 Fire: 1 Reactivity: 0

We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and of these opinions and the conditions of use of the product are not within the control of Petroferm Inc., it is the user's obligation to determine the conditions of safe use of the product.

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: CleanSafe™ 787C
Supplier: Petroferm Inc.
3938 Porett Drive
Gurnee, IL 60031
(847) 244-3410
www.petroferm.com
Emergency Contact: CHEMTREC EMERGENCY RESPONSE
US: (800) 424-9300
INTERNATIONAL: (703) 527-3887
CHEMTREC should only be contacted in the event of transportation related chemical emergencies involving a spill, leak, fire, exposure, or accident.

Date Prepared: 04/16/2009
Replaces: 03/13/2007

2. HAZARDS IDENTIFICATION

Hazards Overview

WARNING: Irritating to eyes and skin.

Potential Health Hazards

Skin: Irritating to skin. Prolonged contact may cause dermatitis.

Eyes: Irritating to eyes. May cause redness, swelling, and burns.

Ingestion: May cause abdominal discomfort, nausea, and vomiting.

Inhalation: Low volatility makes vapor inhalation unlikely. Aerosol or mist may be irritating to the respiratory tract.

Listed Carcinogens: This product contains no known or suspected human carcinogens by OSHA/IARC/ACGIH.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Component	CAS Number	Weight %
Sodium silicate	1344-09-8	< 5%
Potassium carbonate	584-08-7	< 5%
Anionic surfactant	proprietary	10 – 20%

4. FIRST AID MEASURES

Skin: Remove contaminated clothing. Thoroughly rinse affected area with water. Seek medical attention if irritation persists.

Eyes: Thoroughly flush eyes with water for 15 – 20 minutes. Immediate medical attention is required.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention if symptoms of overexposure develop.

Ingestion: DO NOT induce vomiting. Give one or two glasses of water to conscious victim. Seek medical attention.

5. FIRE FIGHTING MEASURES

- Extinguishing Media:** Dry chemical, chemical foam, carbon dioxide. Class BC, ABC fire extinguisher.
- Special Fire Fighting Procedures:** Self-contained positive pressure breathing apparatus and protective clothing should be worn in fighting fires involving chemicals.
- Unusual Fire Hazards:** Exercise care when disposing of rags contaminated with this product. Use normal precautions appropriate for oily rags.

6. ACCIDENTAL RELEASE MEASURES

Do not allow product to enter drains or waterways. Remove all ignition sources from affected area. Absorb small spills with inert material, then place in chemical waste container. For large spills, dike affected area to prevent spreading. Observe government regulations.

7. HANDLING AND STORAGE

Store in original container with compatible materials, preferably in a cool, ventilated, fire-resistant building. Avoid overheating or freezing. Avoid open flames and sparks.

8. EXPOSURE CONTROLS - PERSONAL PROTECTIONExposure Guidelines

OSHA PEL Not Established for the constituents of this product

ACGIH TLV Not Established for the constituents of this product

Engineering Controls/PPE

- Respiratory:** Use NIOSH/MSHA approved respirator if ventilation is not sufficient and if mists are generated.
- Ventilation:** Use with adequate local or general ventilation. Wear a NIOSH approved full face respirator with the proper cartridge if vapors cannot be controlled with ventilation.
- Clothing/Glove:** Chemically resistant gloves and safety glasses must be worn while handling this material. An apron and splash shield should be worn if transfer or use of the material presents a splash hazard. A safety shower should be provided in the work area.
- Eye Protection:** Safety glasses/goggles must be worn while handling this product. A splash shield should be worn if transfer or use of this product presents a splash hazard. Provide an eye bath in the work area.

9. PHYSICAL AND CHEMICAL DATA

pH	12
Boiling Point(760 mm Hg):	>210°F (99°C)
VOC Content:	Not determined
Specific Gravity (H₂O =1):	1.08 at 77°F (25°C)
Vapor Pressure(20°C):	Not determined
Flash Point:	None to boiling (ASTM 93-85)
Vapor Density (Air = 1):	Not determined
Evaporation Rate (BUAC = 1):	Not determined
Solubility in Water:	Completely soluble
Appearance :	Clear liquid
Odor:	Mild

10. STABILITY AND REACTIVITY

Stability:	This product is stable under recommended storage conditions.
Conditions to Avoid:	Direct sunlight, sparks, and open flames.
Incompatibility:	Strong mineral acids and strong oxidizing agents.
Hazardous Decomposition Products:	None, other than normal products of combustion.
Hazardous Polymerization:	Will not occur.

11. TOXICOLOGICAL INFORMATION

No data available for this mixture.

12. ECOLOGICAL INFORMATION

No data available for this mixture.

13. DISPOSAL CONSIDERATIONS

Do not dispose into drains, sewers, or surface water. Dispose of used material in compliance with all applicable government regulations.

14. TRANSPORT INFORMATION

US DOT/IATA/IMO
Not Regulated for Shipping.

15. REGULATORY INFORMATION

USA TSCA: All components listed or exempt.

USA SARA 313: No listed components

USA EPCRA 311/312: Acute health hazard

16. OTHER INFORMATION

NFPA Codes: Health: 2 Fire: 1 Reactivity: 0

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. Such information is to the best of the company's knowledge and believed accurate and reliable as of the date indicated. However, no representation, warranty or guarantee of any kind, express or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use.