RCT

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Safety Data Sheet

Behenic Acid

I IDENTIFICATION

Synonyms **1-docosanoic acid*; *n*-docosanoic acid; $C_{12}H_{44}O_2$**
CAS# **112-85-6 + others** (*see listing in Part 3*)
Europe EC # **205-010-8**
Material Use **lubricants, cosmetics, waxes, etc**

EMERGENCY INFORMATION		
In the U.S.A.	***Call CHEMTREC***	***(800) 424-9300***
In Canada	***Call CANUTEC (collect)***	***(613) 996-6666***

II HAZARD IDENTIFICATION

GHS Class (Category) ***NOT HAZARDOUS***
Signal Words ***NONE***

Hazard Statements *NONE*

GHS Precautionary Statements for Labelling **NONE**

III COMPOSITION

		CAS NUMBER	%	TLV $_3$ ppm / mg/m	LD_{50} (*mg/kg*) ORAL	LD_{50} (mg/kg) SKIN	LC_{50} ppm INHALATION
Docosanoic Acid	(Behenic acid – C_{22})	112-85-6	60-95%	not listed	>>2000	>>2000	not toxic
Eicosanoic Acid	(Arachidic Acid – C_{20})	506-30-9	10-40%	not listed	>4640	>3575	not toxic
Octadecanoic Acid	(Stearic Acid – C_{18})	57-11-4	1-10%	not listed	4600	>5000	1620
Hexadecanoic Acid	(Lauric Acid – C_{16})	143-07-7	0-1%	not listed	10,000	not toxic	not toxic
Tetracosanoic Acid	(Lignoceric Acid – C_{24})	557-59-5	0-5%	not listed	not toxic	not toxic	not toxic

IV FIRST AID

SKIN: Brush off. Then wash with soap & water. Remove contaminated clothing and do not reuse until laundered.
EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If victim's breathing stops, administer artificial respiration and seek medical aid promptly.
INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

NOTE: Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this non-toxic product. The stomach should only be emptied under medical supervision, after the installation of an airway to protect the lungs.

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V FLAMMABILITY & FIRE-FIGHTING

Flash Point	~180°C / 365°F (closed cup)
Autoignition Temperature	~400°C / ~750°F
Flammable Limits	not known
Combustion Products	carbon monoxide, nitrogen oxides, smoke, part oxidised hydrocarbon fragments
Firefighting Precautions	as for materials sustaining fire; firefighters to wear SCBA
Static Discharge	product dust may accumulate a static charge; static discharge may cause ignition

VI ACCIDENTAL RELEASE MEASURES

Leak Precaution	not applicable – *solid material*
Handling Spill	sweep (*but avoid creating dust*), shovel & store in closed containers for disposal *Molten material solidifies on contact with cool surfaces and can readily be shovelled.*

VII HANDLING & STORAGE

Store and use in a cool environment away from oxidising agents and alkalis.

Behenic acid dust clouds are potentially flammable/explosive. Avoid generating product dust. If dust forms in processing, install adequate ventilation to clear workplace air. Avoid prolonged contact with skin and wash work clothes frequently. An eye bath and safety shower should be available near the workplace.

NOTE: *Molten behenic acid is hotter than 80°C (176°F) and presents a burn hazard to exposed skin.*

VIII EXPOSURE CONTROL & PERSONAL PROTECTION

ACGIH TLV	not listed	ACGIH STEL	not listed
OSHA PEL	not listed	OSHA STEL	not listed
Ventilation	no special mechanical ventilation required – *behenic acid dust is flammable/explosive; a spark or flame may cause ignition*; if dust clouds form in use, exhaust ventilation must be installed to clear workplace air		
Hands	no special protective gloves required – *always confirm suitability with supplier*		
Eyes	safety glasses with side shields – *always protect eyes!*		
Clothing	no special protective clothing required		

IX PHYSICAL AND CHEMICAL PROPERTIES

NOTE: *for Flash Point, Autoignition Temp, & Flammable Limits see Part 5.*

Odour & Appearance	white to pale yellow crystals or powder with faint fatty odour
Odour Threshold	not known – nearly odourless
Vapour Pressure	7.15×10^{-8} mmHg / 9.53×10^{-9} kPa (25°C/ 77°F)
Evaporation Rate (*Butyl Acetate = 1*)	not known – not volatile
Vapour Density (air = 1)	11-12 – *theoretical value*
Decomposition Temperature	not known – no decomposition expected below the autoignition temperature (~400°C)
Boiling Point	306°C / 583°F – *at reduced pressure 60mmHg / 8kPa*
Melting Point	80°C / 176°F
Specific Gravity	0.822 (100°C) – *room temperature density not available*
Water Solubility	0.016mg/litre (25°C / 77°F) – *virtually insoluble*
- in other solvents	slightly in methanol & diethyl ether
Log $K_{o/w}$ (*Octanol/H_2O Partition Coefficient*)	9.9
pH	none – *does not yield hydrogen ions in solution (however can neutralize strong alkalis)*
Molecular Weight	341grams per mole (*behenic acid only*)

NOTE: *These data are for pure behenic acid and will vary depending on the proportion of other fatty acids present.*

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X REACTIVITY

Dangerously Reactive With	strong oxidising agents, strong reducing agents
Also Reactive With	reactive metals (eg: Na, Ca, K), finely divided aluminum; strong alkalis cause saponification which may become rapid enough to cause heating and fire; gradually corrodes brass
Chemical Stability	stable; will not polymerize
Decomposes in Presence of	exposure to light or air may cause slow breakdown creating low levels of hydroperoxides, which decompose to short chain (C_1-C_{10}) aldehydes & ketones with a pungent, rancid odour
Decomposition Products	hydroperoxides, short chain aldehydes and ketones & hydroxy- compounds may form during the slow breakdown of docosanoic acid in the presence of light or air.
Mechanical Impact	not sensitive

XI TOXICITY INFORMATION

i. ACUTE EXPOSURE

Skin Contact	little to no effect
Skin Absorption	yes, slowly; toxic effects unlikely by this route
Eye Contact	dust may be a mechanical irritant – *not chemically irritating*
Inhalation	little to no effect
Ingestion	large quantities (100g or more) may cause nausea & steatorrhea – *not a route of industrial exposure*
Behenic Acid:	
LD_{50} (oral)	>2000 & >5000mg/kg (rat)[1] – *no mortality in either report*[1], 8250mg/kg (mouse)[1]
LD_{50} (skin)	>2000mg/kg (rabbit) – *no mortality in three reports*[1]
Icosanoic (or Eicosanoic) Acid:	
LD_{50} (oral)	>2000, >4640 & 10,000mg/kg (rat)[2],
LD_{50} (skin)	3575 & >5000mg/kg (rabbit)[2] – *no mortality in two reports*[2]
Stearic Acid:	
LD_{50} (oral)	4600, >5000[3], >6000[3] & >10,000mg/kg (rat) – *only one death recorded – in the 5000mg/kg test*
LD_{50} (skin)	>2000[3] & >5000mg/kg (rabbit) – *no mortality seen*

No LC_{50} available for any of the above fatty acids – they are considered not toxic by inhalation.[1,2,3]

This Product:	***Cannot calculate because the exact composition of this product is not known, however, from the above information on its major components this product is clearly not toxic.***

ii. CHRONIC EXPOSURE

General	no known effect
Sensitising	not a sensitiser[1,2,3]
Carcinogen/Tumorigen	not known to be a tumorigen or a carcinogen in humans or animals[1,2,3]
Reproductive Effect	no known effect on humans or animals[1,2,3]
Mutagen	not known to be a mutagen or teratogen in humans or animals[1,2,3]
Synergistic With	not known

XII ECOLOGICAL INFORMATION

Docosanoic (Behenic) Acid

Bioaccumulation	readily metabolised (*as are most fatty acids*) probably cannot bioaccumulate
Biodegradation	biodegrades in the presence of oxygen; 52% in 28 days[1]
Abiotic Degradation	not known
Mobility in soil, water	water insoluble; immobile in soil & the water column
Aquatic Toxicity	
LC_{50} (Fish 96 hr)	>5mg/litre (Oryzias latipes)[1]
LC_{50} (Crustacea, 48hr)	>5mg/litre (Daphnia magna)[1]
EC_{50} (Algae, 96hr)	>5mg/litre (Pseudokirchnerella subcapitata)[1]
LC_{10} (Microorganisms)	883mg/litre (Pseudomonas putida)[1] – *note this is an EC_{10}, not an EC_{50}*

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XII ECOLOGICAL INFORMATION, cont'd

Icosaenoic (Eicosanoic) Acid:

Bioaccumulation	readily metabolised (*as are most fatty acids*) probably cannot bioaccumulate
Biodegradation	biodegrades in the presence of oxygen;
Abiotic Degradation	reacts with atmospheric hydroxyl (OH) radicals; estimated ½-life in air
Mobility in soil, water	water soluble; moves readily through soil & the water column
Aquatic Toxicity	
LC_{50} (Fish 96 hr)	5 & 40mg/litre (Oryzias latipes)[2], 12mg/litre (Oncorhynchus kisutch)[1]
LC_{50} (Crustacea, 48hr)	40mg/litre (Daphnia pulex)[2], 5mg/litre (Daphnia magna)[2]
EC_{50} (Algae, 96hr)	4.1 & >5mg/litre (Pseudokirchnerella subcapitata)[2]
LC_{50} (Microorganisms)	75mg/litre (Vibrio fischerii)[2], 5.9mg/litre (Tetrahymena pyriformis – *QSAR estimate*)[2]

Stearic Acid:

Bioaccumulation	readily metabolised and will not bioaccumulate
Biodegradation	biodegrades readily & rapidly in the presence of oxygen*; 72% - 95% in 28 days[1]
Abiotic Degradation	reacts with atmospheric hydroxyl (OH) radicals; its estimated ½-life in air is 17 hours
Mobility in soil, water	water insoluble; cannot move through soil and the water column
Aquatic Toxicity	
LC_{50} (Fish, 96hr)	>10,000mg/litre (Leuciscus idus)[2] – *no mortality seen*
LC_{50} (Crustacea, 48hr)	> 32mg/litre (Daphnia magna)[2] – *no mortality seen*, >20mg/litre (Artemia salina)[2]
EC_{50} (Algæ, 72 or 96hr)	>0.9mg/litre (Pseudokirchnerella subcapitata)[2] – *no toxicity observed*
LC_{10} (Microorganisms)	>883mg/litre (Pseudomonas putida)[2] – *considered to be the "toxicity threshold"*

XIII DISPOSAL CONSIDERATIONS

Waste Disposal **do not flush to sewer**; may be incinerated in approved facility with flue gas monitoring & scrubbing, mix with a suitable flammable waste before incineration; may be landfilled if local regulations permit

Containers **Drums** should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use.
Pails must be vented and thoroughly dried prior to crushing and recycling.
IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5 years). Steel containers must be inspected, pressure tested & recertified every 5 years.
Warning: never cut, drill, weld or grind on or near this container, even if empty.

XIV TRANSPORT INFORMATION

USA 49 CFR & Canada TDG

Product Identification Number	**UN – not regulated for transport**
Shipping Name	**not regulated for transport**
Classification	**not regulated for transport**
Marine Pollution	***not a marine pollutant***
ERAP Required	***No***
Reportable Quantity (RQ)	***none***

**** NOTE: Molten behenic acid is over 80°C (176°F) and causes thermal burns to exposed skin! Molten Behenic Acid requires this safety mark. ➔ ➔***

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XV REGULATIONS

Canada DSL **on inventory**
U.S.A. TSCA **ACTIVE**
Europe EINECS **on inventory**

SARA 311/312
Acute: No
Chronic: No
Fire: No
Sudden Release of Pressure: No
Reactivity: No

No SARA 311/312

XVI OTHER INFORMATION

Date of Preparation **May 2013**
Date of Revision **November 2017, February 2019 (D. Moreno)**
Prepared for Rierden Chemical & Trading Company, by **Peter Bursztyn**
With data from Registry of Toxic Effects of Chemical Substances (RTECS - USA), Hazardous Substance Data Base (HSDB - USA), Cheminfo (CCOHS - Canada), OSHA website, European Chemicals Agency (EChA) dossiers & other sources (below if used), as required/available.

(1) European Chemicals Agency (EChA) dossier for docosanoic acid:
http://echa.europa.eu/registration-dossier/-/registered-dossier/14201/1

(2) European Chemicals Agency (EChA) dossier for icosanoic acid:
http://echa.europa.eu/registration-dossier/-/registered-dossier/11014/7/3/3

(3) European Chemicals Agency (EChA) dossier on stearic acid:
http://echa.europa.eu/registration-dossier/-/registered-dossier/15163/1

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