SAFETY DATA SHEET

According to US Regulation 29 CFR 1910.1200 (HazCom 2012)

1. Identification

Product identifier: Cyclohexanone

Other means of identification

Product No.: 4872, 9210

Recommended restrictions

Recommended use: For Laboratory, Research or Manufacturing Use.
Restrictions on use: Not determined.

Details of the supplier of the safety data sheet

Company Name:	Avantor Performance Materials, LLC
Address:	100 Matsonford Rd, Suite 200 Radnor, PA 19087
Telephone:	Customer Service: 855-282-6867
Contact Person:	Product Information Compliance
E-mail:	info@avantormaterials.com

Emergency telephone number:

CHEMTREC: 1-800-424-9300 within US and Canada (24 hrs/day, 7 days/week)

2. Hazard(s) identification

Hazard Classification

Physical Hazards

Flammable liquids	Category 3

Health Hazards

Acute toxicity (Oral)	Category 4
Acute toxicity (Dermal)	Category 3
Acute toxicity (Inhalation - vapor)	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2A
Specific Target Organ Toxicity - Single Exposure	Category 3[1.]
Aspiration Hazard	Category 1

Target Organs

1. Respiratory tract irritation., Narcotic effect.

Label Elements

Hazard Symbol:

Signal Word: Danger

Hazard Statement:
Flammable liquid and vapor.
Harmful if swallowed.
Toxic in contact with skin.
Harmful if inhaled.
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.

Precautionary Statements

Prevention: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid breathing dust/mist/vapors/spray. Use only outdoors or in a well-ventilated area.

Response: In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse. IF SWALLOWED: Immediately call a POISON CENTER/doctor. Do NOT induce vomiting. Rinse mouth. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Storage: Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Hazard(s) not otherwise classified (HNOC): None.

3. Composition/information on ingredients

Substances

Chemical Identity	CAS number	Content in percent (%)*
Cyclohexanone	108-94-1	95 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention if symptoms persist. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Most important symptoms/effects, acute and delayed

Symptoms: Toxic in contact with skin. May be fatal if swallowed. Irritating to eyes, respiratory system and skin. In high concentrations, vapors and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea.

Hazards: None known.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: Flammable liquid and vapor.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Specific hazards arising from the chemical: Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapors or gases to explosive concentrations. Heat may cause the containers to explode.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out. Fight fire from a protected location.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Evacuate area. See Section 8 of the SDS for Personal Protective Equipment. Keep unauthorized personnel away. Ventilate closed spaces before entering them. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep upwind. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: In case of leakage, eliminate all ignition sources. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Take precautionary measures against static discharges. Ground and bond container and receiving equipment. Use personal protective equipment as required. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Wash hands thoroughly after handling. See Section 8 of the SDS for Personal Protective Equipment.

Conditions for safe storage, including any incompatibilities: Keep away from food, drink and animal feeding stuffs. Keep out of reach of children. Keep container tightly closed in a cool, well-ventilated place. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	Type	Exposure Limit Values		Source
Cyclohexanone	TWA	20 ppm		US. ACGIH Threshold Limit Values (2011)
	STEL	50 ppm		US. ACGIH Threshold Limit Values (2011)
	SKIN_DES	Can be absorbed through the skin.		US. ACGIH Threshold Limit Values (2011)
	SKIN_DES	Can be absorbed through the skin.		US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	REL	25 ppm	100 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	PEL	50 ppm	200 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	TWA	25 ppm	100 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	SKIN_FINAL	Can be absorbed through the skin.		US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	25 ppm	100 mg/m3	US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A (06 2008)
	SKIN_DES	Can be absorbed through the skin.		US. Tennessee. OELs. Occupational Exposure Limits, Table Z1A (06 2008)
	ST ESL	Health	800 µg/m3	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (11 2016)
	AN ESL	Health	80 µg/m3	US. Texas. Effects Screening Levels (Texas

				Commission on Environmental Quality) (11 2016)
	AN ESL	Health	20 ppb	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (11 2016)
	ST ESL	Health	200 ppb	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (11 2016)
	SKIN_DES	Can be absorbed through the skin.		US. California Code of Regulations, Title 8, Section 5155. Airborne Contaminants (08 2010)
	TWA PEL	25 ppm	100 mg/m3	US. California Code of Regulations, Title 8, Section 5155. Airborne Contaminants (08 2010)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
Cyclohexanone (1,2-Cyclohexanediol, with hydrolysis: Sampling time: End of shift at end of work week.)	80 mg/l (Urine)	ACGIH BEI (03 2013)
Cyclohexanone (Cyclohexanol, with hydrolysis: Sampling time: End of shift.)	8 mg/l (Urine)	ACGIH BEI (03 2013)

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area. Use explosion-proof ventilation equipment.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin Protection
Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory Protection: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Respirator type: Chemical respirator with organic vapor cartridge and full facepiece.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state: Liquid
Form: Viscous liquid
Color: Colorless, Pale yellow

Odor:	Acetone-like odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-31 - -28.9 °C
Initial boiling point and boiling range:	154.3 - 155.6 °C
Flash Point:	43 - 44 °C (Closed Cup)
Evaporation rate:	0.29 (butyl acetate=1) 40.6 (ether=1)
Flammability (solid, gas):	Class IIIA Combustible Liquid
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	9.4 %(V)
Flammability limit - lower (%):	1.1 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	5 hPa (20 °C) 5.77 hPa (25 °C)
Vapor density:	3.4 (Air=1)
Density:	0.94 g/ml (25 °C)
Relative density:	0.94 - 0.95 (20 °C)
Solubility(ies)	
Solubility in water:	150 g/l (10 °C) 50 g/l (30 °C)
Solubility (other):	acetone: Soluble ethanol: Soluble ether: Soluble
Partition coefficient (n-octanol/water):	0.81
Auto-ignition temperature:	420 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Liquid conductivity:	0.05 µS/cm
Molecular weight:	98.14 g/mol (C6H10O)

10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical Stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Heat, sparks, flames. Contact with incompatible materials.
Incompatible Materials:	Strong oxidizing agents.
Hazardous Decomposition Products:	Thermal decomposition may release oxides of carbon.

11. Toxicological information

Information on likely routes of exposure

Inhalation:	Harmful if inhaled. Irritating to respiratory system. May cause drowsiness or dizziness.

Skin Contact: Toxic in contact with skin. Causes skin irritation.

Eye contact: Causes serious eye irritation.

Ingestion: Harmful if swallowed.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 1,620 - 2,650 mg/kg

Dermal
Product: LD 50 (Rabbit) 1,000 mg/kg

Inhalation
Product: LC 50 (Rat, 4 h) > 6.2 mg/l

Repeated dose toxicity
Product: No data available.

Skin Corrosion/Irritation
Product: Causes skin irritation.

Serious Eye Damage/Eye Irritation
Product: Causes serious eye irritation.

Respiratory or Skin Sensitization
Product: Not a skin nor a respiratory sensitizer.

Carcinogenicity
Product: Confirmed animal carcinogen with unknown relevance to humans.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: Narcotic effect. Respiratory tract irritation.

Specific Target Organ Toxicity - Repeated Exposure

Product: None known.

Target Organs
Specific Target Organ Toxicity - Single Exposure: Respiratory tract irritation., Narcotic effect.

Aspiration Hazard
Product: May be fatal if swallowed and enters airways.

Other effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
Cyclohexanone LC 50 (Fathead minnow (Pimephales promelas), 96 h): 481 - 770 mg/l

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
Cyclohexanone EC 50 (Daphnia magna, 48 h): > 100 mg/l

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: Expected to be readily biodegradable.

BOD/COD Ratio
Product: No data available.

Bioaccumulative potential
Bioconcentration Factor (BCF)
Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 0.81

Mobility in soil: No data available.

Other adverse effects: The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.

14. Transport information

DOT

UN Number:	UN 1915
UN Proper Shipping Name:	Cyclohexanone
Transport Hazard Class(es)	
Class:	3
Label(s):	3
Packing Group:	III
Marine Pollutant:	No
Special precautions for user:	Not determined.

IMDG

UN Number:	UN 1915
UN Proper Shipping Name:	CYCLOHEXANONE
Transport Hazard Class(es)	
Class:	3
Label(s):	3
EmS No.:	F-E, S-D
Packing Group:	III
Marine Pollutant:	No
Special precautions for user:	Not determined.

IATA

UN Number:	UN 1915
Proper Shipping Name:	Cyclohexanone
Transport Hazard Class(es):	
Class:	3
Label(s):	3
Packing Group:	III
Marine Pollutant:	No
Special precautions for user:	Not determined.

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

None present or none present in regulated quantities.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

Chemical Identity	Reportable quantity
Cyclohexanone	5000 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Flammable (gases, aerosols, liquids, or solids)
Acute toxicity (any route of exposure)
Skin Corrosion or Irritation
Serious eye damage or eye irritation
Specific target organ toxicity (single or repeated exposure)
Aspiration Hazard

SARA 302 Extremely Hazardous Substance

None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

None present or none present in regulated quantities.

SARA 311/312 Hazardous Chemical

Chemical Identity	Threshold Planning Quantity
Cyclohexanone	10000 lbs.

SARA 313 (TRI Reporting)

None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3):

None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65

No ingredient requiring a warning under CA Prop 65.

US. New Jersey Worker and Community Right-to-Know Act

Chemical Identity
Cyclohexanone

US. Massachusetts RTK - Substance List

Chemical Identity
Cyclohexanone

US. Pennsylvania RTK - Hazardous Substances

Chemical Identity
Cyclohexanone

US. Rhode Island RTK

Chemical Identity
Cyclohexanone

International regulations

Montreal protocol

Not applicable

Stockholm convention

Not applicable

Rotterdam convention

Not applicable

Kyoto protocol

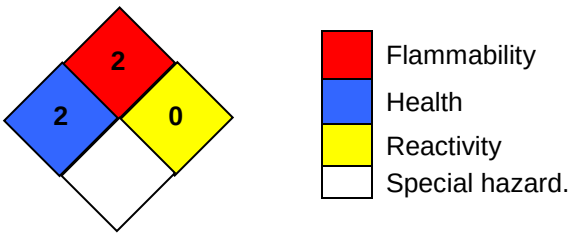
Not applicable

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
Japan ISHL Listing:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Mexico INSQ:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Philippines PICCS:	On or in compliance with the inventory
Taiwan Chemical Substance Inventory:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe; RNP - Rating not possible

Issue Date:	01-14-2020
Revision Information:	Not relevant.
Version #:	1.1
Source of information:	Sources of information used in preparing this SDS included one or more of the following: results from in house or supplier toxicology studies, information from the Toxicology Data Network (TOXNET), European Chemical Agency (ECHA) substance dossiers, IARC Monographs, US National Toxicology Program data, the Agency for Toxic Substances and Disease Registry, other manufacturer's SDSs and other sources, as appropriate.
Further Information:	No data available.

Disclaimer:

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