MATERIAL SAFETY DATA SHEET

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Section 1 - Product and Company Information

Product Name	4-METHYL-2-PENTANONE, 99+%, SPECTROPHOTO - METRIC GRADE
Product Number	242896
Brand	ALDRICH
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
4-METHYL-2-PENTANONE	108-10-1	Yes

Formula	C6H12O
Synonyms	Hexon (Czech) * Hexone (OSHA) * Isobutyl-methylketon (Czech) * Isobutyl methyl ketone * Isopropylacetone * Ketone, isobutyl methyl * Methyl-isobutyl-cetone (French) * Methylisobutylketon (Dutch, German) * Methyl isobutyl ketone (ACGIH:OSHA) * Metyloizobutyloketon (Polish) * 4-Methyl-pentan-2-on (Dutch, German) * 2-Methyl-4-pentanone * 4-Methyl-2-pentanon (Czech) * 4-Methyl-2-pentanone * Metilisobutilchetone (Italian) * 4-Metilpentan-2-one (Italian) * MIBK * MIK * RCRA waste number U161 * Shell MIBK
RTECS Number:	SA9275000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Harmful.
Harmful by inhalation. Irritating to eyes and respiratory system.
Repeated exposure may cause skin dryness or cracking.
Target organ(s): Nerves. May form explosive peroxides.

HMIS RATING

HEALTH: 2*
FLAMMABILITY: 3
REACTIVITY: 1

NFPA RATING

HEALTH: 2
FLAMMABILITY: 3
REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures

FLAMMABLE HAZARDS
Flammable Hazards: Yes

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions. Forms explosive mixtures in air.

FLASH POINT
57.2 °F 14 °C Method: closed cup

EXPLOSION LIMITS
Lower: 1.2 % Upper: 8 %

AUTOIGNITION TEMP
459 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep container closed. Keep away from heat, sparks, and open flame.
Unsuitable: May form peroxides on contact with air.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	STEL	75 PPM
USA	ACGIH	TWA	50 PPM
USA	MSHA Standard-air	TWA	100 PPM (410 MG/M3)
USA	OSHA.	PEL	8H TWA 100 PPM (410 MG/M3)
USA	NIOSH	TWA	50 PPM
		STEL	75 PPM

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	83
Poland		NDSCh	200
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	100.16 AMU	
pH	N/A	
BP/BP Range	117.0 - 118.0 °C	
MP/MP Range	- 80.0 °C	
Freezing Point	N/A	
Vapor Pressure	15 mmHg	20 °C
Vapor Density	3.5 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.8 g/cm3	
Bulk Density	N/A	
Odor Threshold	0.1 ppm	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	23.6 mN/m	20 °C
Partition Coefficient	Log Kow: 1.31	
Decomposition Temp.	N/A	
Flash Point	57.2 °F 14 °C	Method: closed cup
Explosion Limits	Lower: 1.2 % Upper: 8 %	
Flammability	N/A	
Autoignition Temp	459 °C	
Refractive Index	1.396	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water:20 mg/ml H2O Other Solvents: SOLUBLE IN ALCOHOL, ETHER ACETONE, BENZENE CHLOR	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Conditions to Avoid: May form peroxides on contact with air.
Materials to Avoid: Oxidizing agents, Strong bases.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: Harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SENSITIZATION
Sensitization: Will not occur

TARGET ORGAN(S) OR SYSTEM(S)
Nerves.

SIGNS AND SYMPTOMS OF EXPOSURE
Contact with eyes can cause redness, tearing, and blurred vision. Prolonged or repeated contact with skin can cause defatting and dermatitis. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA
Skin
Rabbit
> 16,000 mg/kg
LD50
4 H
Inhalation
Rat
8.2 - 16.4 mg/m3
LC50

Oral
Rat
2080 mg/kg
LD50

Inhalation
Rat
100,000 mg/m3
LC50

Intraperitoneal
Rat
400 MG/KG
LD50

Oral
Mouse
1900 mg/kg
LD50

Inhalation
Mouse
23,300 mg/m3
LC50

Intraperitoneal
Mouse
268 MG/KG
LD50

Oral
Guinea pig
1600 mg/kg
LD50

Intraperitoneal
Guinea pig
800 MG/KG
LD50

IRRITATION DATA

Skin
Rabbit
Remarks: Moderate irritation effect
Eyes
Rabbit
Remarks: No irritation effect

Eyes
Human
200 ppm
15M

Skin
Rabbit
500 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
40 mg
Remarks: Severe irritation effect

Eyes
Rabbit
0.1 ml
24H
Remarks: Moderate irritation effect

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 300 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse
Dose: 3000 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 3000 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Cardiovascular (circulatory) system.

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae
Species: Scenedesmus subspicatus
Time: 48 h

Value: 980.0 - 2,000.0 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 1,550.0 - 3,623.0 mg/l

Test Type: LC50 Fish
Species: Leuciscus idus
Time: 48 h
Value: 672.0 - 744.0 mg/l

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 496.0 - 593.0 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Methyl isobutyl ketone
UN#: 1245
Class: 3
Packing Group: Packing Group II
Hazard Label: Flammable liquid
PIH: Not PIH

IATA
Proper Shipping Name: Methyl isobutyl ketone
IATA UN Number: 1245
Hazard Class: 3
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: F-Xn
Indication of Danger: Highly Flammable. Harmful.
R: 11-20-36/37-66
Risk Statements: Highly flammable. Harmful by inhalation. Irritating to eyes and respiratory system. Repeated exposure may cause skin dryness or cracking.
S: 9-16-29
Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Do not empty into drains.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Flammable (USA) Highly Flammable (EU). Harmful.
Risk Statements: Harmful by inhalation. Irritating to eyes and respiratory system. Repeated exposure may cause skin dryness or cracking.

Safety Statements: Keep away from sources of ignition - no smoking. Do not empty into drains. Keep container in a well-ventilated place.
US Statements: Target organ(s): Nerves. May form explosive peroxides.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.