



Safety Data Sheet acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

1 Identification

- **Product identifier**
- **Trade name: (R)-Ketamine (hydrochloride) (CRM)**
- **Article number:** 26316
- **Application of the substance / the mixture**
This product is for research use - Not for human or veterinary diagnostic or therapeutic use. It is the responsibility of the purchaser to determine suitability for other applications.
- **Details of the supplier of the safety data sheet**
- **Manufacturer/Supplier:**
Cayman Chemical Co.
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108
USA
- **Information department:** Product safety department
- **Emergency telephone number:**
During normal opening times: +1 (734) 971-3335
US/CANADA: 800-424-9300
Outside US/CANADA: 703-741-5970

2 Hazard(s) identification

- **Classification of the substance or mixture**



GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.



GHS06 Skull and crossbones

Acute Tox. 3 H301 Toxic if swallowed.

Acute Tox. 3 H311 Toxic in contact with skin.

Acute Tox. 3 H331 Toxic if inhaled.



GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.

STOT SE 1 H370 Causes damage to the central nervous system and the visual organs.

(Contd. on page 2)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 1)

- **Label elements**

- **GHS label elements**

The product is classified and labeled according to the Globally Harmonized System (GHS).

- **Hazard pictograms**



GHS02 GHS06 GHS08

- **Signal word** Danger

- **Hazard-determining components of labeling:**

Methanol

- **Hazard statements**

H225 Highly flammable liquid and vapor.
 H301+H311+H331 Toxic if swallowed, in contact with skin or if inhaled.
 H351 Suspected of causing cancer.
 H370 Causes damage to the central nervous system and the visual organs.

- **Precautionary statements**

P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
 P240 Ground/bond container and receiving equipment.
 P241 Use explosion-proof electrical/ventilating/lighting/equipment.
 P242 Use only non-sparking tools.
 P243 Take precautionary measures against static discharge.
 P260 Do not breathe dust/fume/gas/mist/vapors/spray.
 P264 Wash thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P271 Use only outdoors or in a well-ventilated area.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P301+P310 If swallowed: Immediately call a poison center/doctor.
 P321 Specific treatment (see on this label).
 P330 Rinse mouth.
 P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 P308+P313 IF exposed or concerned: Get medical advice/attention.
 P312 Call a poison center/doctor if you feel unwell.
 P361+P364 Take off immediately all contaminated clothing and wash it before reuse.
 P370+P378 In case of fire: Use CO₂, powder or water spray to extinguish.
 P403+P233 Store in a well-ventilated place. Keep container tightly closed.
 P403+P235 Store in a well-ventilated place. Keep cool.
 P405 Store locked up.
 P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Classification system:**

- **NFPA ratings (scale 0 - 4)**



Health = 0
 Fire = 3
 Reactivity = 0

(Contd. on page 3)

- US -

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 2)

- **HMIS-ratings (scale 0 - 4)**

HEALTH	0	Health = *0
FIRE	3	Fire = 3
REACTIVITY	0	Reactivity = 0

- **Other hazards**
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**
- **Description:** Mixture of the substances listed below with nonhazardous additions.

- **Dangerous components:**

CAS: 67-56-1 RTECS: PC1400000	Methanol	99.9%
CAS: 33795-24-3 RTECS: GW1350000	S-(+)-Ketamine hydrochloride	0.1%

4 First-aid measures

- **Description of first aid measures**
- **General information:**
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing have been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.
- **After inhalation:**
Supply fresh air or oxygen; call for doctor.
In case of unconsciousness place patient stably in side position for transportation.
- **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
- **After swallowing:** Do not induce vomiting; immediately call for medical help.
- **Information for doctor:**
- **Most important symptoms and effects, both acute and delayed**
May cause anemia, cough, CNS depression, drowsiness, headache, heart damage, lassitude (weakness, exhaustion), liver damage, narcosis, reproductive effects, teratogenic effects.
No further relevant information available.
- **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:**
CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture**
67-56-1 During heating or in case of fire poisonous gases are produced.

(Contd. on page 4)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 3)

- **Advice for firefighters**
- **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
- **Environmental precautions:**
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.
- **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
- **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
- **Protective Action Criteria for Chemicals**

- **PAC-1:**

67-56-1	Methanol	530 ppm
---------	----------	---------

- **PAC-2:**

67-56-1	Methanol	2,100 ppm
---------	----------	-----------

- **PAC-3:**

67-56-1	Methanol	7200* ppm
---------	----------	-----------

7 Handling and storage

- **Handling:**
- **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
Prevent formation of aerosols.
- **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect against electrostatic charges.
Keep respiratory protective device available.
- **Conditions for safe storage, including any incompatibilities**
- **Storage:**
- **Requirements to be met by storerooms and receptacles:** Store in a cool location.
- **Information about storage in one common storage facility:** Not required.
- **Further information about storage conditions:**
Keep receptacle tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
- **Specific end use(s)** No further relevant information available.

US

(Contd. on page 5)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 4)

8 Exposure controls/personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Control parameters**
- **Components with limit values that require monitoring at the workplace:**
The following constituent is the only constituent of the product which has a PEL, TLV or other recommended exposure limit.
At this time, the remaining constituent has no known exposure limits.

67-56-1 Methanol

PEL	Long-term value: 260 mg/m ³ , 200 ppm
REL	Short-term value: 325 mg/m ³ , 250 ppm Long-term value: 260 mg/m ³ , 200 ppm Skin
TLV	Short-term value: 250 ppm Long-term value: 200 ppm Skin; BEI

- **Ingredients with biological limit values:**

67-56-1 Methanol

BEI	15 mg/L Medium: urine Time: end of shift Parameter: Methanol (background, nonspecific)
-----	---

- **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
- **Personal protective equipment:**
- **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
- **Breathing equipment:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
- **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

- **Material of gloves**

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

(Contd. on page 6)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 5)

- **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
- **Eye protection:**



Tightly sealed goggles

9 Physical and chemical properties

· Information on basic physical and chemical properties

· General Information

· Appearance:

Form:

Liquid

Color:

Colorless

· Odor:

Alcohol-like

· Structural Formula

C₁₃H₁₆ClNO • HCl

· Molecular Weight

274.2 g/mol

· Odor threshold:

Not determined.

· Formulation

A 1 mg/ml solution in methanol

· pH-value:

Not determined.

· Change in condition

Melting point/Melting range:

-98 °C (-144.4 °F)

Boiling point/Boiling range:

64.7 °C (148.5 °F)

· Flash point:

11 °C (51.8 °F)

· Flammability (solid, gaseous):

Not applicable.

· Ignition temperature:

455 °C (851 °F)

· Decomposition temperature:

Not determined.

· Auto igniting:

Product is not selfigniting.

· Danger of explosion:

Product is not explosive. However, formation of explosive air/vapor mixtures are possible.

· Explosion limits:

Lower:

5.5 Vol %

Upper:

44 Vol %

· Vapor pressure at 20 °C (68 °F):

128 hPa (96 mm Hg)

· Density at 20 °C (68 °F):

0.79 g/cm³ (6.59255 lbs/gal)

· Relative density

Not determined.

· Vapor density

Not determined.

· Evaporation rate

Not determined.

· Solubility in / Miscibility with

Water:

Fully miscible.

· Partition coefficient (n-octanol/water):

Not determined.

(Contd. on page 7)

US

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 6)

· Viscosity:	
Dynamic:	Not determined.
Kinematic:	Not determined.
· Solvent content:	
Organic solvents:	99.9 %
VOC content:	99.90 %
	999.0 g/l / 8.34 lb/gal
· Solids content:	0.1 %
· Other information	No further relevant information available.

10 Stability and reactivity

- **Reactivity** No further relevant information available.
- **Chemical stability**
- **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** reducing agents, oxidizing agents
- **Hazardous decomposition products:** carbon dioxide, carbon monoxide

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:**

- **LD/LC50 values that are relevant for classification:**

67-56-1 Methanol

Oral	LDLO	143 mg/kg (hmn)
	TDLO	5 ml/kg (rat)
	LD50	5,600 mg/kg (rat)
Dermal	LD50	15,800 mg/kg (rabbit)
	Inhalative	LC50/4 h
Irritation of skin	LC50	64,000 mg/m ³ (rat)
	Irritation	61,100 mg/m ³ /134 m (mouse)
Irritation of eyes	Irritation	20 mg/24h (rabbit)
	Irritation	(rabbit)
	Irritation	5.63 mg/kg/exempt preparation (rabbit)
	Irritation	40 mg (rabbit)
	Intraperitoneal TDLO	5 mg/kg (rat)
	Intraperitoneal LD50	10,765 mg/kg (mouse)
Subcutaneous LD50	Subcutaneous LD50	143 mg/kg/human (mouse)
	Data	20 mg/24h (rabbit)
33795-24-3 S-(+)-Ketamine hydrochloride		
	Subcutaneous TDLO	2.5 mg/kg (rat)
	Intraperitoneal TDLO	20 mg/kg (rat)

(Contd. on page 8)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 7)

- **Primary irritant effect:**
- **on the skin:** No irritant effect.
- **on the eye:** No irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Toxic

- **Carcinogenic categories**

- **IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

- **NTP (National Toxicology Program)**

None of the ingredients is listed.

- **OSHA-Ca (Occupational Safety & Health Administration)**

None of the ingredients is listed.

12 Ecological information

- **Toxicity**
- **Aquatic toxicity:** No further relevant information available.
- **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
- **Bioaccumulative potential** No further relevant information available.
- **Mobility in soil** No further relevant information available.
- **Additional ecological information:**
- **General notes:**
Water hazard class 2 (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to official regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

US

(Contd. on page 9)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 8)

14 Transport information

· **UN-Number**
· **DOT, IMDG, IATA** UN1230

· **UN proper shipping name**
· **DOT, IATA** Methanol solution
· **IMDG** METHANOL solution

· **Transport hazard class(es)**
· **DOT**



· **Class** 3 Flammable liquids
· **Label** 3, 6.1

· **IMDG**



· **Class** 3 Flammable liquids
· **Label** 3/6.1

· **IATA**



· **Class** 3 Flammable liquids
· **Label** 3 (6.1)

· **Packing group**
· **DOT, IMDG, IATA** II

· **Environmental hazards:** Not applicable.

· **Special precautions for user** Warning: Flammable liquids
· **Hazard identification number (Kemler code):** 336
· **EMS Number:** F-E,S-D
· **Stowage Category** B
· **Stowage Code** SW2 Clear of living quarters.

· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

· **Transport/Additional information:**

· **DOT**
· **Quantity limitations** On passenger aircraft/rail: 1 L
On cargo aircraft only: 60 L

(Contd. on page 10)

-US

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 9)

<ul style="list-style-type: none"> · IMDG · Limited quantities (LQ) · Excepted quantities (EQ) 	1L Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
--	---

<ul style="list-style-type: none"> · IATA · Remarks: 	When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.
--	---

<ul style="list-style-type: none"> · UN "Model Regulation": 	UN 1230 METHANOL SOLUTION, 3 (6.1), II
---	--

15 Regulatory information

- **Safety, health and environmental regulations/legislation specific for the substance or mixture**
No further relevant information available.

- **Sara**

- **Section 355 (extremely hazardous substances):**

None of the ingredients is listed.

- **Section 313 (Specific toxic chemical listings):**

67-56-1 | Methanol

- **TSCA (Toxic Substances Control Act):**

67-56-1 | Methanol

ACTIVE

- **Hazardous Air Pollutants**

67-56-1 | Methanol

- **Proposition 65**

- **Chemicals known to cause cancer:**

None of the ingredients is listed.

- **Chemicals known to cause reproductive toxicity for females:**

None of the ingredients is listed.

- **Chemicals known to cause reproductive toxicity for males:**

None of the ingredients is listed.

- **Chemicals known to cause developmental toxicity:**

67-56-1 | Methanol

- **Carcinogenic categories**

- **EPA (Environmental Protection Agency)**

None of the ingredients is listed.

- **TLV (Threshold Limit Value)**

None of the ingredients is listed.

- **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients is listed.

(Contd. on page 11)

Safety Data Sheet

acc. to OSHA HCS

Printing date 01/05/2022

Revision date 01/05/2022

Trade name: (R)-Ketamine (hydrochloride) (CRM)

(Contd. from page 10)

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

All chemicals may pose unknown hazards and should be used with caution. This SDS applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. Cayman Chemical Company assumes no responsibility for incidental or consequential damages, including lost profits, arising from the use of these data. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Cayman Chemical Company assumes no responsibility for the completeness or accuracy of the information contained herein.

· **Department issuing SDS:** Environment protection department.

· **Contact:** -

· **Date of preparation / last revision** 01/05/2022 / -

· **Abbreviations and acronyms:**

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

EINECS: European Inventory of Existing Commercial Chemical Substances

ELINCS: European List of Notified Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

VOC: Volatile Organic Compounds (USA, EU)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

PBT: Persistent, Bioaccumulative and Toxic

vPvB: very Persistent and very Bioaccumulative

NIOSH: National Institute for Occupational Safety

OSHA: Occupational Safety & Health

TLV: Threshold Limit Value

PEL: Permissible Exposure Limit

REL: Recommended Exposure Limit

BEI: Biological Exposure Limit

Flam. Liq. 2: Flammable liquids – Category 2

Acute Tox. 3: Acute toxicity – Category 3

Carc. 2: Carcinogenicity – Category 2

STOT SE 1: Specific target organ toxicity (single exposure) – Category 1