

Product Stewardship Summary

Effective date: 1 September 2019

Supersedes: 17 October 2016

2-Pyrrolidinone, 1-cyclohexyl-

General Statement

2-Pyrrolidinone, 1-cyclohexyl- is used in the electronics, textiles and specialty cleaner industries as a complexing agent, dispersion aid, solvent and surfactant. 2-Pyrrolidinone, 1-cyclohexyl- is a low to moderate hazard material and risk of adverse health effects associated with both occupational and consumer use of this chemical is anticipated to be low.

Chemical Identity

Name: 2-Pyrrolidinone, 1-cyclohexyl-

Brand Names: Not applicable

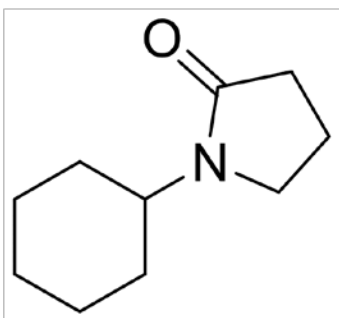
Chemical name (IUPAC): n-Cyclohexyl-2-pyrrolidone

CAS number(s): 6837-24-7

EC number: 229-919-7

Molecular formula: C₁₀H₁₇NO

Structure:



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Uses and Applications

2-Pyrrolidinone, 1-cyclohexyl- is used as a chemical intermediate, a solvent for cleaning, degreasing, or formulation of product or mixture.

Physical/Chemical Properties

Phys/Chem Safety Assessment

Property	Value
Form	Substance
Physical state	Liquid
Color	Clear
Odor	Characteristic
Density	1.026 g/cm ³ @ 25°C
Melting / boiling point	12°C / 284°C
Flammability	No data available
Explosive properties	No data available
Self-ignition temperature	No data available
Vapor pressure	<0.07 hPa @ 20°C
Mol weight	167.25 g/mol
Water solubility	Soluble
Flash point	145°C
Octanol-water partition coefficient (Logk _{ow})	2.16

Exposure, Hazard and Safety Assessment

The following section describes possible exposure scenarios and hazards associated with 1-cyclohexyl-2-pyrrolidone. The exposure assessment describes both the amount of and the frequency with which a chemical substance reaches a person, a population of people, or the environment. Hazard refers to the inherent properties of a substance that make it capable of causing harm to human health or the environment. The safety assessment reports the possibility of a harmful event arising from exposure to a chemical or physical agent under specific conditions. Just because a substance may possess potentially harmful properties does not mean that it automatically poses a risk. It is not possible to make that determination without understanding the nature of associated exposure.

Human Health Effects

Human Exposure Assessment

Consumer: 1-cyclohexyl-2-pyrrolidone is used in the electronics, textiles and the specialty cleaner industries as a complexing agent, dispersion aid, solvent and surface active. Consumer exposure is

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most likely limited to low levels of the residual chemical in consumer products as an artifact of the manufacturing process.

Worker: In industrial settings, 1-cyclohexyl-2-pyrrolidone is manufactured and handled in closed processes as much as possible, ensuring that worker exposure to 1-cyclohexyl-2-pyrrolidone is minimized. The proper use of personal protective equipment during loading, unloading, sampling or during maintenance operations, will further minimize potential exposures to 1-cyclohexyl-2-pyrrolidone.

Human Hazard Assessment

1-cyclohexyl-2-pyrrolidone has moderate oral and dermal acute toxicity. It is not associated with developmental toxicity and is not classified as to its carcinogenicity. 1-cyclohexyl-2-pyrrolidone is considered corrosive to both the skin and eyes.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Moderate toxicity following oral or dermal exposures.
Irritation / corrosion Skin / eye / respiratory test	Causes severe skin burns and eye damage. Causes serious eye damage.
Toxicity after repeated exposure Oral / inhalation / dermal	No data available.
Genotoxicity / Mutagenicity	Not genotoxic based on negative <i>in vitro</i> test
Carcinogenicity	Not classified based on available information.
Toxicity for reproduction	No adverse effect on development.

Human Health Safety Assessment

Consumer: Consumer exposure to 1-cyclohexyl-2-pyrrolidone is most likely limited to low levels of the residual chemical in consumer products which may remain as an artifact of the manufacturing process. Based on the low anticipated consumer exposure along with the toxicity profile for 1-cyclohexyl-2-pyrrolidone, consumer risk is considered unlikely.

Worker: In industrial settings, 1-cyclohexyl-2-pyrrolidone is manufactured and handled primarily in closed processes which limit exposure. Based on good manufacturing processes and industrial hygiene, the occupational health risk associated with 1-cyclohexyl-2-pyrrolidone is low.

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Environmental Effects

Environmental Exposures

1-Cyclohexyl-2-pyrrolidone is inherently biodegradable and has low potential for bioaccumulation. Based on its physical and chemical properties, 1-cyclohexyl-2-pyrrolidone will not evaporate from water surfaces and adsorption to solid soil phase is not expected.

Environmental Hazard Assessment

Effect Assessment	Result
Aquatic Toxicity	Low toxicity to fish, no toxicity data are available for aquatic invertebrates or algae.

Fate and behavior	Result
Biodegradation	Inherently biodegradable.
Bioaccumulation potential	Not potentially bioaccumulative ($\log K_{ow} = 2.16$).
PBT / vPvB conclusion	Not considered to be either PBT or vPvB.

Environmental Safety Assessment

1-Cyclohexyl-2-pyrrolidone is predominantly used in closed industrial processes. Therefore, emissions and subsequent environmental exposure to n-cyclohexyl-2-pyrrolidone are very low. If released into the environment, 1-cyclohexyl-2-pyrrolidone has low toxicity to fish, has a low potential for bioaccumulation, and is inherently biodegradable.

Risk Management Recommendations

Exposure to 1-cyclohexyl-2-pyrrolidone in the workplace can be controlled by sufficient ventilation, proper handling and storage techniques, and the use of appropriate personal protective equipment as recommended in the SDS. Consumer products that contain low levels of 1-cyclohexyl-2-pyrrolidone present within final product formulations should include applicable safety labeling and provide appropriate handling and disposal methods.

A selection of occupational exposure limits is presented below:

- No occupational exposure limits known.

Regulatory Agency Review

2-Pyrrolidinone, 1-cyclohexyl- is on the following lists:

Danish Environmental Protection Agency (DK-EPA) - Advisory List for Self-classification of Dangerous Substances

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ECHA - List of Pre-registered Substances

Environment Canada - Non-Domestic Substances List (NDSL)

EPA - Chemical Update System (CUS) - 2002

EPA - TSCA - Inventory

EU - European Inventory of Existing Commercial Substances (EINECS)

New Zealand - Inventory of Chemicals (NZIoC)

Philippine Inventory of Chemicals and Chemical Substances (PICCS)

Regulatory Information / Classification and Labeling

Under the Globally Harmonized System for classification and labeling (GHS), substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (Extended) SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

GHS Classification:

Acute toxicity (Oral), Category 4

Acute toxicity (Dermal), Category 4

Skin irritation, Category 2

Serious eye damage, Category 1

Hazard Statements:

H302+H312: Harmful if swallowed or in contact with skin.

H315: Causes skin irritation.

H318: Causes serious eye damage

Signal Word: Danger

Precautionary Statements:

P264: Wash skin thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

P280: Wear eye protection/ face protection/protective gloves/ protective clothing.

P301: IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.

P302: IF ON SKIN: Wash with plenty of soap and water. P312: Call a POISON CENTER or doctor/ physician if you feel unwell.

P305: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.

P332: If skin irritation occurs: Get medical advice/ attention.

P362: Take off contaminated clothing and wash before reuse.

P501: Dispose of contents/ container to an approved waste disposal plant.

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Hazard Pictograms:



Conclusion

1-Cyclohexyl-2-pyrrolidone is a useful chemical in the electronics, textiles and the specialty cleaner industries as a complexing agent, dispersion aid, solvent and surfactant. When handled responsibly, the potential for acute toxicity or skin and eye damage can be minimized, allowing consumers and workers to use materials containing 1-cyclohexyl-2-pyrrolidone safely.

Contact Information

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Additional Information

For more information on Product Stewardship at INEOS Composites, visit our website's Safety, Health and Environment (SHE) page: www.ineos.com/composites-she

For more information on GHS, visit <http://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf> or http://live.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.

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REACH registration is specific to Importers/Manufacturers that place the chemical on the EU market and is specific to registered uses. Inclusion on the list of REACH Registered Substances does not automatically imply registration by INEOS Composites.

Inclusion on the New Zealand Inventory of Chemicals applies only to the pure substance listed. The importer of record must determine whether their substances comply.