

## Product safety summary

### Caprolactam

#### CAS number

105-60-2

#### Chemical formula

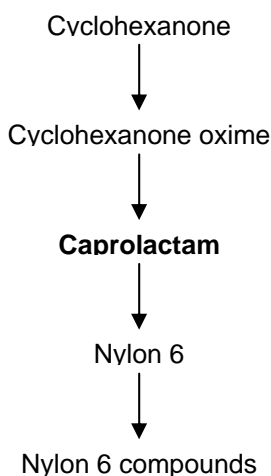
 $C_6H_{11}NO$ 

#### Introduction

DSM Fibre Intermediates, a Business Group of Royal DSM N.V., is a global leader in producing caprolactam with manufacturing facilities in the Netherlands, United States and China.

#### What is caprolactam?

Caprolactam is an [organic compound](#) consisting of carbon, nitrogen, oxygen and hydrogen. Most of the caprolactam is synthesized from [cyclohexanone](#) via an oximation process using [hydroxylammonium sulfate](#) followed by catalytic rearrangement using the [Beckmann rearrangement](#) process step. There are other, alternative, routes to produce caprolactam.



#### Use, storage and transport of caprolactam

Caprolactam is intended to be used by industrial manufacturing companies as a chemically reacted intermediate for other products. It is the raw material for Nylon-6. Nylon-6 is produced almost exclusively by hydrolytic polymerization of caprolactam. Nylon-6 is a highly versatile material that is used to make textile, floor coverings, industrial yarns, engineering plastics and films.

Nylon-6 is found in numerous applications ranging from conveyor belts, parachutes and lingerie to automotive air inlets and packaging for fresh food products.

Caprolactam in molten form is transported by rail and road. Caprolactam as solid flakes is transported over road and sea. Caprolactam is not classified and regulated as a chemical that is hazardous for transportation by the various global agencies that regulate transportation.

### Physical/chemical properties

Caprolactam is a stable white crystalline solid at 20°C. At that temperature the vapor pressure is low (<0.1 kPa). It has an unpleasant pungent odor. Caprolactam is highly soluble in water (4 560 g/l at 20°C).

### Health information

The key health effects after exposure of humans to caprolactam (fume/dust) is irritation of the eyes, skin and (when inhaled) respiratory system. Exposure to high doses of caprolactam e.g. while handling as a liquid (melting point: 69°C) may result in headaches, dizziness, drowsiness, nausea and unconsciousness.

Caprolactam has extensively been tested and evaluated in international programs. Based on all data available, no other adverse health effects are anticipated. Various regulatory agencies have reviewed the health effects and developed workplace airborne exposure limits. The ACGIH, for example, has established 5 mg/m<sup>3</sup> (time weighted average for working day) based upon respiratory irritation and classified caprolactam as 'not suspected as human carcinogen'.

### Environmental information

Caprolactam is readily biodegradable. If spilled in water damage to the ecosystem may occur due to rapid degradation resulting in extensive oxygen consumption.

Caprolactam has been shown to have a low order of toxicity to aquatic organisms. It has a low potential for bioaccumulation.

### Exposure potential

- **Workplace exposure**  
Caprolactam is used in closed processes. Occasionally exposure may take place e.g. during sampling. Transfer of caprolactam (charging/discharging) from/to vessels takes place at dedicated facilities.
- **Consumer exposure to products containing caprolactam**  
Caprolactam is used as a monomer in polymeric products for numerous applications. In the Nylon-6 process, it is completely reacted and not expected to be present in the products used by the consumer. Therefore exposure to consumers is negligible.
- **Environmental releases**  
Caprolactam emissions are subject to governmental regulations. Under normal conditions no release to the environment will occur. In case of incidental spillage to water, oxygen depletion due to biological degradation may occur.

### Risk management

The main risks in using caprolactam are related to exposure to fume or dust during the manufacturing process. Risk management is achieved by using closed systems, personal protective equipment and procedures.

In the waste water treatment caprolactam will be removed by biological degradation.

### Contact information

For further information on caprolactam or product safety summaries in general, please contact: [info.gps@dsm.com](mailto:info.gps@dsm.com)

**Revision) date**

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This product safety summary is intended to give general information about the chemical or categories of chemical addressed. It is not intended to provide an in-depth analysis of health and safety information. Additional information is available through the chemical's applicable Material Safety Data Sheet, which should be consulted before use of the chemical. This product safety summary does not supply or replace required regulatory and/or legal communication documents. All information contained herein is presented on an 'as is' basis and state of technology as per the issue date. The internet disclaimer is applicable ([http://en.dsm.mobi/pda\\_terms\\_eng.html](http://en.dsm.mobi/pda_terms_eng.html)).