

Adiponitrile

Chemical Identity

Brand names	Adiponitrile	CAS number	111-69-3
Chemical name (IUPAC)	Hexanedinitrile	Molecular formula	C ₆ H ₈ N ₂
Synonyms	ADN; 1-4-dicyanobutane	Molecular weight	108.2 g/mol

Applications

Adiponitrile is mainly used as an intermediate for the production of hexamethylenediamine which is used for the manufacture of polyamide 6-6.

Safety Assessment, Exposure and Risk Management Recommendations

Physical and chemical properties

Property	Result
Physical state	Liquid at room temperature
Colour	Colourless
Odour	Odourless
Relative density	0.97 g/cm ³ at room temperature
Boiling point	305.3°C at atmospheric pressure
Melting point range	-5 to 6°C at atmospheric pressure
Flash point	Non flammable
Vapour pressure	Low volatility
Water solubility	Readily soluble
Octanol water partition	No potential for bioaccumulation

Health effects



Adiponitrile causes adverse effects to human health by oral route and by inhalation. It must be handled under strictly controlled conditions, in accordance with REACH regulation for on-site isolated and transported intermediates, to preserve human health.

Environmental effects



Adiponitrile is readily biodegradable and has no potential for bioaccumulation. It is not classified as dangerous for the environment. Additionally, as it must be handled under strictly controlled conditions, in accordance with REACH regulation for on-site isolated and transported intermediates, the environment is not at risk.

Regulatory information and certifications

Classification and labelling

EU regulation (EC) 1272/2008 (CLP)



Acute toxicity, Oral, Cat. 3
Acute toxicity, Inhalation, Cat. 4

H301 Toxic if swallowed
H332 Harmful if inhaled

Danger

Registration and certification

ISO 9001: 2008 certified
EU regulation on chemicals (EC) 1907/2006 (REACH)

GPS Safety Summary

This Product Safety Summary is intended to provide a general overview of the chemical substance in the context of ICCA Global Product Strategy. The information on the Summary is basic information and is not intended to provide emergency response information, medical information or treatment information. The summary should not be used to provide in-depth safety and health information. In-depth safety and health information can be found on the (extended) Safety Data Sheet (e)SDS for the chemical substance.

Adiponitrile

General Statement

Adiponitrile is an organic compound. This substance is an important precursor for the synthesis of the polymer nylon 6-6.

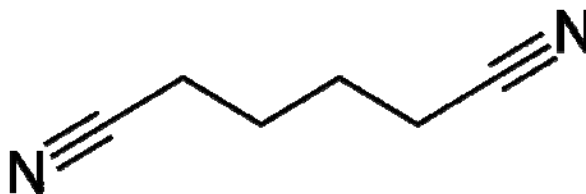
The pure substance may cause adverse effects to human health by inhalation and oral route. Used only in industry as an intermediate for chemical synthesis, it is handled under strictly controlled conditions (SCC), in accordance with REACH regulation for on-site isolated and transported intermediates, to preserve human health and environment.

Consumer exposure to adiponitrile is not expected.

Chemical Identity

Name:	Adiponitrile
Brand names:	Adiponitrile
Chemical name (IUPAC):	Hexanedinitrile
Synonyms:	ADN; 1,4-Dicyanobutane
CAS number(s):	111-69-3
EC number:	203-896-3
Molecular formula:	C ₆ H ₈ N ₂

Structure:



Uses and applications

Adiponitrile is mainly used as an intermediate for the chemical synthesis of hexamethylenediamine which is used for the production of polyamide 6-6, raw material for the fiber, plastic and textile industries.

Physical/Chemical Properties

Phys/Chem Safety Assessment

Property	Value
Physical state	Liquid at 20°C and atmospheric pressure
Colour	Colourless
Odour	Odourless
Molecular weight	108.2 g/mol
Relative density	0.97 g/cm ³ at 20°C
Melting point	-5 to 6°C at atmospheric pressure
Boiling point	305°C at atmospheric pressure
Flash point	163°C at atmospheric pressure
Explosive properties	Non explosive
Self-ignition temperature	475°C at atmospheric pressure
Vapour pressure	0.09 Pa at 25°C, low volatility
Water solubility	80 g/l at 20°C, readily soluble
Octanol Water partition coefficient (log Kow)	-0.32 at 25°C

Based on available data, adiponitrile is not classified regarding physical and chemical hazards, according to EU regulation (EC) 1272/2008.

Health Effects

Human Health Safety Assessment

Effect Assessment	Result
Acute Toxicity Oral/inhalation/dermal	Toxic if swallowed. Harmful by inhalation. Not classified for dermal acute toxicity.
Irritation / corrosion Skin/eye	Not irritating to skin. Slightly irritating to eyes, not resulting in classification.
Sensitisation	Not classified as skin sensitizer.
Toxicity after repeated exposure Oral/inhalation/dermal	Not classified based on test results by inhalation. No data for oral and dermal routes.
Genotoxicity / Mutagenicity	Neither mutagenic nor genetic effect, based on <i>in vitro</i> and <i>in vivo</i> tests results.
Carcinogenicity	No data available.
Toxicity for reproduction	No adverse effect observed on fertility and on development.

All these results are based on available data. Adiponitrile is classified as hazardous for health according to EU regulation (EC) 1272/2008 criteria.

Environmental Effects

Environment Safety Assessment

Effect Assessment	Result
Aquatic Toxicity	No effect for aquatic life up to 100 mg/L

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Not potentially bioaccumulative
PBT / vPvB conclusion	Not considered to be either PBT nor vPvB

Based on available data, adiponitrile is not classified as dangerous for the environment according to EU regulation (EC) 1272/2008.

Exposure

Adiponitrile is only used in industry. It is manufactured in a closed, continuous and automated process which ensures that the risk is controlled, and it is handled under strictly controlled conditions during its whole lifecycle in accordance with REACH regulation for on-site isolated and transported intermediates to avoid human and environment exposure.

Human health

During manufacturing and use, adiponitrile is handled under strictly controlled conditions, i.e. process, storage and handling operations are enclosed to avoid human exposure. Where there is a risk of exposure, during purification or cleaning and maintenance of equipment, special procedures are applied to minimize workers' exposure potential.

Environment

As adiponitrile is handled under strictly controlled conditions, emissions to the environment are very unlikely even in cases of accident.

Based on its physico-chemical properties, adiponitrile is water soluble and readily biodegradable, it has a low potential for bioaccumulation and for volatility.

Industrial aqueous releases that may contain the substance are recycled or directed to a specific on-site incineration unit, allowed to destroy hazardous chemical wastes in compliance with European legislation.

Risk Management Recommendations

Adiponitrile is manufactured and handled under strictly controlled conditions, in accordance with REACH regulation for on-site isolated and transported intermediates.

Human health

During its whole lifecycle including manufacture, purification, cleaning and maintenance of equipment, sampling, analysis, (un)loading, waste disposal or purification and storage, adiponitrile must be rigorously contained by technical measures. Workers must be trained and authorised to handle the substance and must refer to the Safety Data Sheet (SDS). Procedural and control technologies must be put in place to minimise emission and any resulting exposure. Special procedures such as purging and washing must be applied before the system is opened and entered for cleaning and maintenance.

Where there is a risk of exposure (during maintenance and cleaning activities and in case of accidents and incidents), appropriate Personal Protective Equipment (PPE) must be worn (safety goggles, gloves, protective suit, suitable respiratory equipment in case of insufficient ventilation) as recommended in the SDS.

General industrial hygiene measures are required to ensure safe handling of the substance: Emergency equipment immediately accessible; use well-maintained PPE; wash hands and skin immediately following contact; do not eat, drink or smoke at the workplace.

Environment

All industrial aqueous releases that may contain the substance are recycled or directed to an incineration unit allowed to destroy hazardous chemical wastes in compliance with European legislation.

Disposal, treatment or recycling of industrial waste must comply with applicable regulations to preserve environment.

State Agency Review

Adiponitrile has been registered under: EU regulation (EC) 1907/2006 (REACH)

Adiponitrile has been reviewed under the following regulatory and/or voluntary programmes: OECD list of High Production Volume Chemicals, published by UNEP in 2002

Regulatory Information / Classification and Labelling

Substance classification and labelling according to EU regulation (EC) 1272/2008 (CLP):

Classification

Acute toxicity, Oral, Category 3

Acute toxicity, Inhalation, Category 4

H301 Toxic if swallowed.

H332 Harmful if inhaled.

Labelling

Pictogram:



Signal word:

Danger

Hazard statements:

H301 Toxic if swallowed
H332 Harmful if inhaled

Precautionary statements:

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.

Contact Information within Company

For further information on this substance or Product Safety Summaries in general, please contact:

Rhodia Global Product Strategy: http://www.rhodia.com/en/sustainability/global_product_strategy/index.tcm

Contact: globalproductstrategy@eu.rhodia.com

Additional Information

ICCA Global Product Strategy: <http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

(extended) Safety Data Sheet available on demand: http://www.rhodia.com/en/contact/contact_form_business.tcm

Glossary of technical terms: http://www.rhodia.com/en/sustainability/global_product_strategy/glossary/index.tcm

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Disclaimer

The information provided in the present Safety Summary is based on European data available in REACH regulatory dossier (EC N°1907/2006) and is correct to the best of our knowledge, information and belief at the date of its publication. Such information is only intended to provide a general overview of the chemical substance in the context of ICCA Global Product Strategy and is not to be considered as a warranty or quality specification. It does not replace the safety data sheet and technical sheets. Thus, the information provided in this Safety Summary only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.