

## GPS Safety Summary

**Substance Name:**

### 2-(Dimethylamino)ethyl acrylate

#### 1. General Statement

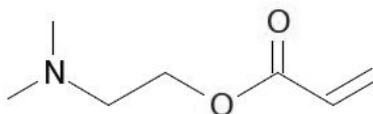
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2-(Dimethylamino)ethyl acrylate is a chemical intermediate mostly converted into other intermediates: quaternary ammonium salts. The resulting materials are ingredients used in water treatment.

#### 2. Chemical Identity

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<b>Name:</b>	2-(Dimethylamino)ethyl acrylate
<b>Brand name:</b>	NORSOCRYL <sup>®</sup> ADAME
<b>Chemical name (IUPAC):</b>	2-(dimethylamino)ethyl prop-2-enoate
<b>CAS number:</b>	2439-35-2
<b>EC number:</b>	219-460-0
<b>Molecular formula:</b>	C <sub>7</sub> H <sub>13</sub> NO <sub>2</sub>
<b>Structure:</b>	



#### 3. Use and applications

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2-(Dimethylamino)ethyl acrylate is industrially manufactured and used as a chemical intermediate under strictly controlled conditions. Most of it is converted to quaternary ammonium salts which are used in the manufacture of homo- and copolymers (mainly with acrylamide) to produce cationic polymer flocculants for water treatment and paper industries.

2-(Dimethylamino)ethyl acrylate is not sold to consumers.

#### 4. Physical / Chemical properties

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2-(Dimethylamino)ethyl acrylate is a combustible, liquid organic substance with the following physicochemical properties:

Property	Value
Physical state	Liquid at 20°C and 1013 hPa
Colour	Colourless to clear yellowish
Odour	Pungent
Molecular weight	143 g/mol
Density	0.938 g/cm <sup>3</sup> at 20°C
Vapour pressure	1 hPa at 19.1°C

Freezing / boiling points	< -61°C / 172.8°C at 1013 hPa
Flash point – flammability	60.5°C – combustible liquid
Self-ignition temperature	195°C at 1013 hPa
Explosive / oxidizing properties	Not expected based on structure
Water solubility	High: $\geq$ 240 g/L at 20°C, indicative due to hydrolysis
Dissociation constant (pK <sub>a</sub> )	8.41 (calculated), indicative due to hydrolysis
Octanol-water partition coefficient (Log K <sub>ow</sub> )	0.68 at 25°C and pH 8.5, indicative since basic pH implies very rapid hydrolysis

## 5. Health Effects

2-(Dimethylamino)ethyl acrylate is a hazardous chemical which should be handled with care.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Harmful if swallowed. It may result in gastrointestinal irritation or ulceration. Toxic in contact with skin. Fatal if inhaled.
Irritation / corrosion Skin / eye/ respiratory tract	Corrosive to skin and eyes.
Sensitisation	May cause an allergic skin reaction: strong sensitising potential by skin contact.
Toxicity after repeated exposure Oral / inhalation / dermal	The predominant effect is local irritation. Does not cause toxicity to internal organs after repeated exposure in animal studies.
Genotoxicity / Mutagenicity	The substance was not mutagenic in bacteria, but was mutagenic in various cell culture test systems; however, these results could not be confirmed in tests with mammals.
Carcinogenicity	No data available.
Reproductive / Developmental Toxicity	Did not cause reproductive effects in laboratory animals. Animal studies gave no indication of a developmental toxic effect at doses that were not toxic to the parental animals.

## 6. Environmental Effects

In aquatic organisms, 2-(Dimethylamino)ethyl acrylate is very toxic to algae. For fish and invertebrates, it is toxic after short-term exposure and harmful after long-term exposure. Due to the hydrolysis described below, these data also reflect the ecotoxicity of degradation products.

At basic pH, rapid hydrolysis (half-life of 2.2 h at pH 8.3) occurs, leading to the production of acrylic acid and 2-dimethylaminoethanol. At neutral or acid pH, hydrolysis is slower (half-life of 12.5 h at pH 7) and at pH = 7 the substance predominates under its charged form due to the indicative pK<sub>a</sub> value of 8.41. 2-(Dimethylamino)ethyl acrylate is unlikely to persist in the environment, being subject to hydrolysis at environmental pH values and to ready biodegradation. The hydrolysis products are themselves readily biodegradable. At acid or neutral pH, charged 2-(Dimethylamino)ethyl acrylate is expected to bind to soil and sediment (log K<sub>oc</sub> = 3.15-3.82 at pH 5-7).

If released to air, photochemical degradation is expected to occur within days. It is not expected to accumulate in the food chain, i.e., the bioaccumulative potential is low due to low octanol-water partition coefficient ( $\log K_{ow} = 0.68$  – indicative due to very rapid hydrolysis).

Effect Assessment	Result
Aquatic Toxicity	Acute: very toxic. Chronic: harmful.

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Not expected to bioaccumulate
PBT / vPvB conclusion	Not considered to be PBT* or vPvB**

\*: Persistent, Bioaccumulative and Toxic (PBT)

\*\* : very Persistent and very Bioaccumulative (vPvB)

## 7. Exposure

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### 7.1 Human health

#### **Consumers:**

Consumers are not directly exposed to 2-(Dimethylamino)ethyl acrylate because it is transformed in several steps before exposure to consumers could occur via water or paper.

Indirect exposure via the environment is negligible due to the biodegradability and low bioaccumulative potential.

#### **Workers:**

2-(Dimethylamino)ethyl acrylate is industrially manufactured and used almost entirely within closed systems, under strictly controlled conditions, thus minimizing the occupational exposure potential.

Procedures, controls, collective and personal risk management measures are in place, which limit the occupational exposure. Workers who might accidentally come into contact with the undiluted substance should follow the safety measures recommended in the Extended Safety Data Sheet.

When used under strictly controlled conditions as recommended in the Safety Data Sheet (see Chap. 8), exposure is negligible and thus risks are acceptable.

### 7.2 Environment

2-(Dimethylamino)ethyl acrylate is industrially manufactured and used in closed systems in a continuous or batch process and consumed when used as an intermediate, minimizing release to the environment.

Procedures, controls and risk management measures are in place, which limit the environmental exposure.

If accidentally released to the environment, 2-(Dimethylamino)ethyl acrylate would transiently partition to water (where it would be degraded in sewage treatment plants and by hydrolysis) and then to some extent to soil and sediments. It would not move to the atmosphere due to the low volatility.

When used under strictly controlled conditions as recommended in the Safety Data Sheet (see Chap. 8), exposure is negligible and thus risks are acceptable.

## 8. Risk Management recommendations

Human health measures	
<b>Organizational</b>	Only use for the purpose of chemical transformation (intermediate).* Implement high standards of occupational hygiene.* Ensure operatives are well informed of the hazards and trained to minimise exposures.* Maintain clear and up-to-date handling procedures and control their application.* Collect the latest available Safety Data Sheet. Handle and store according to the indications of the Safety Data Sheet.
<b>Engineering controls</b>	Manufacture and use in rigorously contained (closed) systems.* Use material of high integrity for loading and unloading.* Reduce exposures to a minimum and ensure their regular monitoring.* Provide appropriate local exhaust ventilation at points of emission.* Purge and ventilate systems before cleaning/maintenance worker entry.* Should be handled in well ventilated areas. Prevention of combustion and unscheduled polymerisation should be in place. Ensure that eye- and handwash stations and safety showers are close to workstation locations.
<b>Protection</b>	<b>Eye/Face protection:</b> Tightly fitting safety goggles
	<b>Skin protection:</b> Protective suit
	<b>Hand protection:</b> Neoprene gloves tested to EN374
	<b>Respiratory protection:</b> Respirator if ventilation is insufficient <b>or when opening systems.*</b>
Environment protective measures	
Do not release into the environment. Do not let product enter drains. Treat or incinerate any waste. Incinerate sludge.*	

\*: Taken together, these specific risk management measures enable to respect strictly controlled conditions of manufacture and use along the whole life-cycle.

## 9. Regulatory Information / Classification and Labelling

### 9.1 Regulatory Information

This substance has notably been registered and assessed under:

- EU Regulation EC 1907/2006 (REACH)
- OECD SIDS (Screening Information Data Set) program

### 9.2 Classification and labelling

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. 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. Substances registered for REACH are classified according to CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification	
<ul style="list-style-type: none"> <li>– Acute toxicity - Inhalation: Category 1.</li> <li>– Acute toxicity - Dermal: Category 3.</li> <li>– Acute toxicity - Oral: Category 4.</li> <li>– Skin corrosion: Category 1B.</li> <li>– Serious eye damage: Category 1.</li> <li>– Skin sensitization: Category 1A.</li> <li>– Acute aquatic toxicity: Category 1.</li> <li>– Chronic aquatic toxicity: Category 3.</li> </ul>	
Signal word	
Danger	
Pictograms	
– GHS05: Corrosion	
– GHS06: Skull and crossbones	
– GHS09: Environment	
Hazard statements	
<ul style="list-style-type: none"> <li>– H330: Fatal if inhaled.</li> <li>– H311: Toxic in contact with skin.</li> <li>– H302: Harmful if swallowed.</li> <li>– H314: Causes severe skin burns and eye damage.</li> <li>– H317: May cause an allergic skin reaction.</li> <li>– H400: Very toxic to aquatic life.</li> <li>– H412: Harmful to aquatic life with long lasting effects.</li> </ul>	
Additional classification according to Globally Harmonized System (GHS)	
<ul style="list-style-type: none"> <li>– Flammable liquids: Category 4; Combustible liquid.</li> <li>– Specific target organ toxicity - single exposure (inhalation): Category 3; May cause respiratory irritation.</li> </ul>	

## 10. Contact Information within Company

For further information on this substance or product safety summary in general, please contact:

- **ICCA portal where the GPS Safety Summary is posted:**  
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>
- Arkema-acrylics-reach-uses@arkema.com

## 11. Date of Issues / Revision

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- Date of issue: 2012-08-30
- Date of revision:

## 12. Disclaimer

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The information contained in this paper is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information currently available, is to be relied upon at the user's own risk.

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