



# 2,2,2-trifluoroethanol

## Chemical Identity

<i>Brand names</i>	<b>2,2,2-trifluoroethanol</b>	<i>CAS number</i>	<b>75-89-8</b>
<i>Chemical name (IUPAC)</i>	<b>2,2,2-trifluoroethanol</b>	<i>Molecular formula</i>	<b>CF<sub>3</sub>CH<sub>2</sub>OH</b>
<i>Synonyms</i>	<b>TFE; 2,2,2-trifluoroethanol</b>	<i>Molecular weight</i>	<b>100.05 g/mol</b>

## Applications

Trifluoroethanol (TFE) is used in industry, as an intermediate for chemical synthesis of agrochemicals and pharmaceuticals.

## Safety Assessment, Exposure and Risk Management Recommendations

### Physical and chemical properties

Property	Result
Physical state	Liquid
Colour	Colourless
Odour	Characteristic
Melting point	- 43.7°C
Boiling point range	74°C
Density	1.38
Water solubility	Readily soluble
Octanol water partition	Low potential for bioaccumulation

### Health effects



TFE causes adverse effects to human health at short term or after repeated exposure. 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



TFE is soluble in water but not readily biodegradable. It has a low potential for bioaccumulation and 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)	
	Flammable liquids, Cat. 3 H226 Flammable liquid and vapour.
	Acute toxicity, Oral, Cat.3 Acute toxicity, Inhalation, Cat.3 H301 Toxic if swallowed. H331 Toxic if inhaled.
	Serious eye damage, Cat. 1 H318 Causes serious eye damage.
	Reproductive toxicity, Cat.1B Specific target organ toxicity repeated exposure, Cat. 2, Blood H360F: May damage fertility. H373 May cause damage to organs through prolonged or repeated exposure.
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.*

# 2,2,2-trifluoroethanol

## General Statement

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Trifluoroethanol (TFE) is an intermediate for organic synthesis of pharmaceuticals and agrochemicals.

TFE is a dense and fluid colourless liquid with a characteristic odour. It is fully miscible in water, where it will not dissociate nor be degraded. The substance has a low potential for bioaccumulation and is not considered as hazardous to aquatic organisms.

TFE is considered as a Volatile Organic Compound and it is classified as a flammable liquid.

The pure substance may cause adverse effects to human health at short term or after repeated exposure. It is a severe eye irritant, may have a toxic effect if inhaled or swallowed and may damage fertility.

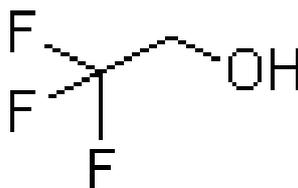
The substance is only intended for industrial use and is handled under strictly controlled conditions (SCC) in accordance with REACH regulation for on-site isolated and transported intermediates to control the risk of exposure and preserve human health and environment. Consumer exposure to TFE is not expected.

## Chemical Identity

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<b>Name:</b>	2,2,2-trifluoroethanol (TFE)
<b>Brand names:</b>	2,2,2-trifluoroethanol
<b>Chemical name (IUPAC):</b>	2,2,2-trifluoroethanol
<b>Synonyms:</b>	TFE; Trifluoroethanol
<b>CAS number(s):</b>	75-89-8
<b>EC number:</b>	200-913-6
<b>Molecular formula:</b>	CF <sub>3</sub> CH <sub>2</sub> OH

### Structure:



## Uses and applications

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TFE is an intermediate for chemical synthesis of pharmaceuticals and agrochemicals, produced and used only in industry.

Final products are designed for the markets of crop protection and animal nutrition, electrical and electronics, health, personal and home care and also industry and processing.

## Physical/Chemical Properties

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### Phys/Chem Safety Assessment

Property	Value
Physical state	Liquid at 20°C and atmospheric pressure
Colour	Colourless
Odour	Characteristic
Molecular weight	100.05 g/mol
Relative density	1.383 at 25°C
Melting Point range	- 43.7°C at atmospheric pressure
Boiling Point range	74°C at atmospheric pressure
Flash point	30°C (closed cup), flammable
Autoignition temperature	450°C
Explosive properties	No potential
Vapour pressure	7.1 kPa at 20°C, volatile organic compound
Water solubility	1000 g/l at 25°C, fully miscible
Octanol Water partition coefficient (log Kow)	≤ 0.3 at 25°C, low potential for bioaccumulation

Based on available data, trifluoroethanol is considered as a volatile organic compound, it is fully miscible in water and not potentially bioaccumulative. It is classified as flammable regarding physical and chemical hazards in accordance to EU regulation (EC) 1272/2008 criteria.

## Health Effects

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### Human Health Safety Assessment

Effect Assessment	Result
Acute Toxicity Oral/inhalation/dermal	Toxic if inhaled and if swallowed. Not classified by dermal route based on available data.
Irritation / corrosion Skin/eye	Slightly irritating to the skin not resulting in classification. Causes serious eye damage.
Sensitisation	Not classified for skin sensitisation based on available data.
Toxicity after repeated exposure Oral/inhalation/dermal	May cause damage to organs (blood) through repeated exposure by inhalation. No data available by oral and dermal route.
Genotoxicity / Mutagenicity	Neither mutagenic nor genotoxic based on <i>in vitro</i> tests results.
Carcinogenicity	No data available.

Toxicity for reproduction	May damage fertility: testicular damages obviously conducted to a decrease of the male fertility <i>via</i> a spermiogenesis alteration, based on <i>in vivo</i> tests results on rats, by inhalation and oral route of exposure.
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All these results are based on available data. TFE is classified as hazardous for health according to EU regulation (EC) 1272/2008 criteria.

## Environmental Effects

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### Environment Safety Assessment

Effect Assessment	Result
Aquatic Toxicity	Not hazardous to fish, algae and invertebrates.

Fate and behaviour	Result
Biodegradation	Not readily biodegradable.
Bioaccumulation potential	Not potentially bioaccumulative (Log Kow ≤ 0.3).
PBT / vPvB conclusion	Not considered to be either PBT or vPvB.

Trifluoroethanol is fully miscible in water where it will not biodegrade. It is not dangerous for aquatic organisms and has no potential for bioaccumulation, therefore it is not classified as dangerous for aquatic environment according to EU regulation (EC) 1272/2008 criteria.

## Exposure

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TFE is only used in industry. It is manufactured in a closed, continuous and automated process which ensures that the risk is controlled, and it must be handled under strictly controlled conditions, in accordance with REACH regulation for on-site isolated and transported intermediates, to control the risk of exposure and preserve human health and environment.

### Human health

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

### Environment

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

Trifluoroethanol is considered as a Volatile Organic Compound, but is also fully miscible in water, where it will not dissociate nor be biodegraded. The substance has a low potential for bioaccumulation.

Industrial releases that may contain the substance are directed to incineration.

## **Risk Management Recommendations**

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TFE must be 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, TFE 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 or incidents), appropriate Personal Protective Equipment (PPE) must be worn as recommended in the SDS (tightly fitting safety goggles, appropriate gloves and boots, appropriate suit and respiratory protection when necessary).

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

### **Environment**

All industrial releases that may contain the substance must be directed to incineration, in compliance with regulatory requirements.

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

## **State Agency Review**

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TFE has been registered under EU regulation (EC) 1907/2006 (REACH).

## **Regulatory Information / Classification and Labelling**

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

### **Classification**

Flammable liquids, Category 3	H226 Flammable liquid and vapour.
Acute toxicity, Oral, Category 3	H301 Toxic if swallowed.
Acute toxicity, Inhalation, Category 3	H331 Toxic if inhaled.
Serious eye damage, Category 1	H318 Causes serious eye damage.
Reproductive toxicity, Category 1B	H360F May damage fertility.
Specific target organ toxicity - repeated exposure, Category 2, Blood	H373 May cause damage to organs through prolonged or repeated exposure.

## Labelling

Pictogram:



Signal word: Danger

Hazard statements:

H226 Flammable liquid and vapour.  
H301 Toxic if swallowed.  
H331 Toxic if inhaled.  
H318 Causes serious eye damage.  
H360F May damage fertility.  
H373 May cause damage to organs (Blood) through prolonged or repeated exposure.

Precautionary statements:

P201 Obtain special instructions before use.  
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
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.  
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P308 IF exposed or concerned:  
P310 Immediately call a POISON CENTER or doctor/ physician.  
P403 + P235 Store in a well-ventilated place. Keep cool.

## Contact Information within Company

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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](http://www.rhodia.com/en/sustainability/global_product_strategy/index.tcm)

Contact: [globalproductstrategy@eu.rhodia.com](mailto:globalproductstrategy@eu.rhodia.com)

## Additional Information

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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](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](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.