

## GPS Safety Summary



# Trifluoroacetic acid

## Chemical Identity

<i>Brand names</i>	<b>Trifluoroacetic acid</b>	<i>CAS number</i>	<b>76-05-1</b>
<i>Chemical name (IUPAC)</i>	<b>2,2,2-trifluoroacetic acid</b>	<i>Molecular formula</i>	<b>CF<sub>3</sub>COOH</b>
<i>Synonyms</i>	<b>TFA; Trifluoroethanoic acid; Perfluoroacetic acid</b>	<i>Molecular weight</i>	<b>114.02 g/mol</b>

## Applications

TFA 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 to pale yellow
Odour	Pungent
Melting point	- 15.3°C
Boiling point	72.2°C
Density	1.52
Water solubility	Readily soluble
Octanol water partition	Low potential for bioaccumulation

### Health effects



TFA may cause severe skin burns and eye damage and may be harmful by inhalation. Stringent safety measures must be respected for industrial uses. For more details, please refer to the Safety Data Sheet.

### Environmental effects



TFA is considered as harmful to aquatic life with long lasting effects, any release must be avoided. All industrial emissions and disposal, treatment or recycling must comply with applicable regulations to preserve the environment.

## Regulatory information and certifications

### *Classification and labelling*



Skin corrosion, Cat. 1A	H314 Causes severe skin burns and eye damage.
Acute toxicity, Inhalation, Cat. 4	H332 Harmful if inhaled.
Chronic aquatic toxicity, Cat. 3	H412 Harmful to aquatic life with long lasting effects.

Danger

### **EU regulation (EC) 1272/2008 (CLP)**

### *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.*

# Trifluoroacetic acid

## General Statement

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Trifluoroacetic acid (TFA) is a strong carboxylic acid, widely used in organic chemistry.

TFA is an important building block in the synthesis of pharmaceuticals, agrochemicals and performance products.

TFA is a liquid substance, colourless to pale yellow and with a pungent odour.

Trifluoroacetic acid is a strong acid, it may cause irreversible skin burns and eye damage and vapours may cause an irritation of the upper respiratory tract.

TFA is harmful to aquatic environment with long lasting effects; any release to the environment must be avoided.

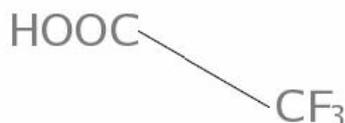
The pure substance is only used in industry or for professional purpose; it must be handled under stringent safety conditions at the workplaces, in accordance with the risk management measures to control the risk of exposure and preserve human health and environment. Consumer exposure to TFA is not expected.

## Chemical Identity

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<b>Name:</b>	Trifluoroacetic acid (TFA)
<b>Brand names:</b>	Trifluoroacetic acid
<b>Chemical name (IUPAC):</b>	2,2,2-trifluoroacetic acid
<b>Synonyms:</b>	TFA; Trifluoroethanoic acid; Perfluoroacetic acid
<b>CAS number:</b>	76-05-1
<b>EC number:</b>	200-929-3
<b>Molecular formula:</b>	$C_2HF_3O_2$

### Structure:



## Uses and applications

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TFA is only used for industrial or professional purpose, as a reagent for chemical synthesis of pharmaceuticals and agrochemicals. It is a reagent of choice for peptide synthesis. It is widely used as a solvent and as a catalyst for polymerization and condensation reactions. It is also used in the manufacture of high performance coatings, in surface treatment of glass and as a laboratory chemical.

## Physical/Chemical Properties

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### Phys/Chem Safety Assessment

Property	Value
Physical state	Liquid at 20°C and atmospheric pressure Strongly hygroscopic fumes in contact with air
Colour	Colourless to pale yellow
Odour	Pungent
Molecular weight	114.02 g/mol
Relative density	1.52 at 20°C
Melting point range	- 15.3°C at atmospheric pressure
Boiling point range	72.2°C at atmospheric pressure
Flash point	No flash point (evaporated at 100°C), non flammable
Vapour pressure	12.4 kPa at 20°C, volatile organic compound
Water solubility	1520 g/l at 20°C, fully miscible
Octanol Water partition coefficient (log Kow)	0.79 at 25°C, low potential for bioaccumulation

Based on available data, TFA is considered as a volatile organic compound, it is fully miscible in water and not potentially bioaccumulative. No physical hazards are anticipated except a very acidic pH that may lead to corrosive effects.

TFA is not classified regarding physical and chemical hazards, in accordance with EU regulation (EC) 1272/2008 criteria.

## Health Effects

### Human Health Safety Assessment

Effect Assessment	Result
Acute Toxicity Oral/inhalation/dermal	Harmful if inhaled TFA is corrosive, it is not justified to study effects on dermal and oral routes
Irritation / corrosion Skin/eye	Causes severe skin burns and eye damage
Sensitisation	Not classified for skin sensitisation by analogy with other fluorinated substances
Toxicity after repeated exposure Oral/inhalation/dermal	TFA is corrosive, it is not justified to study effects after repeated exposure
Genotoxicity / Mutagenicity	Neither mutagenic nor genotoxic activity potential by analogy with sodium trifluoroacetate based on <i>in vitro</i> tests results
Carcinogenicity	No data available
Toxicity for reproduction	TFA is corrosive, it is not justified to study effects on reproduction. No effect expected based on the chemical structure and on related substances conclusive data.

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

## Environmental Effects

### Environment Safety Assessment

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

Fate and behaviour	Result
Biodegradation	Neither readily nor inherently biodegradable
Bioaccumulation potential	Not potentially bioaccumulative (Log Kow = 0.79)
PBT / vPvB conclusion	Not considered to be either PBT or vPvB

Studies show that TFA causes growth inhibition to one algae species. It is found hazardous neither to any other algae species nor to invertebrate and fish.

TFA was found to be highly resistant to degradation, coupled with its extreme chemical stability, these results suggest a very long lifetime of the substance in the environment. TFA is considered as very Persistent (vP) in the environment and it is classified as harmful to aquatic life with long lasting effects, according to EU regulation (EC) 1272/2008 criteria.

TFA has no potential of causing lethal effect on aquatic organisms, so it does not fulfill the Toxic criteria (T). In addition, TFA has a low potential for Bioaccumulation (B), therefore TFA is not considered to be either PBT or vPvB.

## Exposure

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Exposure assessment is based on overall releases that may occur during a given lifecycle stage of the substance. The potential of the effects on human health and on environment is considered in the risk assessment and the risk of exposure is controlled from manufacture to industrial or professional use (synthesis intermediate, solvent, laboratory chemical) by appropriate risk management measures.

### Human health

TFA is manufactured and used in industry, in a closed, continuous and automated process which minimizes the workers exposure potential. However where there is a risk of workers exposure, particularly in batch processes, during sampling, analysis or maintenance operations, it is kept at a safe and controlled level by the use of appropriate risk management measures as suitable collective and personal protective equipment, good industrial hygiene practices and risk communication through appropriate training of workers.

### Environment

As trifluoroacetic acid (TFA) is a strong organic acid, it will be under dissociated form in all environmental compartments. TFA was found to be highly resistant to abiotic and biotic degradation and coupled with its extreme chemical stability, these results suggest a very long lifetime for TFA in the environment. TFA does not accumulate significantly in lower aquatic life forms such as bacteria, algae, small invertebrates, oligochaete worms and some aquatic and terrestrial plants. With such results and because TFA is totally miscible in water, if it is released in effluent, the main environmental compartment will be water, rather than air, ground or biota.

TFA substance is classified as harmful to aquatic life with long lasting effects, therefore any release to the environment must be avoided.

On industrial and professional sites aqueous releases are neutralised and releases that may contain the substance are directed to incineration.

## Risk Management Recommendations

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Trifluoroacetic acid is used only in industry; recommendations are based on the risk assessment to preserve human health and environment.

### Human health

For industrial and professional uses of TFA and as recommended for the use of any chemical product, workers must be well informed and trained and must refer to the (extended) Safety Data Sheet (eSDS).

Where there is a risk of exposure to TFA (during (un)loading, sampling, analysis or maintenance operations), it must be controlled by handling the substance under an adequate ventilation with an effective exhaust ventilation system. Contact with skin and eyes and breathing of vapours must be avoided, appropriate Personal Protective Equipment (PPE) must be worn as recommended in the (e)SDS (safety goggles and face shield, appropriate gloves and boots, full protective suit). In case of insufficient ventilation, a respirator with approved filter must be used.

General industrial hygiene measures must be respected 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

TFA is harmful to the aquatic environment with long lasting effects, therefore any release into the environment must be avoided. All industrial aqueous effluents must be neutralised and other 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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TFA 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

Acute toxicity, Inhalation, Category 4  
Skin corrosion, Category 1A  
Aquatic chronic toxicity, Category 3

H332 Harmful if inhaled.  
H314 Causes severe skin burns and eye damage.  
H412 Harmful to aquatic life with long lasting effects.

### Labelling

Pictogram:



Signal word:

Danger

Hazard statements:

H332 Harmful if inhaled.  
H314 Causes severe skin burns and eye damage.  
H412 Harmful to aquatic life with long lasting effects.

Precautionary statements:

P271 Use only outdoors or in a well-ventilated area.  
P280 Wear protective gloves/protective clothing/eye protection/face protection.  
P310 Immediately call a POISON CENTER or doctor/physician.  
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.  
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P273 Avoid release to the environment.

## 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.