CITROFOL® AI (Regular / Extra / Pharma)

Version 1.2 US / EN	Revision Date: 12/22/2022	SDS Number: 100000000014	Date of last issue: 08/10/2020 Date of first issue: 02/28/2018

SECTION 1. IDENTIFICATION

Product name	:	CITROFOL® AI (Regular / Extra / Pharma)
Substance name	:	Triethyl citrate
Molecular formula	:	C12-H20-O7
Chemical identity	:	1,2,3-Propanetricarboxylic acid, 2-hydroxy-, triethyl ester
CAS-No.	:	77-93-0
Chemical nature	:	Liquid

Manufacturer or supplier's details

Details of the supplier of the safety data sheet

Company	:	Jungbunzlauer Inc. 95 Wells Avenue, Suite 150 Newton, Massachusetts 02459 USA www.jungbunzlauer.com
Telephone	:	+1 617 969-0900
Telefax	:	+1 617 964-2921
E-mail address	:	msds@jungbunzlauer.com
Responsible/issuing person		

Emergency telephone number

National Chemical Emergency Centre (NCEC)
+1 202 464 2554

Recommended use of the chemical and restrictions on use

Recommended use	:	Industrial use Building and construction work Polymer preparations and compounds Plasticiser Raw materials for paint Food additive Perfumes, fragrances Cosmetics, personal care products Pharmaceutical raw material Use in agriculture
Restrictions on use	:	None known.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Hazards Not Otherwise Classified

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture	:	Substance
Chemical nature	:	Liquid
Substance name	:	Triethyl citrate
CAS-No.	:	77-93-0

SECTION 4. FIRST AID MEASURES

General advice	:	Do not leave the victim unattended.
If inhaled	:	If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.
In case of skin contact	:	In case of contact, immediately flush skin with plenty of water.
In case of eye contact	:	Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. If eye irritation persists, consult a specialist.
If swallowed	:	Keep respiratory tract clear. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.
Most important symptoms and effects, both acute and delayed	:	No information available. None known.
Notes to physician	:	Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Water spray Dry powder Foam Carbon dioxide (CO2)
Unsuitable extinguishing media	:	none
Hazardous combustion products	:	Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).
Further information	:	Standard procedure for chemical fires. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. In the event of fire and/or explosion do not breathe fumes.
Special protective equipment for firefighters	:	Wear fire resistant or flame retardant clothing. Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Avoid contact with eyes. Avoid inhalation of vapour or mist. Ensure adequate ventilation, especially in confined areas. Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Wipe up with absorbent material (e.g. cloth, fleece). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Advice on safe handling	:	For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area.
Conditions for safe storage	:	Electrical installations / working materials must comply with the technological safety standards.
Materials to avoid	:	No materials to be especially mentioned.
Further information on storage stability	:	No decomposition if stored and applied as directed.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection	:	No personal respiratory protective equipment normally required. In the case of vapour formation use a respirator with an approved filter. Use NIOSH approved respiratory protection.
Hand protection Remarks	:	Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer.
Eye protection	:	Safety glasses
Skin and body protection	:	Protective suit
Hygiene measures	:	General industrial hygiene practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	colourless, light yellow, clear
Odour	:	characteristic
Odour Threshold	:	Not relevant
pH	:	Not applicable
Melting point/range	:	-40 °F / -40 °C (1,013 hPa) Method: OECD Test Guideline 102
Boiling point/boiling range	:	548.2 °F / 286.8 °C (1,013 hPa) Method: OECD Test Guideline 103
Flammability (solid, gas)	:	No data available
Burning number	:	Not applicable

Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapour pressure	:	0.0025 hPa (77 °F / 25 °C) Calculation
Relative vapour density	:	Not applicable
Relative density	:	1.14 (68 °F / 20 °C, 1,013 hPa) Method: OECD Test Guideline 109
Density	:	1.1399 g/cm3 (68 °F / 20 °C, 1,013 hPa) Method: OPPTS 830.7300
Solubility(ies)		
Water solubility	:	58.1 g/l (68 °F / 20 °C) pH: 3.4 Method: OECD Test Guideline 105
Solubility in other solvents	:	completely miscible Solvent: Alcohol
Partition coefficient: n-octanol/water	:	log Pow: 1.17 (104 °F / 40 °C) Method: OECD Test Guideline 117
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No decomposition if stored and applied as directed.
Viscosity		
Viscosity, dynamic	:	35.2 mPa.s (77 °F / 25 °C) Method: Brookfield
Viscosity, kinematic	:	32.17 mm2/s (68 °F / 20 °C) Method: OECD Test Guideline 114
Explosive properties	:	Not explosive
Oxidizing properties	:	No oxidising effect.
Molecular weight	:	276.3 g/mol
Dust explosion class	:	Not applicable
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.

Chemical stability	:	No decomposition if stored and applied as directed.
Possibility of hazardous reactions	:	Stable under recommended storage conditions. No hazards to be specially mentioned.
Conditions to avoid	:	Continuous exposure to moist air
Incompatible materials	:	Oxidizing agents
Hazardous decomposition products	:	Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Acute oral toxicity	:	LD50 Oral (Rat): 3200 mg/kg body weight Test substance: Triethyl citrate LD50 Oral (Cat): ca. 3500 ml/kg body weight Test substance: Triethyl citrate
Acute inhalation toxicity	:	LC50 (Rat): 1300 - 3500 ppm Exposure time: 6 h Test atmosphere: vapour Test substance: Triethyl citrate
Acute dermal toxicity	:	LD50 Dermal (Rabbit): > 5.000 mg/kg body weight Test substance: Triethyl citrate

Skin corrosion/irritation

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Species	:	Rabbit
Exposure time	:	24 h
Method	:	OECD Test Guideline 404
Result	:	No skin irritation
Test substance	:	Tris(2-ethylhexyl) 2-(acetyloxy)propane-1,2,3-tricarboxylate
Remarks	:	Based on data from similar materials

Serious eye damage/eye irritation

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Species	:	Rabbit
Result	:	No eye irritation
Exposure time	:	72 h
Method	:	OECD Test Guideline 405
Test substance	:	Tris(2-ethylhexyl) 2-(acetyloxy)propane-1,2,3-tricarboxylate
Remarks	:	Based on data from similar materials

Respiratory or skin sensitisation

Skin sensitisation

Not classified based on available information.

Respiratory sensitisation

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Test Type	:	Maximisation Test
Species	:	Guinea pig
Method	:	OECD Test Guideline 406
Result	:	Did not cause sensitisation on laboratory animals.
GLP	:	yes
Test substance	:	Tris(2-ethylhexyl) 2-(acetyloxy)propane-1,2,3-tricarboxylate
Remarks	:	Information given is based on data obtained from similar substances.

Germ cell mutagenicity

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Genotoxicity in vitro	:	Test Type: Ames test Test system: Salmonella typhimurium Concentration: 9 - 495 µg/plate Method: OECD Test Guideline 471 Result: negative Test substance: Tributyl O-acetylcitrate Test Type: in-vitro Mouse Lymphoma Assay Test system: mouse lymphoma cells Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 476 Result: negative Test substance: Tributyl O-acetylcitrate
Genotoxicity in vivo	:	Test Type: Chromosomal aberration Species: Rat Application Route: Oral Dose: 2000 mg/kg bw

Method: OECD Test Guideline 475
Result: negative
Test substance: Tributyl O-acetylcitrate

Carcinogenicity

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Species	:	Rat, male and female
Application Route	:	Oral
Exposure time	:	2 y
Dose	:	ca. 1,5 mg/kg body weight
Result	:	Animal testing did not show any carcinogenic effects.
Test substance	:	Triethyl citrate

IARC No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Effects on foetal development	:	Species: Rat Application Route: Oral General Toxicity Maternal: NOEL: 50 mg/kg bw/day Developmental Toxicity: NOEL: 250 mg/kg bw/day Remarks: Tributyl O-acetylcitrate

STOT - single exposure

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Remarks	:	No data available

STOT - repeated exposure

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

Remarks	:	No data available

Repeated dose toxicity

Non-hazardous ingredients:

Triethyl citrate:

Species	:	Rat, male and female
NOAEL	:	>= 1000 mg/kg bw/day
Application Route	:	Oral
Exposure time	:	13 w
Dose	:	0, 100, 300, 1000 mg/kg bw/day
Test substance	:	Tributyl O-acetylcitrate
Remarks	:	Information given is based on data obtained from similar substances.

Aspiration toxicity

Not classified based on available information.

Non-hazardous ingredients:

Triethyl citrate:

No data available

Experience with human exposure

Product:

Inhalation	:	Target Organs: Respiratory system Symptoms: No information available.
Skin contact	:	Target Organs: Skin Symptoms: No information available.
Eye contact	:	Target Organs: Eyes Symptoms: No information available.
Ingestion	:	Target Organs: Digestive organs Symptoms: No information available.

Further information

Product:

Remarks	:	No data available

Non-hazardous ingredients:

Triethyl citrate:

Remarks	:	No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Non-hazardous ingredients:

Triethyl citrate:

Toxicity to fish	:	LC50 (Fish): ca. 112.02 mg/l Exposure time: 96 h Test substance: Triethyl citrate Remarks: Calculation
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Test Type: static test Test substance: Triethyl citrate Method: OECD Test Guideline 202 GLP: yes
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Test Type: static test Method: OECD Test Guideline 201 GLP: yes EC10: > 100 mg/l
Toxicity to microorganisms	:	Remarks: No data available

Ecotoxicology Assessment

Acute aquatic toxicity	:	This product has no known ecotoxicological effects.

Persistence and degradability

Product:

Biodegradability	:	Test Type: Primary biodegradation Inoculum: activated sludge, non-adapted Result: rapidly biodegradable Biodegradation: 78 % Exposure time: 28 d Method: OECD Test Guideline 301F Test substance: Triethyl citrate GLP: yes

Bioaccumulative potential

Components:

Triethyl citrate:

Bioaccumulation	:	Bioconcentration factor (BCF): 2.75 Concentration: L/kg

Method: The value is calculated

Partition coefficient: n-octanol/water : log Pow: 1.17 (104 °F / 40 °C)
Method: OECD Test Guideline 117

Mobility in soil

Components:

Triethyl citrate:

Mobility : Medium: Soil
Remarks: The product will be dispersed amongst the various environmental compartments (soil/ water/ air).

Distribution among environmental compartments : Adsorption/Soil
Medium: Soil
Koc: 21.02, log Koc: 1.32
Remarks: The value is calculated

Stability in soil : Remarks: Readily biodegradable.

Other adverse effects

Product:

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances
Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

Additional ecological information : No data available

Non-hazardous ingredients:

Triethyl citrate:

Results of PBT and vPvB assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT).

: This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : In accordance with local and national regulations.

Where possible recycling is preferred to disposal or incineration.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR
Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

National Regulations

DOT
Not regulated as a hazardous material

TDG
Not regulated as a dangerous good

Special precautions for user
Not applicable

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act
This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

Triethyl citrate	77-93-0

Pennsylvania Right To Know

Triethyl citrate	77-93-0

Maine Chemicals of High Concern

Triethyl citrate	77-93-0

Vermont Chemicals of High Concern

Triethyl citrate	77-93-0

Washington Chemicals of High Concern

Triethyl citrate	77-93-0

The components of this product are reported in the following inventories:

TCSI	:	On the inventory, or in compliance with the inventory
TSCA	:	All substances listed as active on the TSCA inventory
AIIC	:	On the inventory, or in compliance with the inventory
DSL	:	All components of this product are on the Canadian DSL
ENCS	:	On the inventory, or in compliance with the inventory
ISHL	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN -

Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Items where relevant changes have been made to the previous version are highlighted in the body of this document by two vertical lines, red letters and grey shading.

Revision Date : 12/22/2022

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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