SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
CITROFLEX* A-4

Synonyms:
ATBC, ATC IV

Chemical Abstracts Registry No:
77-90-7

REACH Registration Number:
Not applicable.

1.2. Relevant identified uses of the substance or mixture and uses advised against
Plasticizer, Use in formulation of flavors and fragrances, Use as a pharmaceutical excipient

1.3. Details of the supplier of the safety data sheet
Vertellus LLC
201 North Illinois Street, Suite 1800
Indianapolis, Indiana 46204 USA
1-336-292-1781

e-mail Address: sds@vertellus.com

1.4. Emergency telephone number
Vertellus: 1-336-292-1781
CHEMTREC (USA): +1-800-424-9300 (collect calls accepted)
CHEMTREC (International): +1-703-527-3887 (collect calls accepted)
NRCC (China): +86 25 85477110

SECTION 2: Hazards identification

Not classified as hazardous under this directive.

2.2. Label elements
Signal Word: Not required.
Hazard Precautions: Not classified as hazardous under this directive.
Prevention Precautionary Statements: Note: These precautionary statements are not prescribed by directive 1272/2008 as this product is not classified as hazardous under this directive. Wash hands thoroughly after handling with soap and water. Wear protective gloves, protective clothing, eye protection and face protection. If swallowed, in eyes, on skin or inhaled call a poison center or doctor/physician if you feel unwell. If inhaled, remove victim to fresh air and keep at rest in a comfortable position for breathing. Take off contaminated clothing before reuse. Store in a well-ventilated place. Keep container tightly closed.
First Aid Precautionary Statements: Not required.

2.3. Other hazards
Other Hazards: Not applicable.

SECTION 3: Composition/information on ingredients

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3.1. Substances or 3.2. Mixtures

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS Number</th>
<th>Concentration (weight %)</th>
<th>EC Number</th>
<th>CLP Inventory/Annex VI</th>
<th>EU CLP Classification (1272/2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetyltri-n-butyl Citrate</td>
<td>77-90-7</td>
<td>~ 100</td>
<td>201-067-0</td>
<td>Not listed.</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

NOTE: See Section 8 for exposure limit data for these ingredients. See Section 15 for trade secret information (where applicable).

SECTION 4: First aid measures

4.1. Description of first aid measures

Skin Contact: Immediately flush with water for 15 minutes. Wash the contaminated skin with soap and water. If irritation develops, call a physician.

Eye Contact: Immediately flush eyes with plenty of water. Get medical attention, if irritation persists.

Inhalation: If symptoms are experienced, remove affected person to fresh air and obtain medical attention.

Ingestion: If swallowed, contact physician or poison control center immediately.

4.2 Most important symptoms and effects, both acute and delayed

Acute: Contact with citrate esters may cause mild irritation to skin, eyes and mucous membranes. This material is not expected to be toxic by inhalation, ingestion or dermal exposure. Although it has been observed that health effects related to this substance are minimal, as with any chemical, use appropriate precautions during handling.

Delayed Effects: None known.

4.3. Indication of any immediate medical attention and special treatment needed

Note to Physician: No specific indications. Treatment should be based on the judgment of the physician in response to the reactions of the patient.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Appropriate Extinguishing Media: Foam, Dry chemical, Carbon dioxide, Water spray

5.2. Special hazards arising from the substance or mixture

Hazardous Products of Combustion: As with other organic materials, combustion will produce carbon monoxide and carbon dioxide.

Potential for Dust Explosion: Not applicable.

Special Flammability Hazards: Not applicable.

5.3. Advice for firefighters

Basic Fire Fighting Guidance: Wear self-contained breathing apparatus and protective clothing. Normal firefighting procedures may be used.

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuation Procedures: Isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Special Instructions: See Section 8 for personal protective equipment recommendations. Remove all contaminated clothing to prevent further absorption. Decontaminate affected personnel using the first aid procedures in Section 4. Leather shoes that have been saturated must be discarded.

6.2. Environmental precautions

Prevent releases to soils, drains, sewers and waterways.

6.3. Methods and material for containment and cleaning up

Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Remove all ignition sources. Ventilate the area of spill or leak. Wear protective equipment during clean-up. For small spills, use suitable absorbent material and collect for later disposal. For large spills, the area may require diking to contain the spill. Material can then be collected (eg., suction) for later disposal. After collection of material, flush area with water. Dispose of the material in accordance with standard practice for disposal of potentially hazardous materials as required by applicable federal, state or local laws.

6.4. Reference to other sections

Refer to section 8 for information on selecting personal protective equipment. Refer to section 13 for information on spilled product, absorbent and clean up material disposal instructions.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for Unique Hazards: Not applicable.

Practices to Minimize Risk: Wear appropriate protective equipment when performing maintenance on contaminated equipment. Wash hands thoroughly before eating or smoking after handling this material. Do not eat, drink or smoke in work areas. Prevent contact with incompatible materials. Avoid spills and keep away from drains. Handle in a manner to prevent generation of aerosols, vapors or dust clouds.

Special Handling Equipment: Not applicable.

7.2. Conditions for safe storage, including any incompatibilities

Storage Precautions & Recommendations: This product should be stored at ambient temperature in a dry, well-ventilated location. Keep container closed when not in use.

Dangerous Incompatibility Reactions: Oxidizing materials

Incompatibilities with Materials of Construction: None known

7.3. Specific end use(s)

If a chemical safety assessment has been completed an exposure scenario is attached as an annex to this Safety Data Sheet. Refer to this annex for the specific exposure scenario control parameters for uses identified in subsection 1.2.

SECTION 8: Exposure controls/personal protection

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8.1. Control parameters

Occupational Exposure Limit: Not established
Air Monitoring Method: Not required

8.2. Exposure controls

Also see the annex to this SDS (if applicable) for specific exposure scenario controls.

Other Engineering Controls: All operations should be conducted in well-ventilated conditions. Local exhaust ventilation should be provided.
Personal Protective Equipment: Safety glasses or goggles. Work uniforms or impervious clothing and boots. Latex rubber gloves are recommended where contact is likely. Where overexposures are a concern, use NIOSH-approved chemical cartridge respirator or supplied-air breathing equipment as necessary.
Thermal Hazards: Not applicable.
Environmental Exposure Controls: The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance, State & Odor (ambient temperature): Clear, oily, essentially odorless liquid
Vapor Pressure: 0.8 mm Hg @ 170°C Evaporation Rate: < 1 (Butyl Acetate = 1)
Specific Gravity or Density: 1.048 @ 25°C Vapor Density (air = 1): 14.1
Boiling Point: 327 °C (621 °F) Freezing / Melting Point: - 59 °C (- 75 °F)
Solubility in Water: < 0.1% Octanol / Water Coefficient: Log Kow = 4.92
pH: No data available. Odor Threshold: No data available.
Viscosity: 53.7 cps @ 25°C Autoignition Temperature: No data available.
Flash Point and Method: 400°F (204°C) TCC Flammable Limits: No data available.
flammability (solid, gas): Not applicable. Decomposition Temperature: No data available.

9.2. Other information

Not applicable.

SECTION 10: Stability and reactivity

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10.1. Reactivity
Not classified as dangerously reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will not occur.

10.4. Conditions to avoid
Avoid static discharge and uncontrolled exposure to high temperatures.

10.5. Incompatible materials
Oxidizing materials

10.6. Hazardous decomposition products
Decomposition products may include carbon monoxide, carbon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute Oral LD₅₀: Oral LD₅₀ (rat) = 31400 mg/kg  Finkelstein & Gold 1959
Acute Dermal LD₅₀: Application to guinea pig skin resulted in no pathological effects. Larionov 1977
Acute Inhalation LC₅₀: No data available.
Skin Irritation: Non-irritating to both intact and abraded skin.
Eye Irritation: Slight to moderate erythema observed in eyes in contact with material over 20 minutes to 3 hours.
Skin Sensitization: Not a sensitizer
Mutagenicity: This product has been shown not to be mutagenic based on a battery of assays.
Reproductive / Developmental Toxicity: No evidence of reproductive or developmental toxicity in 90 day dietary rat study.
Carcinogenicity: This material is not listed by IARC, NTP or OSHA as a carcinogen. No test data is available that indicates this material is a carcinogen.
Target Organs: None known
Aspiration Hazard: No data available.
Primary Route(s) of Exposure: Skin contact and absorption, eye contact, and inhalation. Ingestion is not likely to be a primary route of exposure.
Most important symptoms and effects, both acute and delayed Contact with citrate esters may cause mild irritation to skin, eyes and mucous membranes. This material is not expected to be toxic by inhalation, ingestion or dermal exposure. Although it has been observed that health effects related to this substance are minimal, as with any chemical, use appropriate precautions during handling. Delayed Effects: None known.
Additive or Synergistic effects: None known.

SECTION 12: Ecological information

12.1. Toxicity
LC₅₀(96h) Fish = 38 - 60 mg/L  Foulds 1974
NOEC (96-hr) Fish = 10 mg/L  Warbritton & Leak 2001
Aquatic EC₅₀ (48h) Ceriodaphnia dubia = 7.82 mg/L  Jenkins 2008
NOEC (48-HR) Ceriodaphnia dubia = 4.82 mg/L

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12.2. Persistence and degradability
Material is inherently biodegradable

12.3. Bioaccumulative potential
Bioconcentration is not expected to occur.

12.4. Mobility in soil
No data available

12.5. Results of PBT and vPvB assessment
This substance is not a PBT or vPvB.

12.6. Other adverse effects
No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
US EPA Waste Number: Non-Hazardous
Waste Classification: The waste may be classified as "special" or hazardous per State regulations.
Waste Disposal: NOTE: Generator is responsible for proper waste characterization. State hazardous waste regulations may differ substantially from federal regulations. Dispose of this material responsibly, and in accordance with standard practice for disposal of potentially hazardous materials as required by applicable international, national, regional, state or local laws, and environmental protection duty of care principles. Do NOT dump into any sewers, on the ground, or into any body of water. For disposal within the EC, the appropriate classification code according to the European Community List of Wastes should be used. Note that disposal regulations may also apply to empty containers and equipment rinsates.

SECTION 14: Transport information

The following information applies to all shipping modes (DOT/IATA/ICAO/IMDG/ADR/RID/ADN), unless otherwise indicated:

14.1. UN number Not applicable
14.2. UN proper shipping name Chemicals, n.o.s. (Acetyltri-n-Butyl Citrate)
14.3. Transport hazard class(es) Not applicable
14.4. Packing group Not applicable
14.5. Environmental hazards Not applicable
14.6. Special precautions for user Not applicable
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code Not applicable.

IMDG EMS: Not applicable; Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Chemical Inventory Lists: Status:
USA TSCA: Listed
EINECS: 201-067-0

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Canada(DSL/NDSL): DSL  
Korea: KE-00158  
China: Listed  
Taiwan: Listed  
Japan: (2)-1327  
Australia: Listed  
Philippines: Listed  
New Zealand: Listed  

German Water Hazard Classification: ID Number 5228, hazard class 2 - hazard to waters *(Tributyl-o-acetyl citrat)*

SARA 313: Not listed.
Reportable Quantities: Not applicable.
State Regulations: Not applicable.

HMIS IV:  
- HEALTH: 0  
- FLAMMABILITY: 1  
- PHYSICAL HAZARD: 0  

NFPA:
- 0  
- 1  
- 0  
- 0  

15.2. Chemical safety assessment
Not applicable.

SECTION 16: Other information

Key Data Sources:
- Chase, KR and Willoughby, CR.  "Citroflex® A-4: Toxicity Study by Dietary Administration to Han Wistar Rats for 13 Weeks with an In Utero Exposure Phase Followed by a 4-Week Recovery Period"; Performing Laboratory: Huntington Life Sciences, Sponsor: Morflex; Report#: MOX 002/013810; Date: 1 August 2002; GLP, OECD 408.
- Foulds, G.  "Report on Potential Environmental Impact of Citroflexes", Performing Laboratory: Pfizer; Sponsor: Pfizer; Report #: unnumbered; Date: 29 May 1974, non-GLP, non-OECD.

Classification Method: On basis of test data

Legend of Abbreviations:
- ACGIH = American Conference on Governmental Industrial Hygienists.
- CAS = Chemical Abstracts Service.
- DSL/NDSL = Domestic Substances List/Non-Domestic Substances List.
- EC = European Community.
- EINECS = European Inventory of Existing Commercial Chemical Substances.
- ELINCS = European List of Notified Chemical Substances.
- LD = Lethal Dose.
- NIOSH = National Institute of Occupational Safety and Health.
- NTP = National Toxicology Program.
- OSHA = Occupational Safety and Health Administration.
- PEL = Permissible Exposure Limit.
- RQ = Reportable Quantity.

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Email: SDS@Vertellus.com