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

1.1. Product identifier
Nonenyl Succinic Anhydride (K-9)

Synonyms:
2,5-Furandione, dihydro-3-(nonenyl)-; dihydro-3-(nonenyl)furan-2,5-dione; dihydro-3-(tripropenyl)furan-2,5-dione; tripropenyl succinic anhydride

Chemical Abstracts Registry No: 28928-97-4

1.2. Relevant identified uses of the substance or mixture and uses advised against
Intermediate
Corrosion inhibitor

1.3. Details of the supplier of the safety data sheet
Vertellus LLC
201 North Illinois Street, Suite 1800
Indianapolis, Indiana 46204 USA
1-800-344-3426
e-mail Address: sds@vertellus.com

1.4. Emergency telephone number
Vertellus: +1 800-344-3426; +86 21-38993180
CHEMTREC (USA): +1-800-424-9300 (collect calls accepted)
CHEMTREC (International): +1-703-527-3887 (collect calls accepted)

SECTION 2: Hazards identification

Acute Toxicity Oral Category 4
Skin Irritation Category 2
Serious Eye Damage Category 1
Skin Sensitization Category 1A

2.2. Label elements
Hazard Symbols (Pictogram):

Signal Word: Danger

Hazard Precautions:
H302 - Harmful if swallowed.
H315 - Causes skin irritation.
H317 - May cause an allergic skin reaction.
H318 - Causes serious eye damage.

Prevention Precautionary Statements:
P261 - Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 - Wash hands thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.

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P272 - Contaminated work clothing should not be allowed out of the workplace.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Precautionary Statements:
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 - Immediately call a POISON CENTER or doctor/physician.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.
P362+P364 - Take off contaminated clothing and wash it before reuse.
P301+P312 - IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P330 - Rinse mouth.

Storage Precautionary Statements: Not required.
Disposal Precautionary Statements: P501 - Dispose of contents/container in accordance with local/regional/national/international regulation for hazardous wastes.

2.3. Other hazards
Other Hazards: Not applicable.

SECTION 3: Composition/information on ingredients

<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>
</table>
| Nonenyl Succinic Anhydride | 28928-97-4 | >99 | 249-317-8 | Not listed. | Acute Tox. 4; H302
| | | | | | Eye Dam. 1; H318
| | | | | | Skin Irrit. 2; H315
| | | | | | Skin Sens. 1A; H317 |
| Maleic Anhydride | 108-31-6 | <1 | 203-571-6 | 607-096-00-9 | Acute Tox. 4; H302
| | | | | | Skin Corr. 1B; H314
| | | | | | Eye Dam. 1; H318
| | | | | | Skin Sens. 1A; H317
| | | | | | Resp. Sens. 1; H334
| | | | | | STOT RE 1; H372
| | | | | | EUH071 |

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 wash skin with plenty of soap and water while removing contaminated clothing and shoes. Get medical attention if irritation develops or persists.

Eye Contact: Immediately flush the eyes with plenty of water for at least 15 minutes. Call a physician.

Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so. If symptoms develop, seek medical attention.

Ingestion: If swallowed, contact physician or poison control center immediately. Do not give anything by mouth to an unconscious person.
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4.2 Most important symptoms and effects, both acute and delayed

Acute: Direct contact with eyes causes moderate irritation and possible burns and may cause permanent injury. Can cause skin irritation. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

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: Water spray, alcohol-resistant foam, carbon dioxide, dry chemical.

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. Dense smoke, irritating and toxic fumes and vapors may be generated by thermal decomposition and combustion.

Potential for Dust Explosion: Not applicable.

Special Flammability Hazards: None expected

5.3. Advice for firefighters

Basic Fire Fighting Guidance: Wear self-contained breathing apparatus and full protective clothing (i.e., Bunker gear). Skin and eye contact should be avoided. Normal fire fighting procedures may be used.

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. Remove all incompatible materials as outlined in section 10 of the SDS.

6.2. Environmental precautions

Prevent releases to soils, drains, sewers and waterways.

6.3. Methods and material for containment and cleaning up

Remove all ignition sources. Ventilate the area of spill or leak. Wear protective equipment during clean-up. Contain spilled liquid with sand or vermiculite and place in chemical waste container. Prevent runoff from entering drains, sewers, and streams. After collection of material, flush area with water. Dispose of contents & container in accordance with local, regional, national or international regulations.

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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: Keep in sealed containers in a cool, well-ventilated area. Avoid contact with water or humidity. Keep away from heat, sparks, and flame. Protect containers against physical damage.

Dangerous Incompatibility Reactions: Strong oxidizing agents

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

8.1. Control parameters

<table>
<thead>
<tr>
<th>Country</th>
<th>Occupational Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>China, USA, EU</td>
<td>Not established</td>
</tr>
</tbody>
</table>

Air Monitoring Method: Not applicable

Derived No Effect Levels (DNELs) – Workers:

<table>
<thead>
<tr>
<th>Route</th>
<th>DNEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term - systemic effects (inhalation)</td>
<td>2.3 mg/m3  (read-across from CAS 92077-08-2)</td>
</tr>
</tbody>
</table>

Derived No Effect Levels (DNELs) – General Population:

<table>
<thead>
<tr>
<th>Route</th>
<th>DNEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not established</td>
</tr>
</tbody>
</table>

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Predicted No Effect Concentrations (PNECs):

<table>
<thead>
<tr>
<th>Route</th>
<th>PNEC (read-across from CAS 92077-08-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNEC aqua (freshwater)</td>
<td>2.5 mg/l</td>
</tr>
<tr>
<td>PNEC aqua (intermittent releases)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>PNEC aqua (marine water)</td>
<td>250 µg/l</td>
</tr>
<tr>
<td>PNEC aqua (STP)</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>PNEC sediment (freshwater)</td>
<td>25.4 mg/kg sediment dw</td>
</tr>
<tr>
<td>PNEC sediment (marine water)</td>
<td>2.54 mg/kg sediment dw</td>
</tr>
<tr>
<td>PNEC soil</td>
<td>3.6 mg/kg soil dw</td>
</tr>
</tbody>
</table>

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: Neoprene, nitrile or polyvinyl chloride gloves conforming to at least EN374. Use safety glasses with side shields under normal exposure conditions; use chemical goggles where there is potential for splashing, spraying or generation of mists or vapors. Respiratory protection is not normally required, but where overexposure is a concern, use NIOSH-approved chemical cartridge respirator with organic vapor cartridges.

Respirator Caution: Observe OSHA regulations for respirator use (29 CFR 1910.134) or equivalent guidance. Air-purifying respirators must not be used in oxygen-deficient atmospheres.

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance, State &amp; Odor (ambient temperature):</td>
<td>Pale yellow liquid with mild odor</td>
</tr>
<tr>
<td>Vapor Pressure:</td>
<td>28.1 Pa (20°C)</td>
</tr>
<tr>
<td>Specific Gravity or Density:</td>
<td>1.03</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>325°C (617°F)</td>
</tr>
<tr>
<td>Solubility in Water:</td>
<td>&lt; 1 g/l</td>
</tr>
<tr>
<td>pH:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Viscosity:</td>
<td>~150 cP (20°C)</td>
</tr>
<tr>
<td>Flash Point and Method:</td>
<td>&gt;100°C (&gt;212°F)</td>
</tr>
<tr>
<td>Flammability (solid, gas):</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Explosive Properties:</td>
<td>Not explosive.</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>0.02-0.1 (n-Butyl acetate = 1)</td>
</tr>
<tr>
<td>Vapor Density (air = 1):</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Freezing / Melting Point:</td>
<td>-31°C</td>
</tr>
<tr>
<td>Octanol / Water Coefficient:</td>
<td>Log Pow = 2.79 (CAS 147384-84-7)</td>
</tr>
<tr>
<td>Odor Threshold:</td>
<td>No data available.</td>
</tr>
<tr>
<td>Autoignition Temperature:</td>
<td>315°C (CAS 92077-08-2)</td>
</tr>
<tr>
<td>Flammable Limits:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temperature:</td>
<td>325°C</td>
</tr>
<tr>
<td>Oxidizing Properties:</td>
<td>Not an oxidizer.</td>
</tr>
</tbody>
</table>

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9.2. Other information

The product hydrolyses in water.

SECTION 10: Stability and reactivity

10.1. Reactivity

Not classified as dangerously reactive.

10.2. Chemical stability

Stable under normal expected handling conditions. The product hydrolyses in contact with water.

10.3. Possibility of hazardous reactions

Not expected to occur.

10.4. Conditions to avoid

Avoid contact with water, moist air or incompatible materials.

10.5. Incompatible materials

Strong oxidizing agents

10.6. Hazardous decomposition products

Products of incomplete combustion may include carbon monoxide, carbon dioxide and dense smoke.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute Oral LD₅₀: (rat) 1000 - 2000 mg/kg

Acute Dermal LD₅₀: (rat) > 2000 mg/kg

Acute Inhalation LC₅₀: No data available.

Skin Irritation: Irritating to skin. (OECD404, rabbit)

Eye Irritation: Causes serious damage to eyes. (OECD 405)

Skin Sensitization: Positive for skin sensitization potential in Local Lymph Node Assay (OECD 429).

Mutagenicity: A similarly structured product has been shown not to be mutagenic based on a battery of assays.

Reproductive / Developmental Toxicity: NOAEL (P): 50 mg/kg bw/day; NOAEL (F1) 250 mg/kg bw/day. (OECD 421, CAS 92077-08-2)

Carcinogenicity: No data available.

Target Organs: Not determined.

Aspiration Hazard: Not an aspiration hazard.

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

Direct contact with eyes causes irritation and possible burns and may cause permanent injury. Can cause skin irritation. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Delayed Effects: None known.

Additive or Synergistic effects: None known.

Additional Toxicity Information: Repeat dose toxicity: NOAEL: 50 mg/kg bw (OECD407, CAS 92077-08-2)

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## SECTION 12: Ecological information

### 12.1. Toxicity
- **Fish:** LC50 (96h) > 100 mg/l  
  (OECD 203, CAS 92077-08-2)
- **Daphnia:** EC50 (48h) > 100 mg/l  
  (OECD 202, CAS 92077-08-2)
- **Algae:** ErC50 (72h) > 100 mg/l  
  (OECD 201, CAS 92077-08-2)
- **Microorganisms:** NOEC (3h) 100 mg/l  
  (OECD 209, CAS 92077-08-2)
- **Chronic Fish:** NOEC repro (9h) 100 mg/l  
  (OECD 212, CAS 92077-08-2)
- **Chronic Daphnia:** ErC10 (21d) 25 mg/l  
  (OECD 202, CAS 92077-08-2)

### 12.2. Persistence and degradability
The product hydrolyses in water. Not inherently biodegradable (OECD 302B, tripropenyl succinic acid).

### 12.3. Bioaccumulative potential
Based on the log Kow, bioconcentration is not expected to occur.

### 12.4. Mobility in soil
Nonenyl succinic anhydride is expected to have low mobility in soil but the material hydrolyses in water. Nonenyl succinic acid will have more mobility in soil.

### 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:

<table>
<thead>
<tr>
<th>14.1. UN number</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.2. UN proper shipping name</td>
<td>Chemicals, n.o.s. (Nonenylsuccinic Anhydride)</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>14.4. Packing group</td>
<td>Not applicable</td>
</tr>
<tr>
<td>14.5. Environmental hazards</td>
<td>Not applicable</td>
</tr>
<tr>
<td>NA Emergency Guidebook Numbers</td>
<td>Not applicable</td>
</tr>
<tr>
<td>IMDG EMS:</td>
<td>Not applicable;</td>
</tr>
<tr>
<td>14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

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SECTION 15: Regulatory information

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

<table>
<thead>
<tr>
<th>Chemical Inventory Lists:</th>
<th>Status:</th>
<th>EC / list No.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA TSCA:</td>
<td>Listed</td>
<td>249-317-8</td>
</tr>
<tr>
<td>Canada(DSL/NDSL):</td>
<td>NDSL</td>
<td></td>
</tr>
<tr>
<td>Korea:</td>
<td>Not listed.</td>
<td>Not listed.</td>
</tr>
<tr>
<td>China:</td>
<td>Listed</td>
<td>Not listed.</td>
</tr>
<tr>
<td>Taiwan:</td>
<td>Listed</td>
<td>New Zealand:</td>
</tr>
</tbody>
</table>

German Water Hazard Classification: Not listed.

SARA 313: Not listed.

HMIS IV:

- HEALTH: 3
- FLAMMABILITY: 1
- PHYSICAL HAZARD: 0

15.2. Chemical safety assessment

A chemical safety assessment has not been performed on this substance.

SECTION 16: Other information

Key Data Sources: In-house company data and knowledge.
Global chemical inventory databases.

Classification Method: On basis of test data
Bridging principle - similar substance
Expert judgment

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.
EU = European Union.
GHS = Globally Harmonized System.
LC = Lethal Concentration.
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.
TLV = Threshold Limit Value.
WHMIS = Workplace Hazardous Materials Information System.

Important Note: Please note that the information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. The information contained herein may change without prior notice. THIS SAFETY DATA SHEET SUPERSEDES...
SAFETY DATA SHEET

Revision Date: 20 Jun 2019
Original Date of Issue: 9-Oct-92

Issued by: Regulatory Management Department
Email: SDS@Vertellus.com

Revision Details: All sections except 14 updated: new data, GHS classification change and adjusted phrases.

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