SAFETY DATA SHEET

BIOSAN

1. Identification

Product identifier: BIOSAN
Other means of identification: None.
Recommended use: Membrane cleaner
Recommended restrictions: None known.

Company/undertaking identification
GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355 3300, F 215 953 5524

Emergency telephone
(800) 877 1940

2. Hazard(s) identification

Physical hazards
Skin corrosion/irritation

Health hazards
Category 2
Serious eye damage/eye irritation
Category 2A
Specific target organ toxicity, single exposure
Category 3 respiratory tract irritation

OSHA defined hazards
Not classified.

Label elements

Signal word
Warning

Hazard statement
Causes skin irritation. Causes serious eye irritation. May cause respiratory irritation.

Precautionary statement

Prevention
Wear eye/face protection. Avoid breathing mist or vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves. Wear eye/face protection.

Response
If on skin: Wash with plenty of water/. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor// if you feel unwell. Specific treatment (see on this label). If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

Storage
Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)
None known.

Supplemental information
None.
3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Mixtures</th>
<th>Components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Citric acid</td>
<td>77-92-9</td>
<td>10 - 20</td>
</tr>
</tbody>
</table>

Composition comments
Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this SDS for our assessment of the potential hazards of this formulation.

4. First-aid measures

Inhalation
Remove victim to fresh air and keep at rest in a position comfortable for breathing. Give oxygen if necessary. Seek medical attention.

Skin contact
Wash thoroughly with soap and water. Remove contaminated clothing. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Keep eyelids apart. Continue rinsing. Call a physician or poison control center immediately.

Ingestion
Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Dilute contents of stomach using 2-8 fluid ounces (60-240ml) of milk or water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Immediately contact a physician.

Most important symptoms/effects, acute and delayed
Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Skin irritation. May cause redness and pain.

Indication of immediate medical attention and special treatment needed
No special instructions. Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

General information
If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the materials involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media
Not available.

Unsuitable extinguishing media
Not available.

Specific hazards arising from the chemical
Oxides of carbon and sulphur evolved in fire.

Special protective equipment and precautions for firefighters
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

Specific methods
Area should be well-ventilated. Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

General fire hazards
No unusual fire or explosion hazards noted. Non flammable liquid.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions
Prevent from entering sewers or the immediate environment. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage
Precautions for safe handling
Acidic. Do not mix with alkaline material. Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Use care in handling/storage.

Conditions for safe storage, including any incompatibilities
Do not freeze. If frozen, thaw completely and mix thoroughly prior to use. Keep away from strong bases. Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation.

8. Exposure controls/personal protection
Occupational exposure limits
No exposure limits noted for ingredient(s).

Biological limit values
No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls
Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment
Eye/face protection
Splash proof chemical goggles. Face shield.

Skin protection
Hand protection
Wear appropriate chemical resistant gloves. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. Glove selection must take into account any solvents and other hazards present. Wash off after each use. Replace as necessary.

Other
Wear appropriate chemical resistant clothing.

Respiratory protection

Thermal hazards
Not available.

General hygiene considerations
Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties
Appearance
Color
Light yellow to amber

Physical state
Liquid

Odor
Slight

Odor threshold
Not available.

pH (concentrated product)
1.2

pH in aqueous solution
2.5 (1% SOL.)

Melting point/freezing point
27 °F (-3 °C)

Initial boiling point and boiling range
210 °F (99 °C)

Flash point
> 200 °F (> 93 °C) Pensky-Martens Closed Cup

Evaporation rate
< 1 (Ether = 1)

Flammability (solid, gas)
Not applicable.

Upper/lower flammability or explosive limits
Flammability limit - lower (%)
Not available.

Flammability limit - upper (%)
Not available.

Explosive limit - lower (%)
Not available.

Explosive limit - upper (%)
Not available.

Material name: BIOSAN
Version number: 2.0
Vapor pressure: 18 mm Hg
Vapor pressure temp.: 70 °F (21 °C)
Vapor density: < 1 (Air = 1)
Relative density: 1.08
Relative density temperature: 70 °F (21 °C)
Solubility:
   Solubility (water): 100 %
Partition coefficient (n-octanol/water): Not available.
Auto-ignition temperature: Not available.
Decomposition temperature: Not available.
Viscosity: 10 cps
Viscosity temperature: 70 °F (21 °C)
Other information:
   Percent volatile: 0 (Estimated)
   Pour point: 32 °F (0 °C)
   Specific gravity: 1.08

10. Stability and reactivity
Reactivity: May react violently with alkaline materials.
Chemical stability: Material is stable under normal conditions.
Possibility of hazardous reactions: Hazardous polymerization does not occur.
Conditions to avoid: Avoid temperatures exceeding the flash point. Contact with incompatible materials. Protect from freezing. Contact with strong bases may cause a violent reaction releasing heat.
Incompatible materials: Avoid contact with strong oxidizers. Avoid contact with strong bases. Contact with strong bases may cause a violent reaction releasing heat.
Hazardous decomposition products: Oxides of carbon and sulphur evolved in fire.

11. Toxicological information
Information on likely routes of exposure:
   Inhalation: May cause irritation to the respiratory system.
   Skin contact: Causes skin irritation.
   Eye contact: Causes serious eye irritation.
   Ingestion: May cause gastrointestinal irritation.
Symptoms related to the physical, chemical and toxicological characteristics: Irritating to eyes, respiratory system and skin. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. May cause redness and pain.
Information on toxicological effects:
Acute toxicity: Not classified.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOSAN (CAS Mixture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Rabbit</td>
<td>&gt; 5000 mg/kg, (Calculated according to GHS additivity formula)</td>
</tr>
<tr>
<td>Oral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Rat</td>
<td>&gt; 5000 mg/kg, (Calculated according to GHS additivity formula)</td>
</tr>
</tbody>
</table>
### Components

Citric acid (CAS 77-92-9)

<table>
<thead>
<tr>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rabbit</td>
<td>&gt; 2000 mg/kg</td>
</tr>
<tr>
<td>Rat</td>
<td>5400 mg/kg</td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

### Skin corrosion/irritation
Causes skin irritation.

### Serious eye damage/eye irritation
Causes serious eye irritation.

### Respiratory or skin sensitization
Not classified.

### Respiratory sensitization
Not classified.

### Skin sensitization
Causes irritation.

### Germ cell mutagenicity
Not classified.

### Carcinogenicity
Not classified.

### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not listed.

### Reproductive toxicity
Not classified.

### Specific target organ toxicity - single exposure
Respiratory tract irritation.

### Specific target organ toxicity - repeated exposure
Not classified.

### Aspiration hazard
Based on available data, the classification criteria are not met.

### Chronic effects
Prolonged inhalation may be harmful. No evidence of potential chronic effects.

### 12. Ecological information

#### Ecotoxicity

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOSAN (CAS Mixture)</td>
<td>LC50 Fathead Minnow</td>
<td>330 mg/L, Acute Toxicity, 96 hour, (Estimated)</td>
</tr>
<tr>
<td>Aquatic</td>
<td>LC50 Daphnia magna</td>
<td>600 mg/L, Acute Toxicity, 48 hour, (Estimated)</td>
</tr>
<tr>
<td></td>
<td>NOEL Daphnia magna</td>
<td>150 mg/L, Acute Toxicity, 48 hour, (Estimated)</td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

### Bioaccumulative potential
No data available.

### Mobility in soil
No data available.

### Other adverse effects
No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

### Environmental fate
The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

### Persistence and degradability
No data is available on the degradability of this product.

- COD (mgO2/g) 166 (calculated data)
- BOD 5 (mgO2/g) 79 (calculated data)
- BOD 28 (mgO2/g) 91 (calculated data)
- Closed Bottle Test (% Degradation in 28 days) 56 (calculated data)
- Zahn-Wellens Test (% Degradation in 28 days) 72 (calculated data)
13. Disposal considerations

### Disposal instructions
Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

### Local disposal regulations
Dispose in accordance with all applicable regulations.

### Hazardous waste code
D002: Waste Corrosive material \([\text{pH} \leq 2 \text{ or } \geq 12.5, \text{ or corrosive to steel}]\)
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

### Waste from residues / unused products
Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

### Contaminated packaging
Via an authorized waste disposal contractor to an approved waste disposal site, observing all local and national regulations. Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

### DOT
Not regulated as dangerous goods.
Some containers may be exempt from Dangerous Goods/Hazmat Transport Regulations, please check BOL for exact container classification.

### IATA
Not regulated as dangerous goods.

### IMDG
Not regulated as dangerous goods.

15. Regulatory information

### US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

- **TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**
  Not regulated.
- **CERCLA Hazardous Substance List (40 CFR 302.4)**
  Not listed.
- **SARA 304 Emergency release notification**
  Not regulated.
  Not listed.

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

- **Hazard categories**
  Immediate Hazard - Yes
  Delayed Hazard - No
  Fire Hazard - No
  Pressure Hazard - No
  Reactivity Hazard - No
- **SARA 302 Extremely hazardous substance**
  Not listed.
- **SARA 311/312 Hazardous chemical**
  No
- **SARA 313 (TRI reporting)**
  Not regulated.

### Other federal regulations
- **Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**
  Not regulated.
- **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**
  Not regulated.
- **Safe Drinking Water Act (SDWA)**
  Not regulated.
Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A “Yes” indicates that all components of this product comply with the inventory requirements administered by the governing country(s) or region. A “No” indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

Food and drug administration

Food and drug administration regulations

21 CFR 176.170 (components of paper and paperboard in contact with aqueous and fatty foods)

US state regulations

- **US - Massachusetts RTK - Substance List**
  - Not regulated.

- **US - Pennsylvania RTK - Hazardous Substances**
  - Not regulated.

- **US - Rhode Island RTK**
  - Not regulated.

- **US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)**
  - Not listed.

- **US. New Jersey Worker and Community Right-to-Know Act**
  - Not listed.

- **US. Pennsylvania Worker and Community Right-to-Know Law**
  - Not listed.

- **US. California Proposition 65**
  - WARNING: This product contains a chemical known to the State of California to cause cancer.

  - **US - California Proposition 65 - CRT: Listed date/Carcinogenic substance**
    - Sulphuric acid (CAS 7664-93-9) Listed: March 14, 2003

  - **US - California Proposition 65 - CRT: Listed date/Developmental toxin**
    - No ingredient listed.

  - **US - California Proposition 65 - CRT: Listed date/Female reproductive toxin**
    - No ingredient listed.

  - **US - California Proposition 65 - CRT: Listed date/Male reproductive toxin**
    - No ingredient listed.

16. Other information, including date of preparation or last revision

<table>
<thead>
<tr>
<th>Issue date</th>
<th>Revision date</th>
<th>Version #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-02-2014</td>
<td>Jun-19-2015</td>
<td>2.0</td>
</tr>
</tbody>
</table>

List of abbreviations

- CAS: Chemical Abstract Service Registration Number
- ACGIH: American Conference of Governmental Industrial Hygienists
- TWA: Time Weighted Average
- STEL: Short Term Exposure Limit
- LD50: Lethal Dose, 50%
- LC50: Lethal Concentration, 50%
- EC50: Effect Concentration, 50%
- NOEL: No Observed Effect Level
- COD: Chemical Oxygen Demand
- BOD: Biochemical Oxygen Demand
- TOC: Total Organic Carbon
- CEN: European Committee for Standardisation
- TLV: Threshold Limit Value
- IATA: International Air Transport Association
- IMDG: International Maritime Dangerous Goods Code
- NFPA: National Fire Protection Association
- TSRN: Trade Secret Registry Number

References:

- No data available
Disclaimer

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.

Revision Information

This document has undergone significant changes and should be reviewed in its entirety.

Prepared by

This SDS has been prepared by GE Water & Process Technologies Regulatory Department (1-215-355-3300).