SAFETY DATA SHEET
AMMONIUM PERSULFATE

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name AMMONIUM PERSULFATE

Other means of identification

CAS-No 7727-54-0
Synonyms Ammonium Peroxydisulfate; Diammonium Peroxydisulphate; Peroxydisulfuric acid, diammonium salt; Peroxydisulfuric acid, ammonium salt

Recommended use of the chemical and restrictions on use

Recommended Use: Polymerization initiator; Etchant and cleaner for printed circuit boards; Hair bleaching formulations; Secondary oil recovery; Oxidizing agent for a variety of organic reactions

Restrictions on Use: No uses to be advised against were identified.

Manufacturer/Supplier

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: sdsinfo@peroxychem.com

Emergency telephone number

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
1 303/ 389-1409 (Medical - U.S. - Call Collect)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

<table>
<thead>
<tr>
<th>Toxicity</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity - Oral</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin corrosion/irrititation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Category 2B</td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Skin sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 3</td>
</tr>
<tr>
<td>Oxidizing Solids</td>
<td>Category 3</td>
</tr>
</tbody>
</table>
AMMONIUM PERSULFATE

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Danger

Hazard Statements
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H320 - Causes eye irritation
H315 - Causes skin irritation
H317 - May cause an allergic skin reaction
H302 - Harmful if swallowed
H272 - May intensify fire; oxidizer

Precautionary Statements - Prevention
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P285 - In case of inadequate ventilation wear respiratory protection
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/ protective clothing
P264 - Wash face, hands and any exposed skin thoroughly after handling
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 - Keep/Store away from clothing/combustible materials
P221 - Take any precaution to avoid mixing with combustibles

Precautionary Statements - Response
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/ attention
P302 + P352 - IF ON SKIN: Wash with plenty of water.
P333 + P313 - If skin irritation or rash occurs: Get medical advice/ attention
P304 + P341 - IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell
P330 - Rinse mouth
P370 + P378 - In case of fire: Use water for extinction

Precautionary Statements - Storage
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

Hazards not otherwise classified (HNOC)
No hazards not otherwise classified were identified.

Other Information
Risk of decomposition by heat or by contact with incompatible materials

Unknown acute toxicity
0% of the mixture consists of ingredient(s) of unknown toxicity
4. FIRST AID MEASURES

General Advice
Remove from exposure, lie down. Show this material safety data sheet to the doctor in attendance.

Eye Contact
Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. In case of contact, immediately flush eyes with plenty of water. If symptoms persist, call a physician.

Skin Contact
Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Inhalation
Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

Ingestion
Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.

Most important symptoms and effects, both acute and delayed
Itching; Redness; Coughing and/or wheezing

Indication of immediate medical attention and special treatment needed, if necessary
Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Water. Cool containers with flooding quantities of water until well after fire is out.

Unsuitable extinguishing media
Do not use carbon dioxide or other gas filled fire extinguishers; they will have little effect on decomposing persulfate.

Specific Hazards Arising from the Chemical
Decomposes under fire conditions to release oxygen that intensifies the fire.

Explosion data
Sensitivity to Mechanical Impact
Not sensitive.

Sensitivity to Static Discharge
Not sensitive.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.

Other
Never add other substances or combustible waste to product residues.

Environmental Precautions
Knock down dust with water spray. Avoid penetration into waterways, sewers, soil or groundwater. Local authorities should be advised if significant spillages cannot be contained.
AMMONIUM PERSULFATE

Methods for Containment
Vacuum, shovel or pump waste into a drum and label contents for disposal. Avoid dust formation. Store in closed container.

Methods for cleaning up
Clean up spill area and treat as special waste. Dispose of waste as indicated in Section 13.

7. HANDLING AND STORAGE

Handling
Wear personal protective equipment. Avoid breathing dust. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Remove and wash contaminated clothing before re-use.

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Incompatible products
Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Persulfate</td>
<td>TWA: 0.1 mg/m³</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7727-54-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>British Columbia</th>
<th>Quebec</th>
<th>Ontario TWAEV</th>
<th>Alberta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Persulfate</td>
<td>TWA: 0.1 mg/m³</td>
<td>-</td>
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</tr>
<tr>
<td>7727-54-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appropriate engineering controls

Engineering measures
Provide local exhaust or general ventilation adequate to maintain exposures below permissable exposure limits.

Individual protection measures, such as personal protective equipment

Eye/Face Protection
Eye protection recommended. Chemical goggles consistent with EN 166 or equivalent.

Skin and Body Protection
Wear long-sleeved shirt, long pants, socks, and shoes.

Hand Protection
Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber.

Respiratory Protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn: particulate filtering facepiece respirators.

Hygiene measures
Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove contaminated clothing - launder after open handling of product.

General information
Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Crystalline solid</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid</td>
</tr>
<tr>
<td>Color</td>
<td>White</td>
</tr>
</tbody>
</table>
Odor odorless
Odor threshold Not applicable
pH 5.2 (1% solution)
Melting point/freezing point 120 °C (Decomposes)
Boiling Point/Range Decomposes upon heating
Flash point Not flammable
Evaporation Rate No information available
Flammability (solid, gas) Not flammable
Flammability Limit in Air Not applicable
   Upper flammability limit: No information available
   Lower flammability limit: No information available
Vapor pressure 1.47E-23 mm Hg at 25°C
Vapor density No information available
Density 1.98 g/cm³ (crystal density)
Specific gravity No information available
Water solubility 600 g/l @ 25 °C
Solubility in other solvents No information available
Partition coefficient No information available (inorganic)
Autoignition temperature No information available
Decomposition temperature > 100 °C (assume)
Viscosity, kinematic No information available (Solid)
Viscosity, dynamic No information available
Explosive properties Not explosive
Oxidizing properties oxidizer
Molecular weight 228.2
Bulk density 1.05 (loose)

10. STABILITY AND REACTIVITY

Reactivity Strong oxidizer.

Chemical Stability Stable under recommended storage conditions.

Possibility of Hazardous Reactions Use of persulfates in chemical reactions requires appropriate precautions and design considerations for pressure and thermal relief.

   Decomposing persulfates will evolve large volumes of gas and/or vapor, can accelerate exponentially with heat generation, and create significant and hazardous pressures if contained and not properly controlled or mitigated.

   Use with alcohols in the presence of water has been demonstrated to generate conditions that require rigorous adherence to process safety methods and standards to prevent escalation to an uncontrolled reaction.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat (decomposes at 275 °C); Moisture

Incompatible materials Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials.

Hazardous Decomposition Products Oxygen which supports combustion; Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Product Information

Unknown acute toxicity 0% of the mixture consists of ingredient(s) of unknown toxicity
LD50 Oral 740 mg/kg (rat) (Ammonium Persulfate)
LD50 Dermal > 2000 mg/kg (rat) (Ammonium Persulfate)
LC50 Inhalation > 2.95 mg/L (rat) (4-hr) (Ammonium Persulfate)

Serious eye damage/eye irritation Irritating to eyes.
Skin corrosion/irritation Minimally irritating.
Sensitization

Sensitizing to skin and respiratory system.

Information on toxicological effects

Symptoms

Symptoms of allergic reaction may include rash, itching, swelling and trouble breathing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity

Did not show carcinogenic effects in animal experiments.

Mutagenicity

In vivo tests did not show mutagenic effects.

Reproductive toxicity

This product is not recognized as reprotox by Research Agencies.

STOT - single exposure

May cause respiratory irritation.

STOT - repeated exposure

Not classified.

Subchronic toxicity

Oral (NOAEL) = 41.1 mg/kg bw (Ammonium Persulfate)
Inhalation (NOAEC) = 10.3 mg/m³ (Ammonium Persulfate)
Dermal: No data available

Target organ effects

Eyes, Skin, Respiratory System.

Aspiration hazard

No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects

<table>
<thead>
<tr>
<th>Active Ingredient(s)</th>
<th>Duration</th>
<th>Species</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Persulfate</td>
<td>96 h LC50</td>
<td>Onchorhyncus mykiss</td>
<td>76.3</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>48 h EC50</td>
<td>Water flea</td>
<td>120</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>72 h EC50</td>
<td>Marine algae (Phaeodactylym tricornutum)</td>
<td>136</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>96 h LC50</td>
<td>Turbot (Scophthalmus maximus)</td>
<td>107.6</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>18 h EC10</td>
<td>Pseudonomas putida</td>
<td>36</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>5 d</td>
<td>Abra Alba</td>
<td>11</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>96 h LC50</td>
<td>Grass shrimp</td>
<td>391</td>
<td>mg/L</td>
</tr>
<tr>
<td>Ammonium Persulfate</td>
<td>24 h EC50</td>
<td>Daphnia magna</td>
<td>635.7</td>
<td>mg/L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Toxicity to algae</th>
<th>Toxicity to fish</th>
<th>Toxicity to Microorganisms</th>
<th>Toxicity to daphnia and other aquatic invertebrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Persulfate</td>
<td>96 h LC50: = 323 mg/L (Poecilia reticulata) 96 h LC50: = 103 mg/L (Lepomis macrochirus) static 96 h LC50: = 76.3 mg/L (Onchorhyncus mykiss) static</td>
<td>48 h EC50: = 120 mg/L (Daphnia magna)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. DISPOSAL CONSIDERATIONS

Waste disposal methods
This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261). It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.

US EPA Waste Number
D001

Contaminated Packaging
Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT

| UN/ID no  | 1444 |
| Proper Shipping Name | AMMONIUM PERSULFATE |
| Hazard class | 5.1 |
| Packing Group | III |

TDG

| UN/ID no  | 1444 |
| Proper Shipping Name | AMMONIUM PERSULFATE |
| Hazard class | 5.1 |
| Packing Group | III |

ICAO/IATA

| UN/ID no  | 1444 |
| Proper Shipping Name | AMMONIUM PERSULFATE |
| Hazard class | 5.1 |
| Packing Group | III |

IMDG/IMO

| UN/ID no  | 1444 |
| Proper Shipping Name | AMMONIUM PERSULFATE |
| Hazard class | 5.1 |
| Packing Group | III |

ADR/RID-Labels

| Hazard class | 5.1 |

ADR/RID

| UN/ID no  | 1444 |
| Proper Shipping Name | AMMONIUM PERSULFATE |
| Hazard class | 5.1 |
| Packing Group | III |

ADN

| Proper Shipping Name | AMMONIUM PERSULFATE |
| Hazard class | 5.1 |
| Packing Group | III |

OTHER INFORMATION
Protect from physical damage. Do not store near acids, moisture or heat.

15. REGULATORY INFORMATION

U.S. Federal Regulations
AMMONIUM PERSULFATE

SDS #: 7727-54-0-US
Revision date: 2015-07-07
Version 1.01

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Yes</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute health hazard</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Chronic health hazard</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Fire hazard</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Sudden release of pressure hazard</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Reactive Hazard</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA (United States)</th>
<th>DSL (Canada)</th>
<th>EINECS/EL (Europe)</th>
<th>ENCS (Japan)</th>
<th>China (IECSC)</th>
<th>KECL (Korea)</th>
<th>PICCS (Philippines)</th>
<th>AICS (Australia)</th>
<th>NZIoC (New Zealand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Persulfate 7727-54-0 (&gt;98)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

CANADA

WHMIS Statement
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
C - Oxidizing materials
D2A - Very toxic materials
D2B - Toxic materials

16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazards</th>
<th>Flammability</th>
<th>Stability</th>
<th>Special Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td>OX</td>
</tr>
</tbody>
</table>

NFPA/HMIS Ratings Legend
Special Hazards: OX = Oxidizer
Protection=J (Safety goggles, gloves, apron, combination dust and vapor respirator)

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Prepared By:

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End of Safety Data Sheet