1. IDENTIFICATION

Product identifier
Product Name: Phosphorus Pentabromide

Other means of identification
Product Code: 6500
UN/ID no.: UN2691
Synonyms: None

Recommended use of the chemical and restrictions on use
Recommended Use: Laboratory chemicals.
Uses advised against: No information available

Details of the supplier of the safety data sheet
Manufacturer Address:
Harrell Industries, Inc.
2495 Commerce Drive
Rock Hill, SC 29730

www.harrellindustries.com

Emergency telephone number
Company Phone Number: 803-327-6335
Fax Number: 803-327-7808
24 Hour Emergency Phone Number: 800 633-8253 (PERS)

2. HAZARDS IDENTIFICATION

Classification
OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Skin corrosion/irritation</th>
<th>Category 1</th>
</tr>
</thead>
</table>

Label elements

Emergency Overview

Danger

Hazard statements
Causes severe skin burns and eye damage

TOXIC! TOXIC BY INHALATION, SKIN CONTACT, AND INGESTION. CAUSES BURNS. REACTS VIOLENTLY WITH WATER!
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE). IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. REMOVE ALL CONTAMINATED CLOTHING IMMEDIATELY. WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION. STORE
Precautionary Statements - Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray
Wash skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection

Corrosive. Redness, pain, blurred vision can occur. Can cause burns and permanent eye damage. May cause blindness. Rapidly absorbed through the skin with systematic poisoning effects to follow. This material is extremely destructive to tissue of the mucus membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi as well as chemical pneumonitis and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.
Poison. Symptoms may include burning pain in mouth and throat, abdominal pain, nausea, vomiting, headache, dizziness, muscular weakness, central nervous system effects, increase in heart rate, irregular breathing, coma, and possibly death.

Hazards not otherwise classified (HNOC)
Not applicable

Other Information
Not applicable
Unknown acute toxicity 100% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance</th>
<th>Synonyms</th>
<th>Formula</th>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>PBr5</td>
<td>Phosphorus Pentabromide</td>
<td>7789-69-7</td>
<td>95 min</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Description of first aid measures

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

Skin contact
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician immediately. Wash clothing before reuse. Discard contaminated shoes.

Inhalation
Remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion
Wash out mouth with water given the person is conscious. Get medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms
No information available.

Indication of any immediate medical attention and special treatment needed
Note to physicians
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Dry chemical.

Unsuitable extinguishing media  DO NOT USE WATER.

Specific hazards arising from the chemical
Emits toxic fumes under fire conditions. Water hydrolyzes this material liberating acidic gas which, in contact with metal surfaces, can generate flammable and/or explosive hydrogen gas.

Explosion data
Sensitivity to Mechanical Impact  None.
Sensitivity to Static Discharge  None.

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, protective equipment and emergency procedures

Personal precautions
Evacuate area! Ventilate area of spill. Wear appropriate personal protective equipment. Absorb spilled material with an inert material (e. g., vermiculite, dry sand, earth), and place in a closed chemical waste container. Do not use combustible materials, such as saw dust. Wash spill site after material pickup is complete. Do not flush to sewer!

Environmental precautions
See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment
Keep in suitable, closed containers for disposal.

Methods for cleaning up
Absorb with inert materials (e.g., vermiculite, dry sand, earth). Do not use combustible materials, such as saw dust. Do not flush to sewer!! Wash spill site after pickup is complete.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling
Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Storage Conditions
DO NOT ALLOW CONTACT WITH WATER! Keep in a tightly closed container. Store under nitrogen. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Store separately from reactive or combustible materials, and out of direct sunlight. Containers of this material may be hazardous when empty since they retain product residues; observe all warnings and precautions listed for the product. CORROSIVE. POISON.

Incompatible materials

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure Guidelines

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection
Use chemical safety goggles and/or full face shield. Maintain eye wash fountain and quick-drench facilities in work area.

Skin and body protection
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Wear protective butyl rubber gloves. Wear protective Neoprene™ gloves.

Respiratory protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks · Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Dark brown to yellow crystals</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Dark brown to yellow</td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>Sharp bromine odor</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No information available</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks · Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Melting point / freezing point</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability limit:</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit:</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Vapor density</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Relative density</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Water solubility</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
<td></td>
</tr>
</tbody>
</table>

Other Information

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks · Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softening point</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>430.56</td>
<td></td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>No information available</td>
<td></td>
</tr>
</tbody>
</table>
Bulk density
No information available

10. STABILITY AND REACTIVITY

Reactivity
No data available

Chemical stability
Stable under ordinary conditions of use and storage.

Possibility of Hazardous Reactions
None under normal processing.

Conditions to avoid
Trifluoroacetic acid: Moisture and incompatibles. Heat.

Incompatible materials

Hazardous Decomposition Products
Hydrogen bromide gas. Phosphine. phosphorus oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information
No data available

Inhalation
Harmful by inhalation.

Eye contact
Causes eye burns.

Skin contact
Harmful if absorbed through the skin. Causes burns.

Ingestion
Harmful if swallowed. Causes burns.

Information on toxicological effects

Symptoms
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Cough, shortness of breath, headache, nausea.

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

Sensitization
No information available.

Germ cell mutagenicity
No information available.

Carcinogenicity
No information available.

Reproductive toxicity
No information available.

STOT - single exposure
No information available.

STOT - repeated exposure
No information available.

Aspiration hazard
No information available.

Numerical measures of toxicity - Product Information

12. ECOLOGICAL INFORMATION

Ecotoxicity
100% of the mixture consists of components(s) of unknown hazards to the aquatic environment

Persistence and degradability
No information available.

Bioaccumulation
No information available.
Other adverse effects
No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations. Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility.

Contaminated packaging
Do not reuse container.

14. TRANSPORT INFORMATION

DOT
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II
Reportable Quantity (RQ) 2 kg

TDG
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

MEX
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

ICAO (air)
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

IATA
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

IMDG
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

RID
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

ADR
Regulated
UN/ID no. UN2691
Proper shipping name Phosphorus Pentabromide
Hazard Class 8
Packing Group II

ADN
Regulated
UN Number: UN2691
Proper shipping name: Phosphorus Pentabromide
Hazard Class: 8
Packing Group: II

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Complies</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA</td>
<td></td>
</tr>
<tr>
<td>DSL/NDSL</td>
<td></td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td></td>
</tr>
<tr>
<td>ENCS</td>
<td></td>
</tr>
<tr>
<td>IECSC</td>
<td></td>
</tr>
<tr>
<td>KECL</td>
<td></td>
</tr>
<tr>
<td>PICCS</td>
<td></td>
</tr>
<tr>
<td>AICS</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
- DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
- EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
- ENCS - Japan Existing and New Chemical Substances
- IECSC - China Inventory of Existing Chemical Substances
- KECL - Korean Existing and Evaluated Chemical Substances
- PICCS - Philippines Inventory of Chemicals and Chemical Substances
- AICS - Australian Inventory of Chemical Substances

US Federal Regulations

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

CWA (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

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus Pentabromide</td>
<td>7789-69-7</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

U.S. EPA Label Information
EPA Pesticide Registration Number: Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION
NFPA Health hazards 0 Flammability 0 Instability 0 Physical and Chemical Properties
HMIS Health hazards 0 Flammability 0 Physical hazards 0 Personal protection X

Issue Date 17-Apr-2015
Revision Date 17-Apr-2015
Revision Note No information 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.

End of Safety Data Sheet