MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2321
Gaithersburg, Maryland 20899-2321

SRM Number: 186g
MSDS Number: 186g
SRM Name: pH Standards
Potassium Dihydrogen Phosphate (186-I-g);
Disodium Hydrogen Phosphate (186-II-g)

Date of Issue: 07 November 2003

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SECTION I. MATERIAL IDENTIFICATION

Material Name: pH Standards: Potassium Dihydrogen Phosphate (186-I-g); Disodium Hydrogen Phosphate (186-II-g)

Description: SRM 186g consists of two components, each prepared to ensure high purity and uniformity: KH$_2$PO$_4$, Potassium Dihydrogen Phosphate (186-I-g) and Na$_2$HPO$_4$, Disodium Hydrogen Phosphate (186-II-g). However, neither SRM component is certified for purity of substance. A unit of SRM 186g consists of 30 g of potassium dihydrogen phosphate (186-I-g) and 45 g of disodium hydrogen phosphate (186-II-g), each contained in its respective clear glass bottle.

Other Designations: Potassium Dihydrogen Phosphate (potassium acid phosphate; monopotassium phosphate; potassium diposphate; potassium biphosphate; potassium orthophosphate; potassium dihydrogen phosphate)
Disodium Hydrogen Phosphate (disodium phosphate; disodium acid orthophosphate; soda phosphate; disodium phosphoric acid; disodium monohydrated phosphate; monohydrated disodium phosphate; DSP; sodium phosphate; sodium phosphate (Na$_2$HPO$_4$); hydrogen disodium phosphate; phosphoric acid, disodium salt; sodium monohydrated phosphate; anhydrous sodium acid phosphate; disodium acid phosphate; dibasic sodium phosphate; disodium orthophosphate; disodium hydrogenorthophosphate)

Name Chemical Formula CAS Registry Number
Potassium Dihydrogen Phosphate KH$_2$PO$_4$ 7778-77-0
Disodium Hydrogen Phosphate Na$_2$HPO$_4$ 7558-79-4

DOT Classification: Potassium dihydrogen phosphate and disodium hydrogen phosphate are not regulated by DOT.

SECTION II. HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Components</th>
<th>Nominal Concentration (%)</th>
<th>Exposure Limits and Toxicity Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium Dihydrogen Phosphate</td>
<td>100</td>
<td>No occupational exposure limits established.</td>
</tr>
<tr>
<td>Disodium Hydrogen Phosphate</td>
<td>100</td>
<td>No occupational exposure limits established.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rat, Oral LD$_{50}$: 12.9 g/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rat, Intraperitoneal: LD$_{Lo}$: 1 g/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rat, Subcutaneous: LD$_{Lo}$: 1 g/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rat, Intramuscular: LD$_{Lo}$: 1 g/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rabbit, Intravenous: LD$_{Lo}$: 1075 mg/kg</td>
</tr>
</tbody>
</table>

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SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Appearance and Odor: white powder and granules; no odor</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight: 136.09</td>
<td>Molecular Weight: 141.96</td>
</tr>
<tr>
<td>Specific Gravity (water = 1): 2.338</td>
<td>Specific Gravity (@ 16 °C; water = 1): 2.066 (dihydrate)</td>
</tr>
<tr>
<td>Boiling Point: not applicable</td>
<td>Boiling Point: not applicable</td>
</tr>
<tr>
<td>Melting Point: 253 °C</td>
<td>Melting Point: not available</td>
</tr>
<tr>
<td>pH: 4.1 - 4.5 @ 25 °C (5 % solution)</td>
<td>PH (@ 25 °C): 8.7 - 9.3 (5 % solution)</td>
</tr>
<tr>
<td>Water Solubility: 33 %</td>
<td>Water Solubility: 12.5 %</td>
</tr>
<tr>
<td>Solvent Solubility: insoluble in alcohol</td>
<td>Solvent Solubility: very slightly soluble in alcohol</td>
</tr>
</tbody>
</table>

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Potassium Dihydrogen Phosphate and Disodium Hydrogen Phosphate:

- Flash Point: Not Applicable
- Method Used: Not Applicable
- Autoignition Temperature: Not Applicable

Flammability Limits in Air (Volume %): UPPER: Not Applicable
LOWER: Not Applicable

Unusual Fire and Explosion Hazards: These materials are negligible fire hazards.

Extinguishing Media: Use extinguishing agents appropriate for surrounding fire.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full-face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Potassium Dihydrogen Phosphate and Disodium Hydrogen Phosphate:

- Stability: ___ X Stable ___ Unstable

Conditions to Avoid: Avoid generating dust.

Incompatibility (Materials to Avoid): Potassium dihydrogen phosphate is incompatible with metals and strong bases. Strong bases may react violently.

Disodium hydrogen phosphate is incompatible with metals and acids. Strong acids may react violently.

Hazardous Decomposition or Byproducts: Hazardous decomposition of potassium dihydrogen phosphate may form phosphorous oxides.
Hazardous decomposition of disodium hydrogen phosphate can produce phosphorus oxides and sodium oxides.

Hazardous Polymerization: ___ Will Occur ___ X Will Not Occur
SECTION VI. HEALTH HAZARD DATA

<table>
<thead>
<tr>
<th>Route of Entry</th>
<th>Inhalation</th>
<th>Skin</th>
<th>Ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Health Hazards (Acute and Chronic)

Potassium dihydrogen phosphate is irritating to the eyes, skin, and respiratory system. It may be harmful if swallowed.

Eye Contact: Acute eye contact of potassium dihydrogen phosphate may cause mild irritation. There is no data for chronic exposure to the eyes.

Skin Contact: Exposure to the skin may cause irritation. Chronic exposure of potassium dihydrogen phosphate may cause dermatitis.

Inhalation: Inhalation of potassium dihydrogen phosphate may cause irritation of the nose and throat, coughing and choking. There is no data for chronic exposure.

Ingestion: Phosphates are slowly and incompletely absorbed when ingested. However, effects have occurred when large doses are ingested (acute exposure): nausea, vomiting, diarrhea, and stomach pain. If sufficient amounts are absorbed, slow or irregular heartbeat, weakening of cardiac contractility with hypotension, rapid breathing or shortness of breath, dizziness, mental confusion, weakness or heaviness of the legs, tiredness, paresthesias of the hands, feet, and lips, and paralysis may occur. Chronic exposure (repeated ingestion) may result in symptoms as detailed in acute ingestion. Bone and joint pain may also occur.

Disodium hydrogen phosphate is irritating to the eyes, skin, and respiratory system. It may be harmful if swallowed.

Eye Contact: Eye contact of disodium hydrogen phosphate may cause irritation with redness and pain. There is no data for chronic exposure to the eyes.

Skin Contact: Exposure to the skin may cause mild irritation and redness. Repeated and prolonged exposure may cause dermatitis.

Inhalation: Inhalation of disodium hydrogen phosphate may cause mild irritation of mucous membranes with sore throat, coughing, and difficulty breathing. There is no data for chronic exposure.

Ingestion: Ingestion of sodium hydrogen phosphate may result in pain and burning in the mouth, abdominal pain, nausea, vomiting, diarrhea, and cramps. Amounts greater than 45 ml of disodium hydrogen phosphate solution may cause a change in blood pressure, slow pulse, and coma.

Listed as a Carcinogen/Potential Carcinogen (Potassium Dihydrogen Phosphate and Disodium Hydrogen Phosphate):

In the National Toxicology Program (NTP) Report on Carcinogens
In the International Agency for Research on Cancer (IARC) Monographs
By the Occupational Safety and Health Administration (OSHA)

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<td>X</td>
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</tbody>
</table>

EMERGENCY AND FIRST AID PROCEDURES:

Potassium Dihydrogen Phosphate and Disodium Hydrogen Phosphate:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance immediately.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration by qualified personnel. Obtain medical assistance immediately.
**Ingestion:** If a large amount is swallowed, obtain immediate medical attention.

### SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

**Potassium Dihydrogen Phosphate and Disodium Hydrogen Phosphate:**

**Steps to be Taken in Case Material Is Released or Spilled:** Collect spilled material in appropriate container for disposal. Avoid generating dust. If disodium hydrogen phosphate is accidentally released into the water, add alkaline material such as lime, crushed limestone, sodium bicarbonate, or soda ash.

**Waste Disposal:** Follow all federal, state, and local regulations.

**Handling and Storage:** Wear gloves and chemical safety glasses where contact with dust may occur. An eye wash station and washing facilities should be readily available near handling and use areas.

**NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store and handle in accordance with all current regulations and standards. Store with caps tightly closed in a dry environment, and under normal laboratory temperature. Keep separated from incompatible substances.

### SECTION VIII. SOURCE DATA/OTHER COMMENTS

**Sources:** MDL Information Systems, Inc., MSDS Sodium Phosphate, Dibasic, 19 March 2003.


**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was carefully prepared, using current references; however, NIST **DOES NOT** certify the data on the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.