SAFETY DATA SHEET

According to JIS Z 7253:2019
Revision Date 15-Jul-2021
Version 4.02

Section 1: PRODUCT AND COMPANY IDENTIFICATION

<table>
<thead>
<tr>
<th>Product name</th>
<th>Perchloric Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>162-00695,160-00691</td>
</tr>
</tbody>
</table>

Manufacturer
FUJIFILM Wako Pure Chemical Corporation
1-2 Doshomachi 3-Chome
Chuo-ku, Osaka 540-8605, Japan
Phone: +81-6-6203-3741
Fax: +81-6-6203-5964

Supplier
FUJIFILM Wako Pure Chemical Corporation
1-2 Doshomachi 3-Chome, Chuo-ku, Osaka 540-8605, Japan
Phone: +81-6-6203-3741
Fax: +81-6-6203-2029

Emergency telephone number
+81-6-6203-3741 / +81-3-3270-8571

Recommended uses and restrictions on use
For research use only

Section 2: HAZARDS IDENTIFICATION

GHS classification

Classification of the substance or mixture
Oxidizing liquids Category 1
Corrosive to metals Category 1
Acute toxicity - Oral Category 4
Skin corrosion/irritation Category 1
Serious eye damage/eye irritation Category 1
Carcinogenicity Category 2
Reproductive Toxicity Category 2
Specific target organ toxicity (single exposure) Category 3
  Respiratory tract irritation
Specific target organ toxicity (repeated exposure) Category 1
  thyroid gland

Pictograms

Signal word Danger

Hazard statements
H271 - May cause fire or explosion; strong oxidizer
H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage
H302 - Harmful if swallowed
H351 - Suspected of causing cancer
H361 - Suspected of damaging fertility or the unborn child
H335 - May cause respiratory irritation
H372 - Causes damage to the following organs through prolonged or repeated exposure: thyroid gland
Precautionary statements-(Prevention)
• Keep away from heat/sparks/open flames/hot surfaces. — No smoking
• Keep/Store away from clothing/combustible materials
• Obtain special instructions before use
• Do not handle until all safety precautions have been read and understood
• Use personal protective equipment as required.
• Wash face, hands and any exposed skin thoroughly after handling
• Do not eat, drink or smoke when using this product
• Do not breathe dust/fume/gas/mist/vapors/spray
• Use only outdoors or in a well-ventilated area
• Take any precaution to avoid mixing with combustibles
• Wear fire/flame resistant/retardant clothing
• Keep only in original container

Precautionary statements-(Response)
• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
• Immediately call a POISON CENTER or doctor/physician
• Wash contaminated clothing before reuse.
• IF ON CLOTHING: rinse immediately contaminated clothing and skin with plenty of water before removing clothes
• Rinse skin with water/shower
• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
• Call a POISON CENTER or doctor/physician if you feel unwell.
• IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
• Rinse mouth.
• Do NOT induce vomiting.
• In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion
• Absorb spillage to prevent material damage

Precautionary statements-(Storage)
• Store away from other materials
• Store locked up.
• Store in a well-ventilated place. Keep container tightly closed
• Store in corrosive resistant/container with a resistant inner liner

Precautionary statements-(Disposal)
• Dispose of contents/container to an approved waste disposal plant

Others
Other hazards Not available

**Section 3: COMPOSITION/INFORMATION ON INGREDIENTS**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Weight-%</th>
<th>Molecular weight</th>
<th>ENCS</th>
<th>ISHL No.</th>
<th>CAS RN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>70.0 - 72.0</td>
<td>100.46</td>
<td>(1)-221</td>
<td>公表</td>
<td>7601-90-3</td>
</tr>
<tr>
<td>Water</td>
<td>28.0 - 30.0</td>
<td>18.02</td>
<td>N/A</td>
<td>N/A</td>
<td>7732-18-5</td>
</tr>
</tbody>
</table>

Impurities and/or Additives: Not applicable

**Section 4: FIRST AID MEASURES**

Inhalation
Remove to fresh air. If symptoms persist, call a physician.

Skin contact
Wash off immediately with soap and plenty of water. If symptoms persist, call a physician.

Eye contact
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediate medical attention is required.

Ingestion
Rinse mouth. Never give anything by mouth to an unconscious person. Call a physician or poison control center.
immediately. Do not induce vomiting without medical advice.

**Protection of first-aiders**
Use personal protective equipment as required.

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**Section 5: FIRE FIGHTING MEASURES**

**Suitable extinguishing media**
- Flood with water,
- Sand

**Unsuitable extinguishing media**
No information available

**Specific hazards arising from the chemical product**
Thermal decomposition can lead to release of irritating and toxic gases and vapors.

**Special extinguishing method**
No information available

**Special protective actions for fire-fighters**
Use personal protective equipment as required. Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

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**Section 6: ACCIDENTAL RELEASE MEASURES**

**Personal precautions, protective equipment and emergency procedures**
For indoor, provide adequate ventilation process until the end of working. Deny unnecessary entry other than the people involved by, for example, using a rope. While working, wear appropriate protective equipments to avoid adhering it on skin, or inhaling the gas. Work from windward, and retract the people downwind.

**Environmental precautions**
To be careful not discharged to the environment without being properly handled waste water contaminated.

**Methods and materials for contamination and methods and materials for cleaning up**
Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers

**Recovery, neutralization**
No information available

**Secondary disaster prevention measures**
Clean contaminated objects and areas thoroughly observing environmental regulations.

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**Section 7: HANDLING AND STORAGE**

**Handling**

**Technical measures**
Avoid contact with organic substance. Avoid contact with reducing agents and combustible materials. Avoid contact with strong bases. Use with local exhaust ventilation.

**Precautions**
Do not rough handling containers, such as upsetting, falling, giving a shock, and dragging. Prevent leakage, overflow, and scattering. Not to generate steam and dust in vain. Seal the container after use. After handling, wash hands and face, and then gargle. In places other than those specified, should not be smoking or eating and drinking. Should not be brought contaminated protective equipment and gloves to rest stops. Deny unnecessary entry of non-emergency personnel to the handling area.

**Safety handling precautions**
Avoid contact with skin, eyes or clothing. Use personal protective equipment as required.

**Storage**

**Safe storage conditions**
- Storage conditions: Store away from sunlight in well-ventilated place at room temperature (preferably cool).
- Keep container tightly closed.
- Glass
- Organic substance, Combustible materials, Reducing agent, Strong bases, Metals

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**Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**
Engineering controls
In case of indoor workplace, seal the source or use a local exhaust system. Provide the safety shower facility, and hand- and eye-wash facility. And display their position clearly.

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

Personal protective equipment
Respiratory protection
- Gas mask for acidic gas
Hand protection
- Impermeable protective gloves
Eye protection
- Protective eyeglasses or chemical safety goggles
Skin and body protection
- Long-sleeved work clothes

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

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Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Form
- Color: colorless
- Turbidity: clear
- Appearance: liquid
- Odor: No data available

Melting point/freezing point
- Melting point: -17 °C
- Freezing point: No data available

Boiling point, initial boiling point and boiling range
- Boiling point: 203 °C (72.4%) (azeotrope)
- Initial boiling point: No data available
- Boiling range: No data available

Flammability
- Flammability: No data available

Evaporation rate:
- No data available

Flammability (solid, gas):
- No data available

Upper/lower flammability or explosive limits
- Upper limit: No data available
- Lower limit: No data available

Flash point:
- No data available

Auto-ignition temperature:
- No data available

Decomposition temperature:
- No data available

pH
- 1.67 g/mL

Viscosity (coefficient of viscosity)
- No data available

n-Octanol/water partition coefficient (log Pow)
- No data available

Vapour pressure
- No data available

Specific Gravity / Relative density
- 1.67 g/mL

Vapour density
- No data available

Particle characteristics
- No data available

Section 10: STABILITY AND REACTIVITY

Stability
- Chemical stability: Stable under recommended storage conditions.

Reactivity
- No data available

Hazardous reactions
- None under normal processing

Conditions to avoid
- Extremes of temperature and direct sunlight

Incompatible materials
- Organic substance, Combustible materials, Reducing agent, Strong bases, Metals

Hazardous decomposition products
- Halides

Section 11: TOXICOLOGICAL INFORMATION
Acute toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>1100 mg/kg (Rat)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Acute toxicity -oral- source information</th>
<th>Acute toxicity -dermal- source information</th>
<th>Acute toxicity -inhalation gas-source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
<td>Based on the NITE GHS classification results.</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Acute toxicity -inhalation vapor-source information</th>
<th>Acute toxicity -inhalation dust-source information</th>
<th>Acute toxicity -inhalation mist-source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
<td>Based on the NITE GHS classification results.</td>
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</tr>
</tbody>
</table>

Skin irritation/corrosion

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Skin corrosion/irritation source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

Serious eye damage/irritation

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Serious eye damage/irritation source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

Respiratory or skin sensitization

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Respiratory or Skin sensitization source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

Reproductive cell mutagenicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>germ cell mutagenicity source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

Carcinogenicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Carcinogenicity source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NTP</th>
<th>IARC</th>
<th>ACGIH</th>
<th>JSOH (Japan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>7601-90-3</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reproductive toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Reproductive toxicity source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
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</table>

STOT-single exposure

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>STOT -single exposure- source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

STOT-repeated exposure

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>STOT -repeated exposure- source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

Aspiration hazard

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Aspiration Hazard source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>N/A</td>
<td>LC50 : Danio rerio 98 h 1131 mg/L</td>
<td>LC50 : Daphnia magna 495 mg/L 48 h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOEC : Fathead minnow =&gt;495 mg/L 35 d</td>
<td>NOEC : Ceriodaphnia dubia 10.1 mg/L 7 d</td>
</tr>
</tbody>
</table>

Other data

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Short-term (acute) hazardous to the aquatic environment source information</th>
<th>Long-term (chronic) hazardous to the aquatic environment source information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloric Acid</td>
<td>Based on the NITE GHS classification results.</td>
<td>Based on the NITE GHS classification results.</td>
</tr>
</tbody>
</table>
Persistence and degradability  No information available
Bioaccumulative potential  No information available
Mobility in soil  No information available
Hazard to the ozone layer  No information available

Section 13: DISPOSAL CONSIDERATIONS

Waste from residues
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated container and contaminated packaging
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Section 14: TRANSPORT INFORMATION

ADR/RID
UN number  UN1873
Proper shipping name:  perchloric acid
UN classification  5.1
Subsidiary hazard class  8
Packing group  I
Marine pollutant  Not applicable

IMDG
UN number  UN1873
Proper shipping name:  perchloric acid
UN classification  5.1
Subsidiary hazard class  8
Packing group  I
Marine pollutant (Sea)  Not applicable
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code  No information available

IATA
Cargo Aircraft only
UN number  UN1873
Proper shipping name:  perchloric acid
UN classification  5.1
Subsidiary hazard class  8
Packing group  I
Environmentally Hazardous Substance  Not applicable

Section 15: REGULATORY INFORMATION

International Inventories
EINECS/ELINCS  -
TSCA  -

Japanese regulations
Fire Service Act  Category VI, perchlorate,
Poisonous and Deleterious Substances Control Law  Not applicable
Industrial Safety and Health Act  Dangerous Substances - Oxidizing Substance (Enforcement Order Attached Table 1 Item 3)
Regulations for the carriage and storage of dangerous goods in ship  Oxidizing Agents - Oxidizing Agents (Ordinance Regarding Transport by Ship and Storage, Attached Table 1)
Civil Aeronautics Law  Oxidizing Agents - Oxidizing Agents (Ordinance Art.194, MITL Notification for Air Transportation of Explosives etc., Attached Table 1)
Pollutant Release and Transfer  Not applicable
Register Law
Export Trade Control Order Not applicable

Section 16: OTHER INFORMATION

Key literature references and sources for data etc.
NITE: National Institute of Technology and Evaluation (JAPAN)
http://www.safe.nite.go.jp/japan/db.html
IATA dangerous Goods Regulations
RTECS: Registry of Toxic Effects of Chemical Substances
Japan Industrial Safety and Health Association GHS Model SDS
Dictionary of Synthetic Organic Chemistry, SSOJC, Koudansha Scientific Co.Ltd.
Chemical Dictionary, Kyoritsu Publishing Co., Ltd.
etc

Disclaimer
This SDS is according to JIS Z 7253: 2019. 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, 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.
GHS Classification is according to JIS Z7252(2019). *JIS: Japanese Industrial Standards

End of Safety Data Sheet