Conforms to US OSHA Hazard Communication 29CFR1910.1200

SAFETY DATA SHEET

Agilent Technologies

OQ/PV Standards Kit-2 for UV-VIS Holmium Oxide - Perchloric Acid, Part Number 5063-6521

Section 1. Identification

1.1 Product identifier

Product name : OQ/PV Standards Kit-2 for UV-VIS Holmium Oxide - Perchloric Acid, Part Number 5063-6521

Part no. (chemical kit) : 5063-6521

Part no. : Holmium Oxide in 10% Perchloric Acid Solution 5063-6521-1
Perchloric Acid Solution (10% v/v) 5063-6521-2

Validation date : 1/19/2024

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Reagents and Standards for Analytical Chemistry Laboratory Use
Holmium Oxide in 10% Perchloric Acid Solution 1 x 10 ml
Perchloric Acid Solution (10% v/v) 1 x 10 ml

1.3 Details of the supplier of the safety data sheet

Supplier/Manufacturer : Agilent Technologies, Inc.
5301 Stevens Creek Blvd
Santa Clara, CA 95051, USA
800-227-9770

1.4 Emergency telephone number

In case of emergency : CHEMTREC®: 1-800-424-9300

Section 2. Hazards identification

2.1 Classification of the substance or mixture

OSHA/HCS status : Holmium Oxide in 10% Perchloric Acid Solution — This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Perchloric Acid Solution (10% v/v) — This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture

Holmium Oxide in 10% Perchloric Acid Solution

H272	OXIDIZING LIQUIDS - Category 2
H314	SKIN CORROSION - Category 1
H318	SERIOUS EYE DAMAGE - Category 1
H373	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

Perchloric Acid Solution (10% v/v)

H272	OXIDIZING LIQUIDS - Category 2
H314	SKIN CORROSION - Category 1
H318	SERIOUS EYE DAMAGE - Category 1
H373	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

Holmium Oxide in 10% Perchloric Acid Solution — Percentage of the mixture consisting of ingredient(s) of unknown hazards to the aquatic environment: 3.6%

2.2 GHS label elements

Section 2. Hazards identification

Hazard pictograms : Holmium Oxide in 10% Perchloric Acid Solution

Perchloric Acid Solution (10% v/v)

Signal word : Holmium Oxide in 10% Perchloric Acid Solution — Danger

Perchloric Acid Solution (10% v/v) — Danger

Hazard statements : Holmium Oxide in 10% Perchloric Acid Solution

H272 - May intensify fire; oxidizer.
H314 - Causes severe skin burns and eye damage.
H373 - May cause damage to organs through prolonged or repeated exposure.

Perchloric Acid Solution (10% v/v)

H272 - May intensify fire; oxidizer.
H314 - Causes severe skin burns and eye damage.
H373 - May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

Prevention : Holmium Oxide in 10% Perchloric Acid Solution

P280 - Wear protective gloves, protective clothing and eye or face protection.
P210 - Keep away from heat. No smoking.
P220 - Keep away from clothing and other combustible materials.
P221 - Take any precaution to avoid mixing with combustibles.
P260 - Do not breathe vapor.

Perchloric Acid Solution (10% v/v)

P280 - Wear protective gloves, protective clothing and eye or face protection.
P210 - Keep away from heat. No smoking.
P220 - Keep away from clothing and other combustible materials.
P221 - Take any precaution to avoid mixing with combustibles.
P260 - Do not breathe vapor.

Response : Holmium Oxide in 10% Perchloric Acid Solution

P304 + P310 - IF INHALED: Immediately call a POISON CENTER or doctor.
P301 + P310, P330, P331 - IF SWALLOWED: Immediately call a POISON CENTER or doctor. Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353, P310 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Immediately call a POISON CENTER or doctor.
P363 - Wash contaminated clothing before reuse.
P305 + P351 + P338, P310 - 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.

Perchloric Acid Solution (10% v/v)

P304 + P310 - IF INHALED: Immediately call a POISON CENTER or doctor.
P301 + P310, P330, P331 - IF SWALLOWED: Immediately call a POISON CENTER or doctor. Rinse mouth. Do NOT induce vomiting.

Section 2. Hazards identification

P303 + P361 + P353, P310 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Immediately call a POISON CENTER or doctor.
P363 - Wash contaminated clothing before reuse.
P305 + P351 + P338, P310 - 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.

Storage : Holmium Oxide in 10% Perchloric Acid Solution — Not applicable.
Perchloric Acid Solution (10% v/v) — Not applicable.

Disposal : Holmium Oxide in 10% Perchloric Acid Solution — P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
Perchloric Acid Solution (10% v/v) — P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Holmium Oxide in 10% Perchloric Acid Solution — Keep container tightly closed. Do not breathe vapor or spray. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.
Perchloric Acid Solution (10% v/v) — Keep container tightly closed. Do not breathe vapor or spray. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.

2.3 Other hazards

Hazards not otherwise classified : Holmium Oxide in 10% Perchloric Acid Solution — Causes respiratory tract burns. Causes digestive tract burns.
Perchloric Acid Solution (10% v/v) — Causes respiratory tract burns. Causes digestive tract burns.

Section 3. Composition/information on ingredients

Substance/mixture : Holmium Oxide in 10% Perchloric Acid Solution — Mixture
Perchloric Acid Solution (10% v/v) — Mixture

Ingredient name	%	CAS number
Holmium Oxide in 10% Perchloric Acid Solution		
Perchloric acid	≥10 - ≤22	7601-90-3
Perchloric Acid Solution (10% v/v)		
Perchloric acid	≥10 - <22	7601-90-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

4.1 Description of necessary first aid measures

Eye contact

: Holmium Oxide in 10% Perchloric Acid Solution

Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Perchloric Acid Solution (10% v/v)

Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation

: Holmium Oxide in 10% Perchloric Acid Solution

Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Perchloric Acid Solution (10% v/v)

Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact

: Holmium Oxide in 10% Perchloric Acid Solution

Get medical attention immediately. Call a poison center or physician. Rinse immediately contaminated clothing and skin with plenty of water. Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Perchloric Acid Solution (10% v/v)

Get medical attention immediately. Call a poison center or physician. Rinse immediately contaminated clothing and skin with plenty of water. Wash contaminated skin with soap and water.

Section 4. First aid measures

			Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	:	Holmium Oxide in 10% Perchloric Acid Solution	Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
		Perchloric Acid Solution (10% v/v)	Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

4.2 Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	:	Holmium Oxide in 10% Perchloric Acid Solution	Causes serious eye damage.
		Perchloric Acid Solution (10% v/v)	Causes serious eye damage.
Inhalation	:	Holmium Oxide in 10% Perchloric Acid Solution	Corrosive to the respiratory system.
		Perchloric Acid Solution (10% v/v)	Corrosive to the respiratory system.
Skin contact	:	Holmium Oxide in 10% Perchloric Acid Solution	Causes severe burns.
		Perchloric Acid Solution (10% v/v)	Causes severe burns.
Ingestion	:	Holmium Oxide in 10% Perchloric Acid Solution	May cause burns to mouth, throat and stomach. Corrosive to the digestive tract. Causes burns.
		Perchloric Acid Solution (10% v/v)	May cause burns to mouth, throat and stomach. Corrosive to the digestive tract. Causes burns.

Over-exposure signs/symptoms

Section 4. First aid measures

Eye contact	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: pain watering redness
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: pain watering redness
Inhalation	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: respiratory tract irritation coughing
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: respiratory tract irritation coughing
Skin contact	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: pain or irritation redness blistering may occur
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: stomach pains
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: stomach pains

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

Notes to physician	:	Holmium Oxide in 10% Perchloric Acid Solution	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
		Perchloric Acid Solution (10% v/v)	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	:	Holmium Oxide in 10% Perchloric Acid Solution	No specific treatment.
		Perchloric Acid Solution (10% v/v)	No specific treatment.
Protection of first-aiders	:	Holmium Oxide in 10% Perchloric Acid Solution	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
		Perchloric Acid Solution (10% v/v)	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Section 4. First aid measures

See toxicological information (Section 11)

Section 5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	Holmium Oxide in 10% Perchloric Acid Solution	Use an extinguishing agent suitable for the surrounding fire.
		Perchloric Acid Solution (10% v/v)	Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media	:	Holmium Oxide in 10% Perchloric Acid Solution	None known.
		Perchloric Acid Solution (10% v/v)	None known.

5.2 Special hazards arising from the substance or mixture

Specific hazards arising from the chemical	:	Holmium Oxide in 10% Perchloric Acid Solution	Oxidizing material. May intensify fire. In a fire or if heated, a pressure increase will occur and the container may burst.
		Perchloric Acid Solution (10% v/v)	Oxidizing material. May intensify fire. In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	:	Holmium Oxide in 10% Perchloric Acid Solution	Decomposition products may include the following materials: halogenated compounds
		Perchloric Acid Solution (10% v/v)	Decomposition products may include the following materials: halogenated compounds

5.3 Advice for firefighters

Special protective actions for fire-fighters	:	Holmium Oxide in 10% Perchloric Acid Solution	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
		Perchloric Acid Solution (10% v/v)	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
Special protective equipment for fire-fighters	:	Holmium Oxide in 10% Perchloric Acid Solution	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
		Perchloric Acid Solution (10% v/v)	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel :

Holmium Oxide in 10% Perchloric Acid Solution: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Perchloric Acid Solution (10% v/v): No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders :

Holmium Oxide in 10% Perchloric Acid Solution: If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Perchloric Acid Solution (10% v/v): If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions

:

Holmium Oxide in 10% Perchloric Acid Solution: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Perchloric Acid Solution (10% v/v): Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up :

Holmium Oxide in 10% Perchloric Acid Solution: Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. Do not absorb in sawdust or other combustible material. It may lead to a fire risk when it dries out. Dispose of via a licensed waste disposal contractor.

Perchloric Acid Solution (10% v/v): Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. Do not absorb in sawdust or other combustible material. It may lead to a fire risk when it dries out. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

7.1 Precautions for safe handling

Protective measures	:	Holmium Oxide in 10% Perchloric Acid Solution	Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from clothing, incompatible materials and combustible materials. Keep away from alkalis. Keep away from heat. Empty containers retain product residue and can be hazardous. Do not reuse container.
		Perchloric Acid Solution (10% v/v)	Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from clothing, incompatible materials and combustible materials. Keep away from alkalis. Keep away from heat. Empty containers retain product residue and can be hazardous. Do not reuse container.
Advice on general occupational hygiene	:	Holmium Oxide in 10% Perchloric Acid Solution	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
		Perchloric Acid Solution (10% v/v)	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

	:	Holmium Oxide in 10% Perchloric Acid Solution	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Separate from alkalis. Separate from reducing agents and combustible materials. Store away from grease and oil. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.
		Perchloric Acid Solution (10% v/v)	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from

Section 7. Handling and storage

incompatible materials (see Section 10) and food and drink. Store locked up. Separate from alkalis. Separate from reducing agents and combustible materials. Store away from grease and oil. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

7.3 Specific end use(s)

Recommendations	:	Holmium Oxide in 10% Perchloric Acid Solution	Industrial applications, Professional applications.
		Perchloric Acid Solution (10% v/v)	Industrial applications, Professional applications.
Industrial sector specific solutions	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Not available.

Section 8. Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Holmium Oxide in 10% Perchloric Acid Solution Perchloric acid	None.
Perchloric Acid Solution (10% v/v) Perchloric acid	None.

Biological exposure indices

No exposure indices known.

8.2 Exposure controls

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Section 8. Exposure controls/personal protection

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state	:	Holmium Oxide in 10% Perchloric Acid Solution	Liquid.
		Perchloric Acid Solution (10% v/v)	Liquid.
Color	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Colorless.
Odor	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Odorless.
Odor threshold	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Not available.
pH	:	Holmium Oxide in 10% Perchloric Acid Solution	<2
		Perchloric Acid Solution (10% v/v)	<2
Melting point/freezing point	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Not available.
Boiling point, initial boiling point, and boiling range	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Not available.
Flash point	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Not available.
Evaporation rate	:	Holmium Oxide in 10% Perchloric Acid Solution	Not available.
		Perchloric Acid Solution (10% v/v)	Not available.
Flammability	:	Holmium Oxide in 10% Perchloric Acid Solution	Not applicable.
		Perchloric Acid Solution (10% v/v)	Not applicable.

Section 9. Physical and chemical properties and safety characteristics

Lower and upper explosion limit/flammability limit :

Holmium Oxide in 10% Perchloric Acid Solution	Not available.
Perchloric Acid Solution (10% v/v)	Not available.

Vapor pressure :

Ingredient name	Vapor Pressure at 20°C			Vapor pressure at 50°C		
	mm Hg	kPa	Method	mm Hg	kPa	Method
Holmium Oxide in 10% Perchloric Acid Solution						
water	17.5	2.3	-	92.258	12.3	-
Perchloric acid	0.53	0.071	-	-	-	-
Perchloric Acid Solution (10% v/v)						
water	17.5	2.3	-	92.258	12.3	-
Perchloric acid	0.53	0.071	-	-	-	-

Relative vapor density :

Holmium Oxide in 10% Perchloric Acid Solution	Not available.
Perchloric Acid Solution (10% v/v)	Not available.

Relative density :

Holmium Oxide in 10% Perchloric Acid Solution	Not available.
Perchloric Acid Solution (10% v/v)	Not available.

Solubility(ies) :

Media	Result
Holmium Oxide in 10% Perchloric Acid Solution	
water	Soluble
Perchloric Acid Solution (10% v/v)	
water	Soluble

Partition coefficient: n-octanol/water :

Holmium Oxide in 10% Perchloric Acid Solution	Not applicable.
Perchloric Acid Solution (10% v/v)	Not applicable.

Auto-ignition temperature : Not available.

Decomposition temperature :

Holmium Oxide in 10% Perchloric Acid Solution	Not available.
Perchloric Acid Solution (10% v/v)	Not available.

Viscosity :

Holmium Oxide in 10% Perchloric Acid Solution	Not available.
Perchloric Acid Solution (10% v/v)	Not available.

Particle characteristics

Median particle size :

Holmium Oxide in 10% Perchloric Acid Solution	Not applicable.
Perchloric Acid Solution (10% v/v)	Not applicable.

Section 10. Stability and reactivity

10.1 Reactivity	:	Holmium Oxide in 10% Perchloric Acid Solution	No specific test data related to reactivity available for this product or its ingredients.
		Perchloric Acid Solution (10% v/v)	No specific test data related to reactivity available for this product or its ingredients.
10.2 Chemical stability	:	Holmium Oxide in 10% Perchloric Acid Solution	The product is stable.
		Perchloric Acid Solution (10% v/v)	The product is stable.
10.3 Possibility of hazardous reactions	:	Holmium Oxide in 10% Perchloric Acid Solution	Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with combustible materials Reactions may include the following: risk of causing or intensifying fire
		Perchloric Acid Solution (10% v/v)	Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with combustible materials Reactions may include the following: risk of causing or intensifying fire
10.4 Conditions to avoid	:	Holmium Oxide in 10% Perchloric Acid Solution	Drying on clothing or other combustible materials may cause fire.
		Perchloric Acid Solution (10% v/v)	Drying on clothing or other combustible materials may cause fire.
10.5 Incompatible materials	:	Holmium Oxide in 10% Perchloric Acid Solution	Attacks many metals producing extremely flammable hydrogen gas which can form explosive mixtures with air. Reactive or incompatible with the following materials: alkalis combustible materials reducing materials
		Perchloric Acid Solution (10% v/v)	Attacks many metals producing extremely flammable hydrogen gas which can form explosive mixtures with air. Reactive or incompatible with the following materials: alkalis combustible materials reducing materials
10.6 Hazardous decomposition products	:	Holmium Oxide in 10% Perchloric Acid Solution	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
		Perchloric Acid Solution (10% v/v)	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Holmium Oxide in 10% Perchloric Acid Solution Perchloric acid	LD50 Oral	Rat	1100 mg/kg	-
Perchloric Acid Solution (10% v/v) Perchloric acid	LD50 Oral	Rat	1100 mg/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Holmium Oxide in 10% Perchloric Acid Solution Perchloric acid	Category 2	-	thyroid
Perchloric Acid Solution (10% v/v) Perchloric acid	Category 2	-	thyroid

Aspiration hazard

Not available.

Information on the likely routes of exposure :
- Holmium Oxide in 10% Perchloric Acid Solution: Routes of entry anticipated: Oral, Dermal, Inhalation, Eyes.
- Perchloric Acid Solution (10% v/v): Routes of entry anticipated: Oral, Dermal, Inhalation, Eyes.

Potential acute health effects

Eye contact :
- Holmium Oxide in 10% Perchloric Acid Solution: Causes serious eye damage.
- Perchloric Acid Solution (10% v/v): Causes serious eye damage.

Inhalation :
- Holmium Oxide in 10% Perchloric Acid Solution: Corrosive to the respiratory system.
- Perchloric Acid Solution (10% v/v): Corrosive to the respiratory system.

Skin contact :
- Holmium Oxide in 10% Perchloric Acid Solution: Causes severe burns.
- Perchloric Acid Solution (10% v/v): Causes severe burns.

Section 11. Toxicological information

Ingestion	:	Holmium Oxide in 10% Perchloric Acid Solution	May cause burns to mouth, throat and stomach. Corrosive to the digestive tract. Causes burns.
		Perchloric Acid Solution (10% v/v)	May cause burns to mouth, throat and stomach. Corrosive to the digestive tract. Causes burns.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: pain watering redness
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: pain watering redness
Inhalation	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: respiratory tract irritation coughing
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: respiratory tract irritation coughing
Skin contact	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: pain or irritation redness blistering may occur
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	:	Holmium Oxide in 10% Perchloric Acid Solution	Adverse symptoms may include the following: stomach pains
		Perchloric Acid Solution (10% v/v)	Adverse symptoms may include the following: stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General	:	Holmium Oxide in 10% Perchloric Acid Solution	May cause damage to organs through prolonged or repeated exposure.
		Perchloric Acid Solution (10% v/v)	May cause damage to organs through prolonged or repeated exposure.
Carcinogenicity	:	Holmium Oxide in 10% Perchloric Acid Solution	No known significant effects or critical hazards.
		Perchloric Acid Solution (10% v/v)	No known significant effects or critical hazards.

Section 11. Toxicological information

Mutagenicity	:	Holmium Oxide in 10% Perchloric Acid Solution	No known significant effects or critical hazards.
		Perchloric Acid Solution (10% v/v)	No known significant effects or critical hazards.
Reproductive toxicity	:	Holmium Oxide in 10% Perchloric Acid Solution	No known significant effects or critical hazards.
		Perchloric Acid Solution (10% v/v)	No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapors) (mg/l)	Inhalation (dusts and mists) (mg/l)
Holmium Oxide in 10% Perchloric Acid Solution					
Holmium Oxide in 10% Perchloric Acid Solution	7281.0	N/A	N/A	N/A	N/A
Perchloric acid	1100	N/A	N/A	N/A	N/A
Perchloric Acid Solution (10% v/v)					
Perchloric Acid Solution (10% v/v)	7017.5	N/A	N/A	N/A	N/A
Perchloric acid	1100	N/A	N/A	N/A	N/A

Section 12. Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
Holmium Oxide in 10% Perchloric Acid Solution			
Perchloric acid	Acute EC50 >100 mg/l Fresh water	Daphnia - *Daphnia magna*	48 hours
Perchloric Acid Solution (10% v/v)			
Perchloric acid	Acute EC50 >100 mg/l Fresh water	Daphnia - *Daphnia magna*	48 hours

12.2 Persistence and degradability

Not available.

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Holmium Oxide in 10% Perchloric Acid Solution			
Perchloric acid	-	0.039	Low
Perchloric Acid Solution (10% v/v)			
Perchloric acid	-	0.039	Low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Section 12. Ecological information

12.5 Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

13.1 Waste treatment methods

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IMDG	IATA
UN number	UN1802	UN1802	UN1802	UN1802	UN1802
UN proper shipping name	Perchloric acid solution	PERCHLORIC ACID solution	ACIDO PERCLORICO solution	PERCHLORIC ACID solution	Perchloric acid solution
Transport hazard class(es)	8 (5.1) 	8 (5.1) 	8 (5.1) 	8 (5.1) 	8 (5.1) 
Packing group	II	II	II	II	II
Environmental hazards	No.	No.	No.	No.	No.

Additional information

Remarks: Excepted Quantity

DOT Classification : **Limited quantity** Yes.
Packaging instruction Exceptions: 154. Non-bulk: 202. Bulk: 243.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 30 L.
Special provisions IB2, N41, T7, TP2

Section 14. Transport information

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.40-2.42 (Class 8), 2.23-2.25 (Class 5).
Explosive Limit and Limited Quantity Index 1
ERAP Index 3000
Passenger Carrying Road or Rail Index Forbidden

IMDG : **Emergency schedules** F-H, S-Q

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Packaging instructions: Forbidden. Cargo Aircraft Only: 30 L. Packaging instructions: 855. Limited Quantities - Passenger Aircraft: Forbidden. Packaging instructions: Forbidden.
Special provisions A1

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification :

Holmium Oxide in 10% Perchloric Acid Solution	OXIDIZING LIQUIDS - Category 2 SKIN CORROSION - Category 1 SERIOUS EYE DAMAGE - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 HNOC - Corrosive to digestive tract HNOC - Corrosive to respiratory tract
Perchloric Acid Solution (10% v/v)	OXIDIZING LIQUIDS - Category 2 SKIN CORROSION - Category 1 SERIOUS EYE DAMAGE - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 HNOC - Corrosive to digestive tract HNOC - Corrosive to respiratory tract

Composition/information on ingredients

Section 15. Regulatory information

Name	%	Classification
Holmium Oxide in 10% Perchloric Acid Solution		
Perchloric acid	≥10 - ≤22	OXIDIZING LIQUIDS - Category 1 CORROSIVE TO METALS - Category 1 ACUTE TOXICITY (oral) - Category 4 SKIN CORROSION - Category 1A SERIOUS EYE DAMAGE - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 HNOC - Corrosive to digestive tract HNOC - Corrosive to respiratory tract
Perchloric Acid Solution (10% v/v)		
Perchloric acid	≥10 - <22	OXIDIZING LIQUIDS - Category 1 CORROSIVE TO METALS - Category 1 ACUTE TOXICITY (oral) - Category 4 SKIN CORROSION - Category 1A SERIOUS EYE DAMAGE - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 HNOC - Corrosive to digestive tract HNOC - Corrosive to respiratory tract

State regulations

Massachusetts : The following components are listed: PERCHLORIC ACID

New York : None of the components are listed.

New Jersey : The following components are listed: PERCHLORIC ACID

Pennsylvania : The following components are listed: PERCHLORIC ACID

California Prop. 65

This product does not require a Safe Harbor warning under California Prop. 65.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : All components are listed or exempted.

Canada : At least one component is not listed in DSL but all such components are listed in NDSL.

China : All components are listed or exempted.

Japan : **Japan inventory (CSCL)**: All components are listed or exempted.
Japan inventory (ISHL): All components are listed or exempted.

New Zealand : All components are listed or exempted.

Philippines : Not determined.

Republic of Korea : All components are listed or exempted.

Taiwan : All components are listed or exempted.

Section 15. Regulatory information

Thailand : All components are listed or exempted.

Turkey : Not determined.

United States : All components are active or exempted.

Viet Nam : All components are listed or exempted.

Section 16. Other information

Procedure used to derive the classification

Classification	Justification
Holmium Oxide in 10% Perchloric Acid Solution	
OXIDIZING LIQUIDS - Category 2	Expert judgment
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Calculation method
Perchloric Acid Solution (10% v/v)	
OXIDIZING LIQUIDS - Category 2	Expert judgment
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Calculation method

History

Date of issue/Date of revision : 01/19/2024

Date of previous issue : 12/23/2020

Version : 8

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
N/A = Not available
UN = United Nations

Indicates information that has changed from previously issued version.

Notice to reader

Disclaimer: The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.