

# Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

## 1 Identification of the substance/mixture and of the company/undertaking

### Product identifier

**Product name:** Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N

**Stock number:** 42109

**CAS Number:**

16774-21-3

**Relevant identified uses of the substance or mixture and uses advised against.**

**Sector of Use** SU24 Scientific research and development

### Details of the supplier of the safety data sheet

#### Manufacturer/Supplier:

Alfa Aesar, A Johnson Matthey Company

Johnson Matthey Catalog Company, Inc.

30 Bond Street

Ward Hill, MA 01835-8099

Emergency Phone: (978) 521-6300

CHEMTREC: (800) 424-9300

Web Site: [www.alfa.com](http://www.alfa.com)

**Information Department:** Health, Safety and Environmental Department

#### Emergency telephone number:

During normal hours the Health, Safety and Environmental Department. After normal hours call Chemtrec at (800) 424-9300.

## 2 Hazards identification

### Classification of the substance or mixture



GHS05 Corrosion

H314 Causes severe skin burns and eye damage.

H318 Causes serious eye damage.

### Classification according to Directive 67/548/EEC or Directive 1999/45/EC



C; Corrosive

R34: Causes burns.



O; Oxidizing

R8: Contact with combustible material may cause fire.

### Label elements

#### Labelling according to EU guidelines:

#### Code letter and hazard designation of product:

C Corrosive

O Oxidizing

#### Risk phrases:

8 Contact with combustible material may cause fire.

34 Causes burns.

#### Safety phrases:

17 Keep away from combustible material.

20 When using do not eat or drink.

26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

45 In case of accident or if you feel unwell, seek medical advice immediately.

#### Hazard description:

#### WHMIS classification



(Contd. on page 2)

USA

# Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

**Product name: Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N**

**Classification system**

(Contd. of page 1)

**HMIS ratings (scale 0-4)****(Hazardous Materials Identification System)**

HEALTH	2
FIRE	0
REACTIVITY	1

Health (acute effects) = 2

Flammability = 0

Reactivity = 1

**Other hazards****Results of PBT and vPvB assessment****PBT:** Not applicable.**vPvB:** Not applicable.**3 Composition/information on ingredients****Chemical characterization: Substances****(CAS#) Description:**

Cerium (IV) ammonium nitrate (CAS# 16774-21-3): 12-17%

Perchloric acid (CAS# 7601-90-3): 4-6%

Water (CAS# 7732-18-5): Balance

**4 First aid measures****Description of first aid measures****General information** Immediately remove any clothing soiled by the product.**After inhalation**

Supply fresh air. If required, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

**After skin contact**

Immediately wash with water and soap and rinse thoroughly.

Seek immediate medical advice.

**After eye contact**

Rinse opened eye for several minutes under running water. Then consult a doctor.

**After swallowing** Seek immediate medical advice.**5 Firefighting measures****Extinguishing media****Suitable extinguishing agents**

Product is not flammable. Use fire fighting measures that suit the surrounding fire.

**Special hazards arising from the substance or mixture**

This substance is an oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

In case of fire, the following can be released:

Hydrogen chloride (HCl)

Nitrogen oxides (NOx)

Ammonia

**Advice for firefighters****Protective equipment:**

Wear self-contained respirator.

Wear fully protective impervious suit.

**6 Accidental release measures****Personal precautions, protective equipment and emergency procedures**

Wear protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

**Environmental precautions:**

Do not allow material to be released to the environment without proper governmental permits.

**Methods and material for containment and cleaning up:**

Use neutralizing agent.

Dispose contaminated material as waste according to item 13.

Ensure adequate ventilation.

Absorb with liquid-binding material.

(Contd. on page 3)

USA

**Alfa Aesar**  
A Johnson Matthey Company

**Alfa Aesar**  
A Johnson Matthey Company

**Alfa Aesar**  
A Johnson Matthey Company



**Material Safety Data Sheet**  
acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

**Product name: Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N**

**Reference to other sections**

(Contd. of page 2)

See Section 7 for information on safe handling  
See Section 8 for information on personal protection equipment.  
See Section 13 for disposal information.

**7 Handling and storage****Handling****Precautions for safe handling**

Keep container tightly sealed.  
Store in cool, dry place in tightly closed containers.  
Ensure good ventilation at the workplace.

**Information about protection against explosions and fires:**

Substance/product can reduce the ignition temperature of flammable substances.  
This substance is an oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.  
The product is not flammable

**Conditions for safe storage, including any incompatibilities****Storage**

**Requirements to be met by storerooms and receptacles:** No special requirements.

**Information about storage in one common storage facility:**

Store away from flammable substances.  
Store away from reducing agents.  
Do not store together with alkalies (caustic solutions).

**Further information about storage conditions:**

Keep container tightly sealed.  
Store in cool, dry conditions in well sealed containers.

**8 Exposure controls/personal protection****Additional information about design of technical systems:**

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

**Control parameters**

**Components with limit values that require monitoring at the workplace:** Not required.

**Additional information:** No data

**Exposure controls****Personal protective equipment****General protective and hygienic measures**

The usual precautionary measures for handling chemicals should be followed.  
Keep away from foodstuffs, beverages and feed.  
Remove all soiled and contaminated clothing immediately.  
Wash hands before breaks and at the end of work.  
Avoid contact with the eyes and skin.

**Breathing equipment:** Use suitable respirator when high concentrations are present.

**Protection of hands:** Impervious gloves

**Eye protection:**

Safety glasses  
Tightly sealed goggles  
Full face protection

**Body protection:** Protective work clothing.

**9 Physical and chemical properties****Information on basic physical and chemical properties****General Information****Appearance:**

<b>Form:</b>	Liquid
<b>Color:</b>	Yellow Orange
<b>Odor:</b>	Odorless
<b>Odour threshold:</b>	Not determined.

<b>pH-value:</b>	Not determined.
------------------	-----------------

(Contd. on page 4)

- USA

**Alfa Aesar**  
A Johnson Matthey Company

**Alfa Aesar**  
A Johnson Matthey Company

**Alfa Aesar**  
A Johnson Matthey Company

**Material Safety Data Sheet**  
acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

**Product name: Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N**

(Contd. of page 3)

<b>Change in condition</b>	
Melting point/Melting range:	Not determined
Boiling point/Boiling range:	Not determined
Sublimation temperature / start:	Not determined
<b>Flash point:</b>	Not applicable Not determined
<b>Flammability (solid, gaseous)</b>	Not applicable.
<b>Ignition temperature:</b>	Not determined
<b>Decomposition temperature:</b>	Not determined
<b>Auto igniting:</b>	Not determined.
<b>Explosion limits:</b>	
Lower:	Not determined
Upper:	Not determined
<b>Vapor pressure:</b>	Not determined
<b>Density:</b>	Not determined
<b>Relative density</b>	Not determined.
<b>Vapour density</b>	Not determined.
<b>Evaporation rate</b>	Not determined.
<b>Solubility in / Miscibility with Water:</b>	Fully miscible
<b>Segregation coefficient (n-octanol/water):</b>	Not determined.
<b>Viscosity:</b>	
dynamic:	Not determined.
kinematic:	Not determined.
<b>Other information</b>	No further relevant information available.

**10 Stability and reactivity****Reactivity****Chemical stability****Thermal decomposition / conditions to be avoided:**

Decomposition will not occur if used and stored according to specifications.

**Possibility of hazardous reactions**

Reacts with alkali metals.

Reacts with reducing agents

Reacts with flammable substances

Reacts with alkaline earth metals.

**Incompatible materials:**

Reducing agents, easily oxidized materials

Organic materials

Metal powders

Aqueous solutions are incompatible with alkali and alkaline earth metals and many reactive organic and inorganic chemicals.

**Bases****Hazardous decomposition products:**

Hydrogen chloride (HCl)

Nitrogen oxides (NOx)

Ammonia

**11 Toxicological information****Information on toxicological effects****Acute toxicity:****Primary irritant effect:****on the skin:**

Strong corrosive effect on skin and mucous membranes.

Irritant to skin and mucous membranes.

**on the eye:**

Strong corrosive effect.

(Contd. on page 5)

USA



**Material Safety Data Sheet**  
acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

**Product name: Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N**

Irritating effect.

(Contd. of page 4)

**Sensitization:** No sensitizing effects known.**Subacute to chronic toxicity:**

Small doses of nitrates may cause weakness, general depression, headache and mental impairment. Larger doses may cause dizziness, abdominal cramps, vomiting, bloody diarrhea, convulsions and collapse.

Perchloric acid is a powerful oxidizer and extremely corrosive to tissue. Causes burns on contact. Contact with eyes may cause blindness. Dilution reduces both corrosiveness and oxidative hazards.

Cerium salts increase the blood coagulation rate. Exposure to cerium salts may increase sensitivity to heat, itching and skin lesions. Large doses to experimental animals have caused writhing, ataxia, labored respiration, sedation, hypotension and death by cardiovascular collapse.

**Subacute to chronic toxicity:**

Corrosive materials are acutely destructive to the respiratory tract, eyes, skin and digestive tract. Eye contact may result in permanent damage and complete vision loss. Inhalation may result in respiratory effects such as inflammation, edema, and chemical pneumonitis. May cause coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Ingestion may cause damage to the mouth, throat and esophagus. May cause skin burns or irritation depending on the severity of the exposure.

**Additional toxicological information:**

Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of perforation of esophagus and stomach.

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

**12 Ecological information****Toxicity****Aquatic toxicity:** No further relevant information available.**Persistence and degradability** No further relevant information available.**Behavior in environmental systems:****Bioaccumulative potential** No further relevant information available.**Mobility in soil** No further relevant information available.**Additional ecological information:****General notes:**

Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

Do not allow material to be released to the environment without proper governmental permits.

**Results of PBT and vPvB assessment****PBT:** Not applicable.**vPvB:** Not applicable.**Other adverse effects** No further relevant information available.**13 Disposal considerations****Waste treatment methods****Recommendation** Consult state, local or national regulations to ensure proper disposal.**Uncleaned packagings:****Recommendation:** Disposal must be made according to official regulations.**Recommended cleansing agent:** Water, if necessary with cleansing agents.**14 Transport information****DOT regulations:****Hazard class:**

8

(Contd. on page 6)

USA

**Alfa Aesar**  
A Johnson Matthey Company

**Alfa Aesar**  
A Johnson Matthey Company

**Alfa Aesar**  
A Johnson Matthey Company

**Material Safety Data Sheet**  
acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

**Product name: Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N**

(Contd. of page 5)

**Identification number:** UN3093  
**Packing group:** II  
**Proper shipping name (technical name):** CORROSIVE LIQUID, OXIDIZING, N.O.S. (cerium ammonium nitrate/perchloric acid solution)  
**Label** 8+5.1

**Land transport ADR/RID (cross-border)**

**ADR/RID class:** 8 (C01) Corrosive substances  
**Danger code (Kemler):** 85  
**UN-Number:** 3093  
**Packaging group:** II  
**UN proper shipping name:** 3093 CORROSIVE LIQUID, OXIDIZING, N.O.S. (cerium ammonium nitrate/perchloric acid solution)

**Maritime transport IMDG:**

**IMDG Class:** 8  
**UN Number:** 3093  
**Label** 8+5.1  
**Packaging group:** II  
**Marine pollutant:** No  
**Proper shipping name:** CORROSIVE LIQUID, OXIDIZING, N.O.S. (cerium ammonium nitrate/perchloric acid solution)

**Air transport ICAO-TI and IATA-DGR:**

**ICAO/IATA Class:** 8  
**UN/ID Number:** 3093  
**Label** 8+5.1  
**Packaging group:** II  
**Proper shipping name:** CORROSIVE LIQUID, OXIDIZING, N.O.S. (cerium ammonium nitrate/perchloric acid solution)

**UN "Model Regulation":** UN3093, CORROSIVE LIQUID, OXIDIZING, N.O.S., 8 (5.1), II  
**Special precautions for user** Warning: Corrosive substances  
**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

**15 Regulatory information**

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

Substance is not listed.

**Product related hazard informations:****Hazard symbols:**

C Corrosive  
 O Oxidizing

**Risk phrases:**

8 Contact with combustible material may cause fire.  
 34 Causes burns.

**Safety phrases:**

17 Keep away from combustible material.

(Contd. on page 7)

USA



**Material Safety Data Sheet**  
acc. to OSHA and ANSI

Printing date 02/16/2011

Reviewed on 04/25/2005

**Product name: Cerium (IV) and Perchloric acid, Etchant Solution, Ce (IV) concentration 0.30N**

- 20 When using do not eat or drink. (Contd. of page 6)  
 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.  
 45 In case of accident or if you feel unwell, seek medical advice immediately.

**National regulations**

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

All components of this product are listed on the Canadian Domestic Substances List (DSL).

**Information about limitation of use:** For use only by technically qualified individuals.

**Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

**16 Other information**

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

**Department issuing MSDS:** Health, Safety and Environmental Department.

**Contact:**

Zachariah C. Holt  
Global EHS Manager

**Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)  
 RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)  
 IMDG: International Maritime Code for Dangerous Goods  
 DOT: US Department of Transportation  
 IATA: International Air Transport Association  
 IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)  
 ICAO: International Civil Aviation Organization  
 ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)  
 CAS: Chemical Abstracts Service (division of the American Chemical Society)  
 HMIS: Hazardous Materials Identification System (USA)  
 WHMIS: Workplace Hazardous Materials Information System (Canada)

USA