

**Material Safety Data Sheet**  
According to OSHA and ANSI

Printing date 04/21/2011

Reviewed on 02/02/2007

**1 Identification of the substance/mixture and of the company/undertaking****Product identifier****Product name:** Gold plating solution, electroless**Stock number:** 42307**CAS Number:**

554-07-4

**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

**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**

GHS06 Skull and crossbones

H301 Toxic if swallowed.

H311 Toxic in contact with skin.

H331 Toxic if inhaled.



GHS05 Corrosion

H314 Causes severe skin burns and eye damage.

H318 Causes serious eye damage.



GHS09 Environment

H400 Very toxic to aquatic life.

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

T; Toxic

R23/24/25: Toxic by inhalation, in contact with skin and if swallowed.



C; Corrosive

R34: Causes burns.



N; Dangerous for the environment

R50: Very toxic to aquatic organisms.

R32: Contact with acids liberates very toxic gas.

**Label elements****Labelling according to EU guidelines:****Code letter and hazard designation of product:**

T Toxic

N Dangerous for the environment

**Risk phrases:**

23/24/25 Toxic by inhalation, in contact with skin and if swallowed.

32 Contact with acids liberates very toxic gas.

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- 34 Causes burns.  
50 Very toxic to aquatic organisms.

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**Safety phrases:**

- 9 Keep container in a well-ventilated place.  
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
28 After contact with skin, wash immediately with plenty of water  
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.  
60 This material and its container must be disposed of as hazardous waste.  
61 Avoid release to the environment. Refer to special instructions/Safety data sheets

**Hazard description:****WHMIS classification****Classification system****HMIS ratings (scale 0-4)**

(Hazardous Materials Identification System)

HEALTH	2	Health (acute effects) = 2
FIRE	0	Flammability = 0
REACTIVITY	2	Reactivity = 2

**Other hazards****Results of PBT and vPvB assessment**

PBT: Not applicable.

vPvB: Not applicable.

**3 Composition/information on ingredients****Chemical characterization: Substances****(CAS#) Description:**

- Gold (I) potassium cyanide (CAS# 554-07-4): 8.4%  
Ammonium hydroxide (CAS# 1336-21-6): 36.45%  
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.  
Remove breathing apparatus only after contaminated clothing has been completely removed.  
In case of irregular breathing or respiratory arrest provide artificial respiration.

**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**

Do not induce vomiting; immediately call for medical help.  
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**

In case of fire, the following can be released:

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Ammonia  
Nitrogen oxides (NOx)  
Hydrogen cyanide (HCN)  
Metal oxide fume  
**Advice for firefighters**  
**Protective equipment:**  
Wear self-contained respirator.  
Wear fully protective impervious suit.

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

Mount respiratory protective device.  
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:**

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Use neutralizing agent.

Dispose contaminated material as waste according to item 13.

Ensure adequate ventilation.

**Reference to other sections**

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.  
Open and handle container with care.

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

Do not store together with acids.  
Aqueous solutions are incompatible with alkali and alkaline earth metals and many reactive organic and inorganic chemicals.

**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:**

Ammonia	ppm
ACGIH TLV	25; 35-STEL
Austria MAK	25
Belgium TWA	25; 35-STEL
Denmark TWA	25
Finland TWA	25; 40-STEL
France VME	25; 50-VLE
Germany MAK	50

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Hungary TWA	18; 27-STEL
Japan OEL	25
Korea TLV	25; 35-STEL
Netherlands MAC-TGG	25
Norway TWA	25
Poland TWA	20 mg/m3; 27 mg/m3-STEL
Russia TWA	25; 20 mg/m3-STEL
Sweden NGV	25; 50-TGV
Switzerland MAK-W	25; 50-KZG-W
United Kingdom TWA	25; 35-STEL
OSHA PEL	50

**Cyanides (as CN)**

	mg/m3
Austria MAK	5 (skin)
Denmark TWA	5 (skin)
Finland TWA	5; 10-STEL
France VME	5 (skin)
Germany MAK	5 (skin)
Hungary TWA	0.3; 0.6-STEL (skin)
Netherlands MAC-TGG	5 (skin)
Poland TWA	0.3; 10-Ceiling
Sweden	5-Ceiling (skin)
Switzerland MAK-W	5; 10-STEL (skin)
United Kingdom	5-LTEL (skin)
OSHA PEL	5 (skin)

**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.

Store protective clothing separately.

Avoid contact with the eyes and skin.

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

**Protection of hands:**

Impervious gloves

Check protective gloves prior to each use for their proper condition.

**Material of gloves**

The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

**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>	Clear
<b>Odor:</b>	Ammonia-like
<b>Odour threshold:</b>	Not determined.

**pH-value:** Not determined.

**Change in condition**

<b>Melting point/Melting range:</b>	Not determined
<b>Boiling point/Boiling range:</b>	Not determined
<b>Sublimation temperature / start:</b>	Not determined

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<b>Flash point:</b>	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>Danger of explosion:</b>	Product does not present an explosion hazard.
<b>Explosion limits:</b>	
<b>Lower:</b>	Not determined
<b>Upper:</b>	Not determined
<b>Vapor pressure:</b>	Not determined
<b>Density at 20°C (68 °F):</b>	1.031-1.041 g/cm <sup>3</sup> (34-8.687 lbs/gal)
<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>	
<b>dynamic:</b>	Not determined.
<b>kinematic:</b>	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 alkaline earth metals.

Contact with acids liberates very toxic gas.

Gold can form explosive compounds with ammonia, ammonium hydroxide + aqua regia, and hydrogen peroxide.

**Incompatible materials:****Acids**

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

**Hazardous decomposition products:**

Ammonia

Nitrogen oxides

Hydrogen cyanide (prussic acid)

Metal oxide fume

**11 Toxicological information****Information on toxicological effects****Acute toxicity:****LD/LC50 values that are relevant for classification:**

ORL-HMN LDLo: 43 MG/KG (SOLUTIONS 12-44% NH3)

ORL-RAT LD50: 350 MG/KG (SOLUTIONS 12-44% NH3)

INH-HMN LCLo: 5000 PPM (SOLUTIONS 12-44% NH3)

EYE-RBT: 44 UG: SEV (SOLUTIONS 12-44% NH3)

**Primary irritant effect:****on the skin:**

Corrosive effect on skin and mucous membranes.

Irritant to skin and mucous membranes.

**on the eye:**

Strong corrosive effect.

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Irritating effect.

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

Cyanides may cause symptoms of salivation, nausea without vomiting, anxiety, confusion, vertigo, giddiness, lower jaw stiffness, convulsions, opisthotonos, paralysis, coma, cardiac arrhythmias and respiratory failure. They typically cause death through asphyxia. Skin contact may cause itching, macular, papular and vesicular eruptions.

Gold compounds may cause irritation to the eyes and respiratory tract. Aplastic anemia may result from damage to the blood forming organs. Gold has caused tumors and reproductive effects in laboratory animals via implant, intraperitoneal and subcutaneous routes.

**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:**

Danger through skin absorption.

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.

**Ecotoxicological effects:**

**Remark:** Very toxic for aquatic organisms

**Additional ecological information:****General notes:**

Do not allow product to reach ground water, water course or sewage system, even in small quantities.

Danger to drinking water if even extremely small quantities leak into the ground.

Also poisonous for fish and plankton in water bodies.

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

Very toxic for aquatic organisms

**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.

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**14 Transport information****DOT regulations:**

**Hazard class:** 8  
**Identification number:** UN2922  
**Packing group:** III  
**Proper shipping name (technical name):** CORROSIVE LIQUID, TOXIC, N.O.S. (gold potassium cyanide/ammonium hydroxide solution)  
**Label:** 8+6.1

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

**ADR/RID class:** 8 (CT1) Corrosive substances  
**Danger code (Kemler):** 86  
**UN-Number:** 2922  
**Packaging group:** III  
**Special marking:** Symbol (fish and tree)  
**UN proper shipping name:** 2922 CORROSIVE LIQUID, TOXIC, N.O.S. (gold potassium cyanide/ammonium hydroxide solution)

**Maritime transport IMDG:**

**IMDG Class:** 8  
**UN Number:** 2922  
**Label:** 8+6.1  
**Packaging group:** III  
**Marine pollutant:** No  
**Proper shipping name:** CORROSIVE LIQUID, TOXIC, N.O.S. (gold potassium cyanide/ammonium hydroxide solution)

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

**ICAO/IATA Class:** 8  
**UN/ID Number:** 2922  
**Label:** 8+6.1  
**Packaging group:** III  
**Proper shipping name:** CORROSIVE LIQUID, TOXIC, N.O.S. (gold potassium cyanide/ammonium hydroxide solution)

**UN "Model Regulation":** UN2922, CORROSIVE LIQUID, TOXIC, N.O.S., 8 (6.1), III  
**Environmental hazards:** Environmentally hazardous substance, liquid; Marine Pollutant  
**Special precautions for user Warning:** Corrosive substances  
**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

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**15 Regulatory information**

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

**Product related hazard informations:**

**Hazard symbols:**

T Toxic

N Dangerous for the environment

**Risk phrases:**

23/24/25 Toxic by inhalation, in contact with skin and if swallowed.

32 Contact with acids liberates very toxic gas.

34 Causes burns.

50 Very toxic to aquatic organisms.

**Safety phrases:**

9 Keep container in a well-ventilated place.

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

28 After contact with skin, wash immediately with plenty of water

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.

60 This material and its container must be disposed of as hazardous waste.

61 Avoid release to the environment. Refer to special instructions/Safety data sheets

**National regulations**

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

**Information about limitation of use:**

For use only by technically qualified individuals.

This product is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

This product contains a cyanide compound and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

**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)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

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