

Material Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

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| Product Name: | 24K Brush Gold Solution / Pen Gold Solution |
| Chemical Classification: | Potassium Metallic Cyanide Mixture |
| Product Use: | Electroplating solution |
| Chemical Names: | Mixture of potassium aurocyanide, cobalt complex, weak organic acid buffers, inorganic salts and thickeners |
| Company Identification: | Gold Plating Services, Inc. |
| Address: | 378 North Main #112 Layton, Utah 84041 United States of America |
| Business Phone: | Non-Emergency Phone #: (801) 546-6200 Outside US#: (00) 1 (801) 546-6200 |
| Emergency Telephone | Inside US #: (800) 633-8253 (P.E.R.S.) Outside US #: (00) 1 (801) 629-0667 |
| Preparation Date: | March 30, 2007 |
| Revision Date: | July 26, 2010 – No material changes to previous version |

2. COMPOSITION AND INFORMATION/INGREDIENTS

Information relating to the hazardous constituents in this product are detailed in the table below. The remainder of this solution consists of weak organic acid buffers, inorganic salts and water that are not considered to be hazardous.

| Component | Weight By % | CAS Number | EINECS Number | Symbols | R Phrases |
|---|-------------|------------|---------------|---------|--------------------------|
| *Potassium Aurocyanide K ₂ Au(CN) ₂ | 1- 6 | 13967-50-5 | 237-748-4 | T+ | R26/27/28 R32, R50/53 |
| Cobalt Complex C ₁₀ H ₁₂ CoN ₂ O ₈ | 1-2 | 14931-83-0 | 239-001-8 | Xn | R42/43/53 |
| Nickel Complex C ₆ H ₆ NiNO ₆ H | 0-1 | 34831-03-3 | 222-068-2 | Xn | R40-43 |

* The broad category of cyanide compounds that are included in this product are classified as “CERCLA Hazardous Substances”; however, there is no specific RQ for this material.

Hygiene standards and exposure limits may differ from country to country. Check those that currently apply in your country to insure compliance. The table below is a limited listing of some of the U.S. exposure limits that have been established for chemicals in the mixture.

| Component | OSHA Permissible Exposure Limit (PEL) 8-Hour TWA | ACGIH Threshold Limit Value (TLV) 8-Hour TWA |
|-----------------------|---|--|
| Potassium Aurocyanide | 5.0 mg/m ³ Cyanide Compounds | 5.0 mg/m ³ (ceiling) (Cyanide salts) |
| Cobalt Complex | 0.1 mg/m ³ (cobalt metal dust or fume) | 0.02 mg/m ³ (cobalt and inorganic compounds) |
| Nickel Complex | 1.0 mg/m ³ (nickel metal and insoluble compounds) | 0.1 mg/m ³ (soluble inorganic compounds) |

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3. HAZARD IDENTIFICATION

The 24k Brush Gold Solution has not been tested. The hazard information provided below is based on the properties of the individual components in the product.

Emergency Overview

Although some of the active components in the 24K Brush Gold Solution are toxic, they are present at very low concentrations in the final product. If symptoms of exposure are experienced as result of using this product, call 911 or your local emergency response number.

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| Inhalation: | Symptoms of overexposure to this product through inhalation would include weakness, dizziness, headache, vomiting and death. |
| Skin Contact: | Prolonged or repeated skin contact with this product may result in a "Cyanide Rash". Symptoms might include itching, macular, popular and vesicular eruptions often with secondary infections. |
| Eye Contact: | Contact with the eye may cause severe irritation and eye damage. |
| Skin Absorption: | Pure potassium aurocyanide can be absorbed through intact skin. Symptoms of exposure via skin absorption would include weakness, dizziness, headache, vomiting and death. |
| Ingestion: | May cause death or permanent injury if significant quantities are ingested. |

Acute Health Effects:

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| Local: | Irritant that causes readily reversible changes that disappear after the end of exposure. |
| Systemic: | Ingestion or inhalation may cause death or permanent injury after a very short exposure to significant quantities. |

Chronic Health Effects:

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| Local: | Irritant that causes reversible and irreversible changes but not severe enough to cause death or permanent injury. |
| Systemic: | Ingestion or inhalation may cause readily reversible changes which disappear at the end of exposure. |

This product contains a material (nickel complex) known to the state of California to cause cancer. The American Conference of Governmental Industrial Hygienists (ACGIH) has classified nickel compounds as Type A1 Carcinogens.

4. FIRST-AID MEASURES

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| Inhalation: | Move to fresh air. If symptoms of cyanide poisoning are evident, treat 5 times at 15 second intervals with amyl nitrite. Give artificial respiration if necessary. Call physician |
| Skin Contact: | Wash thoroughly with soap and water. Call a physician. |
| Eye Contact: | Flush eyes with water for 15 minutes or longer. Call a physician. |
| Ingestion: | Call a physician immediately and, if conscious, give emetics to induce vomiting. Repeat until vomit fluid is clear. Never give anything by mouth to an unconscious person. |

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5. FIRE-FIGHTING MEASURES

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| Flammable Properties: | Material will not burn. |
| Hazardous Combustion Products: | N.A. |
| Fire Extinguishing Media: | Do not use a carbon dioxide extinguisher. Use media appropriate for the surrounding fire. |
| Special Fire Fighting Procedures: | Use full protective gear including a NIOSH-approved self contained breathing apparatus if fully involved in a fire. Do not let fire-fighting water run-off into a sewer or other area where acidic materials may be present, as this may cause the release of flammable and poisonous hydrogen cyanide gas. |

6. ACCIDENTAL RELEASE MEASURES

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| Spill and Leak Response: | Evacuate area. Do not inhale mist from solution. Avoid contact with skin, eyes and clothing. Absorb with inert material, carefully sweep up and place in a suitable container for shipment to a refinery. Flush spill area with a dilute solution of sodium or calcium hypochlorite. Collect solution and contact gold Plating Services regarding potential options for reclamation of gold content. |
| Neutralizing Agent: | Dilute solution of sodium or calcium hypochlorite. |
| Environmental Precautions: | Do not allow product to enter drains or watercourses. |

7. HANDLING AND STORAGE

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| Storage and Handling Practices: | Store and handle in a cool dry place (55 – 85° F) away from strong acids and food products. Freezing may render product unusable for its intended purpose. |
| Storage Pressure: | Atmospheric |

8. EXPOSURE CONTROLS – PERSONAL PROTECTION

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| Ventilation and Engineering Controls: | Mechanical ventilation recommended if product is aerosolized. |
| Respiratory Protection: | Generally not required unless solution is aerosolized. |
| Eye Protection: | Splash goggles, face shields or safety glasses recommended. |
| Hand Protection: | Wear rubber gloves if contact with product may occur. |
| Body Protection: | Wear rubber apron if contact with product may occur. |

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9. PHYSICAL AND CHEMICAL PROPERTIES

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| Physical State: | Liquid or gel. |
| Vapor Density: | N.A. |
| Specific Gravity: | 1.1 g/cm ² |
| Evaporation Rate: | N.A. |
| Vapor Pressure: | N.A. |
| Odor Threshold: | Product is odorless |
| Appearance and Color: | Purple liquid or gelled mixture |
| pH: | 6.0 – 6.5 |
| Freezing Point: | ~ 30° F at standard pressures |
| Boiling Point: | N.A. |
| Flash Point: | Will not burn |
| Flammability: | Will not burn |
| Auto Ignition Temp: | Will not burn |
| Solubility in Water: | Very soluble |
| % Volatile by Volume: | N.A. |
| % Solids | N.A. |

10. STABILITY AND REACTIVITY

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| Stability: | Stable at normal temperatures and temperatures. |
| Hazardous Decomposition Products: | Hydrogen cyanide. |
| Materials to Avoid: | Strong acids, acid fumes or steam. |
| Hazardous Polymerization: | Will not polymerize. |

11. EXPOSURE CONTROLS – PERSONAL PROTECTION

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| Toxicity Data: | <p>The mixture has not been tested; however, the oral rat LD₅₀ for the 24K Brush Gold Solution can be conservatively estimated to be in the range of 600 – 1000 mg/kg using the following equation obtained from 49CFR 173.132 to determine the LD₅₀ for the mixture:</p> $C_A/T_A + C_B/T_B + C_Z/T_Z = 100/T_M$ <p>Where:</p> <ul style="list-style-type: none"> C = the % concentration of A, B, ...Z in the mixture T = the oral rat LD₅₀ values of components A, B, ...Z T_m = the LD₅₀ for the mixture <p>This LD₅₀ range was calculated by applying credible sources for oral rat LD₅₀ data for the three active components of the 24K Brush Gold Solution. This calculation was made using (1) both the LD₅₀ of potassium cyanide (5 mg/kg), assuming the potassium cyanide was 32% of the potassium aurocyanide solution and (2) the LD₅₀ of the silver analog (20.9 mg/kg).</p> |
| Suspected Cancer Agent: | Yes – nickel complex. |
| Irritancy of Product: | Mixture has not been tested. Individual components can act as irritants. |

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| Sensitization to the Product: | Product has not been tested. Repeated exposure to cobalt compounds may cause skin sensitization. |
| Reproductive Toxicity Information: | N.A. |
| Medical Conditions Aggravated by Exposure: | N.A. |
| Recommendations to Physicians: | It is recommended that physicians who treat victims of overexposure to this product are well trained in the procedures to address cyanide poisoning, including the administration of amyl nitrite, sodium thiosulfate, sodium nitrite and methylene blue. |
| Biological Exposure Indices (BEIs) | Yes - cobalt |

12. ECOLOGICAL INFORMATION

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| Environmental Stability: | Majority of product would evaporate at rate similar to water, leaving trace residues of potassium aurocyanide, cobalt and nickel complexes. These residues would be expected to be fairly persistent and not very mobile in the environment. |
| Effects of Material on Plants or Animals: | Compounds are not expected to bio-concentrate in organisms. Specific toxic effects on animals and plants are not known. |
| Effects of chemical on Aquatic Life: | Specific toxic effects on aquatic life are not known. |

13. DISPOSAL CONSIDERATIONS

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| Preparing Wastes for Disposal: | Discharge, treatment or disposal may be subject to federal, state, provincial or local laws. Dispose in accordance with all applicable regulations.. |
| RCRA 40 CFR 261 Classification: | N.A. |

14. TRANSPORTATION INFORMATION


Although individual components of the 24K Brush Gold Solution are toxic in their pure form, the concentrations of these components that are present in the shipped material are below thresholds that would require classifying the 24K Brush Gold Solution as a hazardous material shipment under US DOT and UN transport regulations.

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| Basic Description: | Non-hazardous shipment. This gold plating solution is not subject to the requirements of US DOT Hazardous Materials Regulations or UN regulations on the Transport of Dangerous Goods. |
| Proper shipping name: | N.A. |
| U.N. Hazard Class Number: | N.A. |

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| U.N. Identification Number: | N.A. |
| Packing Group: | N.A. |
| Label Requirements: | N.A. |
| Maximum Shippable Qty: | N.A. |
| Packaging: | N.A. |
| Reportable Quantity (RQ) | N.A. |
| NAERG Guide # (2000) | N.A. |
| Marine Pollutant: | N.A. |
| Other Transport: | N.A. |

15. REGULATORY INFORMATION

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| | Section 302 - None of the components are Section 302 Extremely Hazardous Substances. |
| U.S. SARA Reporting Requirements: | Section 313 – This product contains the following chemicals (at levels of 1% or greater which are found on the 313 list of Toxic Chemicals): * potassium aurocyanide, CAS #: 13967-50-5 * cobalt complex, CAS #: 14931-83-0 |
| U.S. SARA Threshold Planning Quantity: | N.A. |
| U.S. CERCLA Reportable Quantity (RQ): | The broad category of cyanide compounds that are included in this product are classified as “CERCLA Hazardous Substances”; however, there is no specific RQ (reportable quantity) threshold for this material. |
| U.S. TSCA Inventory Information: | All substances are TSCA listed. |
| U.S. State Regulatory Information: | This product is subject to state worker and Community Right-to-Know Acts. |
| California Safe Drinking Water and Toxic Enforcement Act (proposition 65): | This product contains the following ingredients which appear on California Proposition 65 list: *nickel complex. CAS# 34831-03-3 (~ 0.2%) |
| Labeling: |  <p>Xn Symbol: “HARMFUL”</p> |

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| | R22, R31, R36/38 |
| R Phrases (risk phrases) | <p>R22: Harmful if swallowed.</p> <p>R31: Contact with acids liberates toxic gas.</p> <p>R36/38: Irritating to eyes and skin.</p> |
| | S1/2, S20/21, S24/25, S26, S29/35, S36/37/39, S59, S61 |
| S Phrases (Safety Phrases) | <p>S1/2: Keep locked up and out of reach of children.</p> <p>S20/21: When using do not eat, drink or smoke.</p> <p>S24/25: Avoid contact with skin and eyes.</p> <p>S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.</p> <p>S29/35: Do not empty into drains; dispose of this material and its container in a safe way.</p> <p>S36/37/39: Wear suitable protective clothing, gloves and eye/face protection.</p> <p>S59: Refer to manufacturer/supplier for information on recovery/recycling.</p> <p>S61: Avoid release to the environment. Refer to special instructions/safety data sheet.</p> |
| Canadian WHMIS Classification: | Non-hazardous |
| EINECS Number: | Refer to page 1, section 2 |

16. OTHER INFORMATION

ABBREVIATIONS USED IN THIS DOCUMENT:

N.A. = Not applicable/Not Available

References:

Code of Federal Regulations (29 CFR, 40 CFR, 49 CFR)

International Chemical Safety Cards

U.S. Environmental Protection Agency List of Lists

A.I.R. Shipper (field manual of International Civil Aviation Organization- ICAO)

Material Safety Data Sheets from the following chemical manufacturers:

Technic, Inc.

CircuitMedic

Johnson Matthey

APE Corporation

Ohio Precious Metals

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