

SUPER SHIELD NICKEL CONDUCTIVE COATING

841-LIQUID

Material Safety Data Sheet

Section 1: Product and Company Identification

Product Name: Super Shield™ Nickel Conductive Coating **MSDS Code:** 841-Liquid

Related Part #: 841-900ML, 841-1G (see also 840-Liquid)

Use: Nickel filled electrically conductive coating for reducing EMI/RFI interference and for repairing traces on circuit boards

Emergency Contact:

USA or CANADA: Call CHEMTREC ☎: 1-800-424-9300 (**For hazardous material incidents ONLY**—leaks, spills, fires, exposures or accidents)

CANADA: Call CANUTEC ☎: 1-613-996-6666 or *666 on cellular phones, Collect 24/7 (**for emergencies involving dangerous goods**)

Manufacturer: MG Chemicals (Head Office), 9347-193 Street, Surrey, B.C., V4N 4E7

Technical Contacts: ☎ 1-800-201-8822 FAX 1-800-708-9888

E-MAIL: support@mgchemicals.com **WEB** www.mgchemicals.com

Section 2: Hazards Identification

WHMIS Classification



B2 – Flammable Liquid;

D2A – Very Toxic Material (Carcinogen IARC: 2B; Teratogenicity/Embryotoxicity);

D2B – Toxic Material (Skin/Eye Irritation; Skin sensitization in humans)

Note: Carcinogenic effects were observed in animal studies for intubation or injection routes of entries, but not for normal inhalation route [Oller 2008].

GHS Pictograms



Signal Word
DANGER

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GHS Categories

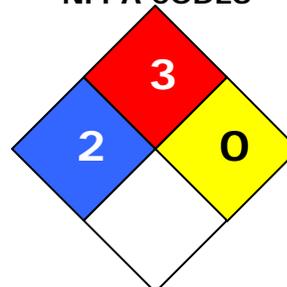
| Criteria | Category | Signal Word | Symbol |
|--|----------|-------------|-------------|
| Flammable Liquid | 2 | Danger | Flame |
| Specific Target Organ Toxicity Repeated Exposure | 1,2 | Danger | Exclamation |
| Eye Irritation | 2 | Warning | Exclamation |
| Sensitization Skin sensitizer | 1 | Warning | Exclamation |
| Carcinogenicity | 2 | Warning | Health |
| Reproductive Toxicity | 2 | Warning | Health |
| Specific Target Organ Toxicity Single Exposure | 3 | Warning | Health |
| Skin Irritation | 3 | Warning | — |
| Acute Toxicity Oral ^{a)} | 5 | Warning | — |
| Acute Toxicity Inhalation ^{a)} | 5 | Warning | — |
| Environmental Hazard Acute Aqua. Tox. | 3 | — | — |
| Environmental Hazard Chronic Aqua. Tox. | 3 | — | — |

a) Base on mixture acute toxicity estimate (ATE)

HMIS RATING

| | |
|-----------------------------|----------|
| HEALTH: | 2 |
| FLAMMABILITY: | 3 |
| PHYSICAL HAZARD: | 0 |
| PERSONAL PROTECTION: | |

NFPA CODES



Approximate HMIS and NFPA Risk Ratings Legend:

0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

Physical Hazards

GHS Code: Hazard Statement

H225: Highly flammable liquid and vapor

Health Hazards

GHS Code: Hazard Statement

H319: Causes serious eye irritation

H372: Can damage lungs through prolonged or repeated exposure

H373: May cause damage to central nervous system through prolonged or repeated exposure

H317: May cause allergic skin reaction.

H351: Suspected of causing cancer

H361: Suspected of damaging fertility or the unborn child

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H336: May cause drowsiness and dizziness

H315: May cause skin irritation

H335: May cause respiratory irritation

H303+H333: May be harmful if swallowed or inhaled

| | |
|-------------------|--|
| Eyes | Causes severe eye irritation if splashed in eyes or exposed to vapors. May also cause eye redness or pain. |
| Skin | May cause mild to moderate skin irritation and skin allergies. |
| Inhalation | May cause nose, throat and lung irritation. Inhalation of mist may cause irritation to the upper respiratory tract. |
| Ingestion | <i>Not a likely route of exposure.</i> Harmful if swallowed. It is a central nervous system depressant. It may cause irritation and burning sensation. |
| Chronic | <p>Prolonged and repeated exposure to the solvents used may cause dermatitis, defatting of the skin, adverse central nervous systems effects. Extreme doses can cause bladder, liver, and kidney damage.</p> <p>Inhalation of mist containing nickel particles of less than 0.1 mm may cause chronic inflammation, lung fibrosis, and accumulation of the nickel particles. Nickel is classified as a suspect carcinogen based on animal intratracheal instillation (intubation) or interperitoneal (in body cavity) injection studies. A reliable 2008 study by Oller <i>et al.</i> shows no carcinogenicity for the nickel metal via normal inhalation route.</p> <p>Ingestion of this paint material or inhalation of its mist or vapors during pregnancy may increase the chances of fetal death and of developmental defects.</p> |

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Section 3: Hazardous Ingredients

| CAS # | Chemical Name | Wt% | ACGIH TWA | OSHA PEL | STEL |
|------------|------------------------------|----------|-----------------------|-------------------------------------|-----------------------|
| 7440-02-0 | nickel | 30-60% | 1.5 mg/m ³ | 1.0 mg/m ³ ^{a)} | N/E |
| 108-88-3 | toluene | 7-13% | 20 ppm | 200 ppm | 150 ppm ^{b)} |
| 67-64-1 | 2-propanone | 5-10% | 500 ppm | 1 000 ppm | 750 ppm ^{c)} |
| 110-19-0 | isobutyl acetate | 1-5% | N/E | N/E | N/E |
| 110-43-0 | 2-heptanone | 1-5% | N/E | N/E | N/E |
| 64-17-5 | ethanol | 1-5% | 1 000 ppm | 1 000 ppm | N/E |
| 14807-96-6 | talc | 1-5% | 2 mg/m ³ | 20 mppcf ^{d)} | |
| 141-78-6 | ethyl acetate | 1-5% | 400 ppm | N/E | N/E |
| 108-65-6 | 1-methoxy-2-propanol acetate | 0.5-1.5% | N/E | N/E | N/E |

Note: Limits from by RTECS database of the Canadian Centre for Occupational Health and Safety (CCOHS). Data from suppliers' MSDS were also consulted.

a) Limit presented is for dust or mist

b) NIOSH STEL; Vacated (retracted) OSHA STEL of 150 ppm; International standard STEL range 100 ppm to 300 ppm

c) ACGIH STEL

d) Millions of particle per cubic foot of air for talc not containing asbestos; 706 millions of particles per cubic meter

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Section 4: First Aid Measures

| <i>Exposure Condition</i> | <i>GHS Code: Precautionary Statement</i> |
|--|---|
| IF INHALED | P304 |
| Symptoms | Immediate: <i>dizziness, drowsiness, headaches, nausea, cough, blurred vision, fatigue</i> |
| Response | P340: Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing. |
| If feeling unwell | P312: Call a POISON CENTRE/doctor |
| If exposed or concerned | P313: Get medical advice. |
| IF IN EYES | P305 |
| Symptoms | Immediate: <i>irritation, redness, pain, blurred vision</i> |
| Response | P351: Rinse cautiously with water for several minutes. P338: Remove contact lenses, if present and easy to do. Continue rinsing. |
| If eye irritation persists | P313: Get medical attention. |
| IF ON SKIN | P302 |
| Symptoms | Immediate: <i>irritation, pain, redness;</i> Delayed: <i>dry skin, rash</i> |
| Response | P362+ P364: Take off contaminated clothing and wash it before reuse. |
| If skin irritation or rash persists | P352: Wash with plenty of water. P313: Get medical attention. |
| IF SWALLOWED | P301 (<i>Not a likely route of exposure under normal use</i>) |
| Symptoms | Immediate: <i>nausea, vomiting, abdominal cramps, irritation, burning sensation, or dizziness</i> |
| Response | P312: Call a POISON CENTRE/doctor if you feel unwell. P330: Rinse mouth. P331: Do NOT induce vomiting. |
| If exposed or concerned | P313: Get medical advice. |

Note: GHS codes and corresponding precaution statements are used when available.

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Section 5: Fire Fighting Measures

| | | | | | |
|---|---------------------|----------------------------------|---------------------|--------------------------------|-----|
| Autoignition Temperature ^{a)} | ≥315 °C [599 °F] | Flash Point ^{b)} | -18 °C [-0.4 °F] | LFL [LEL] ^{c)} | 1% |
| | | | | UFL [UEL] | 11% |

In case of fire P370

Response P378: Use dry chemical, carbon dioxide, or chemical foam to extinguish.

Combustion Products Produces CO, CO₂, nitrous oxides, nickel oxides, and smoke. May produce a very toxic nickel carbonyl gas in presence of CO.

Fire-Fighter Wear self-contained breathing apparatus for fire fighting

General Information Will burn if involved in a fire. Vapors are heavier than air, and may travel to sources of ignition near the ground.

Note: The GHS codes and the GHS precaution statements are used. The format is *GHS Codes: Statements.*

- a) Values based on 1-methoxy-2-propanol acetate, which is the component with the lowest autoignition value.
- b) Lower bound FP estimate is based on the closed cup value for the acetone component.
- c) LFL = Lower Flammability [or Explosion] Limit (in volume %);
UFL = Upper Flammability [or Explosion] Limit (in volume %)

Section 6: Accidental Release Measures

Personal Protection: See Section 8. Avoid breathing the mist/vapors.

Containment Remove all sources of ignition.

Cleaning Collect liquid in a sealable, solvent-resistant container. Sprinkle inert absorbent compound onto spill, then sweep into the container. Wipe up further residue with paper towel and place in container. Wash spill area with soap and water to remove the last traces of residue.

RECOMMENDATION: A metal container is suggested.

Disposal Dispose of spill waste according to Section 13.

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Section 7: Handling and Storage

- Prevention** P202: Do not handle until all safety precautions have been read and understood.
- P210: Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- P261 + P271 + P284: Avoid breathing fume/mist/vapors. Use only outdoors or in well ventilated area. In cases of inadequate ventilation wear respiratory protection.
- P270: Do not eat, drink, or smoke when using this product.
- Handling** P280: Wear protective gloves/clothing/eye protection.
- P242 + P243: Use non-sparking tools. Take precautionary measures against static discharge.
- P264: Wash hands thoroughly after handling.
- Storage** P403 + P233+ P235: Keep Container tightly closed. Store in a well-ventilated area. Keep cool.
- RECOMMENDATION:** Keep in a dry and clean area, away from incompatible substances.

Note: The GHS codes and the GHS precaution statements are used.

Section 8: Exposure Controls/Personal Protection

Routes of Entry

Eyes, ingestion, inhalation, and skin

Engineering Controls

Ventilation Keep airborne concentrations below exposure limits given in Section 3.

RECOMMENDATION: Respect the time weighted average of 20 ppm for toluene.

Personal Protective Equipment

Eye protection Wear appropriate protective eyeglasses or chemical safety goggles.

RECOMMENDATION: Use safety glasses with lateral protection (side shields).

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Skin Protection Wear appropriate protective clothing to prevent skin contact.

RECOMMENDATION: Use of protective gloves in butyl rubber, latex, neoprene, or other chemically resistant gloves.

Respiratory Protection If exposed to mist, wear respirator such as a half-mask respirator.

RECOMMENDATION: Consult your local safety supply store to ensure your respirator has filter cartridges appropriate for the ingredients listed in section 3 of this MSDS, and that the respirator is fitted to the employee by a professional. Ensure vapor cartridges are stored in sealed plastic bags when not being used.

General Hygiene Considerations

Wash hands thoroughly with water and soap after handling.

Section 9: Physical and Chemical Properties

| | | | | | |
|--|------------------------|--|------------------------|------------------------------------|-------------------|
| Physical State | Liquid | Odor | Benzene like, sweetish | Odor Threshold^{a)} | 2 ppm |
| Appearance | Steel grey | Specific Gravity | 1.65 | Freezing Point | Not established |
| Boiling Point^{a)} | ≥56 °C | Vapor Pressure @ 21 °C | 1 lb/in ² | Evaporation Rate | fast |
| Autoignition Temperature^{b)} | ≥315 °C [599 °F] | Flash Point^{a)} | -18 °C [-0.4 °F] | Vapor Density^{a)} | 4.1 (Air =1) |
| Lower Flammability Limit^{c)} | 1% | Upper Flammability Limit^{c)} | 11% | Decomposition Temp. | Not available |
| Viscosity^{d)} | ≥34 mm ² /s | Partition Coefficient | Not established | Solubility in Water | Partially soluble |
| pH | 7 | | | | |

a) The values for the boiling point and closed cup flash point are based on the acetone component.

b) The autoignition value is based on 1-methoxy-2-propanol acetate, which is the component with the lowest value.

c) Lower and Upper Explosive Limits of mixture calculated using Le Chatelier principle and component LFL and UFL limits

d) Kinematic viscosity at 40 °C for separation layer

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Section 10: Stability and Reactivity

| | |
|----------------------------|---|
| Stabilities | Chemically stable at normal temperatures and pressures |
| Conditions to Avoid | Ignition sources and incompatible substances |
| Incompatibilities | Strong oxidizing agents, strong acids, strong bases, ammonium nitrate, perchlorates, phosphorus, selenium, and sulfur |
| Polymerization | Will not occur |
| Decomposition | Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5 |

Section 11: Toxicological Information

| | |
|---|---|
| Skin corrosion/irritation | Skin irritant. Prolonged or repeated skin contact may cause dermatitis |
| Serious eye damage/irritation | Causes serious eye irritation and lesions. Contains mechanically abrasive particles. |
| Sensitization (allergic reactions) | Nickel may cause skin sensitization in humans |
| Carcinogenicity (risk of cancer) | Elemental Nickel [7440-02-0] IARC Group 2B: Possibly carcinogenic to humans ACGIH A5: Not suspected as human carcinogen CA Prop 65: Listed as a carcinogen NTP: Reasonably anticipated to be a human carcinogen |
| Mutagenicity (risk of heritable genetic effects) | Not known |
| Reproductive Toxicity (risk to sex functions) | Toluene, ethanol, and acetone present reproductive and developmental hazards at high doses (>13 000 µg/day) |
| Teratogenicity (risk of fetus malformation) | Harmful to unborn fetus in large doses |
| STOT-single exposure | Inhalation of toluene may affect the central nervous system |
| STOT-repeated exposure | Nickel particles can damage the lungs. Toluene may cause damage to organs through prolonged or repeated exposure. |
| Aspiration hazard | Viscosity at 40 °C is >20.5 mm ² /s, thus not classified as aspiration hazard. |

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Acute Toxicity (Lethal Exposure Concentrations)

| Chemical Name | LD50 oral | LD50 dermal | LC50 inhalation | TCLo inhalation ^{a)} |
|------------------------------|-----------------------|----------------------------|----------------------------------|---|
| nickel | 5,000 mg/kg Rat | N/E | N/E | 10 mg/m ³ 2 h Mouse |
| toluene | 636 mg/kg Rat | 12,124 mg/kg Rabbit | 49 g/m ³ 4h Rat | 200 ppm Human |
| 2-propanone | 5,800 mg/kg Rat | >9 400 µL/kg Guinea pig | 44 g/m ³ 4 h Rat | 10 mg/m ³ 6 h Human |
| | 5,340 mg/kg Rabbit | | 50.1 g/m ³ 8 h Rat | 30 g/m ³ 2 h Rat |
| isobutyl acetate | 13,400 mg/kg Rat | >17 400 mg/kg Rabbit | N/E | 8 000 ppm 4h Rat LCLo ^{b)} |
| 2-heptanone | 1,670 mg/kg Rat | 12,600 µL/kg Rabbit | N/E | 7,000 mg/m ³ 4 h Guinea pig |
| | 730 mg/kg Mouse | | | |
| ethanol | 7,060 mg/kg Rat | N/E | 20,000 ppm 10 h Rat | 2,500 mg/m ³ 20 min Human |
| | 3,450 mg/kg Mouse | | 39 g/m ³ 4 h Mouse | 50,000 mg/m ³ 2 h Mouse |
| Talc | N/E | N/E | N/E | 17 mg/m ³ 6 h 26 d Rat |
| Ethyl Acetate | 5,620 mg/kg Rat | >20,000 µL/kg Rabbit | 45 g/m ³ 2 h Mouse | 1,105 mg/m ³ 4 h Rat |
| | 4,100 mg/kg Mouse | | | |
| 1-methoxy-2-propanol acetate | 8,532 mg/kg Rat | >5 g/kg Rabbit | N/E | 400 ppm Human |
| | >5,000 mg/kg Mouse | | | |

Note: Representative toxicity data from by RTECS database of the Canadian Centre for Occupational Health and Safety (CCOHS) data from supplier MSDS were also consulted.

a) Lowest published lethal concentration

b) Lethal concentration low

SUPER SHIELD NICKEL CONDUCTIVE COATING**841-LIQUID****Section 12: Ecological Information****Acute Ecotoxicity**

Category 2

GHS Code: Hazard Statement

H412: Harmful to aquatic life with long lasting effects.

P273: Avoid release to the environment.

Chronic Ecotoxicity

Long lasting effect

Biodegradability

The nickel content is not biodegradable.

VOC (EPA, WHIMS, and Europe) = 27% [466 g/L]

VOC = Volatile Organic ContentNote:* Nickel can be recovered from the waste to reclaim the value of the nickel.**Section 13: Disposal Information**

P501: Dispose of contents in accordance with all local, regional, national, and international regulations.

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Section 14: Transport Information

Ground (less than 4 liter size)

Consumer Commodity; ORM-D

(greater than 4 liter size)

Recommend Shipper be trained and certified. Refer to TDG regulations (Canadian Transportation of Dangerous Goods regulations); **USA CFR 49 Regulations** (Parts 100 to 185).

UN number: UN1263; **Shipping Name:** PAINT; **Class:** 3, **Packing Group:** II, **Flashpoint** -18 °C

Air

Shipper must be trained and certified. Refer to IATA Dangerous Goods Regulations.

UN number: UN1263; **Shipping Name:** PAINT; **Class:** 3, **Packing Group:** II, **Flashpoint** -18 °C

Sea

Shipper must be trained and certified. Refer to IMDG regulations.

UN number: UN1263; **Shipping Name:** PAINT; **Class:** 3, **Packing Group:** II, **Flashpoint** -18 °C

Section 15: Regulatory Information

Canada

Domestic Substance List (DSL) / Non-Domestic Substance Lists (NDSL)

All hazardous ingredients are listed on the DSL/NDSL.

Industry and Science Canada

MG Labels products intended for the workplace to conform to WHMIS labeling regulations. Product identification, net quantity declaration, minimum printing type size heights, and packaging of this product are in compliance.

Health Canada

Products produced by MG Chemicals intended for retail display conform to the Canadian Consumer Labeling Regulations.

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SUPER SHIELD NICKEL CONDUCTIVE COATING**841-LIQUID****USA****CAA** (Clean Air Act, USA)

This product does not contain any class 1 ozone depleting substances.

This product does not contain any class 2 ozone depleting substances.

This product contains toluene (CAS# 108-88-3), which is listed as hazardous air pollutants.

EPCRA (Emergency Planning and Right to Know Act, USA, 40 CFR 372.45)

This product contains toluene (CAS# 108-88-3) and nickel (CAS# 7440-02-0) subject to the reporting requirements of section 313 Title III of the SARA of 1986 and 40 CFR part 372.

TSCA (Toxic Substances Control Act of 1976, USA)

All substances are TSCA listed.

California Proposition 65 (Chemicals known to cause cancer or reproductive toxicity, Sept 2, 2011 revision, USA).

This product contains toluene, which is listed as reproductively toxic.

This product contains nickel, which is listed as a carcinogen.

Europe**RoHS**

This product does not contain any lead, cadmium, mercury, hexavalent chromium, PBB's, or PBDE's, and complies with European RoHS regulations.

WEEE

This product is not a piece of electrical or electronics equipment, and is therefore not governed by this regulation.

SUPER SHIELD NICKEL CONDUCTIVE COATING**841-LIQUID****Section 16: Other Information**

| | |
|----------------------------|---|
| MSDS Prepared by | Michel Hachey |
| Date of Revision | 19 March 2013 |
| Supersedes | Version 2.01; 17 April 2012 |
| Reasons for Changes | Added new emergency contact information |
| Reference | All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®) |

Oller, AR; Kirkpatrick, DT; Radovskiy, A; and Bates, HK, *Toxicology and Applied Pharmacology*, **233** (262-275) 2008.

Abbreviations

GHS: Globally Harmonized System of Classification of Labeling of Chemicals

LC50 Lethal Concentration 50%

LCLo Lowest published lethal concentration

LD50 Lethal Dose 50%

N/A Not Applicable

N/E Not Estimated

PEL Permissible Exposure Limit

STEL Short-Term Exposure Limit

TCLo Lowest published toxic concentration

TWA Time Weighted Average

VOC Volatile Organic Content

Technical Queries Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at www.mgchemicals.com.

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