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MSDS-E-CW100L

Prepared to OSHA, ACC, ANSI, NOHSC, WHMIS, 2001/58/EC & 1272/2008/EC Standards MSDS Revision: 2.0 MSDS Revision Date: 08/22/2012

1. PRODUCT IDENTIFICATION 1.1 Product Name: CircuitWriterTM CONDUCTIVE SILVER INK (P/N CW100L) See ingredients listed in section 3 1.3 Synonyms: NA 1.4 Trade Name: CircuitWriter™ CW100L 1.5 Product Use: **Silver Conductive Ink** 1.6 Manufacturer's Name: CAIG Laboratories, Inc. Manufacturer's Address: 1.7 12200 Thatcher Court, Poway, CA 92064-6876 USA 1.8 **Emergency Phone:** CHEMTREC: +1 (703) 527-3887 / +1 (800) 424-3887 1.9 Business Phone: +1 (800)-224-4123 Other Product Names: Part No. CW100P, PEN Applicator, 4 grams; Part No. CW100P, PEN Applicator, 4 grams (Radio Shack Part No. 276-037); Part No. CW100L-4, Bottle, 125 grams; Part No. CW100L-12, Can, 375 grams; Part No. CW100L-32, Can, 1000 grams 2. HAZARD IDENTIFICATION This product is classified as a HAZARDOUS SUBSTANCE but not as DANGEROUS GOODS according to the classification criteria of NOHSC: 1008(2004) and ADG Code (Australia). WARNING! Causes eye irritation. Intentional misuse by concentrating and inhaling contents can be harmful or fatal. This product is lead free. Hazard Statements (H): H320 – Causes eye irritation. Precautionary Statements (P): P280 - Wear protective eyewear. P302 + P352 - IF ON SKIN - Wash with plenty of soap and water. P312 - Call a Poison Control Center or doctor/physician if you feel unwell. P333 + P313 - If skin irritation or rash occurs, get medical advise/attention. P321 - Refer to section 4 of this Safety Data Sheet (First Aid). P305+P351+P338 - IF IN EYES - Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing. P337 + P313 – If eye irritation persists, get medical advice/attention. 2.2 Routes of Entry: Inhalation: YES Absorption: YES YES Effects of Exposure: EYES: Mild to moderate irritation. SKIN: Irritant and potential skin sensitizer. Prolonged or repeated contact may cause temporary contact dermatitis (localized redness or rash). INGESTION: Gastrointestinal irritation and central nervous system depression. INHALATION: Central nervous system depressant. Irritating to the upper respiratory tract. Symptoms of Overexposure EYES: Mild irritation, redness, and watering. Contact dermatitis, characterized by localized red or puffy dry skin and itching. SKIN: INGESTION: Nausea, vomiting, and diarrhea. INHALATION: Mouth, nose, and throat irritation, dizziness, nausea, light-headedness, drunkenness, and loss of coordination. 2.5 Acute Health Effects: Gastrointestinal irritation and central nervous system depression. INGESTION: EYES: Mild to moderate irritation. SKIN: Irritant and potential skin sensitizer. Prolonged or repeated contact may cause temporary contact dermatitis (localized INGESTION: Gastrointestinal irritation and central nervous system depression. INHALATION: Central nervous system depressant. Irritating to the upper respiratory tract. 2.6 Chronic Health Effects: This product contains silver metal. Exposure to silver may cause argyria, a blue-gray discoloration of the eyes, skin, mucous membranes and upper respiratory tract. Target Organs: Eyes.

NA = Not Available; ND = Not Determined; NE = Not Established; C = Ceiling Limit; See Section 16 for Additional Definitions of Terms Used NOTE: all WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-2010 format.



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2	COMPOSITION	0	INICIDENIENIT	INIEMPAAATIMNI
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					EXPOSURE LIMITS IN A					IN AIR	(mg/r		
					AC	GIH	I	NOHSC	:		OSHA		
					pp	m		ppm			ppm		OTHER
							ES-	ES-	ES-				
CHEMICAL NAME(S)	CAS No.	RTECS No.	EINECS No.	%	TLV	STEL	TWA	STEL	PEAK	PEL	STEL	IDLH	
SILVER	7440-22-4	VW350000	231-131-3	60-70	0.1	NA	.01	NF	NF	NA	NA	10	DUST
DIMETHYL GLUTARATE	1119-40-0	NA	214-277-2	15-40	NA	NA	NF	NF	NF	NE	NA	NA	
DIMETHYL SUCCINATE	106-65-0	WM6765000	203-419-9	NA	NA	NA	NF	NF	NF	15	NA	NA	
DIMETHYL ADIPATE	627-93-0	AV1645000	211-020-6	NA	NA	NA	NF	NF	NF	NA	NA	NA	•
PROPRIETARY RESINS	NA	NA	NA	NA	NA	NA	NF	NF	NF	NA	NA	NA	

4. FIRST AID MEASURES

4.1 First Aid:

EYES: Flush eyes thoroughly with copious amounts of water for at least 15 minutes, holding eyelid(s) open to ensure complete

flushing. If irritation persists, seek immediate medical attention.

SKIN: Remove contaminated clothing and wash affected areas with soap and water. If irritation persists, seek prompt

medical attention. Do not wear contaminated clothing until after it has been properly cleaned.

INGESTION: If swallowed, wash out mouth with water provided person is conscious. Call Poison Control for further instructions. DO

NOT INDUCE VOMITING. Contact a physician.

INHALATION: Remove victim to fresh air at once. If breathing is difficult, administer supplemental oxygen and seek immediate

medical attention. If breathing stops, perform artificial respiration.

4.2 Medical Conditions Aggravated by Exposure:

None reported by the manufacturer.

HEALTH				1	
FLAMM		1			
PHYSICAL HAZARDS				0	
PROTECTIVE EQUIPMENT				В	
FYFS	SKIN				

5. FIREFIGHTING MEASURES

5.1	Flashpoint & Methoa:

100 °C (212 °F)

5.2 Autoignition Temperature:

NA

5.3 Flammability Limits: Lower Explosive Limit (LEL): NA Upper Explosive Limit (UEL):

5.4 Fire & Explosion Hazards:

Emits carbon monoxide, carbon dioxide and other toxic fumes when burning.

5.5 Extinguishing Methods:

Carbon dioxide, dry chemical, foam, and halon. Use extinguishing agents suitable for class B fires.

5.6 Firefighting Procedures:

Wear NIOSH/MSHA approved self-contained breathing apparatus and protective clothing. Fight from a maximum distance or use unmanned hose holders or monitor nozzles. Use a water spray to cool containers involved in fire. Do not use direct water stream. Container storage areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Keep containers cool until well after the fire is out to prevent rupture. Prevent runoff from fire control or dilution from entering sewers, drains, drinking water supply, or any natural waterway.



NA



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6. ACCIDENTAL RELEASE MEASURES

6.1 Spills:

Secure spill area, remove or minimize all sources of ignition, and maximize ventilation. Stop spill or leak at source if safely possible. Deny entry to all unprotected individuals. Individuals involved in the cleanup must wear appropriate personal protective equipment. Recover free liquid or cover with inert absorbent material and place into appropriate container(s) for disposal. If necessary, dike well ahead of the spill to prevent runoff into drains, sewers or any natural waterway or drinking supply. Contact appropriate local and/or provincial authorities for assistance and/or reporting requirements.

7. HANDLING & STORAGE INFORMATION

7.1 Work & Hygiene Practices:

Wash hands thoroughly after using this product and before eating, drinking, or smoking. Remove soiled clothing to prevent prolonged skin contact. Avoid breathing mist. Eliminate all possible sources of ignition.

7.2 Storage & Handling:

Store at temperatures 50 °F (10 °C). Keep away from freezing. Keep container closed. Loosen closure cautiously before opening. Keep away from direct sunlight, heat, sparks, open flame, and other sources of ignition. Use only with adequate ventilation. Avoid breathing mist.

7.3 Special Precautions

Empty containers retain hazardous properties. Do not cut, drill, grind, weld or perform similar operations on or near containers. Avoid breathing mist.

8. EXPOSURE CONTROLS & PERSONAL PROTECTION

8.1 Ventilation & Engineering Controls:

Provide general dilution ventilation or local exhaust as needed to keep vapor concentrations in the air as low as possible. Local exhaust is essential for spraying operations. Ensure appropriate decontamination equipment is available (e.g., sink, safety shower, eye-wash station).

8.2 Respiratory Protection:

In restricted ventilation areas use NIOSH approved chemical cartridge respirators for vapors or combination chemical cartridge and spray mist filters for mist from spraying. In confined areas or in case of very high concentrations, as from indoor spills, use NIOSH approved air supply or self-contained breathing apparatus.

8.3 Eye Protection:

Wear splash proof goggles or equivalent eye protection (ANSI Z87).

ΝΔ

8.4 Hand Protection:

Impermeable gloves required.

8.5 Body Protection:

9.1 Density:

Use as necessary to prevent skin contact. Ensure appropriate decontamination equipment is available (e.g., sink, safety shower, eyewash station).

9. PHYSICAL & CHEMICAL PROPERTIES

	=	INA .
9.2	Boiling Point:	196-212 °C (338-413 °F)
9.3	Melting Point:	NA NA
9.4	Evaporation Rate:	Slower than ethyl ether
9.5	Vapor Pressure:	0.10mm Hg @ 20 °C
9.6	Molecular Weight:	NA NA
9.7	Appearance & Color:	Thick silver colored paste, sweet odor.
9.8	Odor Threshold:	ND
9.9	Solubility:	Negligible
9.10	На	NA NA
9.11	Viscosity:	NA NA
9.12	Other Information:	NVC 60-70%



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		10. STABILITY & REACTIVITY
10.1	Stability:	
	Stable under normal storage and	handling.
0.2	Hazardous Decomposition Products:	
	Combustion may yield carbon ma	pnoxide and/or carbon dioxide, and oxides of nitrogen.
0.3	Hazardous Polymerization:	· · · · · · · · · · · · · · · · · · ·
	Will not occur.	
0.4	Conditions to Avoid:	
	Use or storage near open flames, sunlight.	sparks, high heat (>100 °F) or other heat sources, and proximity to incompatible substances and direct
0.5	Incompatible Substances:	
	None listed by the manufacturer.	
	,	
		11. TOXICOLOGICAL INFORMATION
1.1	Toxicity Data:	
	This product has not been tested	on animals to obtain toxicological data. There are toxicology data for the components of this produc
		erature. These data have not been presented in this document.
1.2	Acute Toxicity:	
	See section 2.5	
1.3	Chronic Toxicity:	
	See section 2.6	
1.4	Suspected Carcinogen:	
	Silver: IARC Group 4: Substance no	on-classifiable with regard to carcinogenicity.
1.5	Reproductive Toxicity:	· · · · · · · · · · · · · · · · · · ·
	This product is not reported to pro-	duce reproductive toxicity in humans.
		his product is not reported to produce mutagenic effects in humans.
		his product is not reported to produce embryotoxic effects in humans.
	Teratogenicity:	his product is not reported to produce teratogenic effects in humans.
	Reproductive Toxicity:	his product is not reported to produce reproductive effects in humans.
1.6	Irritancy of Product:	
	See Section 2.3	
1.7	Biological Exposure Indices:	
	NE	
1.8	Physician Recommendations:	
	Treat symptomatically.	
	· · · · · · · · · · · · · · · · · · ·	
		12. ECOLOGICAL INFORMATION
2.1	Environmental Stability:	
	•	m soil. Components of this product will slowly decompose into organic compounds.
2.2	Effects on Plants & Animals:	Components of this product this stormy accompase this organic compounds.
۷.۷	There is no specific data available	a for this product
2.3	Effects on Aquatic Life:	i izi ilili pradati.
د.ی	•	product are expected to be harmful or fatal to overexposed aquatic life.
	releases of large volumes of mis p	moduci die expecied io de naimilio oi idial lo overexposed aqualic lile.
		13. DISPOSAL CONSIDERATIONS
3 1	Waste Disposal:	13. DISI OSAL CONSIDERATIONS
3.1	Dispose of in accordance with fee	leral, state or local regulations.
13.2		vironmental contamination from the use of this material. The user of this material has the responsibility t
		vironmental contamination from the use of this material. The user of this material has the responders and containers in compliance with all relevant local, state, federal and provincial regulation



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14. TRANSPORTATION INFORMATION

The basic description (ID Number, proper shipping name, hazard class & division, packing group) is shown for each mode of transportation. Additional descriptive information may be required by 49 CFR, IATA/ICAO, IMDG and the CTDGR.

14.1	49 CFR (Ground):
	NOT REGULATED
14.2	IATA (Air):
	NOT REGULATED
14.3	IMDG (Ocean):
	NOT REGULATED
14.4	TDGR (Canada):
	NOT REGULATED
14.5	ADR/RID (EU):
	NOT REGULATED
14.6	SCT (Mexico):
	NOT REGULATED
14.7	ADGR (Australia):
	NOT REGULATED

15. REGULATORY INFORMATION

- 15.1 U.S. EPA SARA Reporting Requirements:
 - This material contains Silver which is subject to the reporting requirement of Section 313 of SARA Title III and 40 CFR Part 373.
- 15.2 U.S. EPA SARA Threshold Planning Quantity:
- None of the chemicals in this product have a TPQ.
- 15.3 U.S. EPA TSCA Inventory Status:
 - All chemical substances of this product are listed on the TSCA inventory or are otherwise exempt from inventory status.
- 15.4 U.S. EPA CERCLA Reportable Quantity (RQ):
 - NA
- 15.5 Other U.S. Federal Requirements:
 - Silver is listed as a Priority Pollutant under the Clean Water Act. Silver is listed as a toxic pollutant under the Clean Water Act.
- 15.6 Other Canadian Regulations

This product has been classified according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR. The components of this product are listed on the DSL/NDSL. None of the components of this product are listed on the Priorities Substances List.



15.7 U.S. State Regulatory Information:

Silver can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, and Massachusetts. California No Significant Risk Level: None of the chemicals in this product are listed.

15.8 67/548/EEC (European Union) Requirements:

The primary component of this product is listed in Annex I of EU Directive 67/548/EEC:

<u>Silver</u>: Xi (Irritant). <u>Risk Phrases</u> (R): 33 Danger of cumulative effects. <u>Safety Phrases</u> (S): 28-37-45 - After contact with skin, wash immediately with plenty of water. Wear suitable gloves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WARNING! Causes eye irritation. Intentional misuse by concentrating and inhaling contents can be harmful or fatal. This product is lead free.

Hazard Statements (H): H320 – Causes eye irritation.

<u>Precautionary Statements</u> (P): P280 – Wear protective eyewear. P302 + P352 – IF ON SKIN – Wash with plenty of soap and water. P312 – Call a Poison Control Center or doctor/physician if you feel unwell. P333 + P313 – If skin irritation or rash occurs, get medical advise/attention. P321 – Refer to section 4 of this Safety Data Sheet (First Aid). P305+P351+P338 – IF IN EYES - Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing. P337 + P313 – If eye irritation persists, get medical advice/attention.







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16. OTHER INFORMATION

16.1 Other Information:

NA

16.2 Terms & Definitions:

See last page of this MSDS.

16.3 Disclaime

This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR §1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of ShipMate's & CAIG Laboratories, Inc.'s knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either expressed or implied, are provided. The information contained herein relates only to the specific product(s). If this product(s) is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

16.4 Prepared for:

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16.5 Prepared by:

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DEFINITION OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these that are commonly used include the following:

GENERAL INFORMATION:

CAS No. Chemical Abstract Service Number			
	·		

EXPOSURE LIMITS IN AIR:

	ACGIH	American Conference on Governmental Industrial Hygienists		
	TLV Threshold Limit Value			
OSHA U.S. Occupational Safety and Health Administration		U.S. Occupational Safety and Health Administration		
	PEL Permissible Exposure Limit			
	IDLH	Immediately Dangerous to Life and Health		

FIRST AID MEASURES:

	Cardiopulmonary resuscitation - method in which a person whose
	heart has stopped receives manual chest compressions and breathing
	to circulate blood and provide oxygen to the body

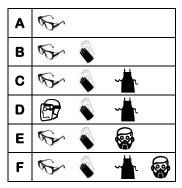
HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: HMIS

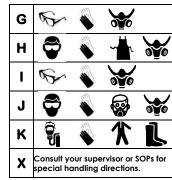
HEALTH, FLAMMABILITY & REACTIVITY RATINGS:

0	Minimal Hazard	
1	1 Slight Hazard	
2	Moderate Hazard	
3	Severe Hazard	
4	Extreme Hazard	



PERSONAL PROTECTION RATINGS:













Note: the dotted circle indicates that this respiratory protective equipment is required for high concentrations or for large volume spills or releases of product.

OTHER STANDARD ABBREVIATIONS:

NA	Not Available
NR	No Results
NE	Not Established
ND	Not Determined
ML	Maximum Limit
SCBA	Self-Contained Breathing Apparatus

NATIONAL FIRE PROTECTION ASSOCIATION: NFPA

FLAMMABILITY LIMITS IN AIR:						
Autoignition	Autoignition Minimum temperature required to initiate combustion in air with no					
Temperature	other source of ignition					
LEL Lower Explosive Limit - lowest percent of vapor in air, by volume, the						
	will explode or ignite in the presence of an ignition source					
UEL Upper Explosive Limit - highest percent of vapor in air, by volu						
	that will explode or ignite in the presence of an ignition source					

HAZARD RATINGS:

0	Minimal Hazard			
1	Slight Hazard			
2	Moderate Hazard			
3	Severe Hazard			
4	Extreme Hazard			
ACD	Acidic			
ALK	Alkaline			
COR	Corrosive			
₩	Use No Water			
OX	Oxidizer			
TREFOIL	Radioactive			



TOXICOLOGICAL INFORMATION:

LD ₅₀	Lethal Dose (solids & liquids) which kills 50% of the exposed					
	animals s					
LC ₅₀	Lethal concentration (gases) which kills 50% of the exposed animal					
ppm	Concentration expressed in parts of material per million parts					
TD _{Io}	Lowest dose to cause a symptom					
TCLo	Lowest concentration to cause a symptom					
TD _{Io} , LD _{Io} , & LD _o or	Lowest dose (or concentration) to cause lethal or toxic					
TC, TCo, LCIo, & LCo	effects					
IARC	International Agency for Research on Cancer					
NTP	National Toxicology Program					
RTECS	Registry of Toxic Effects of Chemical Substances					
BCF	Bioconcentration Factor					
TLm	Median threshold limit					
log Kow or log Koc	Coefficient of Oil/Water Distribution					

REGULATORY INFORMATION:

WHMIS	Canadian Workplace Hazardous Material Information System				
DOT	DOT U.S. Department of Transportation				
TC	Transport Canada				
EPA	U.S. Environmental Protection Agency				
DSL	DSL Canadian Domestic Substance List				
NDSL	Canadian Non-Domestic Substance List				
PSL	Canadian Priority Substances List				
TSCA	U.S. Toxic Substance Control Act				
EU	European Union (European Union Directive 67/548/EEC)				
WGK	WGK Wassergefährdungsklassen (German Water Hazard Class)				

WORKPLACE HAZARDOUS MATERIALS IDENTIFICATION (WHMIS) SYSTEM:

		(A)		(Ţ)	®		R
Α	В	C	D1	D2	D3	E	F
Compressed	Flammable	Oxidizing	Toxic	Irritation	Infectious	Corrosive	Reactive

EC (67/548/EEC) INFORMATION:

			*			×	×
С	E	F	N	0	T+	Xi	Xn
Corrosive	Explosive	Flammable	Harmful	Oxidizing	Toxic	Irritant	Harmful

CLP/GHS (1272/2008/EC) PICTOGRAMS:

			\Diamond			$\langle \overline{\cdot} \rangle$		***
GHS01	GHS02	GHS03	GHS04	GHS05	GHS06	GHS07	GHS08	GHS09
Explosive	Flammable	Oxidizer	Pressurized	Corrosive	Toxic	Harmful Irritating	Health Hazard	Environment