MATERIAL SAFETY DATA SHEET

I. MANUFACTURER INFORMATION:

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MSDS# TSL-302

II. MATERIAL IDENTIFICATION – UNKNOWN NUMBERS 119-130 & Custom Series 500:

Qualitative analysis unknowns are designed for individual student use in chemistry laboratory courses. Each package contains between 0.20 grams and 0.40 grams of solid chemical (pure or mixture) which is sealed in a small plastic vial bearing a code number. In typical use, the instructors of chemistry labs do not reveal the code number or the identity of the contents of any vial to students. Identity of each sample is known to the instructor or stockroom personnel by comparing the "Key" to the code numbers.

III. GROUP III CATIONS: INGREDIENTS, EXPOSURE LIMITS AND TOXICITY DATA

Please refer to the Key for the identification of cations for Unknown Numbers 119 – 130, Custom Series 500. The cations and corresponding raw materials are as follows:

Cation	Ingredient	CAS	TWA	LD50-Oral	LD50-Dermal	National Fire Protective Association		
			mg/m^3	mg/kg	mg/kg	H	F	R
Al^{3+}	$Al_2(SO_4)$•14-18 H_2O	7784-31-8	0.14 (Al)	>9gm/kg (mouse)		0	0	1
Cr^{3+}	$CrCl_3$•$6H_2O$	10060-12-5	0.5 (Cr)	1790		3	0	0
Fe^{2+}	$FeCl_3$	10025-77-1	1mg/Fe/m^3	900mg/kg (oral-rat)		1	0	1
Mn^{2+}	$MnCO_3$	598-62-9	1				0	0
$ZnNO_3$	$Zn(NO_3)_2$	7779-88-6						
$ZnCO_3$	3Zn(OH)2.2$ZnCO_3$	3486-35-9				1	0	0
$NiCO_3$	$NiCO_3$.2Ni $(OH)_2$.xH_2O	12607-70-4	1mg(Ni)/m^3 ACGIH TLV: 0.2mg(Ni)/m^3	840mg/kg (oral-rat)		3	0	0
$CoCO_3$	$CoCO_3$	513-79-1	0.05mg/m^3	640mg/kg (oral-rat)		0	0	0

N/A = Not Available
$Al_2(SO_4)$• H_2O: Aluminum Sulfate
$CrCl_3$•$6H_2O$: Chromium (III) chloride hexahydrate; Chromic chloride hexahydrate
Fe_2O_3: Iron (III) oxide; Ferric oxide
$MnCO_3$: Manganese carbonate
$ZnCO_3$: Zinc Carbonate, basic
$ZnNO_3$: Zinc Nitrate
$NiCO_3$: Nickel Hydroxide Carbonate
$CoCO_3$: Cobalt Carbonate

IV. HEALTH HAZARDS:

Due to the small amount of material in each package, the hazard associated with each package is minimal. This information is obtained from the MSDS of the individual raw materials and other reliable sources and may or may not be directly applicable to the small amount of the individual material or mixtures. The unknown vials are to be used under supervision of a chemist or trained laboratory instructor.

POTENTIAL HAZARD FROM ACUTE EXPOSURE

Ingredient	Eye Contact	Ingestion	Inhalation	Skin	
				Absorption	Contact
$CrCl_3 \bullet 6H_2O$	Irritant	Harmful: **Very Dangerous**	Harmful: Irritating to the mucous membranes and upper respiratory tract	Slight Potential as a permeator	Irritant: May cause allergic skin irritation
$Al_2(SO_4) \bullet 18 H_2O$	Irritant	Harmful	May be Harmful	May be Harmful	Irritant: may be harmful
Fe_2O_3	Irritant	May be Harmful	May be Harmful		May cause irritation
$MnCO_3$	Irritant	May be Harmful	May be Harmful	May be Harmful	May cause irritation
$ZnNO_3$	Irritant	May be Harmful	May be Harmful	May be Harmful	May cause irritation
$ZnCO_3$	Irritant	Slightly Hazardous	Slightly Hazardous	Slightly Hazardous	May cause irritation
$NiCO_3$	Irritant/Abrasive	Not highly toxic orally.	Avoid Inhalation of dust.		
$CoCO_3$	Irritant	**Toxic** Internally		**Highly toxic** subcutaneous or implanted.	

CHRONIC HEALTH EFFECTS due to long term or repeated exposure:
Chromium (III) chloride hexahydrate ($CrCl_3 \bullet 6H_2O$) is a suspected carcinogen by ACGIH.

V. FIRST AID MEASURES

Skin: Wash hands thoroughly after contact using soap and warm water. If spilled on clothing, flush affected areas with water, remove contaminated clothing as soon as possible and wash before reuse.

Ingestion: Because of the small sample size (400 mg or less), most of the unknowns present little hazard. Rinse out the mouth with plenty of water. If ingested, drink 1-2 glasses of water and induce vomiting. DO NOT induce vomiting for unknowns containing $Al_2(SO_4) \bullet 14\text{-}18\ H_2O$. Seek medical attention.

Eye Contact: Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Obtain medical attention.

Inhalation: Remove victim to a well ventilated area. Seek medical attention.

VI. PHYSICAL DATA, STABILITY AND REACTIVITY DATA

Cation	MW	MP $^oC/^oF$	Stability	Flammability	Solubility in Cold Water	Comments
$Al^{3+} \bullet 18H_2O$	666.14	Decompose 87/189	Stable	Non-Flammable	Soluble	Emits toxic fumes if heated to decomposition. Non-combustible

Cation	MW	MP $^{o}C/^{o}F$	Stability	Flammability	Solubility in Cold Water	Comments
Cr^{3+}	266.45	83/181.4	Stable	Non-Flammable	Easily Soluble	Incompatible with moisture and oxidizing agents.
Fe^{2+}	159.7	1565/2849	Stable	Non-Flammable	Insoluble	
Mn^{2+}	114.95	Decompose	Stable	Non-Flammable	Very Slightly	
$ZnNO_3$	297.48	1975/3587	Stable	Non-Flammable	Slightly	Sublimes below MP. Hot ZnO can react explosively with Mg. Incompatible with strong oxidizing agents.
$ZnCO_3$	N/A	Decomposes	Stable	N/A	Slightly	Extremely reactive or incompatible with acids.
$NiCO_3$	N/A	N/A	Stable	N/A	Insoluble in water. Soluble in acids with evolution of CO_2	Incompatible with halogens, peroxide. Soluble in acid.
$CoCO_3$	118.94	Density 4.13	Stable	N/A	Insoluble	Liberates CO_2 on contact with acids.

Additional Comments:

Aluminum sulfate has a very slight to slight potential to react with oxidizing agents and moisture.

VII. FIRE AND EXPLOSION HAZARDS

No fire or explosion hazards are known.

VIII. STORAGE AND DISPOSAL

Store in a well ventilated area and protect unknowns from light. Do not breathe dusts. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure. Keep vials closed when not in use. Wash thoroughly after handling. Dispose in accordance with Federal, State and Local regulations.

The information provided in the MSDS is based on available information which is believed to be accurate and reliable. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and assume no liability resulting from its use. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

The following sources were consulted:

1. Material Safety Data Sheets of the individual ingredients.
2. Sigma-Aldrich Library of Chemical Safety Date Ed. II; 1988

Practice good laboratory safety procedures when using chemicals.

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