MATERIAL SAFETY DATA SHEET

I. MANUFACTURER INFORMATION:

Auric Enterprises, Inc.
d/b/a Thorn Smith Laboratories
7755 Narrow Gauge Road
Beulah, MI 49617-9792
Phone: 231-882-4672
Fax: 231-882-4804

MSDS# TSL-305

II. MATERIAL IDENTIFICATION – UNKNOWN NUMBERS 147-164 AND CUSTOM SERIES 600:

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. GENERAL CATION UNKNOWNS: INGREDIENTS, EXPOSURE LIMITS AND TOXICITY DATA

Please refer to the Key for the identification of anions for Unknown Numbers 147-164, Custom 600 Series. The cations and corresponding raw materials are as follows:

$AgC_2H_3O_2$: Silver Acetate
$Al_2SO_43x\ H_2O$: Aluminum Sulfate; Sulfuric Acid, aluminum salt (3:2) hydrate
$BaCO_3$: Barium carbonate
$Bi(OH)_3$: Bismuth (III) hydroxide
$CaCO_3$: Calcium carbonate
$CdCO_3$: Cadnium carbonate
$CoCO_3 \bullet xH_2O$: Cobaltous carbonate
$CrCl_3 \bullet 6H_2O$: Chromium (III) chloride hexahydrate; Chromic chloride hexahydrate
$CuCO_3$: Copper (II) carbonate, basic; Cupric carbonate, basic
$FeCl_3$: Ferric Chloride, Hexahydrate
Hg_2Cl_2: Mercurous chloride; Mercury (I) chloride
HgO: Mercury (II) oxide; Mercuric oxide, yellow
KCl: Potassium chloride
$MgCO_3$: Magnesium carbonate, basic; $(4MgCO_3 \bullet Mg(OH)_2 \bullet 5H_2O)$
$MnCO_3$: Manganese (II) carbonate
$NaHCO_3$: Sodium hydrogen carbonate; Sodium bicarbonate
$NiCo_3$: Nickel Carbonate; $2Ni\ (OH)_2\ .\ xH_2O$
NH_4Cl: Ammonium chloride
NiO: Nickel oxide, black
$PbCO_3$: Lead (II) carbonate
Sb_2O_3: Antimony oxide; Antimony trioxide
$SnCl_4 \bullet 5H_2O$: Tin (IV) chloride, pentahydrate; Stannic chloride, pentahydrate
$SrCO_3$: Strontium carbonate
$Zn(NO_3)_2$: Zinc Nitrate

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

The most hazardous ingredients are listed. Please consult the individual group MSDS for more detail.

Ingredient	Eye Contact	Ingestion	Inhalation	Skin	
				Absorption	Contact
HgO	Irritant: Corrosive: Amount of damage depends on length of contact	**Extremely dangerous.** May be fatal LD50-oral 18 mg/kg (rat)	Very dangerous. May be fatal	Corrosive and a permeator Amount of damage depends on length of contact	Irritation
Hg_2Cl_2	Irritation	Harmful: **Very Dangerous** LD50-oral 166 mg/kg (rat)	Harmful	May be Harmful	May cause Irritation
$CdCO_3$	Irritation	Harmful: **Very Dangerous** LD50-oral 438 mg/kg (rat)	May be Harmful	May be Harmful	May cause irritation
$CuCO_3 \bullet Cu(OH)_2$:	Irritation	Harmful: **Very Dangerous** LD50-oral 19 (rat)	Harmful	May be Harmful	Irritant
Co^{2+}	Irritant	Harmful: **Very Dangerous** LD50-oral 640 (rat)	Harmful: **Very Dangerous**	Corrosive and a permeator Amount of damage depends on length of contact	Irritant
$SnCl_4 \bullet 5H_2O$	Irritant: Corrosive: Amount of damage depends on length of contact	Harmful: **Very Dangerous**	Harmful: **Very Dangerous**	Corrosive and a permeator Amount of damage depends on length of contact	Irritant
$CrCl_3 \bullet 6H_2O$	Irritant	Harmful: **Very Dangerous** LD50-oral 1790 mg/kg	Harmful: Irritating to the mucous membranes and upper respiratory tract	May be fatal	Irritation
$BaCO_3$	Irritant	**Extremely Dangerous.** May be fatal LD50-oral 418 mg/kg (rat)	Very Dangerous Irritating to the mucous membranes and upper respiratory tract	May be fatal	Irritation
$PbCO_3$	Irritant Very Dangerous	May be Harmful	May be Harmful	May be Harmful	Irritation
Al_2SO_4	Irritant	**Slightly hazardous** in case of ingestion.	Lung irritant	Irritant	Irritation

PUTTING THE HAZARD INTO PERSPECTIVE: Due to the small sample size, the individual unknowns present little hazard. HgO is present at approximately 0.20 grams in a two component unknown. It is estimated that 4 vials must be ingested for a 125 pound person to obtain a LD50 dose of 18 mg/kg body weight. As the number of components in an unknown increase, the amount of HgO per vial decreases. Barium carbonate is extremely dangerous. Over 50 vials containing $BaCO_3$ would need to be ingested in order for a 125 pound person to obtain a LD50 oral dose of 418 mg/kg.

CHRONIC HEALTH EFFECTS due to long term or repeated exposure:
Sb_2O_3 is a suspect carcinogen by ACGIH and a possible carcinogen by OSHA.
$CdCO_3$ is classified A2 by ACGIH for carcinogenic effects.
Aluminum: Suspected; chronic effects on male and female (toxin) reproductive system, mucous membranes, skin, eyes, Urinary system. Repeated or prolonged exposure to the substance can produce target organs damage.
Chromium (III) chloride hexahydrate ($CrCl_3 \bullet 6H_2O$) is a suspected carcinogen by ACGIH.
Nickel Oxide, black is classified A1 by ACGIH, 1 by IARC and + by OSHA/NIOSH for carcinogenic effects.
Cobalt carbonate is classified A3 by ACGIH for carcinogenic effects.
Lead and lead compounds (IARC Grp-2B) are listed by IARC as probably carcinogenic to humans based on sufficient animal data but inadequate human evidence. Adverse affects of lead on human reproduction, embryonic and fetal development and post-natal development have been reported.
Long-term exposure to silver may cause argyria which is slate-gray or bluish discoloration of the skin and deep tissues due to the deposit of insoluble albuminate of silver.

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 HgO and $SnCl_4 \bullet 5H_2O$ or aluminum compounds. 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

All components are stable. Some components of the mixtures react with acids and will release carbon dioxide gas. Sunlight will slowly decompose Hg_2Cl_2 into $HgCl_2$ (mercuric chloride) and Hg (metallic mercury).

VII. FIRE AND EXPLOSION HAZARDS

Aluminum: Risks of explosion of the product in presence of mechanical impact or static discharge.

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.

Revised March 2008.