

Arts, Crafts & Theater Safety, Inc. (ACTS)

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<http://www.artscraftstheatersafety.org>

OUTLINE FOR ART/THEATER HAZCOM/HAZMAT TRAINING

© Monona Rossol, 2/26/00 (revised 9/4/08)

Particulars of the law which applies to you

EPA: disposal, storage, containment

OSHA or State OSHA rules for employers, employees, students

Hazard Communication/right to know (label & MSDS requirements)

other laws: respiratory protection, protective equipment,

Other Gov. agencies: CPSC, FDA (theater cosmetics & lasers), ATF (pyro), etc.

Standards organizations: ASHRAE, ACGIH, NFPA, ASTM, ANSI, ESTA, etc.

Legal liability: strategies for protecting ourselves from lawsuits

Physical characteristics of airborne substances

gases, vapors, fumes, dusts, mists, and smoke

How materials enter the body--Routes of Entry

1. inhalation

absorption by lungs: gases, vapors, & soluble particulates

inert particulates--fibrogenic/benign "osis" diseases

direct damage

asphyxiants--physical and chemical

2. skin contact

direct damage--corrosives, irritants

absorption through broken skin; through normal skin

3. ingestion

from lung clearing mechanisms - eating in the workplace, etc.

4. injection

Toxicological concepts

local v. systemic damage

dose; total body burden

acute and chronic effects

cumulative v. non-cumulative toxins

multiple exposures: additive, synergistic, antagonistic

toxins affecting cell replication (DNA): carcinogens, mutagens, teratogens

sensitizers: skin/respiratory allergies;

Factors affecting degree of hazard from toxic materials

1. amount of material

5. total body burden

2. conditions of exposure

6. multiple exposures

3. length and frequency of exposure

7. high risk groups: disabled, ill, medicated, etc.

4. toxicity of materials

Disposal rules

Hazardous waste under US EPA RCRA (Resource Conservation & Recovery Act)

Ignitable e.g., flammable solvents

Corrosive e.g., acids, bases

Reactive e.g., cyanides (cyano/Prussian blue), hypochlorites, organic peroxides, perchlorates, permanganates & sulfides

Toxic: RCRA metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, & silver. Vanadium pentoxide also is a "P" listed waste.

Local laws re: waste water release to: treatment, storm sewers, septic systems
pH, damage to system, toxic, regulated
Other metals regulated by some water treatment plants:
antimony, beryllium, copper, manganese, iron, zinc, nickel
Organic Pigments & Dyes: few rules unless metalized, laked, etc.
Containment: work, storage, waste holding area barriers, Satellite Accumulation Areas
Disposal and accidental release reporting/prevention
Reportable quantities: used, purchased, stored, e.g., lead (100#), arsenic (1#), etc.
Special problems: Dioxin in clay & PCBs in Thalo Blue, etc.

Identifying chemical hazards in consumer products

* use with adequate ventilation	* Water-based	* Natural
* Danger, Warning, Caution	* Biodegradable	* Hypoallergenic
* Generally recognized as safe (GRAS)	* Low VOC	* <u>Non-toxic</u>

Special law for art/craft materials: Labeling of Hazardous Art Material Act (LHAMA)
ASTM D-4236, AP/CP/HL labels, other certifiers
California's Proposition 65 labeling

Detecting air contaminants - from art processes, theatrical fog, pyrotechnics, etc.

Sight/color/cloudiness/beams of light/etc.

Odor/olfactory fatigue/thresholds

Air monitoring: types of monitors; area sampling; personal sampling

Workplace Air Quality--ACGIH TLVs, OSHA PELs, and other standards

Outdoor Air Quality--U.S. EPA air quality index (AQI)

Indoor Air Quality-- for offices, auditoriums, classrooms, etc: ASHRAE standards

Ventilation - slides

Natural ventilation systems

Recirculation systems - ASHRAE standards

Industrial ventilation - ACGIH standards

dilution (aka general, mechanical) systems

local exhaust: hoods, ducts, fans, air cleaners

Substitution

Selecting dust-free, water-based, or low-volatility materials

Avoiding highly toxic chemicals: carcinogens, etc.

Comparing toxicities to find safest (LD50's, TLVs, etc.)

Personal protective equipment

respiratory protection: written programs; NIOSH approval; fit testing; etc.

gloves, aprons, and other protective clothing

face and eye protection

hearing protection

Personal hygiene

Storage and handling of materials

Fire, medical and other emergency situations

extinguishers, sprinkler and deluge systems

emergency plans: abort procedures; drills and training; handicapped access/egress

eye wash fountains and emergency showers

Housekeeping

cleanup: HEPA vacuums, wet mopping, etc. - handling spills, chemical disposal

Medical surveillance programs--choosing doctors, medical exams and tests

Applying the information to selection and safe use of:

work from the list materials found on inspection which require training

Use handout MSDS dictionary and interpret MSDSs on products

ACTS

ARTS, CRAFTS AND THEATER SAFETY

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UNDERSTANDING THE MSDS

© Monona Rossol, October, 1992 (revised: 1/21/07)

The following can be used to interpret step-by-step the information found on the average MSDS. The information may be in a different order on a specific MSDS, but each subject listed here should be covered if the MSDS is legally complete. Workers should also remember that blank spaces are not permitted. If items are not applicable, or no information is available, the company writing the MSDS must mark the space to indicate this.

SECTION I

IDENTITY OF THE PRODUCT. The identifying chemical name or product name should be the same as that on the container label.

EMERGENCY TELEPHONE NUMBER. A 24-hour, U.S. phone number must be included. It does not need to be toll-free.

TELEPHONE NUMBER FOR INFORMATION. It may be the same number as above for small companies.

NAME OF MANUFACTURER OR IMPORTER. Be sure that this name is exactly the same as the name of the manufacturer listed on the product label. Small manufacturers sometimes send out MSDS from the primary manufacturer of the raw materials they used to make the product or that they repackaged which is improper. An importer is the "manufacturer of record" in the US and is responsible for the product.

ADDRESS OF THE MANUFACTURER. Be sure this address is a U.S. address and complete: street or box, town, state, zip.

DATE PREPARED. MSDSs prepared more than three years ago are acceptable in the U.S., but they are invalid in Canada. In the U.S. manufacturers must revise MSDSs to include new data within 3 months. It is common for manufacturers to provide old, outdated MSDSs.

SIGNATURE OF THE PREPARER is optional.

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY DATA

SPECIFIC CHEMICAL NAME/IDENTITY. If the product is a single chemical, the name should be the same as on Section 1.

COMMON NAME(S), synonyms, and chemical class if it has one.

CAS # (CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER, optional). Good MSDSs provide this identification number which is assigned to each chemical by this international research agency. Some state laws, e.g., the NJS Right-to-Know law, require it on MSDSs and labels. Manufacturers who sell to states that require it must include CAS#s on the MSDS.

CHEMICALS IN PRODUCTS THAT ARE MIXTURES. It used to be common for MSDSs to list only ingredients which had TLVs or PELs.

Now any chemical for which there is even one study which shows it may be capable of causing harm should be listed. Toxic chemicals comprising more than 1 % of the product by weight must be listed. Cancer-causing chemicals comprising 0.1% or more by weight of the product must be listed. In some states such as California and New Jersey (for state employees), chemicals that cause reproductive and certain other chronic hazards also must be listed at 0.1% or even lower.

If exposure to amounts even smaller than the required 1.0 or 0.1 % is known to be hazardous, manufacturers also must list these ingredients. In practice, however, such hazardous ingredients often go unlisted. For example, trace amounts of extremely toxic dioxins and PCBs in many pigments and in ball clays usually are not reported.

TRADE SECRET EXEMPTIONS. The identity of ingredients can be withheld by the manufacturer if they are trade secrets or proprietary. The MSDS should have a trade secret registration number if it is sold in states that require one. If there is no number, it may be possible that the company is not legally withholding the identity of the ingredients. Trade secret products should be avoided whenever possible since it is difficult and time-consuming for medical personnel to get this data if there is an accident or illness. Even then, the medical person usually must withhold from the victim the name of the chemical that caused his/her problem because they must sign a confidentiality agreement with the company,

OSHA PEL. These permissible exposure limits (PELs) should be listed here. They can be eight-hour time-weighted averages (PEL-TWA), short term (STEL) or ceiling (C) limits. PELs are enforced by OSHA. These limits were intended to be the amounts of the substance in the air to which most healthy adult workers may be exposed each work day over a 40 hour work week for years without adverse effect. Unfortunately, most of OSHA's PELs were set in the 1970s and are no longer considered protective. OSHA has tried several times to update them.

ACGIH TLV. The American Conference of Governmental Industrial Hygienists (ACGIH) limits should be listed here. These also can be stated as eight-hour time-weighted averages (TLV-TWA), short term (STEL) or ceiling (C) limits. These standards are updated regularly and are more protective than the OSHA PELs. In general, the smaller the TLV, the more toxic the substance is to inhale, although other factors such as evaporation rate should be considered. TLVs are standards

and are not enforced by OSHA except when OSHA uses the General Duty Clause.

OTHER LIMITS (OPTIONAL). Good manufacturers will list other limits here such as the NIOSH RELs (Recommended Exposure Limits), the American Industrial Hygiene Association's WEELs, MRLs (manufacturer's recommended limits), and the MAKs (Federal Republic of Germany Maximum Concentration Values in the Workplace)s.

ODOR THRESHOLD (optional). The odor threshold (OT) is required on Canadian MSDSs when known. It is sometimes included by U.S. manufacturers who sell to both countries. OTs are useful. They are the concentrations in air at which most people can smell the substance. If the OT is smaller than the TLV, then the chemical provides warning before health effects are expected. If the OT is larger than the TLV, one is already at risk by the time the odor can be detected.

PERCENT (optional). If the percentages are listed, check to see if they add up to 100 %. Check to see if toxic substances are a small or large proportion of the product.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

This section provides a physical profile of the chemical through its various characteristics. Some physical data may be omitted on the MSDSs when it is not applicable. For example, some chemicals have no boiling point because they do not boil. However, this same chemical may dissociate (break down) with heat, and this fact and the chemicals into which it dissociates should appear on a good MSDS. If data does not exist, the line on the MSDS where it ordinarily would appear must be filled in to indicate this. Blank spaces are not allowed.

BOILING POINT (BP). The BP is the temperature at which the substance changes rapidly, usually with bubbling, from a liquid to a vapor. Sometimes called the "vaporization point," liquids with low BPs usually expose workers to large amounts of the vapor. If the vapor is also flammable, liquids with low BPs are also fire hazards. A common error is assuming that no vapor is formed by substances such as metals or glass until their BPs are reached. However, vapor is formed at temperatures near their melting points (see below). They are similar to water which boils at 212 °F, but evaporates at room temperature.

MELTING POINT. This is only applicable to solid materials. The MP is the temperature at which a solid changes to a liquid. Vaporization of small amounts of substances such as metals usually begins at the melting point and increases as the temperature is increased. Some solids, e.g. mothballs, volatilize rapidly at below their melting points.

VAPOR PRESSURE (mm Hg). VP is the pressure exerted by a saturated vapor above its own liquid in a closed container. VPs combined with evaporation rates are useful in determining how quickly materials become airborne, and thus how quickly a worker is exposed to it. They are usually reported in millimeters of mercury (mm Hg) at 68 ° F (20 ° C) unless otherwise stated. Substances with VPs above 20 mm Hg may present a hazard due to their extreme volatility.

VAPOR DENSITY (AIR = 1). VD is the weight of a vapor or gas compared to an equal volume of air. Materials with a VD less than 1.0 are lighter than air. Materials with a VD greater than 1.0 are heavier than air. While all vapors and gases will mix with air and disperse, large quantities of unmixed vapor or gas in locations without much air movement such as storage rooms will tend to rise or sink depending on their VD. Flammable vapors that are heavier than air can spread to sources of ignition and flash back to the source.

SOLUBILITY IN WATER. This term represents the amount by weight that will dissolve in water at ambient temperatures. Solubility is

important in determining suitable clean up and extinguishing methods. Solubility is usually reported in grams per liter (g/l) or general categories such as:

negligible or insoluble	=	< 0.1 percent
slight	=	0.1 - 1.0 percent
moderate	=	1 - 10 percent
appreciable	=	> 10 percent
complete	=	soluble in all proportions

APPEARANCE AND ODOR. Comparing this description to the actual product is a way to be sure the right MSDSs has been obtained.

SPECIFIC GRAVITY (SG). The SG describes the heaviness of a material compared to a reference substance. When the reference substance is water (H₂O = 1), it indicates whether it will float or sink in water. SG for solids and liquids compared to water numerically equals density (see above). SG for gases does not equal density because the density of air is not 1.0, but 1.29.

EVAPORATION RATE. This is the rate at which a material will vaporize (volatilize, evaporate) from the liquid or solid state when compared to another material. The two common liquids used for comparison are butyl acetate and ethyl ether.

<u>WHEN BUTYL ACETATE = 1.0</u>	<u>WHEN ETHYL ETHER = 1.0</u>
> 3.0 = FAST	< 3.0 = FAST
0.8 - 3.0 = MEDIUM	3.0 - 9.0 = MEDIUM
< 0.8 = SLOW	> 9.0 = SLOW

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT. The lowest temperature at which a flammable liquid gives off sufficient vapor to form an ignitable mixture with air near its surface or within a vessel. Combustion does not continue. The lower the flash point, the more hazardous the liquid. The METHOD USED should also be designated here. There are various tests for determining flash point and these should also be designated here for accuracy. The four test methods recognized by the National Fire Protection Association are: Tag Open Cup test, Tag Closed-Cup test, Cleveland Open Cup, and Pensky-Martens closed cup.

FLAMMABLE LIMITS. Only applicable to flammable liquids and gases, these are the minimum and maximum concentrations in air between which ignition can occur. Concentrations below the lower flammable limit (LFL) are too lean to burn, while concentrations above the upper flammable limit (UFL) are too rich and will burn. All concentrations in between can flash or explode. (Sometimes called lower and upper explosion limits—LEL and UEL.)

EXTINGUISHING MEDIA. The type of extinguisher or suppression system needed to put out a fire involving the substance.

SPECIAL FIRE FIGHTING PROCEDURES. Lists any special methods needed to fight fires involving the substance. Peroxides like those used to cure polyester resins, for example, supply oxygen when burned and cannot be extinguished by ordinary methods that smother or cut off air.

UNUSUAL FIRE AND EXPLOSION HAZARDS apply to substances such as some organic peroxides or ethyl ether that ignite spontaneously under certain conditions or that become explosive when old.

SECTION V - REACTIVITY DATA

This section must be completely understood before doing any kind of experimenting with the material. Artists also should be aware that the manufacturers usually have no liability for damages caused when their products are not used as directed.

STABILITY: STABLE/UNSTABLE. Stability is the ability of the material to remain unchanged under reasonable conditions of storage and use.

CONDITIONS TO AVOID. Conditions which will render a material more unstable, e.g., storage at above room temperature causes certain materials to change rapidly—even become explosive.

INCOMPATIBILITY. Here the MSDS should list substances which will react dangerously with the product. Workers can use this to determine which substances also should not be stored in proximity to each other.

HAZARDOUS DECOMPOSITION PRODUCTS. This section should list any hazardous chemicals given off when the product burns or when it degrades or decomposes without burning. However, manufacturers often only report the results of high temperature incineration with all the oxygen necessary for complete combustion. Under these conditions, most organic chemicals will give off carbon dioxide, water, and a few other low molecular weight chemicals. Actual burning in open air, heating with torches, hot wire cutting, or other methods of rapid decomposition usually will produce very different results. Workers should be aware that this section may not be relevant to the way in which the product is actually burned or decomposed.

Failure to report decomposition products fully is especially common and egregious when the product is a two-component pyrotechnic. These companies usually report decomposition of each component separately should they be involved in a fire. However, it is the smoke created when the product is used as directed about which data is needed.

HAZARDOUS POLYMERIZATION. Polymerization is the process by which the molecules of a chemical can combine to form larger molecules. Examples include the setting up of epoxy or polyester resins. Polymerization is hazardous if during the reaction excessive heat, gases, or some other byproduct is given off in amounts sufficient to cause fires, burst containers, or cause some other kind of harm. If high temperatures must be avoided to prevent polymerization, this should be stated in the Conditions to Avoid (see above).

SECTION VI - HEALTH HAZARD DATA

ROUTES OF ENTRY are the ways chemicals can enter the body.

INHALATION is the most common route. For example, vapors or dusts can be inhaled and absorbed by the body.

SKIN. If this route is checked, the material can be absorbed by the skin in significant amounts. Often it is also checked if it only damages the skin itself. Good MSDSs clarify whether skin damage and/or absorption can occur.

INGESTION. If this route is indicated, the material can be eaten, drunk, or swallowed, or inhaled particles can be expelled from the lungs and swallowed.

INJECTION is not a common route but may be included.

HEALTH HAZARDS, ACUTE AND CHRONIC. This section usually varies greatly in quality. Some manufacturers supply detailed data on both chronic and acute health effects. Others provide very little. Workers should not consider this section sufficient and should supplement it from additional references.

When there is very little data, it is likely that the chemical has never been studied for toxicity. Workers must understand that the majority of the roughly 80,000 chemicals used in the workplace and in consumer products have never, ever, been studied for chronic effects. We literally do not know what effects they may have.

ACUTE. Information about short term exposure hazards belong here. Many MSDSs report OSHA and ACGIH short term exposure limits

(STELs) and Ceiling limits (C) here. The OSHA PEL-STEL and the ACGIH TLV-STEL are for 15 minute exposures, while the Ceiling limits (PEL-C and TLV-C) are limits not to be exceeded at any time. The Odor Threshold (OT) if provided is also useful. Chemicals provide warning if their odor can be detected before their TLVs.

Other data commonly found here are LD₅₀s and LC₅₀s. The LC₅₀ is the concentration in the air that will kill 50 % of the test animals when administered in a single exposure in a specific time period, usually 1 hour. LD₅₀ is the single dose that will kill 50 % of the test animals by any route other than inhalation such as by ingestion or skin contact. These tests establish the degree to which a chemical is acutely hazardous and determine if it will be designated "non-toxic," "toxic," or "highly toxic" (see table below).

LABEL DEFINITIONS OF TOXICITY IN THE U.S. AND CANADA

label term	LD50	LC50
Nontoxic	> 5.0 g/kg*	>20,000 ppm**
toxic	0.05-5.0 "	200-20,000 "
highly toxic	< 0.05 "	< 200 "

* grams per kilogram of body weight.

** part per million; part of substance in 1 million parts of air.

As defined by the Federal Hazardous Substances Act (FHSA) in the U.S., and the Federal Hazardous Products Act in Canada, "non-toxic" means the substance passes the LD50 and LC50 acute or short term animal tests. Long term damage such as cancer and birth defects are not detected by these tests. For example, powdered asbestos passes these tests and is technically "non-toxic" because it doesn't cause cancer in animals in two weeks (the duration of the tests).

This is one reason that the FHSA has been amended to provide chronic hazard labeling for consumer product art materials. (This rule has now been extended to all U.S. consumer products, but as yet there is little or no compliance.) Art material labels must identify any known chronic hazards associated with the product. Unfortunately, many ingredients including almost all the organic pigments used in art materials have never been studied for chronic effects. And in the US, chemicals for which there is no data, can be labeled "non-toxic" even if they are related to known toxic substances or carcinogens..

CHRONIC. This section should report known chronic hazards such as cancer, reproductive or developmental damage, neurological or other organ damage to animals or humans related to repeated or long term exposure. However, most of the chemicals used in paints, dyes, and other art and theater materials have never been studied for long term hazards. Failure to see data in this section should never be interpreted to mean that the material has no chronic hazards. Instead, care should be taken with all materials including those labeled 'nontoxic.'

CARCINOGENICITY. There are three agencies whose opinions regarding carcinogenicity must be reported on MSDSs. These are:

- * NTP (the National Toxicology Program);
- * IARC (the International Agency for Research on Cancer); and
- * OSHA. The categories for these agencies are as follows:

- NTP:** K—Known to be a human carcinogen.
R—Reasonably anticipated to be a carcinogen, with limited evidence in humans, sufficient evidence in experimental animals or some combination of these.
- IARC:** 1—Carcinogenic to humans: sufficient evidence of carcinogenicity.
2A—Probably carcinogenic to humans; limited human evidence; sufficient evidence in experimental animals.
2B—Possibly carcinogenic to humans; limited human evidence in the absence of sufficient evidence in experimental animals.
3—Unclassifiable as to carcinogenicity to humans.
4—Probably not carcinogenic to humans.

OSHA: X--Carcinogen defined with no further categorization.

Some MSDSs state cancer data in words rather than listing categories. If the MSDS says that "this chemical is not considered to be a carcinogen by NTP, IARC, or OSHA," it is most likely that these agencies have never evaluated the chemical because there is little or no data. Never assume the chemical has been evaluated by these agencies and found safe. If it were studied and found safe, the chemical would have an IARC 4 rating.

REPRODUCTIVE HAZARDS. Chemicals such as lead and many solvents are teratogens (cause birth defects) and cause reproductive system damage. But very few chemicals have been studied for these effects. Pregnant women should avoid all unnecessary chemical exposures.

SIGNS AND SYMPTOMS OF EXPOSURE. These are usually acute or subacute manifestations of the chemical, since chronic exposure often produces no clear symptoms for years. If chronic symptoms are given they usually are identified as such.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE. Here the MSDS should list medical conditions which are known or suspected to be exacerbated by the chemical. For example, chemicals which are respiratory irritants may aggravate chronic lung conditions such as asthma or emphysema.

EMERGENCY AND FIRST AID PROCEDURES should be listed here. In some cases the recommendations will include actual first aid products that should be on hand. For example, MSDSs on glass etching creams or liquids should tell users to have calcium gluconate or benzalkonium chloride in the first aid kit.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING/USE

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED. The MSDS should list preferred methods for spill control (e.g. chemical sorbants, fuller's earth, etc.) and protective equipment (respirators, gloves, emergency ventilation, etc.) needed to keep workers safe during clean up of large spills or accidents. Some manufacturers have begun including more detailed disposal information such as advising that spills or releases of some substances such as lead, cadmium and certain solvents must be reported to the EPA almost immediately.

WASTE DISPOSAL METHOD. Unless the material can be rendered completely innocuous, MSDSs usually only advise users to dispose of the material in accordance with local, state, and federal regulations. Disposal has become extraordinarily complex because state, county, and municipal regulations may vary greatly. For this reason, disposal usually cannot be addressed in a few lines on an MSDS. It is the user's responsibility to research local sewer, water, and waste rules before disposing of the products they use.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING. Here the MSDS should list safe storage conditions (e.g. cool, dry area).

OTHER PRECAUTIONS, if needed, should include any special equipment that would be needed or which is required to be in a storage area with the material.

SECTION VIII - CONTROL MEASURES

This section should provide information about protective equipment needed for normal use of the product. The manufacturer decides what constitutes "normal use." If there is any doubt about what is normal, or if any unusual or experimental use is contemplated, the employer should contact the manufacturer about additional protection. Manufacturers are usually not liable for damages if their products are used other than directed. Questions about the hazards of using the

product in unusual ways should be answered in writing by the manufacturer or by a consulting industrial hygienist.

RESPIRATORY PROTECTION (SPECIFIC TYPE). If needed during normal use, a good MSDS tells the user whether or not there is a filter or cartridge capable of collecting the substance or if an air-supplied system will be necessary. However, the MSDS cannot be completely specific about respiratory protection because the type of respirator is determined by the concentration of the substance in the air. The manufacturer cannot predict the concentration because he/she does not know the conditions in the users facility under which the product will be used. It is the user's responsibility to personally monitor the workers to determine their exposures and to select the appropriate respirator.

VENTILATION. If needed during normal use, a good MSDS specifies the type of ventilation system that provides proper protection. This includes recommendations about the use of general (mechanical) ventilation, local exhaust (which captures the contaminants at their source), or any special ventilation system which might be needed.

PROTECTIVE GLOVES. Good MSDSs list the specific type of glove material needed (rubber, nitrile, etc.) and other glove attributes such as length and thickness. Workers should know that many chemicals penetrate gloves without changing the glove's appearance. It is the user's responsibility to contact the technical department of their glove supplier and obtain precise information about glove permeability.

EYE PROTECTION. Good MSDSs indicate the type of eyewear needed by their ANSI Z87.1 standard classification. For example, MSDSs may indicate whether vented or unvented chemical splash goggles, glasses rated for impact, or other specific types are needed.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT, such as aprons, boots, face shields, or eye wash stations should be listed here if needed.

WORK/HYGIENIC PRACTICES. Practices such as proper daily clean up methods and equipment after normal use should be detailed here.

TERMS NOT ON THIS DATA SHEET: Don't hesitate to call or write ACTS about terms not found on this data sheet or for additional information about your products' MSDSs.

Section 1: PRODUCT & COMPANY IDENTIFICATION

Product Name: Lemon Scent Simple Green® All-Purpose Cleaner
Lemon Scent Simple Green® All-Purpose Wipes (fluid only)

Company: Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Harbour, CA 92649 USA

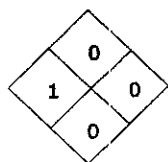
Telephone: 800-228-0709 • 562-795-6000 Fax: 562-592-3830

Emergency Phone: Chem-Tel 24-Hour Emergency Service: 800-225-3924

Use of Product: An all purpose cleaner and degreaser used undiluted or diluted in water for direct, spray and dip procedures. Wipes are for direct wipe applications.

Section 2: HAZARDS IDENTIFICATION

Emergency Overview: CAUTION. Mild eye irritant.
Lemon Scent Simple Green® is a yellow liquid with a lemon odor. Wipes are infused with a clear liquid and lemon odor.



HMIS Rating:
Health = 1 = slight
Fire = 0
Reactivity, and Special = 0 = minimal

Eye Contact: Mild Eye Irritant.

Skin Contact: No adverse effects expected under typical use conditions. Prolonged exposure may cause dryness. Under this condition, use of gloves or skin moisturizer after washing may be indicated.

Ingestion: May cause stomach or intestinal upset if swallowed (due to deterative properties.)

Inhalation: No adverse effects expected under typical use conditions. Adequate ventilation should be present when using Lemon Scent Simple Green® over a prolonged period of time. Open windows or ventilate via fan or other air-moving equipment if necessary.

Carcinogens: No ingredients are listed by OSHA, IARC, or NTP as known or suspected carcinogens.

Medical Conditions: No medical conditions are known to be aggravated by exposure to Lemon Scent Simple Green®. Dermal-sensitive users may experience mild but reversible reactions.

UN Number: Not Required **Dangerous Goods Class:** Nonhazardous

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

The only ingredient of Lemon Scent Simple Green® with established exposure limits is undiluted 2-butoxyethanol (<6% (Butyl Cellosolve; CAS No. 111-76-2); the ACGIH TLV-TWA is 20 ppm (97 mg/m³). Based upon chemical analysis, Lemon Scent Simple Green® contains no known EPA priority pollutants, heavy metals or chemicals listed under RCRA, CERCLA, or CWA. Analysis by TCLP (Toxicity Characteristic Leaching Procedure) according to RCRA revealed no toxic organic or inorganic constituents.

2A

All components of Lemon Scent Simple Green® are listed on the TSCA Chemical Substance Inventory.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION – continued –

General hygiene conditions: There are no known hazards associated with this material when used as recommended. The following general hygiene considerations are recognized as common good industrial hygiene practices:

- Avoid breathing vapor or mist.
- Avoid contact with eyes.
- Wash thoroughly after handling and before eating, drinking, or smoking.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Cleaner is a yellow liquid; Wipes are infused with a clear liquid; both have a lemon fragrance			
Specific Gravity:	1.020	Vapor Pressure:	18 mm Hg @ 20°C; 23.5 mmHg @ 26°C
Evaporation:	>1 (butyl acetate = 1)	Vapor Density:	1.3 (air = 1)
Water Solubility:	100%	Density:	8.5 lbs/gallon
Boiling Point:	100.6°C (212°F)	pH:	9.35; Wipe pH is 8.1 - 8.8
Ash Content:	At 600°F: 1.86% by weight	Nutrient Content:	
Freezing Point:	Approx -9 °C (16 °F) <i>If product freezes, it will reconstitute without loss of efficacy when brought back to room temperature and agitated.</i>	Phosphorus: 0.3% by formula Nitrogen <1.0% by weight (fusion and qualitative test for ammonia) Sulfur: 0.6% by weight (barium chloride precipitation method)	
VOC Composite Partial Pressure: 0.006 mmHg @ 20°C			
Volatile Organic Compounds (VOCs): Per EPA Method 24, VOC's are 5.9%. Cleaner must be diluted at least 1 part Simple Green to 2 parts water to meet CARB, and 1 part Simple Green to 4 parts water to meet SCAQMD Rule 1171 & Rule 1122 and BAAQMD Regulation 8-16 VOC requirements for solvent cleaning operations. Wipe VOCs are 1.2%.			

Section 10: STABILITY AND REACTIVITY

Stability: Stable
 Materials to Avoid: None known
 Hazardous Decomposition Products: None expected

Section 11: TOXICOLOGICAL INFORMATION

The information and conclusions cited in this section are based on data and testing of Simple Green® because, except for fragrance and dyes which have been removed, it contains the same ingredients as Simple Green®.

Nonhuman Toxicity (Data for Simple Green®)

Acute Toxicity: Oral LD₅₀ (rat): >5.0 g/kg body weight Dermal LD₅₀ (rabbit) >2.0 g/kg body weight

Eye Irritation: With or without rinsing with water, the irritation scores in rabbits at 24 hours did not exceed 15 (mild irritant) on a scale of 0-110.

Dermal Irritation: Only mild, but reversible, irritation was found in a standard 72 hour test on rabbits. A value of 0.2 (non-irritating) was found on a scale of 0-8.

Subchronic Dermal effects: No adverse effects, except reversible dermal irritation, were found in rabbits exposed to Simple Green (up to 2.0 g/kg/day for 13 weeks) applied to the skin of 25 males and 25 females. Only female body weight gain was affected.

Fertility Assessment by Continuous Breeding: The Simple Green® formulation had no adverse effect on fertility and reproduction in Cd-1 mice with continuous administration for 18 weeks, and had no adverse effect on the reproductive performance of their offspring.

Section 4: FIRST AID MEASURES

- Eye Contact: Reddening may develop. Immediately rinse the eye with large quantities of cool water; continue 10-15 minutes or until the material has been removed; be sure to remove contact lenses, if present, and to lift upper and lower lids during rinsing. Get medical attention if irritation persists.
- Skin Contact: Minimal effects, if any; rinse skin with water, rinse shoes and launder clothing before reuse. Reversible reddening may occur in some dermal-sensitive users; thoroughly rinse area and get medical attention if reaction persists.
- Swallowing: Essentially non-toxic. Give several glasses of water to dilute; do not induce vomiting. If stomach upset occurs, consult physician.
- Inhalation: Non-toxic. Exposure to concentrate may cause mild irritation of nasal passages or throat; remove to fresh air. Get medical attention if irritation persists.

Section 5: FIRE FIGHTING MEASURES

Lemon Scent Simple Green® is stable, not flammable, and will not burn. No special procedures required.

- Flash Point/Auto-Ignition: Not flammable. Extinguishing Media: Not flammable/nonexplosive.
Flammability Limits: Not flammable. Special Fire Fighting Procedures: None required.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: Avoid contact with eyes. Do not rub eyes with hands during cleanup. No special precautions for dermal contact are needed. Wash hands thoroughly after cleaning up spill or leak.

Method for cleaning up: Recover usable material by convenient method, residual may be removed by wipe or wet mop. If necessary, unrecoverable material may be washed to drain with large quantities of water.

Section 7: HANDLING AND STORAGE

No Special precautions are required. **This product is non-hazardous for storage and transport according to the U.S. Department of Transportation Regulations.** Lemon Scent Simple Green® requires no special labeling or placarding to meet U.S. Department of Transportation requirements.

UN Number: Not Required

Dangerous Goods Class: Nonhazardous

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

- Exposure Limits: The Lemon Scent Simple Green® formulation presents no health hazards to the user when used according to label directions for its intended purposes. Mild skin and eye irritation is possible (please see Eye contact and Skin contact in section IV.) No special precautionary measures required under normal use conditions.
- Ventilation: No special ventilation, precautions or respiratory protection is required during normal use. Large-scale use indoors should provide an increased rate of air exchange.
- Human Health Effects or Risks From Exposure: Adverse effects on human health are not expected from Lemon Scent Simple Green®, based on 20 years of use of Simple Green® without reported adverse health incidence in diverse population groups, including extensive use by inmates of U.S. Federal prisons in cleaning operations.
- Eye protection: Lemon Scent Simple Green® is a mild eye irritant; mucous membranes may become irritated by concentrate. Eye protection not generally required. Wash hands after using wipes.
- Skin protection: Lemon Scent Simple Green® is not likely to irritate the skin in the majority of users. Repeated daily application to the skin without rinsing, or continuous contact on the skin may lead to temporary, but reversible, irritation. Rinse completely from skin after contact.



New Jersey Department of Health and Senior Services
**HAZARDOUS SUBSTANCE
FACT SHEET**

Common Name: **2-BUTOXY ETHANOL**

CAS Number: 111-76-2
DOT Number: UN 2369

RTK Substance number: 0275
Date: November 1994 Revision: February 2001

HAZARD SUMMARY

- * **2-Butoxy Ethanol** can affect you when breathed in and by passing through your skin.
- * Exposure may cause reproductive damage. Handle with extreme caution.
- * Exposure to **2-Butoxy Ethanol** can irritate the eyes, nose, mouth and throat.
- * **2-Butoxy Ethanol** can cause headache, dizziness, lightheadedness, confusion, and passing out.
- * **2-Butoxy Ethanol** may damage the liver and kidneys.

IDENTIFICATION

2-Butoxy Ethanol is a colorless liquid. It is used as a solvent in making plastics and in dry cleaning.

REASON FOR CITATION

- * **2-Butoxy Ethanol** is on the Hazardous Substance List because it is regulated by OSHA cited by ACGIH, DOT and NIOSH.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
- * **ODOR THRESHOLD = 0.1 ppm.**
- * The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

- OSHA: The legal airborne permissible exposure limit (PEL) is **50 ppm** averaged over an 8-hour workshift.
- NIOSH: The recommended airborne exposure limit is **5 ppm** averaged over a 10-hour workshift.
- ACGIH: The recommended airborne exposure limit is **20 ppm** averaged over an 8-hour workshift.

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to **2-Butoxy Ethanol** and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **2-Butoxy Ethanol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **2-Butoxy Ethanol**:

- * Exposure to **2-Butoxy Ethanol** can irritate the eyes, nose, mouth and throat.
- * **2-Butoxy Ethanol** can cause headache, dizziness, lightheadedness, confusion, and passing out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **2-Butoxy Ethanol** and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health and Senior Services, **2-Butoxy Ethanol** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * **2-Butoxy Ethanol** may damage the developing fetus.
- * **2-Butoxy Ethanol** may damage the testes (male reproductive glands).

Other Long-Term Effects

- * **2-Butoxy Ethanol** may damage the liver and kidneys.
- * Very irritating substances may affect the lungs. It is not known whether **2-Butoxy Ethanol** causes lung damage.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- * Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- * Where possible, automatically pump liquid **2-Butoxy Ethanol** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by **2-Butoxy Ethanol** should change into clean clothing promptly.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **2-Butoxy Ethanol**.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with **2-Butoxy Ethanol**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **2-Butoxy Ethanol**, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where **2-Butoxy Ethanol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.