

Introduction to Pesticide Safety

Texas School IPM Program



What is a pesticide

- Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.
- Any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.
- Any nitrogen stabilizer.
- A product is likely to be a pesticide if the labeling or advertising:
 - Makes a claim to prevent, kill, destroy, mitigate, remove, repel or any other similar action against any pest.
 - Indirectly states or implies an action against a pest.
 - Draws a comparison to a pesticide.
 - Pictures a pest on the label.

Not considered pesticides

- Drugs used to control the diseases of humans or animals, which are regulated by the FDA
- Fertilizers and soil nutrients
- Certain low-risk substances such as cedar chips, garlic and mint oil are exempted from regulation by EPA (requires license)
 - 25b classification requires no signal word (mostly food-safe compounds)
- Pest control devices (i.e., mousetraps) are not pesticides, but subject to labeling requirements

There are many kinds of pesticides GROUNDCLE **WEED & GRASS KILLE** topchoice FLUSHING & CO STARTS WORKING IMMEDIATELY Insecticide 50 lbs SKU# 79982844 Kills: Cockroache Palmettobugs, Waterbugs, Apps, Silverfish, Carpenter Anta, and Termites FORUSE IN Homes, Restaurants, Grocery Stres, Schools, Warehouses, Mobile Homes, Hotels, Offices, Apartments, Attics, CAUTION . PRECAUCION Nursing Homes, Ships, Yachts, Buses, LANDSCAPE BEDS" Kannels, Zoos, New Building Construction Sewers and Hospitals **PRECAUCI** LONG-LASTING POWDER
 DOORLESS Orboboric Acid KEEP OUT OF REACH OF CHILDREN SEESIDE PANEL FOR ADDITIONAL PRECAUTIONS ROACH KILLING GEL STATEMENT OF PRACTICAL TREATMENT Interdately contact physician or Posson Costro Celescon Costro Celescon Costro Celescon Costro Celescon Celesco Energately contact physician or Possot Coeter of tradbased, it eye contact occurs, such eyes with party of water. Get medical attention of irritation persist. NET WEIGHT 1 Ib/454 9

...and many pesticide "modes of action" (how a pesticide works on an organism)

- Nervous system poisons
 - Acts on the nerve
- Metabolic inhibitors
 - Affect ability of target to process food
- Hormone mimics
 - Disrupt normal growth & reproduction
- Physical poisons
 - Physically damage insect
- Repellents & attractants

First rule of toxicology: The dose makes the poison

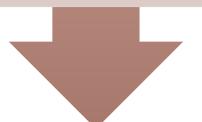
- Paracelsus: a 16th Century Swiss alchemist.
- His most famous toxicology quote:
- All things are poisons, there is nothing which is not a poison; the right dose differentiates a poison and a remedy.



Not all pesticides are equally toxic!

First rule of toxicology: The dose makes the poison

All things are poison, and nothing is without poison; only the dose permits something not to be poisonous.



So how do we measure this?



LD_{50}

A measurement of relative toxicity used by toxicologists today

Lethal Dose 50 - The amount of material needed to kill half of a test population. A statistically valuable estimate of average toxicity.

Mg/Kg

Most common unit used in LD50s.

Amount of toxin (in milligrams)
per Kilogram of body weight of
the test subject (same as parts per
million)



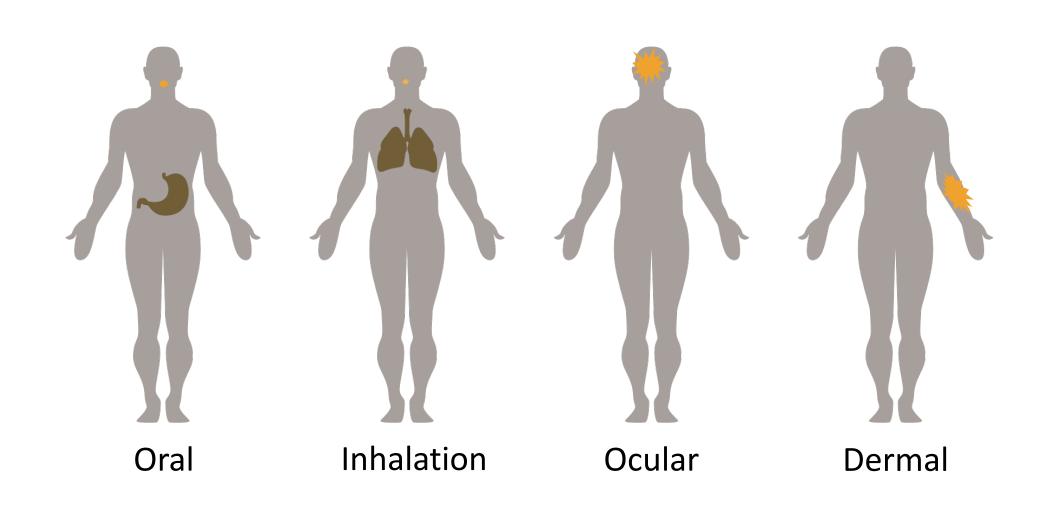
Hazard Indicators	Highly Toxic 1	Moderately Toxic 2	Slightly Toxic 3	Practically Nontoxic 4
Signal Word	DANGER (Poison Skull & Crossbones)	WARNING	CAUTION	CAUTION or no signal word
Acute Oral LD ₅₀	0 - 50 mg/kg	> 50 - 500 mg/kg	> 500 -5000 mg/kg	> 5000 mg/kg
Acute Dermal LD ₅₀	0- 200 mg/kg	> 200 - 2000 mg/kg	> 2000 - 5000 mg/kg	> 5000 mg/kg
Acute Inhalation LC ₅₀	0- 0.05 mg/liter	> 0.05 - 0.5 mg/liter	> 0.5 - 2 mg/liter	> 2 mg/liter
Primary Eye Irritation	Corrosive: corneal opacity or irritation persisting for more than 21 days	Corneal involvement or other eye irritation clearing in 8-21 days	Corneal involvement or other eye irritation clearing in 7 days or less	Minimal effects clearing in less than 24 hour
Primary Skin Irritation	Corrosive (tissue destruction into the dermis and/or scarring)	Severe irritation at 72 hours (severe erythema or edema)	Moderate irritation at 72 hours (moderate erythema)	Mild or slight irritation at 72 hours (no irritation or slight erythema)
Approximate Oral Dose that can kill the average adult human	A few drops to teaspoon full (even on skin contact)	More than 1 teaspoonful to 3 teaspoonfuls	More than 1 oz to 1 pint or 1 pound	More than a pint or pound

Choosing a low-toxicity product is not the only way to reduce risk

Toxicity x Exposure = Hazard (Risk)

Reduce risk by reducing your exposure...Read the label!

Routes through which pesticides can enter the body



Potential pesticide hazards

- Acute effects happen quickly during or after exposure
- Delayed effects may take time to develop after an exposure
- Chronic effects are the result of exposures over a long period of time
- Sensitization is the gradual development of an allergic reaction to pesticides

Most common site of exposure



PPE & Decontamination

- Make sure everyone has access to Personal Protective Equipment
- Make sure there is enough materials for spill clean up
- Decontamination Supplies
- Remember heat stress is a factor in Texas!



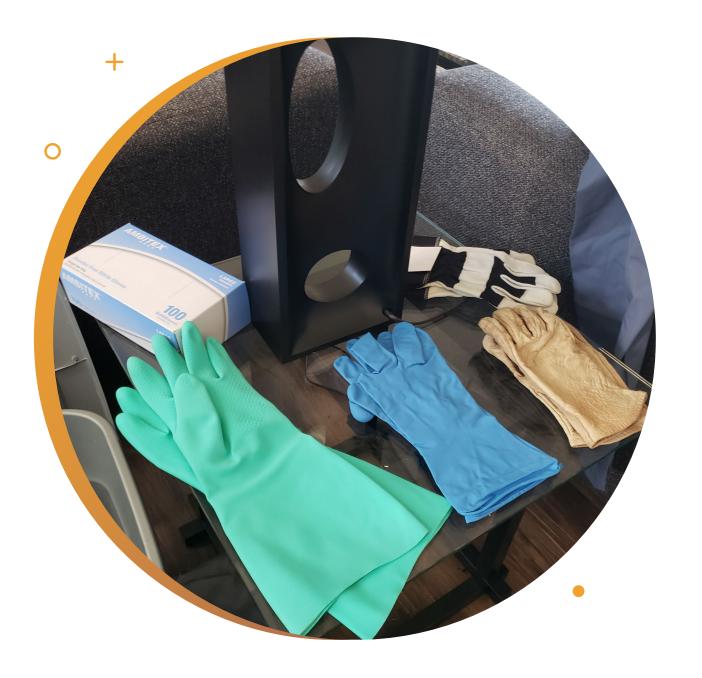
Personal Protective Equipment

Appropriate Long pants clothing Chemical resistant shoes Long-sleeved shirt **Protective** Chemical resistant gloves gear Goggles

Pesticide-rated respirator

Table 1. Minimum personal protective equipment (PPE) and work clothing for handling activities.

	Toxicity category of end- use product					
Route of exposure	I	II	III	IV		
Dermal toxicity or skin irritation potential	Coveralls worn over long-sleeved shirt and long pants	Coveralls worn over long-sleeved shirt and long pants	Long-sleeved shirt and long pants	Long-sleeved shirt and long pants		
	Socks	Socks	Socks	Socks		
	Chemical-resistant footwear	Chemical-resistant footwear	Shoes	Shoes		
	Chemical-resistant gloves	Chemical-resistant gloves	Chemical-resistant gloves	No minimum		
Inhalation toxicity	Respiratory protection device	Respiratory protection device	No minimum	No minimum		
Eye irritation potential	Protective eyewear	Protective eyewear	No minimum	No minimum		



Gloves should be

- Resistant to organic solvents
- Unlined
- Long enough to protect wrists, arms
- Best:
 - Natural rubber
 - Butyl
 - Nitrile

Respirators

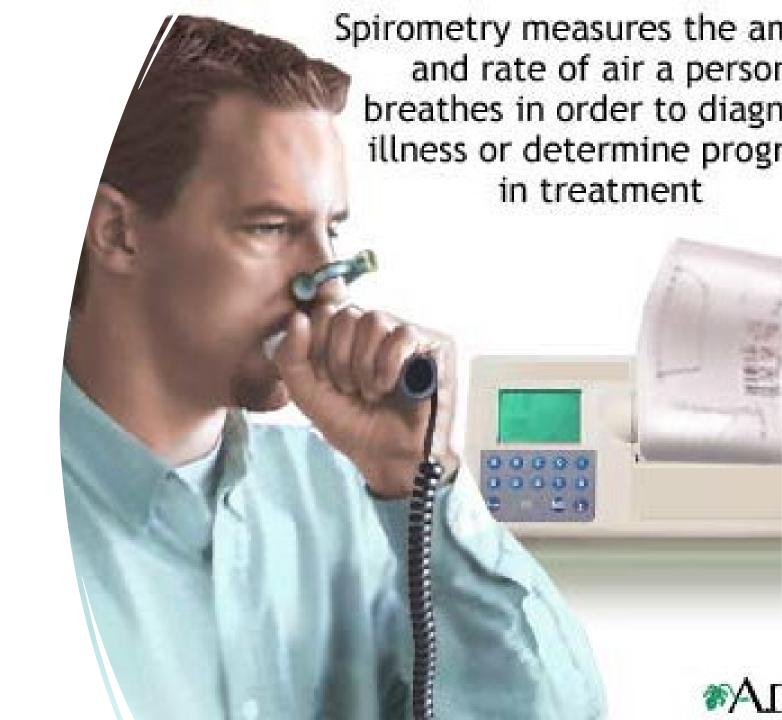


- For toxic dusts, sprays
- NIOSH approval number
- Rated for pesticides
- Look for tight seal
- Must have pre-filter and organic vapor cartridge
- For TDA or other health inspection purposes make sure respirator stored properly on truck.
- Must have a Fit Test medical evaluation



Respirators and Physical Fitness

- Medical evaluations are required for anyone wearing.
- Breathing through a respirator is work for the body.
- Respirators can be hazardous to people with heart or lung problems.



Goggles

Not the same as safety glasses

Use when directed by label

Often used with respirator

Coveralls

- Recommended for most applications
- Remove and wash after use
- Tyvek[©] lightweight, relatively inexpensive and washable
- Wash pesticide contaminated clothes separately
 - Hot water
 - Two cycles



Pesticide Storage Guidelines

- Establish a suitable storage site
- Must be secure
- Temperature must be controlled
- Nonporous flooring
- Runoff protection
- Separate storage for pesticides, food, feed, seed, fertilizer and equipment









Pesticide Storage Guidelines

- Use original containers only
- Labels must be kept on containers--intact and legible
- Watch for container damage
 - (tears, leaks, rust)
- Keep good inventory
- Consider pesticide shelf life

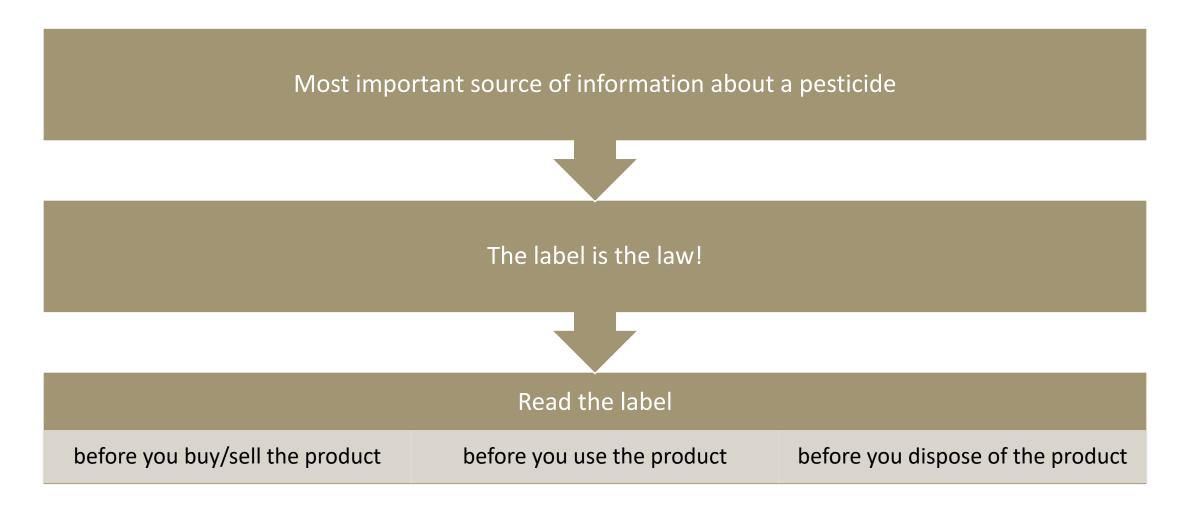
Pesticide labeling



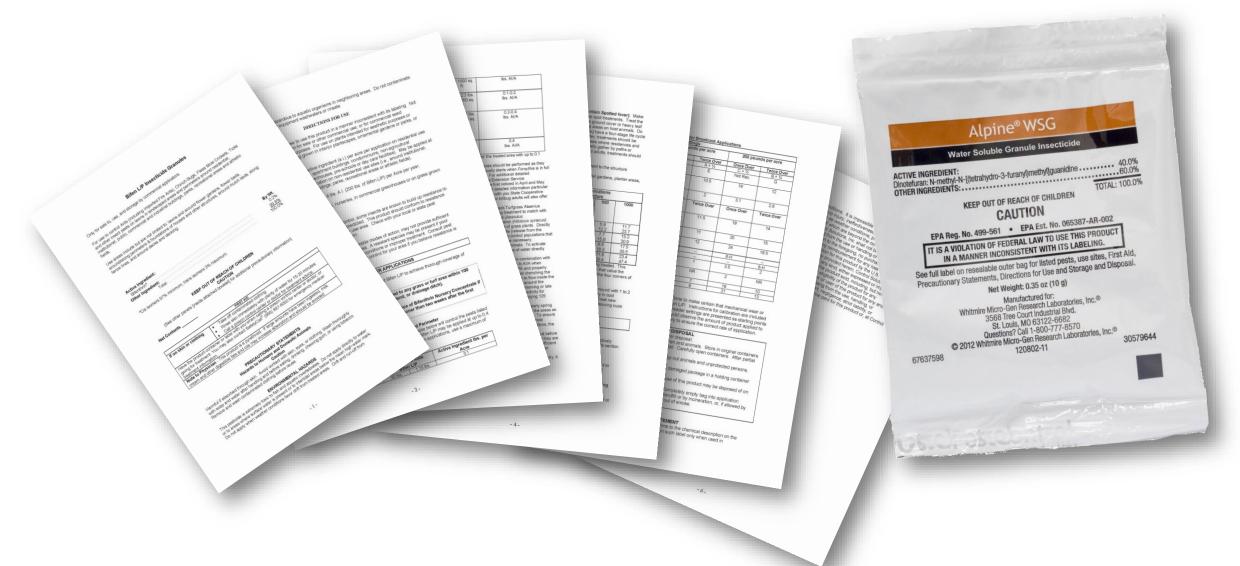




Pesticide labeling



Pesticide Labels may be extensive documents or text printed directly on the pesticide container



Legal considerations

- Use of any pesticide inconsistent with its label is prohibited by federal and state law
- Deliberate violations of the label can result in heavy fines, imprisonment, or both



Stop here for label review

- Trade name
- Ingredients
- Manufacturer name and address
- EPA Establishment No
- EPA Registration No.
- Special consideration
- Directions for use
- Child Warning Statement
- Front panel precautionary statements
- Statement of Practical Treatment

RECTIONS FOR USE CONTINUED

A Affails World Corner on Alfails Woods Larvest Fee Seeds control Apply IFS is of the Feets indicated in the when feeling is noticed to meets appear. Afters from: Agery 1 2 persons are notes Lappen, Lugue Sups. Apply 2 CARRE PURGET OF DAVI STORE BE an autors outling or graning. Co WY THE DATE ON FOR MEET enty so fields planted to dure

Dis Not Can or Grace

28 days.

CANER west the west the west art ha, and ha, sur ha, sel all has sell his self ha, sel art has sell has self ha, sel

IN GALLONAGE PEOURS Ten settens on the settens of the 1 pround equipment, two parties

JOST'S Corn Recovering UM THE ARM OF POWER OF THE PARTY WHEN THE in ty many with white or to property when the French is were part making and the thema a physically compation. Frame Age this gram a to the table of ran along with rankings from the ave commer. Married state n the term after musing and dur concerne the new min unit

and they must find west fire, west art tra, part this part has part

CANE Sugarcane Borer - Appro-to prints the Penne per sure verte of or serial equations - Chieftere helds weekly, beginning in June and existing through sibile garage form and \$74 or more e plants are infested with smart I feeding on an under the leaf higher which have not borned once and cate the unbestation as No. Do not spply within 12



RESTRICTED USE PESTICIDE

FOR RETAIL SALE TO AND APPLICATION ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION



INSECTICIDE **EMULSIFIABLE CONCENTRATE**

ACTIVE INGREDIENT: pestoff—tri-salicylic acid 45.0% INERT INGREDIENTS:

100.0%

8

THIS PRODUCT CONTAINS 4.0 LBS



TOTAL:

(10) STATEMENT OF PRACTICAL TREATMENT

- of SMALLOWED industration has be puring a representation of rain in a greek of many many. Recent with common a year. Can a physician immediately of chemical Company to high an Car a physician immediators
- of the Edds. Fresh type such gipting of agent for an eager by managing. Carry
- of the SA the company of consecut remove company processing and impressing

SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

MFG BY A Z CHEMICALS TOWN, STATE

EPA EST. NO. 00475~ **EPA REGISTRATION NO. 1357-42**

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS (DANGER)

Foreingus by treatment or inhards. Do not terrain agree miss. Do not go NAME AND ADDRESS OF THE PARTY AND THE THE OF EMPERSOR OF A TYPE PARK the Mining Confedended Safety Admir Factor and the historial Indiana for cranicism if or emergency excinence

to furbician defenses assume chalmentered inheren. Do not be not be not be not be about 2009, introveneusly or subquisheously

NVHONNENTAL HAZARE

ether matches Birds feeding on tratrace of mater. Do not apply where of anter tensor Donot spry a maginiar quinti muna "auar drift fram a readed the not contaminate water name. The product about to bee should not be assisted when been are there exerces the eres

> PHYSICAL OR CHEMICAL HAZARDS

Experimental Company of France States

DIRECTIONS FOR USE

The state of the s emphasis on a manner explorate and and

RE ENTRY STATEMENT

CATEGORY OF APPLICATOR

For use any tip agricultural peut conapprix more

13) STORAGE AND DISPOSAL

STORAGE Store in eventual certain On not work must be food, mater or for other process, intended for came-DISPOSAL - Degree by burying

Contact Local State or Reportal Feb.

NET CONTENTS, ONE GALLON

Safety Data Sheets (HCS 2012/GHS Format)

On March 26, 2012, OSHA published the final rule of its revised Hazard Communication Standard (HCS) 29 CFR §1910.1200 to align with the Globally Harmonized System for the Classification and Labeling of Chemicals (GHS).

One of many changes to the HCS is the move from a performance-oriented to a uniformity-oriented approach or standardized format for Safety Data Sheets (SDS), previously called Material Safety Data Sheets (MSDS). The goal is to enhance hazard communication and workplace safety through consistency.

Retained Requirements

- Employers must have an SDS in the workplace for each hazardous chemical used.
- SDS must be readily available to employees in their work areas and during their shifts.
- SDS must be in English.

New Provisions

 SDS must be in a uniform format that includes at least the required section numbers. headings and associated information.*

Compliance Dates

- By December 1, 2013, employers must train employees on new Safety Data Sheets.
- By June 1, 2015, all SDSs must be in the uniform format as prescribed in HCS 2012.
- This poster describes the minimum information that an SRS must include to comply with the

Identification



- (a) Product identifier used on the label:
- (b) Other means of identification:
- Recommended use of the chemical and restrictions on use:
- (d) Name, address, and telephone number of the manufacturer. importer, or other responsible party;
- (it) Emergency phone number.

Hazard(s) Identification



- (a) Classification of the chemical;
- (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s);
- (c) Unclassified hazards.

Composition/Information on Ingredients



- For Substances
- (x) Chemical name; Common name and synonyms;
- CAS number and other unique identifiers:
- (f) Impurities and stabilizing additives which are classified. For Mixtures (In addition to required substance information) The chemical name and concentration or concentration ranges of all ingredients which are classified as health hazards. Note on Trade Secret Claims: Statement must be provided if chemical identify and composition have been withheld.

First Aid Measures



- (x) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion;
- (b) Most important symptoms/effects, acute and delayed;
- (c) Indication of immediate medical attention and special treatment needed. If necessary.

Fire Fighting Measures



- (a) Suitable (and unsuitable) extinguishing media;
- (b) Specific hazard arising from the chemical (e.g., nature of any hazardous combustion products);
- (c) Special protective equipment and precautions for fire-fighters.

Handling and Storage



- (a) Precautions for safe handling:
- (b) Conditions for safe storage, including any incompatibilities.

Exposure Controls/Personal Protection



- (a) OSHA permissible exposure limit (PEL) and any other exposure limit used or recommended by the chemical manufacturer. importer, or employer preparing the safety data sheet;
- (b) Appropriate engineering controls;
- (c) Individual protection measures, such as personal protective

Physical and Chemical Properties



- (a) Appearance (physical state, color, etc.);
- (b) Odor:
- (c) Odor threshold:
- (e) Melting point/freezing point; (f) Initial boiling point
- and boiling range: (c) Flash point:
- (h) Evaporation rate; (i) Flammubility (solid, gas);
- or explosive limits; (k) Vapor pressure;
 - (i) Vapor density:

 - (m) Relative density:
 - (n) Solubility(les):
 - (a) Partition coefficient: n-octanol/water;
 - (p) Auto-ignition temperature: (g) Decomposition temperature;

(3 Upperfower flammability

- (r) Viscosity.

10 Stability and Reactivity



- (a) Reactivity:
- (b) Chemical stability;
- (c) Possibility of hazardous reactions;
- (d) Conditions to avoid (e.g., static discharge, shock, or vibration);
- (e) Incompatible materials:
- (f) Hazardous decomposition products.

Toxicological Information



Description of various toxicological (health) effects and available data;

Ecological Information (Non-Mandatory)



- (a) Ecotoxicity (aquatic and terrestrial, where available);
- (b) Persistence and degradability:
- (c) Bioaccumulative potential:
- (d) Mobility in soit;
- (e) Other adverse effects (such as hazardous to the ozone layer).

Disposal Considerations (Non-Mandatory)



Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

Transport Information (Non-Mandatory)



- (a) UN number;
- (b) UN proper shipping name:
- (c) Transport hazard class(es);
- (d) Packing group, if applicable:
- (e) Environmental hazards (e.g., Marine pollutant (Yes/No));
- (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IRC Code):
- (g) Special precautions.

Regulatory Information (Non-Mandatory)



Safety, health and environmental regulations specific for the product in question.

Other Information



The date of preparation of the SDS or the last change to it.

Hazard Communication Safety Data Sheets

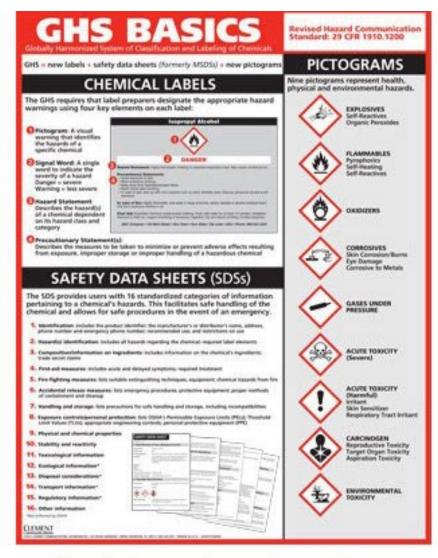
- **Section 1, Identification** includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
- Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.
- **Section 3, Composition/information on ingredients** includes information on chemical ingredients; trade secret claims.
- **Section 4, First-aid measures** includes important symptoms/effects, acute, delayed; required treatment.
- **Section 5, Fire-fighting measures** lists suitable extinguishing techniques, equipment; chemical hazards from fire.
- **Section 6, Accidental release measures** lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Hazard Communication Safety Data Sheets

- **Section 7, Handling and storage** lists precautions for safe handling and storage, including incompatibilities.
- Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); ACGIH Threshold Limit Values (TLVs); and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the SDS where available as well as appropriate engineering controls; personal protective equipment (PPE).
- Section 9, Physical and chemical properties lists the chemical's characteristics.
- Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.
- Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity

Other Info

- Section 12, Ecological information*
 Section 13, Disposal considerations*
 Section 14, Transport information*
 Section 15, Regulatory information*
- **Section 16, Other information,** includes the date of preparation or last revision.
- Employers must ensure that SDSs are readily accessible to employees.



English version shown here

