## LD 50 and MSDS Activity

We handle many materials daily that are toxic. We are often unaware of the degree to which they are toxic. For a variety of reasons, different animals respond differently to the same toxin. Some animals may be very sensitive to a toxin, whereas others are relatively resistant to its effects. Because species of animals vary, it is important to understand that what is toxic to one organism may not necessarily be toxic to other kinds of organisms to the same extent.

Many household items that we deal with on a regular basis are toxic materials, but we don't usually think of them as being toxic. It can be instructive to examine several such materials to determine their toxicity.

The commonly used term to describe acute ingestion toxicity is LD<sub>50</sub>. LD means Lethal Dose (deadly amount) and the subscript 50 means that the dose was acutely lethal to 50% of the animals to whom the chemical was administered under controlled laboratory conditions. The test animals (usually mice or rats) are given specific amounts of the chemical in either one oral dose or by a single injection and are then observed for 14 days.

Since LD<sub>50</sub> values are measured from zero up, the lower the LD<sub>50</sub> the more acutely toxic the chemical. Therefore, a chemical with an oral LD<sub>50</sub> of 500 would be much less toxic than a chemical with an LD<sub>50</sub> of 5. LD<sub>50</sub> values are expressed as milligrams per kilogram (mg/kg) which means mg of chemical per kg of body weight of the animal. mg/kg is the same as ppm. For example, if the oral LD<sub>50</sub> of the insecticide parathion is 4, a dose of 4 parts of parathion for every million parts of body weight would be lethal to at least half of the test animals.

An **MSDS** (Material Safety Data Sheet) is a document (for each chemical) with information on all the physical and chemical properties for that chemical, as well as information on reactions and safe disposal of the chemical waste. The following information can usually be found in a MSDS:

- Identity of the organization responsible for creating the sheet and the date of issue.
- The material's identity, including its chemical and common names.
- Hazardous ingredients.
- Exposure limits.
- Physical and chemical hazards and characteristics.
- Health hazards.
- Emergency and first aid procedures.
- Spill and disposal procedures.
- Precautions and safety equipment.

## Instructions for Pre-lab – LD50 and MSDS

1. Using your **OWN MASS** in <u>kg</u>, figure out how many total g would be required to kill 50% of perfect duplicates of yourself. Be careful about units! For your reference, a penny weighs around 3000 mg or 3 g. Include your weight in pounds, kilograms and grams. Remember, everyone's answers will be slightly different.



Sample: My weight in lbs is 250 lbs.- My weight is 58 kg. Ibuprofen has an LD<sub>50</sub> of 636 mg/Kg 251 lbs = 114 kg  $LD_{50} = 72400$  mg = 72.4 g

## LD 50 and MSDS Activity

## Fill in the table for YOUR weight for the last box, google "Common LD<sub>50</sub>" and pick a substance and calculate **your LD**<sub>50</sub>\* note: these are natural substances

Substance (source or product)	LD₅₀ (mouse or rat) mg/kg or g/kg	SHOW YOUR WORK	LD₅₀ for you (g/person)
disodium EDTA (Secret deodorant)	2000. mg/kg		
benzaldehyde (Cherry Flavor)*	4.8 mg/kg		
Tetrahydrocannabinol (THC from marijuana)*	110 mg/kg		
Ethyl acetate (Cherry Flavor)*	6100 mg/kg		
propylene glycol (Cherry Flavor)	20 g/kg		
Caffeine (Mountain Dew)*	0.13 g/kg		
malic acid (sour candy)*	1.6 g/kg		
Methanol (wood alcohol)*	5628 mg/kg		
Nicotine (through mouth)*	190 mg/kg		
Botulinum toxin (bacteria)*	3 x 10 <sup>-8</sup> mg/kg		
potassium nitrate (fertilizer)	190 mg/kg		
sodium fluoride (toothpaste)	52 mg/kg		
parathion (pesticide)	6.0 mg/kg		
Vx (nerve gas)	2 x 10 <sup>-2</sup> mg/kg		
tetrodotoxin (poison from puffer fish)	334 x 10 <sup>-6</sup> g/kg		
diazinon (ant killer dust)	0.076 g/kg		
amphetamine sulfate	32 mg/kg		
Ephedrine	0.600 g/kg		
gamma hydroxybutyrate (date rape drug)	2.0 g/kg		
Cocaine	96 mg/Kg		