

Selected Definitions

Chemical Hygiene Plan (CHP): must be a written document which establishes procedures and policies to protect laboratory personnel and other support staff from the potential adverse health effects associated with exposure to hazardous chemicals.

Chemical Hygiene Officer (CHO): a qualified individual who provides technical guidance in developing and implementing a chemical hygiene plan. At Dartmouth College the CHO is a member of EHS, reporting to the Director. Individual departments or faculty groups should also designate a CHO for their own specific laboratories.

Designated Area: a pre-determined and labeled area in which potentially hazardous chemicals are used and stored. For simplicity, any laboratory at Dartmouth that uses or stores potentially hazardous chemicals is considered a designated area and must be labeled with an EHS provided door sign.

Laboratory Personnel: any person working in a Dartmouth College teaching or research laboratory who handles or uses potentially hazardous chemicals. At Dartmouth, visiting scientists, guest researchers, special volunteers, support staff, students and other similar personnel are included in the scope of the Chemical Hygiene Plan.

Laboratory/Laboratory Scale/Laboratory Use: a workplace in which relatively small quantities of hazardous chemicals (usually several) are used in a non-production basis and which the tasks performed are generally managed by one person.

Basic Chemical Hazards and Toxicology Terminology

Chemical hazards can be broadly broken into four categories defined as follows:

1) Flammable and Combustible Liquids

Liquids with a flash point at or below 140°F are considered flammable, those with a flash point below 200°F are combustible (see table below). The local fire departments set and enforce flammable storage limits. Always store flammable liquids in rated cabinets when not in use and never store them on the floor or near heat or ignition. Extremely flammable liquids are those that flash below 73° F, these have stricter limits. Contact EHS for assistance in determining your flammable liquid storage limits and options to ensure safety.

Flashpoint	<73°F	73 - 140° F	140 - 200° F
Description	Extremely Flammable	Flammable Liquids	Combustible Liquids
Storage limits with rated cabinet	1 Gal/4 Liters	20 Gal/80 Liters	40 Gal/160 Liters

Policy	Chemical Hygiene Plan	Page:	5
Written by:	Michael D. Cimis	Revision date:	11/17/15

2) Corrosives

This includes solids and liquids at the pH extremes and those that can damage intact skin or mucous membranes on contact. Contact with corrosives must be eliminated by minimizing volumes/use and continuous use of protective equipment (gloves and chemical splash goggles). The federal hazardous waste laws go further to define corrosive wastes as any liquid with a pH <2 (acid) or >12.5 (base). These wastes must be collected for disposal by EHS and cannot be neutralized without a permit from the state of New Hampshire.

3) Reactives

Highly unstable compounds or chemicals that react with air (i.e. white phosphorous), water (i.e. sodium metal), heat (azobisisobutyronitrile), friction/shock (picric acid) to explode, decompose violently, ignite/burn, give off toxic gasses (i.e. sodium cyanide or sulfide) or polymerize/self heat (monomers). Additional considerations must be given for compounds that if combined with other compounds in a procedure, will explode or become uncontrollable. In general these are materials that may undergo chemical or physical changes during routine use to generate by-products that may overcome standard control measures or penetrate available personal protective equipment to cause severe acute or lethal injuries.

4) Toxic Materials

Toxic materials can harm humans or the environment and can be measured in a variety of ways. Toxicity is broken into acute (single or one time exposures with immediate effects) and chronic hazards (lower, long term exposures and/or delayed effects). In reality many toxic materials can produce both acute and chronic health risks with effects that are duration and dose dependent. More importantly, the toxic effects of many research chemicals have not yet been thoroughly identified. With that said the following terms are important in evaluating toxicity:

Extremely Toxic Chemicals: generally substances with lethal dose values of 5mg/kg or lower are considered extremely or super toxic. This is equivalent to as little as 7 drops or even a taste of the pure substance causing death in a 150-lb. person. Lethal dose information can be found on MSDS/SDS sheets and from online and printed resources, always use the lowest published LD or LD₅₀ data irrespective of the route of entry or organism tested.

Particularly Hazardous Substances: these include "select carcinogens", reproductive toxins and substances that have a high degree of acute toxicity. A substance is considered to be "Particularly Hazardous" if it has an LD₅₀ ≤50 mg/kg (approximately one teaspoon for a 150 lb. person) or carries a "skin" designation.

Policy	Chemical Hygiene Plan	Page:	6
Written by:	Michael D. Cimis	Revision date:	11/17/15

Permissible Exposure Limit (PELs): OSHA’s legally enforceable exposure limit for a hazardous chemical (also see TLV’s or threshold limit values – both can be found on MSDS/SDS sheets).

Potentially Hazardous Chemical: a substance which is recognized to have a measurable potential for adverse (acute or chronic) health effects in humans. The Federal Hazard Communication Standard provides additional guidance in determining the extent of the hazard presented by a chemical.

Reproductive Toxins/Teratogens: chemicals that affect an individual’s reproductive ability including chromosomal damage (mutations) and/or have an adverse effect on an embryo/fetus (teratogenesis).

"Select Carcinogen": a substance regulated by OSHA as such, as designated by the National Toxicity Program (NTP) or the International Agency for Research on Cancer (IARC) as having a moderate to high potential for causing cancer in humans or in animal models. The most current “Report on Carcinogens” is available from the National Toxicology Program (<http://ntp-server.niehs.nih.gov/>).

“Skin” Designation: The American Conference of Governmental Industrial Hygienists (ACGIH) designation for chemicals with potentially significant contributions to exposure via skin contact (including eyes and mucous membranes).

Threshold Limit Values (TLVs): occupational exposure limits established by the American Conference of Governmental Industrial Hygienists (ACGIH). At Dartmouth we rely on TLV’s, which generally reflect current exposure research for determining occupational exposures.

Acute Toxicity Table:

Items in red denote particularly hazardous substances where additional care is required.

Toxicity Classes per. Gosselin, Smith and Hodge		
Probable Oral Lethal Dose (Human)		
Toxicity Rating	Dose	For 70-kg Person (150 lbs)
6 Super Toxic	< 5 mg/kg	1 grain (a taste - less than 7 drops)
5 Extremely Toxic	5-50 mg/kg	4 ml (between 7 drops and 1 tsp)
4 Very Toxic	50-500 mg/kg	30 ml (between 1 tsp and 1 fl ounce)
3 Moderately Toxic	0.5-5 g/kg	30-600 ml (between 1 fl oz and 1 pint)
2 Slightly Toxic	5-15 g/kg	600-1200 ml (between 1 pint -1 quart)
1 Practically Non-Toxic	Above 15 g/kg	More than 1200 ml (more than 1 quart)