

Hazardous Waste Management Plan

**CARLETON COLLEGE
CHEMISTRY DEPARTMENT**
(revised December 2012)

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I. PURPOSE

Carleton College is committed to safe and responsible management of hazardous waste, not only because failure to do so can result in civil and criminal penalties, but because the college endeavors to be a good citizen with respect to the local and global environment. The purpose of this plan is to provide information and guidance to the college community with regard to hazardous waste.

Since excess chemicals usually become hazardous waste, the best way to reduce this problem is to only purchase what is needed. It is also a prudent idea to replace lab exercises that produce hazardous waste with ones that teach the same principles but produce less hazardous waste.

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II. SCOPE AND RESPONSIBILITY

Waste is used to define any material which is unwanted or unusable. **Hazardous waste** is defined below.

It is the duty of all who generate hazardous waste to ensure that all hazardous waste is handled in a manner that is safe, environmentally friendly and complies with all local, state and federal regulations. This is meant to include wastes that are not, by statute, hazardous but which, if carelessly discarded, could possibly cause harm to the environment.

To avoid the possibility that a hazardous waste may be erroneously considered harmless, this definition is given as a guideline:

A WASTE IS HAZARDOUS IF IT HAS THE PROPERTY OF IGNITABILITY, CORROSIVITY, IS TOXIC OR REACTIVE OR IS INFECTIOUS.

Keep in mind this is an attempt to simplify definitions and that these are brief definitions and do not cover all possible cases.

Ignitability refers to a liquid whose flash point is below 140F, a solid that can ignite by friction, absorption of water or that burns vigorously when ignited, or is an oxidizer.

A substance is corrosive if its pH is 2 or less or 12.5 or greater. Waste considered hazardous only because of these criteria may be neutralized by qualified personnel and sewered.

Toxic materials are those containing certain heavy metals or certain organic constituents. These abound in most laboratories.

A reactive substance is one that is unstable or explosive, will react violently with air or water or will release toxic gas when heated, burned or when mixed with another material.

The EPA has listed certain chemicals which have previously been designated hazardous. Of interest to us would be those whose prefix is either K, U, or P. For these lists, refer to appendix 2 and CFR 261.

Infectious waste includes organisms, or substances derived from organisms, that pose a threat to (primarily) human health. This can include medical waste, samples of microorganisms, including recombinant organisms, viruses or toxins (from biological sources) that can impact human health. It can also include substances harmful to animals. Certain viruses or infectious agents are tightly controlled. Care needs to be taken to ensure that these harmful agents are not released into nature.

Demolition waste, including asbestos is not included in this plan. Such materials will be handled and discarded by trained personnel as determined by the college shop.

The shop will be responsible for removing refrigerant from unwanted cooling equipment and preventing its release into the environment.

Mercury containing thermostats will be the responsibility of the hazardous waste coordinator.

Housekeeping will be responsible for disposal of expended fluorescent lights.

Radioactive waste will be the responsibility of the radiation safety officer.

Unwanted electronic equipment will be the responsibility of ITS. ITS will ensure that electronic waste does not wind up in landfills but, as much as possible, gets recycled.

Other departments that produce waste that may be hazardous should contact the hazardous waste coordinator to determine the best procedure to deal with it.

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III. WASTE ACCUMULATION

Every area that produces hazardous waste must have a satellite accumulation site. A satellite accumulation area is a safe location that has a sign indicating that it is an area for accumulating hazardous waste. Except in certain cases the area must be used only as a collection place for hazardous materials until they are removed to the main hazardous waste storage area. It must be at or near the point where the hazardous waste is generated and be easily controlled and easily visually inspected. This area should have good ventilation and, where possible, secondary containment in case the primary container leaks.

Each faculty member who has a research lab is responsible for the satellite accumulation area for his/her lab. In addition, someone from that department should be appointed to oversee the accumulation area and provide assistance in determining proper operation of the satellite accumulation site. This person need not be an expert but will act as a liaison to the hazardous waste coordinator.

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A. Chemical waste

1. Containers and labeling

Containers must be compatible with the substances they are to contain. Glass is preferred but plastic bottles as well as steel cans are acceptable in some cases. No waste container may have a capacity of more than five gallons without specific permission from the hazardous waste coordinator. Never use beakers, flasks, pop bottles, etc. Containers for accumulating hazardous waste must be labeled with the words "Hazardous Waste" and there must be available a list of the contents of the container (and the approximate concentration or amount of the hazardous substance), either on the label or on a sign adjacent to the container. Complete names must be used on this list, not chemical formulae or initials. This list must accompany the waste when it is taken to the hazardous waste storage area. All other labels on the containers must be removed or obliterated. If the identity of a waste is not known, the department producing that waste will bear the cost, if any, of having the waste analyzed.

Except when waste is being added, the containers should be closed. When a container is full, the 'fill' date commences and the container must be removed to the main accumulation area in Olin G23 and shipped off site within 270 days. Containers which contained acute hazardous waste must be removed the satellite accumulation areas when the amount reaches 1 kg and shipped off site within 90 days.

Where lab wastes are mixtures of different chemicals the containers should be in a fume hood or ventilated cabinet. When wastes are mixtures of chemicals it is not advisable to tightly cap the containers, since there could be pressure build-up. Care must be taken to make sure that wastes that get mixed are not incompatible (see appendix 1). In any case, do not completely fill the waste container. Leave room for expansion. It is never wise to mix non-hazardous waste with hazardous waste. This only results in a larger volume of hazardous waste.

Empty containers (including centrifuge tubes) that previously held hazardous substances are legally not hazardous waste once the contents have been removed by ordinary means. Emptying and bulking the contents of the centrifuge tubes is the responsibility of the lab that generated them. They should not be included with the actual hazardous waste. Although empty containers are not hazardous waste, they should be cleaned as thoroughly as possible before depositing in the "Co-mingle" recycling bins. Containers may be reused for waste as long as there are no incompatibility issues. If a container previously held a "P" class waste (see appendix 2) it is not legally considered empty until it has been rinsed three times with solvent capable of removing the contents. This rinse solvent is then considered hazardous waste.

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2. Waste removal

Once a container is full, contact the hazardous waste coordinator and arrange to deliver it to the main hazardous waste storage area. As a small quantity generator, Carleton College may accumulate up to 220 pounds of hazardous waste per month but no more than 2.2 pounds of acutely hazardous waste for an indefinite period. Once either limit is reached it must be removed within ninety days. This main storage area will be inspected every week and the conditions will be reported on a form kept in the hazardous waste storage area.

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B. Biological waste

Microorganisms from biological research and other lab exercises will be collected in satellite collection areas. Cultures in liquid will be destroyed using bleach and discarded down a sink drain. Cultures in gels will be collected in autoclavable bags. When these bags are full they will be autoclaved. After autoclaving the gels may be discarded in normal trash. Implements used in these processes will be autoclaved before reuse or disposal.

Dead animals and animal parts will be collected in labeled sealable bags and frozen until being removed by a company that is licensed to handle medical waste.

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C. Other waste

Unwanted paint and paint related materials will be sent to a recycling center when possible. Otherwise it must be considered by the shop as hazardous waste.

Parts cleaning solvent will be handled by a company licensed to recycle or dispose of it.

Used motor oil will be taken to a facility that collects used oil.

Photographic process waste will either be treated or sent out for disposal by a reputable waste removal company. After removal of silver the liquid waste may be sewerred.

If a department has a current contract for removal of certain wastes, they may be removed from the satellite accumulation area without being taken to the main storage location.

Non-hazardous waste may be discarded in a sink drain. However, this practice should only be done with small quantities of materials. Final determination of whether a material is hazardous waste will be made by the hazardous waste coordinator.

While not strictly hazardous waste, broken glass and sharp implements must be discarded in appropriate containers that have warning labels and not placed in general trash where they would pose a danger to housekeeping personnel.

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IV. TRAINING

Each department that produces hazardous waste must have at least one person attend hazardous waste plan training conducted by the hazardous waste coordinator. Attendees will then be responsible for their departments' compliance with the Hazardous Waste Management Plan. In addition, the Associate Dean of the College will attend. The hazardous waste coordinator will determine when it is necessary to have follow-up training.

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V. EMERGENCIES

In the event of any emergency – fire, spill, etc. - notification should be sent to campus security at X4444. Security will then contact the appropriate civil agencies, if necessary, and inform the EH&S director David Leake and Chemical Hygiene Officer Brian Mars.

POSTSCRIPT

Everyone should also consider that the manufacturing process using raw materials often generates more waste, than does manufacturing using recycled materials. Even though the waste is produced at a remote site everyone should conserve and recycle as much as possible.

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APPENDIX 1

Chemical Compatibility Chart

(From Boston Univ. Medical Center)

Group 1-A

Group 1-B

Alkaline Liquids

Acid Liquids

Potential consequences: Heat generation, violent reaction

Group 2-A

Group 2-B

Aluminum
Beryllium
Calcium
Magnesium
Sodium
Other reactive metals and metal hydrides

Any waste in Group 1-A or 1-B

Potential consequences: Fire or explosion generation of flammable hydrogen gas

Group 3-A

Alcohols
Water

Group 3-B

Any concentrated waste in Groups 1-A or 1-B
Calcium
Lithium
Metal hydrides
Potassium
SO₂Cl₂, SOCl₂,
PCl₃,
CH₃SiCl₃
Other water-reactive wastes

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic

Group 4-A

Alcohols
Aldehydes
Halogenated hydrocarbons
Nitrated hydrocarbons
Unsaturated hydrocarbons
Other reactive organic compounds and solvents

Group 4-B

Concentrated Group 1-A or 1-B wastes
Group 2-A wastes

Potential consequences: Fire, explosion, or violent reaction.

Group 5-A

Spent cyanide and sulfide solutions

Group 5-B

Group 1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas

Group 6-A

Chlorates
Chlorine
Chlorites
Chromic acid
Hypochlorites
Nitrates
Nitric acid, fuming
Perchlorates
Permanganates
Peroxides

Group 6-B

Acetic acid and other organic acids
Concentrated mineral acids
Group 2-A wastes
Group 4-A wastes
Other flammable and combustible wastes

Potential consequences: Fire, explosion, or violent reaction.

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