


## Handling Hazardous Chemical Waste

### CTRNet Standard Operating Procedure Handling Hazardous Chemical Waste

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Approved By:	CTRNet Management Group (CMG)	01-May-2012
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## 1.0 PURPOSE

Processing and storage of Human Biological Material could involve the use of hazardous chemicals. Measures and precautions should be taken to ensure that personnel handle these chemicals with care to avoid contamination and injury. Disposal of used chemicals should be done safely and with adherence to local regulations.

## 2.0 SCOPE

The Occupational Health and Safety Procedures at the institution hosting the biobank will have procedures that should form the basis of safety precautions for chemical handling and disposal. However, this procedure covers basic steps that should be followed to ensure that personnel are adequately informed to avoid contamination, damage to the environment and personal injury. These procedures in this standard operating procedure (SOP) apply to all chemical waste at the biobank.

## 3.0 REFERENCE TO OTHER CTRNET SOPS OR POLICIES

*Note: When adopting this SOP for local use please reference CTRNet.*

**3.1 CTRNet Policy:** POL 7 Material and Information Handling

**3.2 CTRNet Policy:** POL 5 Records and Documentation

## 4.0 ROLES AND RESPONSIBILITIES

The SOP applies to all personnel from CTRNet member biobanks that work at the biobank site and are responsible for handling, storing and disposing of hazardous chemicals.

Tumour Biobank Personnel	Responsibility/Role
Laboratory Technician/Technologist	Handle and dispose of Hazardous Chemicals in biobank and be familiar with chemical safety procedures
Pathologist/Pathologist assistant	Handle and dispose of Hazardous Chemicals in biobank
Designated safety committee member	To assist with the monitoring of the use of chemical and disposal of waste.

## 5.0 MATERIALS, EQUIPMENT AND FORMS

The materials, equipment and forms listed in the following list are recommendations only and may be substituted by alternative/equivalent products more suitable for the site-specific task or procedure.

Materials and Equipment	Materials and Equipment (Site Specific)
Hazardous Chemicals and waste	
Disposal Receptacles	
Identifying Labels	
Appropriate Forms and Manifests	

## 6.0 DEFINITIONS

See the CTRNet Program Glossary: <http://www.ctrnet.ca/glossary>

## 7.0 PROCEDURES

CTRNet biobanks must follow Occupational Health and Safety Procedures at the institution at which they work. The procedure below is a guide for minimum precautions that should be taken to safeguard personnel from potential harm they may encounter when using hazardous chemical and disposing of chemical waste.

### 7.1 Restrictions

- 7.1.1 Chemical wastes should not be mixed with biohazardous or radioactive wastes.
- 7.1.2 Hazardous liquids must not be flushed down drains as a method for disposal. This practice is illegal and may lead to dangerous reactions and damage to the draining system as well as create a potential hazard to trades personnel working on the system. Solid or liquid waste chemicals must not be mixed with general garbage.
- 7.1.3 In order to avoid explosions, fires or spills, incompatible combinations of chemicals must not be mixed in a single container.
- 7.1.4 If the personnel overseeing the collection of waste have any doubts about proper labelling or packaging techniques, waste should not be removed until it is properly prepared.
- 7.1.5 Materials requiring special handling include organic peroxides, PCBs [polychlorinated biphenyls] and explosives.
- 7.1.6 Most organic wastes are flammable and toxic and require segregation from other waste products. Specifically, halogenated waste products are toxic and may be very reactive when combined with other bi-products or chemicals. Special care when handling is required.
- 7.1.7 Local, municipal and city environmental legislation dictates how to dispose of organic solvent and solid waste. In accordance with local Bylaws and Regulations, follow specific procedures for the safe disposal of hazardous waste materials.

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### 7.2 Containers

- 7.2.1 All containers used for storing chemical waste must be sealed and undamaged. Any container not properly sealed will not be removed. (Corks or rubber stoppers are not recommended).
- 7.2.2 Liquid waste containers should only be filled to 70-80% capacity to allow for vapour expansion and to minimize the potential for spills occurring from overfilled containers.
- 7.2.3 Container material must be compatible with the stored chemical waste [e.g. hydrofluoric acid cannot be stored in glass containers].
- 7.2.4 Containers should be appropriate for the type of waste stored. e.g. special spout caps for organic wastes.

### 7.3 Labels

- 7.3.1 To prevent the mixing of waste, which could create an incompatible reaction, all materials must be clearly identified by means of standard Chemical Waste labels.
- 7.3.2 The following information must be provided: Specific generic names of the components in the container along with approximate percentages of each component present must be listed. No abbreviations or trademark names are to be used. Vague categories [e.g. solvent waste] are not acceptable.

### 7.4 Storage

- 7.4.1 Waste chemicals should, if possible, be stored in a central waste-holding facility of the building.
- 7.4.2 Should such a facility be non-existent, the chemical waste should be stored in the temporary storage space until final disposal.
- 7.4.3 All safety precautions required for handling and storage of chemicals will also be observed with generated wastes.
- 7.4.4 It is recommended that waste be segregated according to compatibility groups (See Appendix A).

### 7.5 Disposal

- 7.5.1 Do not treat waste prior to disposal.
- 7.5.2 Periodically, waste should be picked up by a licensed waste disposal company for recycling or safe disposal.
- 7.5.3 If not covered under an institutional permit, a special environmental permit may have to be obtained from the provincial or local government to generate and dispose of chemical waste.

## 8.0 APPLICABLE REFERENCES, REGULATIONS AND GUIDELINES

- 8.1 Tri-Council Policy Statement 2; Ethical Conduct for Research Involving Humans; Medical Research Council of Canada; Natural Sciences and Engineering Council of Canada; Social Sciences and Humanities Research Council of Canada, December 2010.  
<http://www.pre.ethics.gc.ca/eng/policy-politique/initiatives/tcps2-eptc2/Default/>
- 8.2 Best Practices for Repositories I. Collection, Storage and Retrieval of Human Biological Materials for Research. International Society for Biological and Environmental Repositories (ISBER).  
[http://www.isber.org/Search/search.asp?zoom\\_query=best+practices+for+repositories](http://www.isber.org/Search/search.asp?zoom_query=best+practices+for+repositories)

8.3 Chemical Waste Disposal Procedures, University of Toronto,  
<http://www.ehs.utoronto.ca/services/environmental/chmdisp.htm>

## 9.0 APPENDICES

9.1 Appendix A – Storage Considerations of Chemical Wastes/Chemical Incompatibilities

## 10.0 REVISION HISTORY

SOP Number	Date revised	Author	Summary of Revisions
SR 001.001	2005	JdSH	1 <sup>st</sup> Release.
9.1.004 e1.0	06-2008	JdSh	Revised to make minor formatting changes and reviewed to reflect current practice at the member biobanks
6.1.002	07/2011	GS	Minor formatting change on page 1
6.1.002 e1.1	May 2012	CMG	<ul style="list-style-type: none"> <li>• Grammatical and formatting throughout</li> <li>• Definitions removed</li> <li>• Revision History moved to bottom</li> <li>• Reference links updates</li> <li>• Updated SOP references</li> <li>• Section 1.0 and 7.5.3: Minor revisions</li> <li>• Section 7.4.2 – Revised “Generator’s laboratory” to “temporary storage space”.</li> <li>• Deleted 7.1.4 : “The waste generator bears the primary responsibility for proper packaging and labelling.”</li> </ul>

## SEGREGATION OF INCOMPATIBLE CHEMICAL WASTE

Waste chemicals should be stored according to the following groupings based on chemical reactivities. Materials requiring special handling include organic peroxides, PCBs [polychlorinated biphenyls] and explosives.

### Group A - Inorganic Acids and Acid Salts

- All inorganic acids (eg. sulphuric, hydrochloric)
- All compounds which do not liberate a gas when acidified (eg. ferric chloride, sodium sulphate).
- Inorganic solids, which are inert (eg. silica).

Note: Perchloric acid, although an inorganic acid, is a powerful oxidizing agent and should be included in Group E.

### Group B - Nitrogenated Bases, Caustics and Acid-Reactive Compounds

- Organic and inorganic bases (eg. pyridine, amines, sodium hydroxide).
- Elements and inorganic salts that may react with acids to liberate gaseous products (eg. potassium cyanide, ferric sulphide).

### Group C - Neutral Organic Solids

- All solid organic compounds, which are neutral - no acids or bases (eg. carbon black, styrene).

### Group D - Flammable Liquids, Halogenated Solvents and Organic Acids

- All organic liquids excluding organic bases (eg. toluene, chloroform).
- Organic acids (eg. formic acid, acetic acid).

### Group E - Oxidizers

- Any inorganic compound that assists fire (eg. hydrogen peroxide, lead nitrate).

### Group F - Pesticides

- Any compounds used to destroy or inhibit plant or animal pest such as pesticides, fungicides, insecticides etc.

### Group Specials - Water and Air Reactive Materials

- All chemicals that react to air and/or water, including fuming substances (eg. sodium - a water reactive, phosphorus - an air reactive, lithium aluminum hydride - both air and water reactive, thionyl chloride and phosphorus tribromide - fuming substances).

## CHEMICAL INCOMPATIBILITIES

When preparing chemical waste for disposal, it is the generator's responsibility to ensure that incompatible chemicals are not stored in the same container. A few general examples are:

- Oxidizers [Group E] should never be mixed with reducing agents [eg water-reactive chemicals such as sodium] or organic materials [Groups B, C and D]

**GROUP E MUST BE KEPT AWAY FROM GROUPS B C & D**

- Acid-reactive compounds [Group B] which liberate gaseous products when acidifies should not be mixed with any acid [Group A and E].

**GROUP B MUST BE KEPT AWAY FROM GROUP A & E**

- Organic acids [Group D] should be segregated from inorganic acids [Group A]. Generally inorganic acids are oxidizing agents while some organic acids may be either reducing agents or combustible.

**GROUP D MUST BE KEPT AWAY FROM GROUP A & E**

Once the waste has been classified according to the chemical groups, it must be segregated to minimize the risk of mixing incompatible groups.