

# Highline Community College Lab Safety Manual

**This manual has moved and  
can be found at**

**[http://biologylab.highline.edu/pdf/lab\\_safety\\_manual.pdf](http://biologylab.highline.edu/pdf/lab_safety_manual.pdf)**

furfurylidene)-amino]-2-oxazolidinone	Oxazepam	Styrene oxide
Mustard gas		Sulfallate
	Panfuran S	Sulfur trioxide
Nafenopin	Pentachlorophenol	Sulphur trioxide N,N-dimethylformamide complex
1-Naphthylamine	Perylene	
2-Naphthylamine	Phenacetin	
3-Naphthylamine	Phenazopyridine hydrochloride	Talc containing asbestiform fibers
Nickel and certain nickel compounds	Phenesterin	Terrazole
Nickel carbonyl	Phenobarbital	Testosterone and its esters
Nickel subsulfide	Phenolphthalein	2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD)
Niridazole	Phenoxybenzamine	1,1,2,2-Tetrachloroethane
Nitrotriacetic acid	Phenoxybenzamine hydrochloride	Tetrachloroethylene (Perchloroethylene)
Nitrotriacetic acid, trisodium salt monohydrate	Phenyl glycidyl ether	p-a,a,a-Tetrachlorotoluene
5-Nitroacenaphthene	Phenylhydrazine and its salts	3,3',5,5'-tetramethylbenzidine
5-Nitro-o-anisidine	o-Phenylphenate, sodium	Tetranitromethane
o-Nitroanisole	2-phenylphenol	Thioacetamide
4-Nitrobiphenyl	Phenytol	4,4'-Thiodianiline
6-Nitrochrysene	PhiP(2-Amino-1-methyl-6-phenylimidazol[4,5-b]pyridine)	Thiourea
Nitrofen	Polybrominated biphenyls	Thorium dioxide
2-Nitrofluorene	Polychlorinated biphenyls	Tobacco, oral use of smokeless products
Nitrofurazone	Polychlorinated dibenzo-p-dioxins	Tobacco smoke
1-[(5-Nitrofurfurylidene)amino]-2-imidazolidinone	Polychlorinated dibenzofurans	Toluene diisocyanate
1-[(5-Nitrofurfurylidene)-N-[4-(5-Nitro-2-furyl)-2-thiazolyl]acetamide	Polycyclic aromatic hydrocarbons	p-toluenesulphonic acid
Nitrogen mustard (Mechlorethamine)	Polygeenan	ortho-Toluidine
Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride)	Ponceau MX	ortho-Toluidine hydrochloride
Nitrogen mustard N-oxide	Ponceau 3R	para-Toluidine
Nitrogen mustard N-oxide hydrochloride	Potassium bromate	Toxaphene
2-Nitropropane	Potassium dichromate	Treosulfan (Tresoluphan)
4-Nitropyrene	Procarbazine	Trichlormethine (Trimustine hydrochloride)
N-Nitrosodi-n-butylamine	Procarbazine hydrochloride	2,4,6-Trichlorophenol
N-Nitrosodiethanolamine	Procymidone	1,2,3-Trichloropropane
N-Nitrosodiethylamine	Progesterone	Triphenyltin hydroxide
N-Nitrosodimethylamine	Progestins	Trichloroethylene
p-Nitrosodiphenylamine	1,3-Propane sultone	Tris(aziridinyl)-para-benzoquinone (Triaziquone)
N-Nitrosodiphenylamine	Progargite	Tris(1-aziridinyl)phosphine sulfide (Thiotepa)
N-Nitrosodi-n-propylamine	beta-Propiolactone	Tris(2-chloroethyl) phosphate
N-Nitroso-N-ethylurea	Propylene oxide	Tris(2,3-dibromopropyl)phosphate
3-(N-Nitrosomethylamino)propionitrile	Propylthiouracil	TRIZMA base
4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	Pyridinium chlorochromate	Trp-P-1 (Tryptophan-P-1) (3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole)
N-Nitrosomethylethylamine		Trp-P-2 (Tryptophan-P-2) (3-Amino-1-methyl-5H-pyrido[4,3-b]indole)
N-Nitroso-N-methylurea		Trypan blue
N-Nitroso-N-methylurethane		
N-Nitrosomethylvinylamine		
N-Nitrosomorpholine		
N-Nitrosornicotine		
N-Nitrosopiperidine		
N-Nitrosopyrrolidine		
N-Nitrososarcosine		
Norethisterone (Norethindrone)		
Ochratoxin A		
Oestrogen, nonstereoidal		
Oestrogen, steroidal		
Oil Orange SS		
4,4'-Oxydianiline		
Oxadiazon		
Oxymetholone		
	Radionuclides	
	Radon	
	Reserpine	
	Residual (heavy) fuel oils	
	Rhodamine 101	
	Saccharin	
	Saccharin, sodium	
	Safrole	
	Selenium sulfide	
	Shale-oils	
	Silica, crystalline (airborne particles of respirable size)	
	Sodium chromate tetrahydrate	
	Sodium dichromate	
	Sodium hexafluoroarsenate(V)	
	Sodium ortho-phenylphenate	
	Sterigmatocystin	
	Streptozotocin	
	Strontium chromate	
	Styrene	
		Uracil mustard
		Urethane (Ethyl carbamate)
		Vinyl bromide
		Vinyl chloride
		4-Vinyl-1-cyclohexene diepoxide (Vinyl cyclohexene dioxide)
		n-vinyl pyrrolidone
		Vinyl pivalate
		Vinyl trichloride (1,1,2-Trichloroethane)
		2,6-Xylidine (2,6-Dimethylaniline)
		Zineb

This list is by no means complete and is continually being tested and updated.

# APPENDIX 5

## EXAMPLES OF INCOMPATIBLE CHEMICALS IN STORAGE FACILITIES

In general, chemicals with the following functional groups are prone to instability:

O-O peroxide	-N= imino	-ONO <sub>2</sub> nitrate ester
-NO <sub>2</sub> nitro	-N <sub>3</sub> azide	-NHNO <sub>2</sub> nitramine
-N=N- Azo	-N=O nitroso	-N-NO <sub>2</sub> nitroamine

CHEMICAL	CHEMICALS INCOMPATIBLE TO STORE WITH
Acetic acid	Nitric acid, peroxides, permanganates, ethylene, glycol, hydroxyl compounds, perchloric acid, or chromic acid
Acetone	Concentrated sulfuric and nitric acid
Acetylene	Bromine, chlorine, fluorine, copper, silver, mercury and their compounds
Alkali metals	Carbon tetrachloride, carbon dioxide, water, halogens
Aluminum or magnesium metal (powdered)	Carbon tetrachloride, or other chlorinated hydrocarbons, halogens, carbon dioxide
Ammonia, liquid	Mercury, hydrogen fluoride, calcium hypochlorite, chlorine, bromine
Ammonium nitrate	Acids, flammable liquids, metal powders, sulfur, chlorates, any finely divided organic or combustible substance.
Aniline	Nitric acid and hydrogen peroxide
Bromine, chlorine	Ammonia, petroleum gases, hydrogen, sodium, benzene, finely divided metals
Carbon, activated	Calcium hypochlorite and all oxidizing agents

Chlorates	Ammonium salts, acids, metal powders, sulfur, and finely divided organic or combustible substance
Copper	Acetylene and hydrogen peroxide
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, sodium peroxide, nitric acid, and the halogens
Hydrocarbons (hexane, gasoline)	Fluorine, chlorine, bromine, sodium peroxide and chromic acid
Hydrofluoric acid	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Most metals and their salts, alcohols, organic substances, any flammable substance
Hydrogen sulfide	Oxidizing gases, fuming nitric acid
Iodine	Acetylene, ammonia, hydrogen
Mercury	Acetylene, ammonia
Nitric acid (concentrated)	Acetic acid, hydrogen sulfide, flammable liquids and gases, aniline
Oxygen	Oils, grease, hydrogen, flammable liquids, solids and gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohols, paper, wood, and other organic material
Phosphorus pentoxide	Water
Potassium chlorate	Sulfuric and other acids, any organic material
Potassium permanganate	Sulfuric acid, glycerine, ethylene glycol
Silver	Acetylene, ammonia compounds, oxalic acid, tartaric acid
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, carbon disulfide, glycerine, ethylene glycol, ethyl acetate
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate, similar compounds of other metals

# APPENDIX 6

## MAXIMUM ALLOWABLE CONTAINER CAPACITY FOR FLAMMABLE LIQUIDS

	<u>Flammable Liquids</u>			<u>Combustible Liquids</u>
<b>CLASS:</b>	<b>IA</b>	<b>IB</b>	<b>IC</b>	<b>II and IIIA</b>
Flash Point Range (°C):	fp <23	fp <23	fp 23-38	fp >38
Boiling Point Range (°C):	bp <38	bp >38	bp --	bp --

CONTAINER TYPE

MAXIMUM ALLOWABLE CAPACITY

CLASS:	IA	IB	IC	II & IIIA
Glass	0.5 L	1 L	4 L	4 L
Metal (other than DOT drum) or Approved Plastic	4 L	20 L	20 L	20 L
Safety cans	7.5 L	20 L	20 L	20
Metal Drums (DOT)	Not allowed	225 L	225 L	225 L

# APPENDIX

## 7

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### COMMON GLASSWARE



Beaker:  
Material type: Hard glass  
Common sizes: 50-2000ml  
Common uses: Heating, mixing, dissolving, pouring.



Erlenmeyer:  
Material type: Hard glass  
Common sizes: 50-2000ml  
Common uses: Mixing; dissolving.



Filter flask:  
Material type: Hard glass  
Common sizes: 125-2000ml  
Common uses: Vacuum filtration; vacuum trap.



Round Bottom Boiling flask:  
Material type: Hard glass  
Common sizes: 50-5000ml; 1-, 2-, or 3-hole type  
Common uses: Refluxing, distillations.



Graduated cylinder:  
Material type: Hard glass  
Common sizes: 10-1000ml  
Common uses: Measuring with moderate accuracy.



Volumetric flask: Material type:  
Hard glass Common sizes: 1.00 -  
2000.00ml  
Common uses: Measuring with great accuracy;  
predetermined volume.



Volumetric pipette: Material  
type: Hard glass Common  
sizes: 1.00 - 50.00ml  
Common uses: Accurate measurement of single volume.



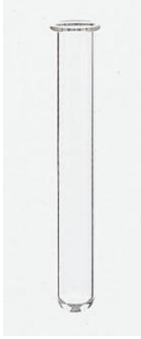
Serological pipette:  
Material type: Hard glass, soft glass, or plastic  
Common sizes: 0.1 -10ml  
Common uses: Transferring solutions; moderately accurate measurement.



Pasteur pipits :(  
disposable) Material type:  
Hard glass

Common sizes: 5.25", 9"

Common uses: Non-accurate transfer of small volumes.



Test tube:

Material type: Hard glass

Common sizes: 10x100-15x175mm (width x length)

Common uses: Mixing small amounts; temporary storage of small volumes.



Centrifuge tubes:

Material type: Hard glass; plastic

Common sizes: 3-500ml; thicker walled than test tubes

Common uses: Separating components of sample with centrifuge.



Culture tube:

Material type: Soft glass, hard glass, plastic

Common sizes: (6x50)-(20x200)mm (width x length)

Common uses: Growing cultures; general purpose small containers.



Petri dish:

Material type: Hard glass; plastic

Common sizes: 60x15-150x15mm (diameter x height)

Common uses: Growing cultures.



Cuvettes:

Material type: Glass, quartz, UV-transparent plastic

Common sizes: 1-10mm path length

Common uses: Spectrophotometric analysis.



**Glass tubing:**

Material type: Hard glass; soft glass

Common sizes: 0.5-35mm I.D.; 4-37mm O.D.

(I.D.=Inside Diameter, O.D.=Outside Diameter)

Common uses: Constructing special-use apparatus.



**Glass rod:**

Material type: Soft glass

Common sizes: 6" to 12"

Common uses: Stirring, transferring.

# APPENDIX 8

## CONTAINER CHEMICAL RESISTANCE CHART

Taken from: [http://www.vp-scientific.com/Chemical\\_Resistance\\_Chart.htm](http://www.vp-scientific.com/Chemical_Resistance_Chart.htm)

<b>PTFE</b> = Polytetrafluoroethylene (Teflon®)						
<b>SS</b> = Stainless Steel			<b>E</b> = Excellent			
<b>LDPE</b> = Conventional Polyethylene			<b>G</b> = Good			
<b>HDPE</b> = Rigid Polyethylene			<b>F</b> = Fair			
<b>PP</b> = Polypropylene			<b>N</b> = Not Recommended			
<b>PVC</b> = Polyvinylchloride						
<b>Chemical</b>	<b>PTFE</b>	<b>SS</b>	<b>LDPE</b>	<b>HDPE</b>	<b>PP</b>	<b>PVC</b>
Acetaldehyde	E	E	G	G	G	G
Acetamide	E	E	E	E	E	N
Acetic Acid, 5%	E	E	E	E	E	E
Acetic Acid, 50%	E	E	E	E	E	E
Acetone	E	E	E	E	E	E
Aluminum Hydroxide	E	E	E	E	E	E
Ammonia	E	E	E	E	E	E
Ammonium Hydroxide	E	E	E	E	E	E
Ammonium Oxalate	E	E	E	E	E	E
n-Amyl Acetate	E	E	G	E	G	F
Amyl Chloride	E	--	N	F	N	N

Aniline	E	E	E	E	G	N
Benzaldehyde	E	--	E	E	E	N
Benzene	E	E	F	G	G	N
Benzoic Acid, Sat.	E	E	E	E	E	E
Benzyl Acetate	E	--	E	E	E	F
Boric Acid	E	F	E	E	E	E
Bromine	E	N	N	F	N	G
Bromobenzene	E	--	N	F	N	F
n-Butyl Acetate	E	F	G	E	G	N
sec-Butyl Alcohol	E	--	E	E	E	G
Butyric Acid	E	E	N	F	N	G
Calcium Hypochlorite	E	F	E	E	E	G
Carbazole	E	--	E	E	E	N
Carbon Disulfide	E	E	N	N	E	N
Carbon Tetrachloride	E	G	F	G	G	G
Chlorine	E	G	G	G	G	E
Chloroacetic Acid	E	F	E	E	E	F
Chloroform	E	E	F	G	G	N
Chromic Acid	E	G	E	E	E	E
Citric Acid	E	E	E	E	E	G
Cresol	E	E	N	F	E	N
Cyclohexane	E	E	G	E	G	G
Decalin	E	--	G	E	G	E
o-Dichlorobenzene	E	--	F	F	F	G
p-Dichlorobenzene	E	--	F	G	E	N

Diethyl Benzene	E	--	N	F	N	N
Diethyl Ether	E	--	N	F	N	F
Diethyl Ketone	E	--	G	G	G	N
Diethyl Malonate	E	--	E	E	E	G
Dimethyl Formamide	E	--	E	E	E	F
Ether	E	E	N	F	N	F
Ethyl Acetate	E	E	E	E	E	F
Ethyl Benzene	E	--	F	G	F	N
Ethyl Benzoate	E	--	F	G	G	N
Ethyl Butyrate	E	--	G	G	G	N
Ethyl Chloride, Liquid	E	E	F	G	F	N
Ethyl Cyanoacetate	E	--	E	E	E	NF
Ethyl Lactate	E	--	E	E	E	F
Ethylene Chloride	E	E	G	G	G	N
Ethylene Glycol	E	E	E	E	E	E
Ethylene Oxide	E	--	F	G	F	F
Fluorine	G	--	F	G	G	N
Formic Acid, 50%	E	F	E	E	E	G
Formic Acid, 90-100%	E	N	E	E	E	F
Fuel Oil	E	E	F	G	E	E
Gasoline	E	E	F	G	E	G
Glycerine	E	E	E	E	E	E
n-Heptane	E	E	F	G	E	F
Hexane	E	E	N	G	E	G
Hydrochloric Acid, 1-5%	E	N	E	E	E	E

Hydrochloric Acid, 35%	E	N	E	E	E	G
Hydrofluoric Acid, 4%	E	N	E	E	E	G
Hydrofluoric Acid, 48%	E	N	E	E	E	G
Hydrogen	E	--	E	E	E	E
Hydrogen Peroxide	E	F	E	E	E	E
Isopropyl Acetate	E	--	G	E	G	N
Isopropyl Benzene	E	--	F	G	F	N
Kerosene	E	E	F	G	G	E
Lactic Acid, 3%	E	G	E	E	E	G
Lactic Acid, 85%	E	F	E	E	E	G
Magnesium Salts	E	G	E	E	E	E
Methoxyethyl Oleate	E	--	E	E	E	N
Methyl Ethyl Ketone	E	E	E	E	E	N
Methyl Isobutyl Ketone	E	E	G	E	G	N
Methyl Propyl Ketone	E	--	G	E	G	N
Methylene Chloride	E	E	F	G	F	N
Nitric Acid, 50%	E	G	E	G	G	G
Nitric Acid, 70%	E	N	E	G	G	F
Nitrobenzene	E	E	F	G	F	N
n-Octane	E	--	E	E	E	F
Orange Oil	E	--	F	G	G	F
Perchloric Acid	E	--	G	G	G	G
Perchloroethylene	E	E	N	N	N	N
Phenol, Crystals	E	E	G	G	G	F
Phosphoric Acid, 1-5%	E	E	E	E	E	E

Phosphoric Acid, 85%	E	G	E	E	E	E
Potassium Hydroxide	E	G	E	E	E	E
Propane Gas	E	E	N	F	N	E
Propylene Glycol	E	E	E	E	E	F
Propylene Oxide	E	--	E	E	E	F
Resorcinol	E	--	E	E	E	F
Salicylaldehyde	E	--	E	E	E	F
Sulfuric Acid, 1-6%	E	F	E	E	E	E
Sulfuric Acid, 20%	E	N	E	E	E	E
Sulfuric Acid, 60%	E	N	E	E	E	E
Sulfuric Acid, 98%	E	N	E	E	E	N
Sulfur Dioxide, Liq.	E	E	N	F	N	F
Sulfur Salts	E	E	F	G	F	N
Tartaric Acid	E	G	E	E	E	E
Tetrahydrofuran	E	E	F	G	G	N
Thionyl Chloride	E	--	N	N	N	N
Toluene	E	E	F	G	G	F
Trichloroethane	E	E	N	F	N	N
Trichloroethylene	E	E	N	F	N	N
Turpentine	E	E	F	G	G	G
Vinylidene Chloride	E	--	N	F	N	N
Xylene	E	E	G	G	F	N
Zinc Salts/Stearate	E	G	E	E	E	E

# APPENDIX 9

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## Lab Rules & Contracts handouts

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This Appendix contains copies of handouts used for the Biology and Chemistry Departments. They are for reference only although they being implemented in their respective areas at the time this document was written. Please peruse the copies on the next few pages and consider using similar documentation in other areas of discipline

# Biology Laboratory Safety Rules and Recommendations

For all students, faculty and staff using the Life General Sciences Department (Biology Lab, Building #12)

## **No food or drink is allowed in any science building.**

Due to the particular activities we do in the Biology Lab, it is very important for your personal health that all food and beverages should be left either outside the lab or in your bags and backpacks. These items should not be placed under the table out of sight, because this will not stop possible contamination.

## **Children are not allowed in the building.**

The Biology Lab is not a safe place for children, either preschool or school age. Please refrain from bringing them in for any reason. We do make one exception, but with controls. There are a number of animals that call this lab their home. You may want to show these to the young ones in your life. Please see the Lab Supervisor beforehand to make arrangements for such a visit. At no time should a child be in the lab rooms!

## **Open toes shoes are not allowed in lab.**

Always be prepared to wear the appropriate footwear the days you have lab. Open toes shoes invite serious injury. We want to avoid an unnecessary problem to yourself or others.

## **All A&P paraphernalia will remain in the A&P lab (no exceptions).**

Anatomy & Physiology labs require the use of many microscope slides and microscopes, bones, and other models. There are several classes and more than enough students using this equipment on a regular basis, both due to lab time and open study time allowed in that particular classroom. At no time should any item leave this room. There are just too many students using too many items to allow this. Please do not ask – you will be told NO!

**All equipment will be returned to original position and/or location.**

When you use a piece of equipment, such as a microscope, beakers of solution, racks of test tubes, etc., it should be returned to where you first found it; and it should also be put back together if necessary. This is especially important in the A&P labs when you are using any of the many models. You may consider even placing it back in its proper location even when you did not find it there in the first place.

**All broken glassware or sharp metal pieces should be placed in “sharps” boxes.**

If perchance, you break a test tube or beaker, microscope slide or other glass item; or if you find a stray razor blade or straight pin left over from a dissection lab, please place these in the red Sharps box located either in the front of the room by the door or if you are in room 106, in the bucket located in the fume hood. If the glass has sharp pointed edges, please let the instructor know so either he/she or the lab technician can clean it up. We don't want you to get hurt. If you break a piece of glass in a sink, please DO NOT take it out. We will take care of it for you.

**Chemical wastes should never be placed in a sink drain unless instructed otherwise.**

Many of the lab experiments require the use of different solutions and reagents. Most of the time these solutions will remain in their respective beakers or flasks for use in other lab classes. Yet, there are times when you will make up your own mixtures and solutions. Please do not place anything down the drain unless authorized by your instructor. It is unlikely that doing so would cause any damage, but we do not want to jeopardize the delicate good bacteria of our local Utility Waste Water plant. The City of Des Moines would not be happy with us.

**Media with microorganisms (liquid or solid) should be placed in a Biohazard bag.\***

Some of the lab experiments we do in lab require the use of personal saliva, chewing gum, spitting into a cup or blowing through a straw. Any item that has a biological factor to it should be disposed of into a Biohazard bag, which will be provided. This in turn, will be sterilized before being placed in the trash.

**All glassware should be rinsed after use and test tubes placed upside down in racks provided.\***

There are several lab experiments that require the use of glassware. Please be considerate of others by rinsing out your own group's glassware and placing same into racks upside down and/or on top of paper towels to air dry. The technician's

responsibility is to set up and take down lab supplies and equipment. Please make clean up yours for the sake of students coming to lab after you.

**Slides and coverslips should be placed in a beaker of water and disinfectant (also provided).**

When you use microscopes, you will be making your own slides, called wet mounts. These should be placed into a beaker of soap and disinfectant that will be provided. At no time should a commercially prepared slide be placed in this beaker.

**Human blood is not to be extracted or used in Highline laboratories.**

We only use sterilized animal blood in Highline's Biology Lab. When we do, we treat it as if it is potentially pathogenic. This means that we require the use of goggles and gloves which will be provided.

**Mouth pipetting or drinking of solutions is strictly prohibited.**

We use a special tool called a pipette for transferring solutions from one container to another. Back when dirt was invented, we used to suck on these pipettes instead of using pumps for doing this. The pumps we attach to the pipettes are called pipettors (go figure). Please – never use a pipette like a straw!

**Know the locations and operation of all safety equipment.**

**This includes fire extinguishers, eye washes, body showers, first aid kits, and the nearest exit from the room. This will be discussed in each lab at the beginning of each quarter!**

**All book bags, books, personal items do not go on the lab tables at any time. All tables will be disinfected before class AND after class.**

\* These rules will be modified for Microbiology labs.

**HIGHLINE COMMUNITY COLLEGE LIFE OCEAN AND GENERAL  
SCIENCES DEPARTMENT**

**INFORMED CONSENT STATEMENT**

Class \_\_\_\_\_ Term/Yr \_\_\_\_\_ Instructor \_\_\_\_\_

As a student, I am aware that instruction in the Life, Ocean and General Sciences comprises lecture and/or lab activities, which may involve some exposure to potential risks. These include, but may not be limited to: contact with glassware, sharp instruments, chemicals, hot objects or liquids, flame, exposure to infectious agents, and dissection of preserved specimens.

In addition, it is my understanding that these activities involve important techniques, procedures, principles, concepts, and facts in support of my learning. I agree that these will benefit my educational experience as a student in the biological and health sciences.

I am aware that instruction and laboratory procedures will provide guidance and precautions to enhance safety. It is my understanding that all activities will be in accordance with applicable laws, regulations, and safety standards.

When instructions are provided I will be attentive to them, and respond accordingly. I will carefully follow all laboratory procedures, written or oral, and will exercise appropriate care and safety in the laboratory or classroom. In addition, I agree to be responsible for the appropriate use and care of all laboratory instruments and supplies provided to me.

As a student, I will inform the instructor immediately should any safety-related problem occur during any classroom or laboratory activity. I have the right to decline to participate in, or to discontinue participation in, any such activity if I have reason to believe such participation would likely result in personal harm. My grade will not be adversely affected should I decline to participate in such activity, provided I complete alternative assignments as determined by my instructor.

I understand that I may revoke this consent in writing at any time.

Signed \_\_\_\_\_ Witness \_\_\_\_\_

Printed Name \_\_\_\_\_ Printed Name \_\_\_\_\_

Date \_\_\_\_\_

**HIGHLINE COMMUNITY COLLEGE – CHEMISTRY DEPARTMENT**

**SAFETY AGREEMENT**

1. I understand that neither food nor beverages are permitted in the lab.
2. I understand that access to the lab prep room is reserved to Highline instructors and staff only.
3. I will obtain approved safety goggles and I will wear them at all times in the lab even when I am not handling chemicals.
4. I am familiar with the location and proper operation of the safety shower, the eyewash stations, the fire extinguisher, and the first aid box.
5. I will obey all instructions concerning the safe performance of experiments. I will use the hood when required, dispose of all chemicals and other materials as instructed, and promptly return all chemicals and reagents to their appropriate place when finished. I will not allow reagents or chemicals to become contaminated.
6. I will protect myself by wearing appropriate clothing in the lab. I realize that I must wear shoes in the lab (neither sandals nor open-toed shoes are permitted).
7. I will not attempt any unauthorized experiments nor will I work in the lab without proper supervision.
8. I will properly label all of my products that I place in the hood or in my equipment drawer. My label will include my Name, Date, and the name of the chemical.
9. I understand that it is my responsibility to make sure that all of my equipment is kept clean and organized in my equipment drawer and that anything missing at the end of the quarter is my responsibility to replace clean and dry.

**I UNDERSTAND THAT I WILL BE EJECTED FROM THE LAB AND MAY RECEIVE A FAILING GRADE FOR THE EXPERIMENT IF I FAIL TO ABIDE BY THE RULES.**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

Course: \_\_\_\_\_

Section: \_\_\_\_\_

Instructor: \_\_\_\_\_

# APPENDIX 10

Highline Community College  
Biology Lab  
Reconnoiter Treasure Hunt

Description	Location(s)
Emergency phone in each room/area:	101
102	103
104/105	106
108	109
List of Emergency Procedures in each room/area	101
102	103
104/105	106
108	109
Nearest (and safest) exits	
Fire extinguishers	
First Aid kit	
Chemical shower(s)	
Eye Wash station(s)	
Chemical Spill kits	
Material and Safety Data Sheet (M.S.D.S.)	
Biology Lab Bible (catalog of inventory)	
Proper lab attire when and where applicable:	
lab coat	
goggles	
gloves	
other P.I.P. (list)	
Disinfectant and absorbent paper towels	
Glassware	
General chemicals	
Flammable chemicals	
Corrosive chemicals	
Dissecting and other lab tools	

# GLOVE RESISTANCE CHART

Taken from: <http://www.abcsafetymart.com/workgloves/chem.html>

E - Excellent: Fluid has very little degrading effect.				
G - Good: Fluid has minor degrading effect.				
F - Fair: Fluid has moderate degrading effect.				
P - Poor: Fluid has pronounced degrading effect.				
Nr - Not Recommended: for work with this chemical.				
GLOVE RESISTANCE CHART				
	<b>Nitrile</b>	<b>Neoprene</b>	<b>PVC</b>	<b>Latex</b>
Acetaldehyde	P	E	Nr	E
Acetic Acid, Glacial	G	E	F	E
Acetone	Nr	G	Nr	E
Acrylonitrile	F	G	F	G
Ammonium Fluoride, 40%	E	E	E	E
Ammonium Hydroxide, Conc	E	E	E	E
Amyl Acetate	E	Nr	P	P
Amyl Alcohol	E	E	Nr	E
Aniline	Nr	G	F	G
Animal Fats	E	E	G	P
Aqua Regia	F	G	G	G
Banana Oil	E	Nr	P	P
Benzaldehyde	Nr	Nr	Nr	F
Benzene	P	Nr	Nr	Nr
Benzol	P	Nr	Nr	Nr
Butyl Acetate	F	Nr	Nr	P
Butylene	E	E	F	F

	<b>Nitrile</b>	<b>Neoprene</b>	<b>PVC</b>	<b>Latex</b>
Carbon Disulfide	G	Nr	Nr	Nr
Carbon Tetrachloride	G	Nr	F	Nr
Castor Oil	E	E	E	E
Cello Solve	G	E	P	E
Cellosolve Acetate	F	G	Nr	G
Chlorobenzene	Nr	Nr	Nr	Nr
Chloroform	Nr	Nr	Nr	Nr
Chloronaphthalene	P	Nr	Nr	Nr
Chlorothene Vg	F	Nr	P	Nr
Chromic Acid, 50%	F	Nr	G	Nr
Citric Acid, 10%	E	E	E	E
Coal Tar Distillate	G	F	F	P
Cotton Seed Oil	E	G	G	P
Creosote	G	G	F	G
Cutting Oil	E	E	G	F
Cyclohexanol	E	E	E	E
Di-Isobutyl Ketone	E	P	P	P
Di-Isocyanate	G	G	F	P
Dibutyl Phthalate	G	F	Nr	G
Dichlorethane	F	P	P	Nr
Diethylamine	F	P	Nr	Nr
Dimethyl Formamide, Dmf	Nr	G	Nr	E
Dimethyl Sulfoxide, Dmso	E	E	Nr	E
Diocetyl Phthalate, Dop	G	G	Nr	F
Dioxane	Nr	N	Nr	F
Electroless Copper	E	E	E	E

	<b>Nitrile</b>	<b>Neoprene</b>	<b>PVC</b>	<b>Latex</b>
Electroless Nickel	E	E	E	E
Epoxy Resins, Dry	E	E	E	E
Ethyl Acetate	Nr	F	Nr	G
Ethyl Alcohol	E	E	G	E
Ethyl Ether	E	E	Nr	Nr
Ethyl Formate	G	G	P	F
Ethylene Dichloride	Nr	N	Nr	P
Ethylene Glycol	E	E	E	E
Formaldehyde	E	E	E	E
Formic Acid, 90%	F	E	E	E
Freon, Tf	E	E	Nr	Nr
Freon, Tmc	Nr	N	Nr	Nr
Furfural	Nr	G	Nr	E
Gasoline (White)	E	Nr	P	Nr
Glycerine	E	E	E	E
Grain Alcohol	E	E	G	E
Hexane	E	E	Nr	Nr
Hydraulic Fluid, Ester	G	E	P	P
Hydraulic Fluid, Petrol	E	G	F	P
Hydrazine, 65%	E	E	E	G
Hydrochloric Acid, 10%	E	E	E	E
Hydrofluoric Acid, 48%	E	E	G	G
Hydrogen Peroxide, 30%	E	E	E	E
Hydroquinone, Saturated	E	E	E	G
Iso-Octane	E	E	P	Nr
Isobutyl Alcohol	E	E	F	E

	<b>Nitrile</b>	<b>Neoprene</b>	<b>PVC</b>	<b>Latex</b>
Isopropyl Alcohol	E	E	G	E
Kerosene	E	E	F	E
Lacquer Thinner	G	G	F	F
Lactic Acid, 85%	E	E	E	E
Lauric Acid, 36%/etoh	E	E	F	G
Linoleic Acid	E	E	G	P
Linseed Oil	E	G	F	P
Maleic Acid, Saturated	E	E	G	E
Methyl Alcohol	E	E	G	E
Methyl Ethyl Ketone, Mek	Nr	P	Nr	G
Methyl Isobutyl Ketone, Mibk	P	N	Nr	F
Methyl Methacrylate	P	N	Nr	P
Methylamine	E	G	E	E
Methylene Bromide	Nr	Nr	Nr	Nr
Methylene Chloride	Nr	Nr	Nr	Nr
Mineral Oils	E	E	F	F
Mineral Spirits, Rule 66	E	G	F	Nr
Monoethanolamine	E	E	E	E
Morpholine	Nr	P	Nr	E
Muriatic Acid	E	E	E	G
Naphtha vm&p	E	G	F	Nr
Nitric Acid, 10%	E	E	G	G
Nitric Acid, 70%	Nr	G	F	Nr
Nitrobenzene	Nr	N	Nr	F
Nitromethane, 95.5%	F	E	P	E
Nitropropane, 95.5%	Nr	G	Nr	E

	<b>Nitrile</b>	<b>Neoprene</b>	<b>PVC</b>	<b>Latex</b>
Octyl Alcohol	E	E	F	E
Oleic Acid	E	E	F	F
Oxalic Acid, Saturated	E	E	E	E
Paint & Varnish Removers	G	G	P	F
Paint Thinner	G	G	F	F
Palmitic Acid, Saturated	G	E	G	G
Pentachlorophenol	E	E	F	Nr
Pentane	E	E	Nr	P
Perchloric Acid, 60%	E	E	E	F
Perchloroethylene	G	N	Nr	Nr
Permachlor	G	G	Nr	P
Petroleum Spirits	E	E	P	F
Phenol	Nr	E	G	E
Phosphoric Acid	E	E	G	G
Phosphoric Acid, Conc	E	E	G	G
Pickling Acid	E	E	G	G
Picric Acid, Sat./Etoh	E	E	E	G
Pine Oil	E	E	G	P
Plating Solutions	E	E	E	E
Potassium Hydroxide/koh 50%	E	E	E	E
Printing Inks	E	E	F	G
Propyl Acetate	F	P	Nr	F
Propyl Alcohol	E	E	F	E
Propylene Oxide	Nr	Nr	Nr	P
Rubber Solvent	E	G	Nr	Nr
Silicon Etch	Nr	G	F	Nr

	<b>Nitrile</b>	<b>Neoprene</b>	<b>PVC</b>	<b>Latex</b>
Skydrol 500	P	P	P	F
Sodium Hydroxide/naoh, 50%	E	E	G	E
Stearic Acid	E	E	G	E
Stoddard Solvent	E	E	F	Nr
Styrene	Nr	Nr	Nr	Nr
Sulfuric Acid, 10%	G	E	G	E
Sulfuric Acid, 95%	Nr	F	G	Nr
Tannic Acid, 65%	E	E	E	E
Tetrahydrofuran, thf	Nr	Nr	Nr	Nr
Toluene	F	Nr	Nr	Nr
Toluene Di-isocyanate, tdi	Nr	Nr	Nr	Nr
Toluol	F	Nr	Nr	Nr
Trichlorethylene, tce	Nr	Nr	Nr	Nr
Tricresyl Phosphate, tcp	E	F	F	E
Triethanolamine, 85% tea	E	E	E	G
Trinitro Toluol	E	G	G	P
Triptane	E	E	P	P
Tung Oil	E	E	F	P
Turpentine	E	Nr	P	Nr
Vegetable Oils	E	G	F	F
Wood Alcohol	E	E	G	E
Wood Preservative, penta	G	G	F	F
Xylene	G	Nr	Nr	Nr

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# GLOSSARY

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## DEFINITIONS and ACRONYMS OF COMMON SAFETY ITEMS

### AGENCIES and CODES

**ACGIH** - American Conference of Governmental Industrial Hygienists

**CFR** - Code of Federal Regulations

**FDA** - U.S. Food and Drug Administration

**IARC** - International Agency for Research on Cancer

**OSHA** - U.S. Occupational Safety and Health Administration

**NFPA** - National Fire Protection Association

**NFPA Code** - A numerical code that rates chemicals under fire conditions, exists for a limited number of chemicals and doesn't represent hazard under normal laboratory use.

**NIOSH** - National Institute for Occupational Safety and Health

**NIOSH -RTECS** - Registry of Toxic Effects of Chemical Substances-Found in major libraries

**WISHA** - Washington Industrial Safety and Hygiene Administration (State equivalent of OSHA)

### DEFINITIONS

**ALC** - The Approximate Lethal Concentration in air for experimental animals: The test animal and the test condition should be specified; the value is expressed in mg/liter, mg/m<sup>3</sup>, or ppm.

**HMIS/HMIG** - Hazardous Materials Identification System/Guide - A chemical label system utilizing a numerical code rating of chemicals for health, flammability, and reactivity hazards, and designating personal protective equipment.

**IDLH** - Immediately Dangerous to Life or Health level representing a maximum concentration from which one could escape within 30 minutes without any escape impairing symptoms or any irreversible health effects

**LC** - Lethal Concentration, a measure of acute inhalation toxicity.

**LC50** - The concentration in air that causes death of 50% of the test animals: The test animal and the test conditions should be specified; the value is expressed in mg/liter, mg/m<sup>3</sup>, or ppm. The higher the number, the lower the toxicity.

**LD** - Lethal Dose, a measure of acute oral and dermal toxicity.

**LD50** - The quantity of material that when ingested, injected, or applied to the skin as a single dose will cause death of 50% of the test animals: The test conditions should be specified; the value is expressed in g/kg or mg/kg of body weight. The higher the number, the lower the toxicity.

**MSDS** - Material Safety Data Sheet. A form produced by the chemical product's manufacturer that list the physical, chemical, and physiological hazards of that chemical.

**OEL** - Occupational Exposure Limit is the allowable exposure to a substance for a specified amount of time.

**PEL** - Permissible Exposure Limits over an 8 hour time-weighted average to which any employee may be exposed without adverse effects. It is set by regulation and enforced by OSHA; most of these limit values were originally set by consensus by ACGIH to assist industrial hygienists in implementing exposure control programs.

**STEL** - Short Term Exposure Limit (15 minutes unless otherwise noted) which should not be exceeded during a work day.

**TLV (TWA)** - The Threshold Limit Value established by ACGIH: The Time Weighted Average concentration for a normal 8-hour workday or 40-hour workweek to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**Carcinogenic** - Causing malignant (cancerous) tumors. OSHA, NIOSH, and FDA consider any tumor to be either a cancer or a precursor of cancer.

**Embryotoxic** - Poisonous to an embryo (without necessarily poisoning the mother).

**Experimental Carcinogen** - A substance that has been shown by valid, statistically significant experimental evidence to induce cancer in animals.

**Human Carcinogen** - A substance that has been shown by valid, statistically significant epidemiological evidence to be carcinogenic to humans.

**Mutagenic** - Causing a heritable change in gene structure

**Oncogenic** - Causing tumors

**Teratogenic** - Producing a malformation of the embryo

**Tumorigenic** - Causing tumors

# AGENCIES DEALING WITH CHEMICAL HAZARDS

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## FEDERAL

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**OSHA** - Occupational Safety and Health Administration - regulates worker exposure.

**RIGHT-TO-KNOW (RTK) or FEDERAL HAZARD COMMUNICATION STANDARD** -a set of rules to carry out the Worker Right to Know Act updated 1987. Ensures employers evaluate chemical hazards, distribute proper information.

**EPA** - Environmental Protection Agency - regulates chemicals in air, water, and land, under the following Acts of Congress:

**RCRA** - Resource Conservation and Recovery Act of 1976, as amended (Federal Hazardous Waste Laws).

**CERCLA** -Comprehensive Environmental Response, Compensation and Liability Act of 1980 (Superfund Laws).

**SARA** - Superfund Amendments and Reauthorization Act (1986). SARA Title III is also known as the Emergency Planning and Community Right-to-Know Act (CRTK).

**DOT** - Dept. of Transportation - shipping, transport on public roads.

## STATE

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**L & I** - Department of Labor and Industries - will help you meet the requirements of the Hazard communication Standard (RTK).

**DOE** - Dept. of Ecology - administers the Community Right-to-Know Act (CRTK) -- administers the Hazardous Waste Laws (RCRA).

**DSHS** - Dept. of Social and Health Services - Environmental Health

For student safety, the DSHS administers The School Safety **WAC** (248-64-350) which provides guidelines for safety in the lab.

# HOT LINE/INFORMATION PHONE NUMBERS

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POISON CONTROL	800-222-1222
HAZARDOUS SUBSTANCE/WASTE (DOE)	425-649-7000 NW Reception
WORKER RIGHT TO KNOW (L&I)	800-423-7233
WASTE REDUCTION & RECYCLING (DOE)	425-649-7000
RECYCLE	206-296-4466
COMMUNITY RIGHT TO KNOW (Title III/SARA) (DOE)	800-562-6108
ASBESTOS	206-343-8800
CHEM TREC - Chemical Transportation Emergency Center	800-262-8200