Engineering Physics/ C.E.D.T. Research Hazards Safety Report

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A) ELABORATION ON POTENTIAL HAZARDS

Radiation – 355 nm and 405 nm Lasers (see section D), 1064/532/355 nm Multi-Laser
Class B (Flammable) – Acetone, Ethanol, and Methanol (see section D)
Electrical – High Voltage Enclosed (laser sources, PMT, enclosed by manufacturer)
High Temperature – Soldering Gun (used to connect electrical wires with sold)
Potential Falling Objects – General (bookcases, boxes on a table, items on a shelf)
Biohazards – Human and Animal Tissue Samples (see section D)

B) ROUTINE/STANDARD OPERATING PROCEDURES

Laboratory Protective Devices: (ex. gas/radiation monitors etc.) – NONE

Personal Protective Devices:

355nm Laser – all visitors/users wear 190-375nm glasses or 190-395nm goggles
405nm Laser - all visitors/users wear 190-532 glasses, while in lab not using this laser 190-395 goggles are sufficient, they will block ~ 95% of 405 nm light but only ~1% of 410 nm light.
Multi-Laser is not in use – in lab for storage, not hooked up to anything, we do not have goggles in the lab to block 1064 nm light.
Chemical/Tissue Handling – Gloves, safety glasses, pipette, tweezers, etc.

Other Protective Procedures: (ex. dose badges, medical monitoring) - NONE

C) EMERGENCY PREPARATION

Types of accidents reasonably possible in the lab and their consequences:

Laser accidents – object falls into beam path confined to the optical table and redirects beam into eyes or onto skin
Sharp/Falling objects – exacto-knife, piled boxes, bookshelf
Chemical Spill – acetone, ethanol, or methanol
Biohazard Spill – clean up after tissue sample

Emergency procedures to be used:

DIAL # 905-525-9140 ext. 88, the lab phone in CRL B109 is an external phone.

Laser - Dial # 88, immediate medical attention, eye damage is usually permanent
Sharp/Falling Objects - Dial # 88, no first aid available in CRL Building
Chemical Spill - follow MSDS, summary in section D
Biohazard Spill – see section D

Emergency Devices/Materials Available:

Fire Extinguisher – There are 3 in the hallways of CRL basement (two BC CO_2 extinguishers and one ABC dry chemical extinguisher), ALL can be used on our chemicals and electrical equipment, class A – paper/wood/garbage
Eye wash station – none in CRL, one located possibly in Human Movement Science lab in B109B
First aid station – none in CRL, T13 (next building) is also empty, dial 88.
Toxic/Corrosive substance antidote – N/A

D) DANGERS/EMERGENCY OF CHEMICALS, LASERS, BIOHAZARDS

LASERS

Lasers are fast pulsed, either diode or Nd: YAG with pulse energies from ~1-150 microjoules. Infrared and UV beams cannot be seen without a detector card or a fluorescent target. These beams can damage the eyes and possibly cause skin burns. Reflected beams off various surfaces are dangerous. ALWAYS know where the beams are going and block any unused or partially transmitted beams (ex. through some mirrors). It is the joint responsibility of the laser operator and individuals entering the laser operating area to ensure that proper eyewear has been selected for the wavelengths in use. Visitors must be accompanied by qualified laser personnel. All laser maintenance must be performed only by qualified laser personnel.

BIOHAZARDS

Take the Health Sciences Biohazards Training course in the Hospital (September) before handling biological samples.

Note: - Chemical information is taken from MSDS.
- Chemicals are used for cleaning purposes in our lab/experiments.

ACETONE 100%

Flashpoint: -19 ºC Explosive Range: 2.6 Vol % to 13.0 Vol%,
Auto Ignition: +465 ºC Vapour Pressure (@ 20ºC): 247 hPa (185 mm Hg)

Hazard: Highly Flammable, eye irritant, dry skin
Note - vapours may cause drowsy/dizziness
SOP: impervious (ie. non-penetrating) gloves, safety glasses, protective work clothing
Disposal: dilute small amounts with water, large amounts require disposal permit
Note – no dangerous reactions known
Clean/Collect: Absorb with liquid binding material ex. Sand, sawdust, acid binders etc.

EMERGENCY:
Inhalation – fresh air, med. advice Eyes - rinse several min, and consult doctor
Skin Contact – soap and water Ingestion - seek immediate med. advice

ETHANOL 90% (methyl alcohol 5%, isopropyl alcohol 5%) "ethanol, anhydrous, denatured"

Flashpoint: +8 ºC Explosive Range: 3.3 Vol % to 19.0 Vol%,
Auto Ignition: +362 ºC Vapour Pressure (@ 20ºC): 58.5 hPa (44 mm Hg)

METHANOL 100%

Flashpoint: +11 ºC Explosive Range: 6.7 Vol % to 36 Vol%,
Auto Ingnition: +385 ºC Vapour Pressure (@ 20ºC): 129 hPa (97 mm Hg)

ETHANOL AND METHANOL

Hazard: Highly Flammable, Toxic by inhalation/skin contact/ingestion
Note - may have nausea/dizzy/headache/gastro-intestinal symptoms
SOP: impervious (ie. non-penetrating) gloves, safety glasses, protective work clothing
Disposal: need proper government permits, okay to work/dispose of tiny quantities.
Note – avoid Halogens, Oxidizing Agents (reacts dangerously!), Bases, Acid Chlorides, Acid Anhydrides, and Alkali Metals.
Clean/Collect: Absorb with liquid binding material ex. Sand, sawdust, acid binders etc and dispose of contaminated waste according to local/national regulations

EMERGENCY:
Inhalation – fresh air, med. advice Eyes - rinse several min, and consult doctor
Skin Contact – soap and water Ingestion - do not induce vomiting, seek immediate med. advice