UNDERGRADUATE RESEARCH

STUDENT HANDBOOK

SUMMER 2007

Chemistry Department

Trinity University

MEMORANDUM

TO: **Research Students**

FROM: **Steven Bachrach, Chair, Chemistry Department**

DA TE: **May 21, 2007**

RE: **Undergraduate Research**

On behalf of the faculty and staff of the Department of Chemistry, I welcome you to the 2007 summer research program. We are excited about having you participate in this program with us and hope that each and every one of you will thoroughly enjoy the experience! While the summer is our most intensive time for conducting research, research continues throughout the academic year, and anyone interesting in continuing on should consult their research adviser.

There will be more than 50 persons – students, post-doctoral associates, and faculty – actively involved in research this summer in the department along with many more across campus. There will be many activities for the summer research participants, not all of which will be academic or research oriented, and we hope that you will take full advantage of all that takes place here this summer.

In order for our research program to work smoothly and efficiently, it is absolutely essential that all research personnel be responsible in performing their work and be sensitive to the needs of others. Areas that are especially critical involve the use of major and minor equipment, proper waste disposal, and general housekeeping. In the pages that follow, you will find the rules, regulations, guidelines, and procedures that apply to all persons doing research. These rules are not meant to provide impediments to a successful research experience, but instead represent the normal expectations and standards applicable to a community of research workers. Keep in mind that our utmost concern is the safety of all research participants. If followed conscientiously by all personnel, they will ensure a good experience for all.

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Building Access Policy-Summer, 2007

Moody Engineering, Marrs-McLean Science, and Cowles Life Science

Weekdays:

The MEB, MMS and CLS will be open from 7 am-6 pm on weekdays; closed on Saturday and Sunday. Students in laboratories after 6 pm may remain until 3 am as long as two students are in the same area of the building.

Students may gain access to MEB, MMS and CLS between 6 pm and 3 am by using their Tiger Card Swipe as long as they abide by departmental after hours policy.

Saturday and Sunday:

Students may obtain access by using their Tiger Card swipe access and work as long as two students are in the same area of the building and they abide by the after hours policy.

After Hours Policy

1. Students **may not work alone** in the lab when the building is closed. When the building is closed, **there must be two students** in the same area of the building. Research directors may place additional restrictions on this access.

2. Each research director will develop a list of pre-approved activities that students may perform after hours. This list will be discussed within each research group.

3. Students need to obtain permission from the research director to conduct after hours activities not listed.

4. **Anytime** a student anticipates staying in a building after hours, or entering and leaving a building after hours, the **student must send an email** to their research director and Joann Lockard in Campus Security (jlockard@trinity.edu) stating the following type of information:

> Lucille Ball and Desi Arnes will be in MMS 220 on Wednesday, May 24th from approximately 6:00 PM until 6:30 PM.

CHEMISTRY DEPARTMENT GENERAL LAB ORA TORY POLICIES
UNDERGRADUATE RESEARCH

I. The following general rules are for all persons in all laboratories:

1. Eye protection is required at all times in the laboratory and where chemicals are stored and handled. The following are acceptable types of eye protection: safety goggles, safety glasses with clear side shields, personal prescription glasses with clear side shields. No contact lenses may be worn unless safety goggles are also worn.

2. Horse play, pranks, or other acts of mischief are especially dangerous and are absolutely prohibited.

3. No eating or drinking is allowed in the laboratory area.

4. Unauthorized experiments are prohibited.

5. Long hair and loose clothing should be confined.

6. Smoking is not permitted in the laboratory or adjacent hallways.

7. Students with bare feet are not permitted in the laboratory.

These rules are rigidly and impartially enforced by laboratory supervision. Willful noncompliance with these rules could result in suspension from the university and failure in an associated course.

II. Working Alone - As a general rule students are not allowed to work alone in a laboratory. At least one other person must be present in a nearby chemistry laboratory on the same floor. When working unsupervised, students are responsible for adhering to experiments and conditions specified by their faculty advisor, and must observe normal rules of safe practice in the laboratory.

III. Chemical Hazards and Waste Disposal – General

1. Material Safety Data Sheets are accessible for students in Room 421 MEB.

2. Paper, metal, glass, wood or plastic items should be disposed of in appropriate waste containers, not in sinks or troughs.

3. Unwanted solids are to be discarded in a covered solid waste container. All containers should be properly labeled.

4. Non-flammable, non-toxic water soluble liquids may be flushed down the sink unless a special container is required. All other liquids should be placed in containers designated for them. (SEE SPECIFIC RULES AND REGULATI0NS FOR UNDERGRADUATE RESEARCH on page 8)

IV. Emergency Procedures

1. When an Emergency Occurs

a. If you are directed to leave the room, promptly cease any additions of reagents or reactants, stop the experiment, and turn off all heaters or other energy producing devices.

b. Report the nature and location of the emergency to the appropriate fire, rescue, or medical facility; give your name, telephone number, building and floor number. Report whether individuals are unconscious, burned, trapped; whether an explosion has occurred; whether there has been a chemical or electrical fire.

c. Do not move seriously injured people unless they are in danger of further injury.

d. If an individual is bleeding severely, a pressure pad may be applied firmly on the wound. Never use a tourniquet. Do not treat the cut yourself, not even to bandage it.

2. Chemical Spills

a. Immediately alert your coworkers.

b. Immediately remove contaminated clothing and wash skin with soap and water. If the spill is over a large area of the body, immediately remove the individual to a safety shower and flood with water for at least 15 minutes. If chemicals are in the eyes, irrigate with water, then check for and remove contact lenses.

c. For spill clean-up, follow directions of your supervisor. Most small spills (100 mL) can be absorbed with paper towels. In case of flammable solvent immediately warn everyone to extinguish flames.

d. Common spill reagent (usually available in lab):
ACIDS - sodium bicarbonate solution or powder
BASES - boric acid solution
MERCURY - powdered sulfur

3. Fires

a. For fires contained in small vessels, suffocate with an inverted beaker or watch glass.

b. For larger fires direct a CO_2 or dry powder extinguisher at the base of the flames.

c. If fire appears uncontrollable, leave immediately, sound alarms, and call fire department.

d. If a person's clothing is on fire, douse the person with water or wrap them in a fire blanket to extinguish the flames. If a blanket is used, then douse the person with water to remove heat. Wrap person to avoid shock and immediately get medical attention.

e. Immediately contact supervisor.

4. Emergency Numbers
   a. Security - 7000
   b. Fire - 911
   c. Ambulance - 911

6. Nitrogen Gas

Room 415 - The nitrogen tanks in room 415 must be turned off each night unless they are in use to provide an inert atmosphere for a reaction. The last person to leave must turn off the nitrogen cylinders. If you need to use nitrogen for a reaction running overnight, attach the sign which says "Nitrogen in Use" to the cylinders. Remember to remove the sign when you are no longer using nitrogen "after hours".

Second Floor - Nitrogen gas for labs 203, 217, and 226 are provided from a central supply located in one of the mechanical rooms on the second floor. It is very important that all nitrogen delivery valves in these labs be checked each day to ensure that they are not left open when not in use. Adjust nitrogen flows to only the minimum necessary for the task at hand, especially if nitrogen purging will be done overnight Turn off the valve as soon as the task is finished. Close valves firnly but do not over tighten.

7. Acetone Use - Acetone should be used sparingly for cleaning and drying purposes. Unnecessary use of large amounts of acetone for drying glassware is not only wasteful but also increases exposure. Prolonged topical exposure causes erythema and dryness, and inhalation of vapors causes headaches and bronchial irritation.

8. Drying Ovens - Do not remove glassware from ovens unless you have placed the glassware in the oven. Do not remove an NMR tube from the oven unless you placed the NMR tube in the oven.

9. Stockroom Access

Chemical Stockroom - Students are allowed access to the Chemical Stockroom. and are permitted to use routine chemicals stored there in their research. (See Appendix A - Routine Chemicals Supplied by Stockroom). However, except for routine solvents and inorganic salts, students should first check with their advisor before removing chemicals from the stockroom. Always record the appropriate information in the chemical log book so that chemical stores may be replaced. Report any unusual conditions in the stockroom to the Laboratory Manager.

Glassware Stockroom - Students are allowed access to the Glassware Stockroom, and are permitted to use routine glassware and supplies stored there in their research. (See Appendix B - Routine Glassware and Supplies Furnished by Stockroom). Any glassware items removed from the

stockroom must be returned in clean and dry conditions when the student has finished using the items. Students should wash and reuse glassware rather than stockpiling dirty items.

10. Waste Disposal and Chemical Spills - A copy of the Waste Management System of the Chemistry Department is attached. Lists of chemicals which are Appendices to the Waste Management document are not included, but are available in the Chemistry Department office.

All personnel are expected to adhere to all waste management policies. Your faculty advisor will provide information on waste disposal procedures appropriate to your research. The general policy of the Chemistry Department regarding the disposal of organic solvents states that waste solvents are to placed in properly labeled waste containers (halogenated or non-halogenated), and the person placing the waste in the container must record the name and amount of solvent added to the container. The labels on the waste bottles obtained from the stockroom are designed to facilitate recording of this information. The Chemistry Department cannot dispose of waste that is not properly labeled. Do not add

MAJOR INSTRUMENTATION IN THE CHEMISTRY DEPARTMENT, SUMMER 2007

The following list contains all of the major pieces of instrumentation that are available for use by all person involved in research in the department. Prior to using any instrument, students must be trained in the proper use of the instrument by an individual. The faculty and staff person listed with each instrument can provide such training, and these individuals should also be consulted whenever a problem occurs with the instrument.

Instrument	date of acquisition	Location	Faculty/staff assignment
Varian Saturn 2100T ion trap GC/MS with MS/MS	2006	MEB 205	Mills
Varian 3900 capillary GC	2005	MEB 226	H-Wang
Akta Prep. FPLC	2005	MEB 226	H-Wang
Innova 140 Benchtop Incubator/Shaker	2005	MEB 217	Urbach
Biotek Absorbance Plate Reader	2005	MEB 219	Chand/Urbac
Jasco UV-Visible Spectrometer	2005	MEB 125	Bushey
New Objective Nanospray MS Source and Michrome Flow splitter	2005	MEB206	Bushey
Beckman Fluorescence Detector/Melles Griot Laser	2005	MEB 125	Bushey
Beckman P A800 Capillary Electrophoresis Autosampler/software upgrades for HPLC 1100	2005	MEB 217	Urbach
Labconco Freeze Drying System	2005	MEB 217	Urbach
Waters Preparatory HPLC System	2005	MEB 217	Urbach
PTI Flurorescence Microwell Plate Reader	2004	MEB 125	Urbach
PTI Flurorescence Spectrometer QM- 7	2004	MEB 125	Urbach
BAS 100 Electrochemical Analyzer	2004	MEB 203	Mills
Dell PC Linux Cluster	2004	Halsell 108	Bachrach
ThermoFinnegan LCQ Deca XP Ion Trap MS with aMALDI, ES, and LC	2004		Bushey
Microcal VP-ITC Microcalorimeter	2004	MEB 217	Urbach
Ocean Optics UV -Visible Spectrometer	2004	MEB 427	Chandler
Agilent 6890N Capillary GC	2003	MEB 413	Baltuskonis
2 Polax Polarimeters	2003	MEB 413	Mills
Nicolet Nexus 470 FT-IR	2003	MEB 413	Chandler
UVDetector with CE Flow Cell	2003	MMS	Bushey
Varian Mercury 300 NMR Spectrometer	2002	MEB 205	Mills
SRI Instruments GC (2)	2002	MEB 427	Chandler
Nicolet Nexus 470 FT-IR	2002	MEB 427	
Finnigan GC-MS	2002	MEB 205	Mills
Quanta Chrome Inst. Co. Autosorb 1-C Chemisorption, Physisorption, and Pore Size Analyzer	2001	MEB 427	Chandler Urbach
Varian Cary 100 Spectrometer Peltier Module			
Varian Atomic Absorption SpectrAA 220 FS	2001	MEB 422	Baltuskonis
Beckman PlACE MDQ Capillary	2000	MEB 205	Bushey

Electrophoresis			
Beckman HPLC	2000	MEB 205	Bushey
Compac XP1000 Computer Workstations (3)	1999	MEB 215	Bachrach
Compaq DS-20 Workstation	1999	MEB 215	Bachrach
Hitachi U-2001 UV-VIS Spectrophotometer (3)	1997	MEB 422	Chandler
Varian Unity Inova 400 MHz NMR Spectrometer	1996	MEB 205	Mills
Hewlett Packard 1100 HPLC System II	1996	MEB 205	Bushey
Hitachi MKT3000 UV -VIS spectroPhotrmeter	1995	MEB 427	Oxley
Hewlett Packard GCD System	1995	MEB 205	Bushey
Hitachi U-2000 UV-VIS Spectrophoto~eter	1993	MEB 220	Schmidtke
Silicon Graphics Molecular Modeling System	1991	MEB 214	Mills
PTI LS-100 Luminescence Spectrometer	1991	MEB 205	Urbach
Beckman J2-21M Refrigerated Centrifuge	1989	MEB 226	Kurtin
Pharmacia Phast Electrophoresis System	1989	MEB 220	Bushey
BAS 100A Electrochemical Analyzer	1987	MEB 220	Mills
Quantel Pulsed Nd:Y AG Laser	1987	MEB 320	Peter's Lab
PRA Pulsed Nitrogen Laser	1986	MEB 219	Pursell
DionexD-110 Stopped Flow Spectrophotometer	1982	MEB 219	Schmidtke
Varian 2315 UV -VIS Spectrophotometer		MEB 205	Chandler
Hewlett Packard 5890L Gas Chromatographs(2)		MEB 413	Baltuskonis
Magnetic Suseptibility Balance		MEB 422	Chandler
Nicolet Magna 550 FT -IR Spectrometer (3)		MEB 413	Chandler
Capillary Electrophoresis Instrumentation (4)	1993	1995 MMS	Bushey
Hewlett Packard 5890A Gas Chromatograph	1991-92	MEB 413	Baltuskonis

Chemical Waste Management
Chemistry Department
Trinity University

Components: I. Responsibility - Assigned responsibility for each area and phase of waste management system

II. Prevention - Reducing the volume of waste

III. Procedures and Policies

1. Identification, Classification, and Segregation of Waste
2. Packaging. Labeling and Storage of Waste
3. Neutralization and Decomposition of Waste
4. Disposal of Waste in Sanitary Sewer System
5. Chemical Spills

I. Responsibility

1. Department

Departmental Chemical Hygiene Officer

This person is responsible for the development and implementation of the Chemical Waste Management System and for coordination of these activities with the Safety Office.

2. Individual Laboratories

Supervisors
The primary responsibility of the principal investigator, instructor or supervisor is to assure that the policies and guidelines established in this document are followed by all personnel under their jurisdiction.

Individual Students, Associates and Employees

It is essential to the success of the Trinity University chemical waste management program that laboratory/workplace personnel and other individuals who work with hazardous chemicals be conscientious in their efforts to follow the guidelines presented in this document. Individuals have a responsibility to:

- Collect all chemical wastes in accordance with established guidelines.
- Determine the identity of all unknown or surplus chemicals utilizing the technical knowledge within the department or by having the unknown chemicals tested.
- Package and label all chemicals slated for waste disposal in accordance with established guidelines.
- Consult with supervisors regarding the safe handling and proper disposal of hazardous chemicals.

II. Prevention

1. Planning Experiments - Every experiment shall include the consideration of the disposal of leftover starting materials and of the products and by-products that will be generated.

2. Reduction of Scale - Every experiment shall include the consideration of optimization of scale with intent to minimize amounts of chemicals employed. Optimization will be consistent with the educational objectives of the experiment.

3. Control of Excess Chemicals - Storage of excess chemicals for long periods of time will be avoided. Chemicals that are known to react with oxygen or water or to form peroxides will be dated when the container is opened, and will not remain in storage for a period exceeding six months.

4. Prevention of Orphan Reaction Mixtures and Waste - All reaction mixtures and waste stored in laboratory glassware will be labeled with the chemical composition, the date they were formed, and the name of the laboratory worker responsible. In the event that unlabeled, orphan reaction mixtures or wastes are encountered. the laboratory responsible for the mixture will be responsible for providing analysis and information necessary for safe disposal.

III. Policies

1. Identification, Classification and Segregation of Laboratory Waste

   All laboratory personnel will be familiar with criteria for identification and classification of hazardous chemical wastes. The complete definition of hazardous waste is contained in the 1976 Resource Conservation and Recovery Act (RCRA). Part 261, Subpart C. The identification of hazardous waste is based on two premises - listing and testing characteristics.

   Listing

   The EPA may list a waste as hazardous if the agency determines that is causes or contributes to the following:

- Increases mortality
- Increases serious irreversible illness
- Increases serious incapacitating reversible illness
- Is a substantial present or potential hazard to human health or the environment if improperly managed

   A waste may also be listed if it is deemed acutely toxic or acutely hazardous or otherwise toxic by the EP A. The criteria for this listing are as follows:

- Small doses cause human mortality

- Oral LD50 = <50 pm by weight (mg/kg)
- Inhalation LC50 = <2 mg/L
- Dermal LD50 = <200 mg/kg
- Contents include a hazardous constituent already listed.

A list of substances designated by the EP A as acutely hazardous or otherwise toxic are provided in Appendices A and B.

Characteristics

Chemical waste demonstrating any of these characteristics is a hazardous waste whether it is listed or not.

Ignitability - A waste is ignitable if a representative sample demonstrates the following properties:

- Is a liquid that has a flash point <60°C (140°F), other than aqueous solutions containing <24% alcohol by volume
- Is a non-liquid capable of causing fire at STP
- Is an ignitable compressed gas
- Is an oxidizer

Corrosivity - A waste is corrosive if a representative sample under aqueous conditions has a pH .s: 2, or ~ 12.5.

Reactivity - A waste is reactive if a representative sample demonstrates any of the following properties:

- Is normally unstable or reacts violently
- Reacts violently with water
- Forms explosive mixtures with water
- Generates toxic gases, vapors or fumes when mixed with water
- Contains cyanide or sulfide and generates toxic gases, vapors or fumes between pH 2 and 12.5
- Could detonate if heated under confinement or subjected to strong initiating source
- Could detonate at STP

Segregation

Chemicals and mixtures declared wastes will be identified as to each of the characteristics listed above by the laboratory which generates the waste. Only compatible chemicals shall be put in any waste container. The following classes of chemicals may be accumulated as mixtures in single waste containers:

- non-halogenated, non-peroxide fonning liquid hydrocarbons
- halogenated, non-peroxide forming liquid hydrocarbons, except brominated compounds
- brominated hydrocarbons in greater than trace amounts

- peroxide-forming hydrocarbons
- aqueous solutions of compatible inorganic compounds containing highly toxic cations or anions
- used vacuum pump oil, unmixed with organic solvents

2. Packaging, Labeling and Storage

Wastes will be accumulated in properly-labeled glass containers with screw caps, with the size of the container not to exceed 4 L. Labels for waste containers will be made available in the chemical stockroom. To all organic waste containers will be added approximately 0.01 % (w/v) hydroquinone as a stabilizing agent Accumulated wastes sha1l be stored temporarily in a hood until ready for disposal. Containers ready for disposal will be tagged with a properly-completed disposal request card (provided by stockroom). The Laboratory Manager will be contacted, and arrangements will be made for transfer .of the waste to the halon-protected storage room (MEB 432). The Laboratory Manager will prepare any further documents required for disposal, and will arrange with the Safety Office for pick up.

3. Neutralization and Decomposition

The following classes of compounds shall be collected separately, and shall be neutralized or decomposed by the laboratory which generates the waste, using acceptable procedures (1):

Acid halides and anhydrides
Organic peroxides
Oxidizing agents
Metal hydrides
Inorganic cyanides
,Metal azides
Water-reactive metal and non-metal halides
Organometallic sensitive to air water
Metal carbonyls

4. Sanitary Sewer Disposal

Organic - Organic materials that are reasonably soluble in water (at least 3%) are suitable for drain disposal, and should be flushed or mixed with at least 100 volumes of water.

CHEMISTRY DEPARTMENT
TRINITY UNIVERSITY
SAFETY EXAM

To be taken by ALL students before they begin independent work as laboratory assistants or research participants

Safety is an important aspect of your work in the Chemistry Department. Each worker has the responsibility for his or her own safety and the safety of co-workers. To insure your safe conduct in the laboratories, you should study the safety exam carefully and learn and follow the safety rules governing your work in the laboratory. You should also constantly watch for unsafe conditions and practices in your work area. You should consult your supervisor or faculty advisor about potential hazards with your work or the work of others.

Procedure: You are required to read the Undergraduate Research Student Handbook and to understand the chemistry department's laboratory policies. You will be given a copy of the safety exam on the first day of the summer research program. You are required to take the exam and sign the safety exam cover sheet indicating that you read and understand the safety guidelines and will abide by them. In taking the exam, you may use the Summer Research Student Handbook, but may NOT consult other students. Exams are to be turned into your research director. Questions answered incorrectly or incompletely must be rewritten in order for the exam to be passed.

You may NOT begin independent work in the lab until the exam is passed.

_____
Signature Date

_____
Signature of Examiner Date

1. Explain the problems which may be associated with wearing contact lenses in a chemical laboratory.

2. Outline the do's and don'ts of clothing worn in a chemical laboratory.

3. Briefly state how each of the following waste materials should be disposed of:

a) used chloroform from a rotary evaporator

b) dilute sodium chloride solution

c) paper towel used to clean up spilled alcohol solvent

d) broken mercury thermometer

4. Why should dewar flasks and large vacuum vessels be taped or otherwise screened?

5. List four practices you should follow which will help to maintain proper ventilation in a laboratory hood.

6. What are MSDS sheets and where are they to be found at Trinity?

7. What special hazard is associated with solvents like ether, THF, and dioxane?

8. What procedure(s) should be used in the event of the following types of chemical spills?

a) solvent or corrosive liquid covering a small amount of skin-

b) major spill of corrosive liquid on clothing-

c) splash of solvent or corrosive liquid into the eye-

d) major spill of solvent or corrosive liquid onto laboratory floor-

9. The use of the house vacuum in conjunction with a rotary evaporator requires that a dry ice-alcohol cooled trap be placed between the evaporator and the vacuum port. Why is this?

10. What procedures should be used to minimize the chance of breaking glass bottles?

11. What is the 4-digit campus phone number for the Security & Safety office at Trinity?

12. For your research floor, indicate the location of the following items:

a) CO_2 fire extinguisher

b) Dry chemical fire extinguisher

c) Emergency shower

d) Emergency eye wash

e) Fire alarm

f) Fire blanket

g) Absorbent for liquid spills

APPEND IX A
ROUTINE CHEMICALS MAINTAINED IN THE CHEMICAL STOCKROOM FOR USE BY ALL RESEARCH PERSONNEL

(These chemicals are ACS reagent grade unless noted otherwise.)

DESCRIPTION	Min. Volume(Liters)
ACETONE reagent	20 liters
ACETONE technical	20 liters
E1HYL ACETATE	20 liters
ETHANOL 190 Proof	20 liters
ETHANOL 200 Proof	20 liters
E'nIYL E11:IER	20 liters
HEXANES isomeric mixture	40 liters
2-PROPANOL	20 liters
DICHLOROMElliANE	20 liters
METHANOL absolute	20 liters
PETROLEUM ETHER	20 liters
LIGROINE	20 liters
, TOLUENE	20 liters
SODIUM CHLORIDE	1 Kgm
SODIUM BICARBONATE	1 Kgm
" SODIUM HYDROXIDE	1 Kgm
SODIUM ACETATE	1 Kgm
SODIUM SULFATE (anhydrous)	1 Kgm
SODIUM CARBONATE	1 Kgm
SODIUM PHOSPHATE (mono-)	500 gm
SODIUM PHOSPHATE (di-)	500 gm
SODIUM PHOSPHATE (tri-)	500 gm
MAGNESIUM SULFATE (anhydrous)	1 Kgm
ACTIVATEDED CHARCOAL	1 Kgm
POTASSIUM HYDROXIDE	1 Kgm
KHP	l Kgm
DRIERITE	1 K gin
SAND	1 Kgm
HYDROCHLORIC ACID	5 liters
NITRIC ACID	5 liters
SULFURIC ACID	5 liters
PHOSPHORIC ACID	5 liters
ACETIC ACID	5 liters
AMMONIUM HYDROXIDE	5 liters

APPENDIX B
ROUTINE GLASSWARE AND SUPPLIES MAINTAINED IN THE GLASSWARE STOCKROOM FOR USE BY ALL RESEARCH PERSONNEL

(All items stocked together in a central location in Room 419)

DETERGENT Alconox	powder
BEAKERS	600,400, 250, 100, and 50 mL sizes
BOILING STONES	
BOTTLES:	Liquids; 4 liter bottles for waste solvents.
Solids; 1/2 pound and 1 pound sizes	
BUFFERS	pH 4.0, 7.0, 10.0; Supplied as tablets or gram packs
CAPILLARY TUBES	Open and Closed end tubes
DISPOSABLE GLOVES	4 mil thick; Large size only
DISPOSABLE PIPETS	5 3/4" length only
ERLENMEYER FLASKS	00, 250, 100, 50 mL sizes
FiLTER PAPER	WHATMAN #4 gtade only;
.	in 5.5, 7.0, 9.0, 11.0, 12.5, & 15.0 cm dia
FUNNELS, CONICAL, GLASS	
GLASS WOOL	
KIMWIPES	
NALGENE BOTTLES	500 ml wash bottles only
PARAFILM	4" width strips avail~ble from stockroom window
PIPET TIPS	For Eppendorf type pipettors
STOPPERS & CORKS	Moderate supplies of all sizes available
TEST TUBES	13 X 100 mm, &16 X 150 mm sizes only
TLC PLATES	Available as 1" strips; Silica gel with indicator only
VACUUM PUMP OIL	
STOPCOCK GREASE	Dow Corning High vacuum grease
WEIGH PAPER	4" X 4" only
WOODEN APPLICATOR STICKS	