CHEM1215: Chemistry I Lab
Course Guide

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ENVIRONMENTAL SCIENCE

Contents:

(*) Return To The Instructor,
(these two pages should be stapled together. SPCI sheet first.)

CHEM1215: Chemistry I Laboratory Syllabus

Contact Information

Instructor: Dr. Daniel Short
Office: 215 John Jay
Laboratory: John Jay Science Laboratories
(Environmental Science and Chemistry)
Office Phone: (412) 397 3260
E-mail: short@rmu.edu
(Please include your lab section number in your messages to me. You must use your @rmu.edu mailbox.)
Office/Lab Hours: http://www.localendar.com/public/dnashort. Also, by appointment. Students are encouraged to see me immediately after class.
Web Site: http://academics.rmu.edu/~short/index.htm

Course Description

This course covers the general principles, theories, and concepts of inorganic chemistry for students in engineering, science and related fields. Topics covered include: laboratory safety, measurements, density, chromatography, melting point determination, atomic spectra, conductivity, molecular shape, and chemical reactions.

Laboratory Safety

Please read the section of this guide entitled 'Undergraduate Laboratory Safety Instructions'.

Lab Policy

Attendance of all weekly lab sessions shown in the table below is required. The instructor must be notified by email at least one week prior to any absence. Missed labs will receive a zero and cannot be made up under any circumstances.

Before coming to any of the labs below you must have read the lab materials and bring completed pre-lab exercises.

Calendar

The experiments you will be performing have been selected because they can be done safely. Procedures and safety precautions should be followed carefully and in the order given. A change in the concentration of one or more chemical reagents is sufficient to alter the conditions of a chemical reaction so as to make it occur in a different way, perhaps at a highly

accelerated rate. Do not deviate from the procedure given in the handouts when performing experiments unless specifically told to do so by your instructor.

Week	Laboratory
1	Intro session: Safety Talk
2	Laboratory Data and Techniques [Lab Techniques Assignment + Dry Lab 1 Worksheet]
3	Exp1: Basic Lab Operations
4	Exp2: Identification of a Compound: Chemical Properties
5	Dry Lab 2A: Inorganic Nomenclature I; Dry Lab 2B: Inorganic Nomenclature II
6	Exp3: Water Analysis: Solids
7	Exp9: A Volumetric Analysis
8	Dry Lab 3: Atomic Structure
9	Glass Blowing
10	Exp13: Calcium Carbonate Analysis: Molar Volume of CO_2
11	Exp11: Periodic Table and Periodic Law
12	Demo/Rocket Week
13	Exp25: Calorimetry
14	Clean-Up Sessions

This schedule is subject to change by your instructor.

Assessment

This class is assessed on the basis of weekly lab exercises.

On assessing your final grade for this course the lowest scoring work will be dropped. If your instructor judges the work to be messy or not legible, or if the lab work does not include all components they may give the grade of zero.

The pre-lab quiz and questions will be checked before the lab starts, you will not be allowed to start the lab without these items.

MAKE SURE THAT YOUR NAME IS ON YOUR WORK. Before leaving for the day, your work must (i) be inspected by the instructor, (ii) be handed in to be used as a record of lab completion. We may also display the results of a lab around the room and discuss them using a 'Gallery Walk'. If you miss this final part of the session you will receive a zero for

the entire lab. You must also demonstrate that your workstation is clean. Grade points will be deducted for any equipment left out, unwashed etc. Grading:

A 93-100 - Outstanding. A thoroughly comprehensive, well-organized and well-written answer or exercise. (Some degree of originality of ideas and treatment may compensate for deficiencies in coverage and organization.)

A- 89-92

B+ 86-88

B 83-85 - Achievement significantly above the level necessary to meet course requirements; coverage, organization and writing satisfactory.

B- 80-82

C+ 77-79

C 70-76 - Achievement meets course requirements, i.e., an evident understanding of the material presented, even with minor deficiencies of coverage, organization, and/or writing.

D 60-69 - Achievement worthy of credit even though course requirement is not fully met, and coverage organization, and/or writing show clearly evident deficiencies.

F <60 Performance indicating that there are serious deficiencies in a student's understanding of the course material, usually accompanied by poor coverage, lack of organization, and/or inadequate writing.

Late work will not be graded; I also observe the right not to grade incomprehensible work or calculations with intermediate steps missing.

Tips for Success

Students should know what they will be doing and why before each lab. Completing the pre-lab work and reading the experimental procedure prior to each laboratory session is strongly advised.

Recommended and Required Materials

Text – None.

Calculator - A scientific calculator is recommended.

Personal Protective Equipment – a lab coat and safety goggles are required.

Learning Aids

Communicate with your instructor – you should take full advantage of the availability of your instructor outside of the classroom for face-to-face meetings and via telephone/email contact.

Cooperative learning Groups – students are asked to form groups of 4-5. Groups should sit together when requested. Group discussions, exercises, and assignments may occur in lecture. Each group may find it helpful to study together outside of class.

Discussion sessions – these informal sessions are held 1-3 times during the semester. The aim is to enable the professor to meet students in small groups. The sessions are open to all those registered in this lecture session. Topics of discussion may or may not be related to course materials.

University Center for Student Success – students who may be eligible to receive learning support or physical accommodations should contact the Center for Student Success. To learn more about their services, call (412) 262-8349 or visit their offices in Franklin Center.

Disability

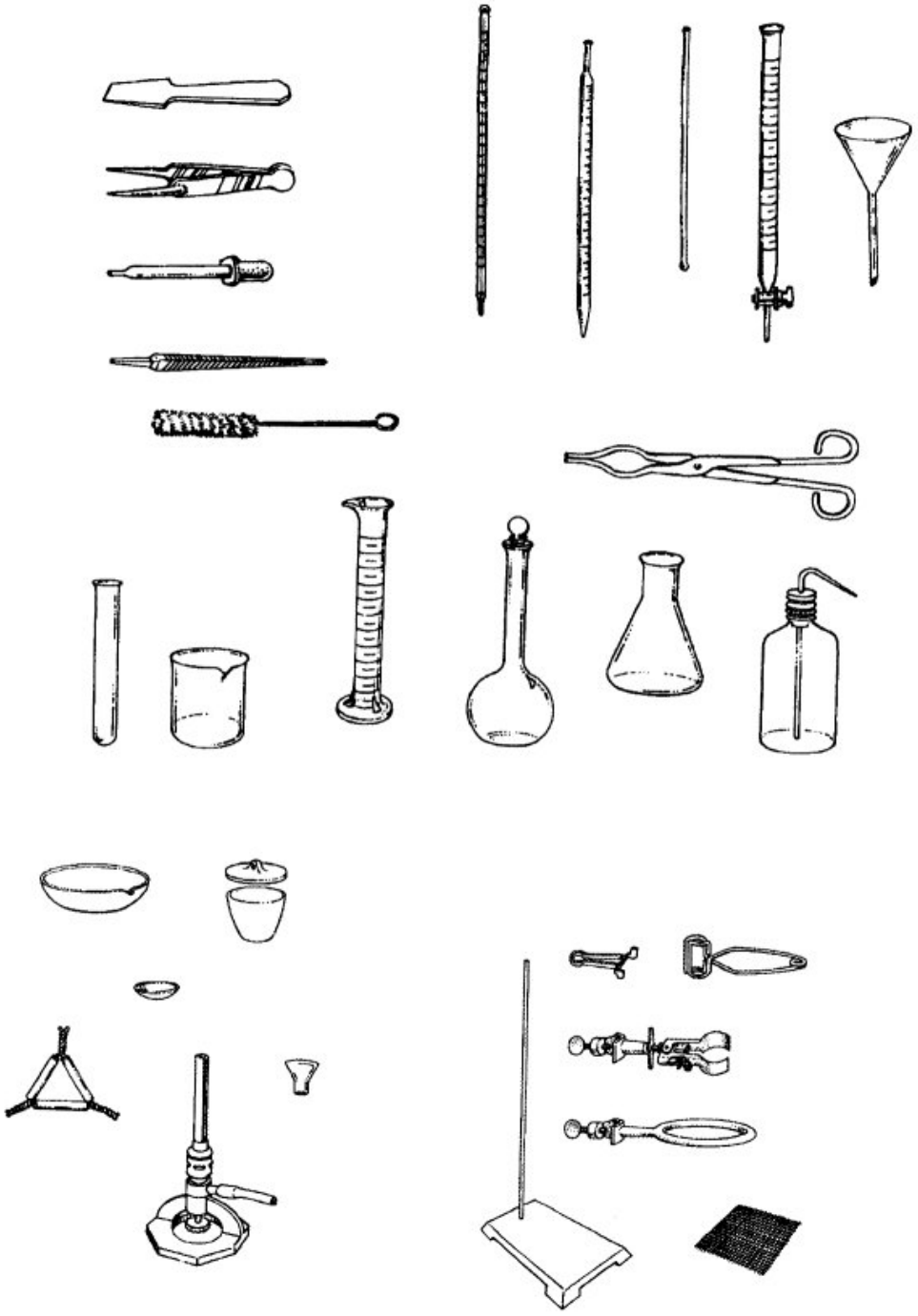
Students with special requirements that can be accommodated and are covered by the Students with Disabilities Act should contact the instructor.

Copyright Information

No Food, Drink or Phone Calls are Permitted in the Labs

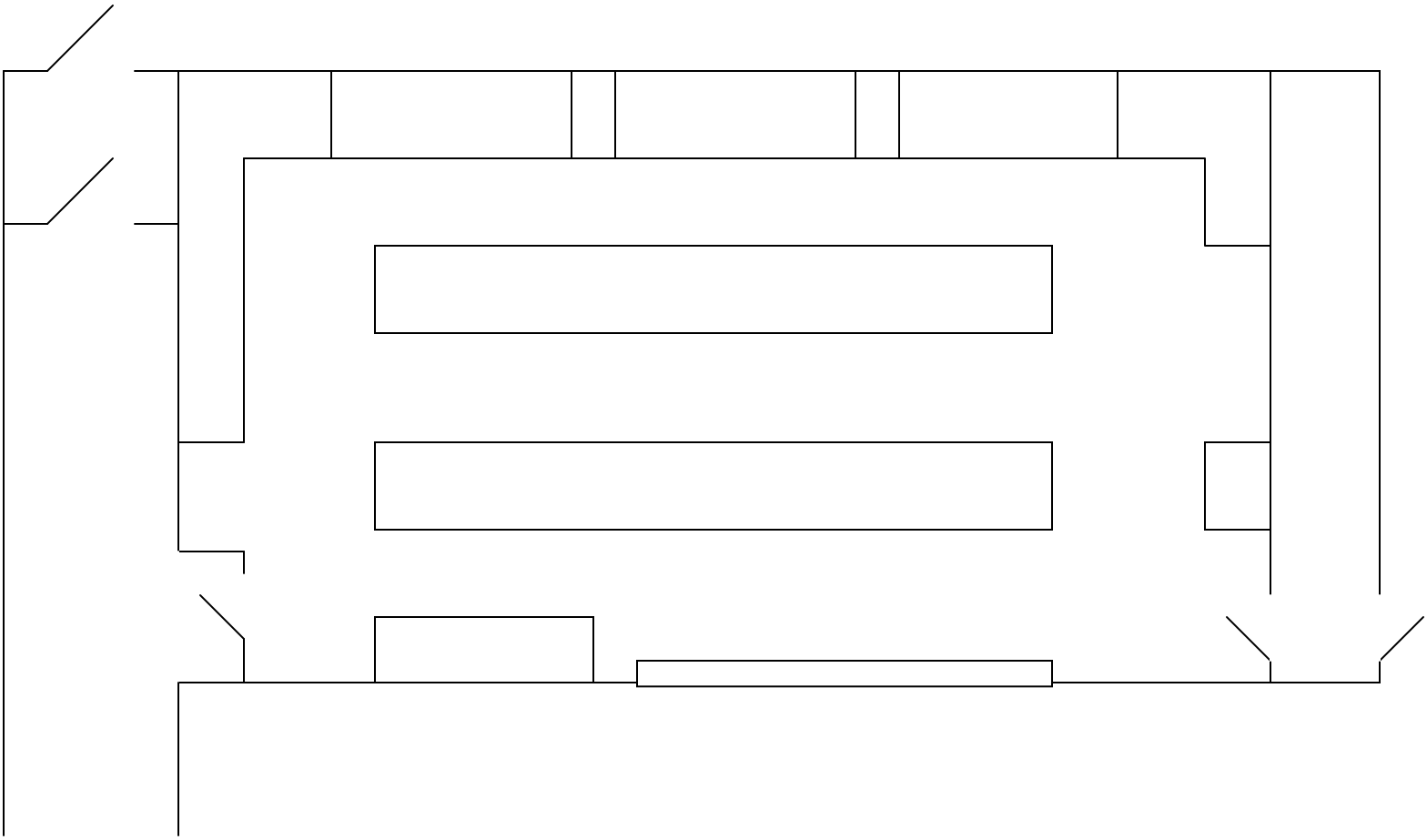
Lab Equipment Quiz

Supply the names of the equipment shown below:



Lab Layout

Mark the location of the safety equipment on the image below. Include: fire exits, fire extinguishers, fire blankets, eye-washes, telephones etc.



Undergraduate Laboratory Safety Instructions

To avoid injury to yourself and to fellow students you are required to read, understand, and sign this agreement. Failure to comply with the following rules whilst performing laboratory experiments may result in suspension or expulsion from this laboratory course.

1. If you have a medical condition that may affect your performance or safety in the laboratory you should discuss it in private with your instructor. This information will be held in strict confidence. If you prefer, you may contact your physician and/or the Office for Disability Services directly, and we will provide them with any information they may need to assist you.

2. **YOU MUST WEAR SAFETY GOGGLES AT ALL TIMES WHILE IN THE LABORATORY**. It is a legal requirement of the Commonwealth of Pennsylvania that eye protection be worn in university teaching and research laboratories. Eye protection must meet or exceed the American National Standards Institute ANSI Z87.1-2003 Splash Goggles standard. Safety glasses are not acceptable. The goggles must be worn at all times within the lab space. NO CONTACT LENSES are to be worn in the laboratory.

There are NO exceptions to this requirement, and failure to comply with this requirement will result in the student being dropped from the laboratory.

3. **OPEN SHOES OR SANDALS CANNOT BE WORN IN THE LABORATORY**. Failure to comply with this rule will result in your dismissal from the laboratory for the day.

4. **YOU MUST WEAR A LAB COAT AT ALL TIMES IN THE LABORATORY**. In order to minimize the possibility of burns you are required to wear a full-length lab coat.

5. In case of accident, spill or emergency, **NOTIFY THE INSTRUCTOR IMMEDIATELY**. Note the location of eye washes and safety showers for when needed.

6. Eye injuries must always be considered serious. The best **procedure IN CASE OF CHEMICAL INJURY TO THE EYE IS IMMEDIATE PROLONGED CONTINUOUS FLUSHING WITH WATER** (20 mins) at an eye fountain. Eyes must be forced open to be washed well.

7. Cracked or chipped glassware should be discarded in the waste bins marked 'Broken Glass Only'.

8. Do not touch any chemical with your fingers. Use a scoopula to transfer solids and wear gloves when needed. **FLUSH WITH WATER ANY PART OF YOUR BODY THAT COMES INTO CONTACT WITH A CHEMICAL USED IN THIS LABORATORY**. Rapid and immediate treatment is essential. **USE LOTS OF WATER**. Clothing must be removed immediately.

YOU MUST READ AND UNDERSTAND THESE INSTRUCTIONS.

9. For treatment of any accident you must go to Sewickley Valley Hospital. Transportation will be provided if needed by calling Campus Police (2424). You and the instructor must file an accident report within 24 hours.

10. All medical claims are the responsibility of the student. Due to the potentially dangerous nature of laboratory work **INSURANCE COVERAGE** is strongly encouraged.

11. **NEVER EAT OR DRINK IN THE LABORATORY**.

12.Exercise care in noting the odor of fumes and **AVOID BREATHING FUMES OF ANY KIND**. Use fume hoods when necessary.

13. Never force glass tubing into stoppers. Always use a lubricant and protect your hands with a towel.

14. Long hair must be confined securely to minimize hazard.

15. **DO NOT RUN** in the laboratory. Do not engage in activities or behavior that might confuse, startle or distract another student.

16. **DO NOT PUT BACK ANY CHEMICAL, SOLID OR LIQUID, INTO THE REAGENT BOTTLES** from which they were obtained. This will contaminate the supply.

17. **REPLACE STOPPERS**, lids, covers, etc. on their containers immediately after use.

18. Never remove chemicals from the laboratory.

19. **BE CAUTIOUS**: assume all chemicals to be toxic, and all organic liquids to be flammable.

20. Clean spills immediately. Check with your instructor for the proper procedure.

21. Ask your instructor about the disposal of used chemicals. All waste chemicals must be placed in containers labeled specifically for each waste material.

22. **SHOULD A FIRE ALARM SOUND** while you are in the laboratory, turn off any Bunsen burner or hot plate, remove any reaction from any heat source, and leave the building by the nearest exit.

23. No unauthorized experiments are permitted.

24. Always leave your work area clean at the end of each lab.

25. **WASH YOUR HANDS WHEN YOU ARE FINISHED**. It is a good idea to wash your hands whenever they have been in contact with chemicals, not just at the end of the session.

Safety Instructions (Student Signed Copy)

To avoid injury to yourself and to fellow students you are required to read, understand, and sign this agreement. Failure to comply with the following rules whilst performing laboratory experiments may result in suspension or expulsion from this laboratory course.

1. If you have a medical condition that may affect your performance or safety in the laboratory you should discuss it in private with your instructor. This information will be held in strict confidence. If you prefer, you may contact your physician and/or the Office for Disability Services directly, and we will provide them with any information they may need to assist you.

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My signature below indicates that I have read the above rules, have been informed of these rules by my instructor, and that I will observe and abide by these rules. I recognize that it is my responsibility to obey them faithfully.

Student's Signature: _____

Printed Name: _____ Date: _____

9. For treatment of any accident you must go to Sewickley Valley Hospital. Transportation will be provided if needed by calling Campus Police (2424). You and the instructor must file an accident report within 24 hours.

10. All medical claims are the responsibility of the student. Due to the potentially dangerous nature of laboratory work **INSURANCE COVERAGE** is strongly encouraged.

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23. No unauthorized experiments are permitted.

24. Always leave your work area clean at the end of each lab.

25. **WASH YOUR HANDS WHEN YOU ARE FINISHED**. It is a good idea to wash your hands whenever they have been in contact with chemicals, not just at the end of the session.

Required Personal Protective Equipment

Students are required to provide their own personal protective equipment. Approved lab coats and goggles are available from RMU's bookstore or online from a list of suppliers available from your instructor.

Eye Protection

Students are required to provide their own safety goggles that (i) meet ANSI 87.1 standards, and (ii) provides a complete seal around the eyes. The ANSI approval stamp can be found on the body or lens.

Just because eyewear meets Z87.1 standards does not necessarily mean it provides adequate protection from the dangers of splashed chemicals. Eyewear that does not provide a complete, snug seal around the eyes may be fine for some activities but not when using hazardous chemicals. When vent openings are provided on splash goggles the vents should be indirect, with covers and/or baffles preventing straight-line passage of liquids into the goggle.

Recommended goggles:

American Allsafe* MonoGoggle* VPC Goggles, meet ANSI Z87.1-1989.

American Allsafe Revolutions Goggles, Z87.1 2003.

Elvex Visionaire II Anti-Fog Chemical Goggle - Dual Lens.

Uvex* futura* 9301 Chemical Splash Goggles, meet ANSI Z87.1-1989 [Ideal for spectacle wearers].

Uvex* classic* 9305 Chemical Splash Goggles, meet ANSI Z87.1-2003.

Clothing Protection

Students are required to provide their own full length lab coat. Lab coats are designed to protect the wearer from chemical splashes and offer some flame resistance. The coat should be of the correct size and properly fitted. Cotton lab coats are recommended over synthetic fiber coats which may adhere to the skin on melting. Due to the possible absorption of chemicals lab coats should not be worn outside the chemical laboratory.

Hand protection

Not required unless you have sensitive skin or allergies to certain chemicals. Gloves will be provided when necessary.

Provided Personal Protective Equipment

Hand Protection

Gloves are provided and should be worn when handling hazardous chemicals, hot or cold materials, or substances of unknown toxicity. When selecting and using protective gloves, laboratory workers should take precaution.

There is no glove currently available that will protect against all chemicals.

1. Selection: For concentrated acids and alkalis, and organic solvents, natural rubber, neoprene or nitrile gloves are recommended(*). For handling hot objects, gloves made of heat-resistant materials should be used. A hot object should never be picked up with rubber or plastic gloves. Special insulated gloves should be worn when handling very cold objects such as liquid N_2 or CO_2.

It is important to wear gloves that are resistant to the material being used. In an accident, the wrong type of glove can be more hazardous than no gloves at all, keeping hazardous chemicals in prolonged contact with the hands.

2. Inspection: Before use, gloves should be inspected for discoloration, holes, and tears. This becomes especially important when working with extremely corrosive material. Rubber and plastic gloves may be checked by inflating with air and submersing them in water to check for air bubbles.

3. Use: Gloves should always be rinsed with a compatible solvent, soap and water prior to and after use.

4. Removal: When removing, keep the working surface of the glove away from hands and skin. The glove should be removed starting from the wrist and then pulled toward the fingers. Wash hands as soon as possible after removing gloves.

Remove gloves before handling common objects such as pens, doorknobs, elevator buttons, etc.

(*) neoprene is good for protection against most common oils, aliphatic hydrocarbons, and certain other solvents, but is unsatisfactory for use against aromatic hydrocarbons, halogenated hydrocarbons, ketones, and many other solvents.

CHEM1215: Student Contact Information Form

As a student enrolled in a science course with a laboratory component, your safety and the safety of others in the laboratory are of paramount importance.

The instructor may need to contact someone on your behalf should an emergency arise. The form will be kept by your instructor for use only during your enrolment in this laboratory course. At the end of the course, the data sheet will be destroyed.

Course Number: _____ Course Name: _____

Semester: _____ Year: _____

Name: _____ Student Number: _____
Home address: _____
_____
_____
Home phone: _____Work Phone: _____

Primary Person to contact in an emergency:
Name: _____ Relationship: _____
Home address: _____
_____
_____
Home phone: _____Work Phone: _____

Secondary Person to contact in an emergency:
Name: _____ Relationship: _____
Home address: _____
_____
_____
Home phone: _____Work Phone: _____

Relevant Medical Conditions/allergies or
Issues:_____
_____
_____

Other information or
comments:_____
_____
_____

Student Signature:_____ Date:_____