Matter and Minerals
Fall 2005

Chemistry Lab/Workshop
Week 1

We will meet in Lab II, 3216 on Thursday of Week 1, from 9 a.m. – 1 p.m.

Prepared and Presented by
Dr. Dharshi Bopegedera

Pre-Workshop Assignment

(To be completed prior to attending the workshop)

This work will be collected at the beginning of the workshop. You will not be permitted into the workshop unless this is submitted.

Please note:

1. "Chemistry Text" refers to "Chemistry", 6th edition, by Steven Zumdahl & Susan Zumdahl, Houghton Mifflin Co., New York, ISBN: 0-618-61032-4

2. Do the following assignment in your "chemistry workshop notebook". This could be a 3-ring binder (preferred) or a bound book. Use this "chemistry workshop notebook" for your chemistry workshop work only (not for your chemistry lab work).

1. Read Chapter 1 of the Chemistry Text twice. Write down three questions you have concerning this chapter and bring it to class.

2. Write down the steps of the "scientific method".

3. Complete the following table.

Physical quantity	**SI unit**	**Common unit you are familiar with**
Mass		
Length		
Time		
Temperature		
Volume		

4. Familiarize yourself with the information given in Table 1.2 of the Chemistry Text (page 9). We will use this **all year**. For now **memorize** the following part of the table.

Prefix	**Symbol**	**Exponential notation**
mega	M	10^{6}
kilo	k	10^{3}
centi	c	10^{-2}
milli	m	10^{-3}
micro	μ	10^{-6}

5. Read page 10 of text ("Chemical Impact" – Critical Units!)

6. Read Appendix 1.1 for a review of exponential notation. We will work with these all year.

7. Define precision and accuracy in your own words.

8. Define random error and systematic error in your own words.

9. Read carefully the rules for significant figures in Chapter 1 of your Chemistry Text (pages 14, 15 and 16).

10. Complete the following table.

Number	Scientific notation	Significant figures
0.0165	1.65×10^{-2}	3
3.123		
9.0264		
100.0		
33.20		
1200		
0.0045		

11. Compute the following and report the answer to the correct number of significant figures (first calculate the answer and then round off to get the correct number of significant figures). Read page 16 of the Chemistry Text for "rules for rounding". **Show all work.**

3.92 x 4.657 =

9.65 + 1.1 + 3.263 =

Workshop Activities (To be done in class)

This work will be collected at the end of the workshop.

Work in pairs.

Recognizing lab equipment

1. Locate the following lab equipment. Draw a rough sketch of each piece of equipment (not an artistic diagram but should be easily recognizable) and write a couple of sentences about
    - what it is used for
    - the accuracy of measurement with this equipment

    a) graduated cylinder
    b) beaker
    c) volumetric pipette
    d) burette
    e) top loading balance
    f) analytical balance
    g) test tube

Uncertainty in measurements

1. You are provided with the following lab equipment. Some are filled with water. Please be careful not to spill any.
    - Determine the amount of water in each container to the correct number of significant figures.
    - Determine the correct units.
    - Show the uncertainty in the measurements.

equipment	volume (include units)	uncertainty
Beaker		
Graduated cylinder		
Pipette		
Burette		
Volumetric flask		

2. Determine the length indicated by arrows on the **two** rulers provided (marked with a red arrow and a blue arrow) to the correct number of significant figures. Show the uncertainty in your measurement.

3. Use a top loading balance to determine the weight of an Erlenmeyer flask. Record it to the correct number of significant figures and show the uncertainty in measurement.

Write down the ID of the Erlenmeyer flask. Draw a picture of an Erlenmeyer flask in your notebook.

4. Use an analytical balance to determine the weight of the **same** Erlenmeyer flask. Write it down to the correct number of significant figures and show the uncertainty in measurement.

Precision, accuracy, random error and systematic error

1. Weigh 10 **different** popcorn kernels **separately** using the **same** analytical balance. Use forceps to handle the popcorn kernels and discard the kernels after weighing them so that no one else can use them. Record the weights of the popcorn seeds and the ID number of the balance. Use a table such as the one below.

ID number of the balance –

seeds	weight (g)
1	
2	
3	
4 etc.	

2. Using a calculator, determine the average weight of a popcorn kernel using the above data. Assume from now on that this average weight you calculated is the correct weight you obtained for a popcorn kernel.

3. Compare the correct weight you obtained above with the "real weight" of 0.1400 g and write a short paragraph about the accuracy of your data.

4. Write a short paragraph about the precision of your data.

5. Does your data represent random error or systematic error? Explain using your own words.