Academic Chemistry Intro HW Packet

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Measuring Length and Volume

1) The abbreviation for centimeter is _____

2) Which of the following pieces of equipment is used to measure centimeters?
   a) Balance b) calculator c) graduated cylinder d) ruler

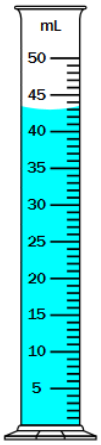
3) 100 centimeters is equal to _____ meter(s)

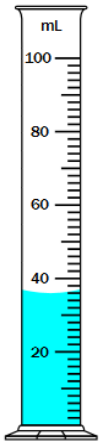
4) The abbreviation for milliliter is _____.

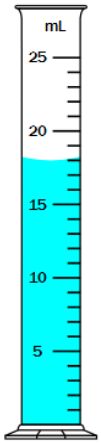
5) Milliliters are a measure of _____.
   a) Volume b) mass c) length d) time

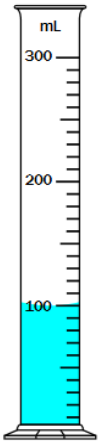
6) 1000 mL is equal to _____ liter(s).

Directions: For the following questions read the piece of equipment provided to the correct number of estimated digits. Be sure to use units of measurement as well.

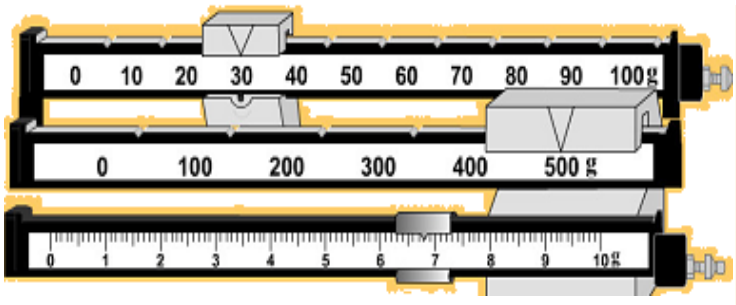


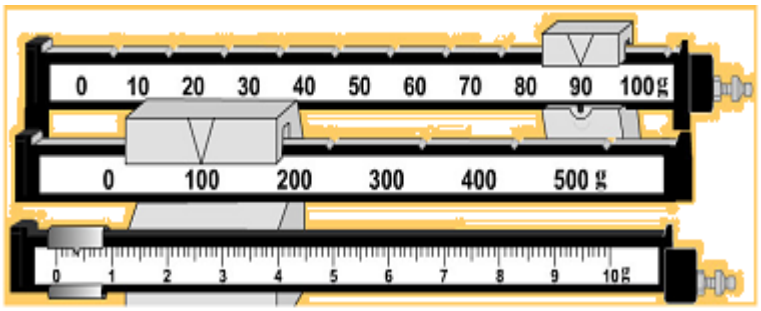






7)_____ 8)_____ 9)_____ 10)_____





11)_____ 12)_____

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Scientific Notation

Directions: Convert the following to scientific notation.

1) 0.005 _____
2) 5,050 _____
3) 0.0008 _____
4) 7,000 _____
5) 7,000,000,000 _____
6) 0.250 _____
7) 0.000809 _____
8) 0.00910 _____
9) 0.000028 _____
10) 40 _____

Directions: Convert the following to standard notation.

1) 1.5×10^{3} _____
2) 3.75×10^{-6} _____
3) 8.0×10^{0} _____
4) 2.2×10^{4} _____
5) 6.7×10^{-2} _____
6) 9.7×10^{-4} _____
7) 1.2×10^{-1} _____
8) 1.0×10^{9} _____
9) 4.32×10^{-5} _____
10) 1×10^{1} _____

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Metrics and Dimensional Analysis

Part I: Fill in the missing parts of the metric table below.

Prefix	Mega			Deka	Base			milli		Nano	
symbol		k			(g)				μ		

Part II: Compare the following values. Circle the larger value. If the values are the same write same under the problem.

a) 63 cm or 6 m b) 7000 mg or 70000 ng c) 3.6 m or 36 cm

d) 536 dm or 5.36 km e) 10 hL or 100 L f) 9000 ps or 900 cs

Part III. Convert the following problems using dimensional analysis. Show all of your work and include units.

1) 1000 mg =_____g

2) 198 g =_____kg

3) 8mm =_____cm

4) 5.6 L =_____cL

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5) 75 mL =_____L

6) 26,000 cm =_____nm

7) 50µg =_____hg

8) 0.900 dL =_____cL

9) 1.7×10^3 L =_____pL

10) 0.900 ng =_____Mg

11) 3hrs =_____seconds

12) 4500 mg =_____ g

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Directions: Solve each of the following problems. Show all of your work and include any units of measurement.

$$\%\ error = \left|\frac{Actual - Experimental}{Actual}\right| \times 100$$

1) As the result of experimental work, a student finds the density of a liquid to be 0.1369 g/cm^3. The known density of that liquid is 0.1478 g/cm^3. What is the percent error of this student's work?

Actual Value:

Experimental Value: Answer_____

2) The melting point of potassium thiocyanate determined by a student in the laboratory turned out to be 174.5 ^{o}C. The accepted value of this melting point is 173.2 ^{o}C. What is the percent error in this reading?

Actual Value:

Experimental Value: Answer_____

3) A student weighs a beaker and records its mass as 47.21 g. The actual mass of the beaker is 47.93 grams. What is the student's % error?

Actual Value:

Experimental Value: Answer_____

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Accuracy and Precision

1) Define Precision:

2) Define Accuracy:

3) The following measurements were made to determine the density of a material whose value was, according to the Handbook of Chemistry and Physics, **1.24 g/mL**

Trial #1	1.20 g/mL
Trial #2	1.22 g/mL
Trial #3	1.22 g/mL

a. make a general statement on the **accuracy** of these results

b. make a general comment on the **precision** of these results

4) Below is data produced by groups measuring the mass of a paperclip which had a known mass of 1.0003 g. The last row represents the average of their measurements. Answer the questions using the data.

	Group A	Group B	Group C	Group D
Trial #1	1.01 g	2.86322 g	1.013251 g	2.06 g
Trail #2	1.03 g	2.75421 g	1.012358 g	0.23 g
Trial #3	0.99 g	2.18647 g	1.013255 g	0.75 g
Average	1.01 g	2.60126 g	1.013255 g	1.01 g

a) Which group(s) has/have the most accurate average?

b) Which group(s) are the most precise?

c) Which group is the most accurate and precise? How can you tell?

3. Suppose the GPS on your phone is not calibrated correctly. You take 3 readings at the same place and they are all close together but 14 miles from your actual location. Explain below your results in terms of accuracy and precision.

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Density

Directions: Answer the questions below. Be sure to show all of your work and include units of measurement.

$$D = \frac{m}{V}$$

1. What is the density of carbon dioxide gas if 0.196 grams occupy a volume of 100 mL.

Answer:_____

2. An irregularly shaped stone was lowered into a graduated cylinder holding a volume of water equal to 2.0 mL. The water level in the graduated cylinder rose to 7.0 mL once the stone was dropped into the cylinder. If the mass of the stone was 25 g. What is the density of the stone?

Answer:_____

3. Silver has a density of 10.5 g/cm^3. What is the volume of 5.0 grams of silver?

Answer:_____

4. Determine the mass of 29 cm^3 of magnesium. (hint: you will need your reference table)

Answer:_____

5. A sample of iron has the dimensions of 2 cm x 3 cm x 2 cm. If the mass of this rectangular object is 94 grams, what is the density of iron?

Answer:_____