Unit 1 Study Guide
Introduction to Chemistry & the Classification of Matter

E6. *Compare the physical and chemical characteristics of elements.*

Activity #1 – Prelab for "Who Kidnapped Roger Rabbit?"

Chromatography is a method for analyzing complex *mixtures* (such as ink) by separating them into the chemicals from which they are made. Chromatography is used to separate and identify all sorts of substances in police work. Drugs from narcotics to aspirin can be identified in urine and blood samples, often with the aid of chromatography.

Open Paper Chromatography. Write a paragraph summarizing the instructions.

Activity #2: Classification of Matter

Click on the links, define the following words, and take the quizzes:

MATTER – definition

1. mixture – definition

    a. homogeneous (solution) - definition

    examples:
    1.
    2.
    3.
    4.
    5.

b. heterogeneous – definition

examples:
1.
2.
3.
4.
5.

2. substance – definition

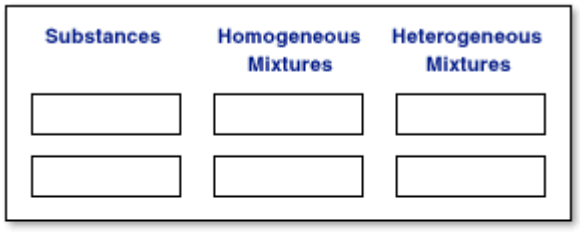
a. element – definition

periodic table – definition

b. compound – definition

DO YOU GET IT?

1) quiz yourself

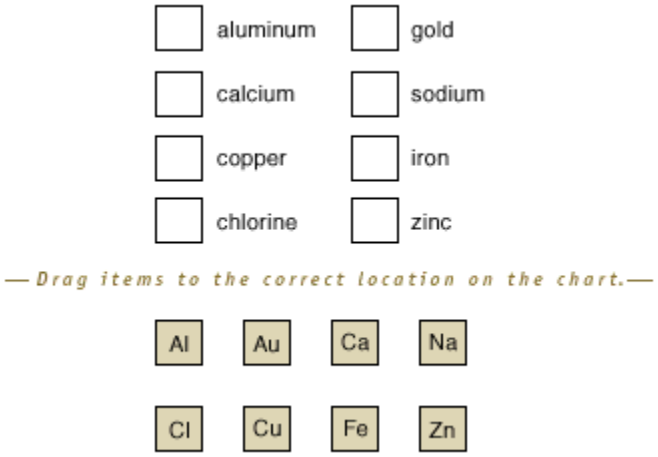


Drag item to the appropriate place on the table.-

gold | coffee | wood

butter | sugar | baking powder

2) quiz yourself



3) *quiz yourself – substance, homogeneous mixture (solution), heterogeneous mixture* or *heterogeneous solution*?

a) yogurt

b) yogurt with real chunks of fruit

c) enamel-based paint

d) table salt

4) quiz yourself – write ALL letters of samples that fit the descriptions.

Pure elements

Elements made of SINGLE ATOMS

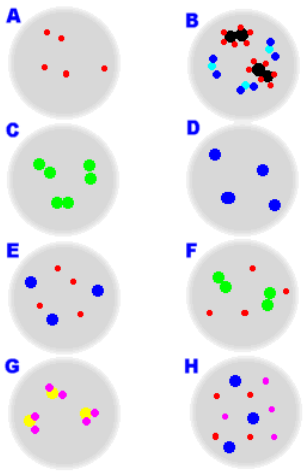
An element made of MOLECULES

Mixture of TWO elements

Mixture of THREE elements

Pure compounds

Mixture of TWO compounds



5) Need a break? Play Periodic Table Breakout or do The First Twenty Elements Word Search.

Activity #3: State of Matter

Read A View From a Distant Universe and answer these questions:

1) Why do liquids and solids have a relatively fixed volume (subject to small expansions and contractions due to temperature), whereas the volume of a gas is much more variable?

2) Why do crystalline solids have a fixed shape, whereas liquids and gases adapt to the shape of their containers?

3) What is different about the way that liquids and gases adapt to their containers?

4) What holds the molecules of a molecular liquid or solid together? Why doesn't this same factor hold for gases?

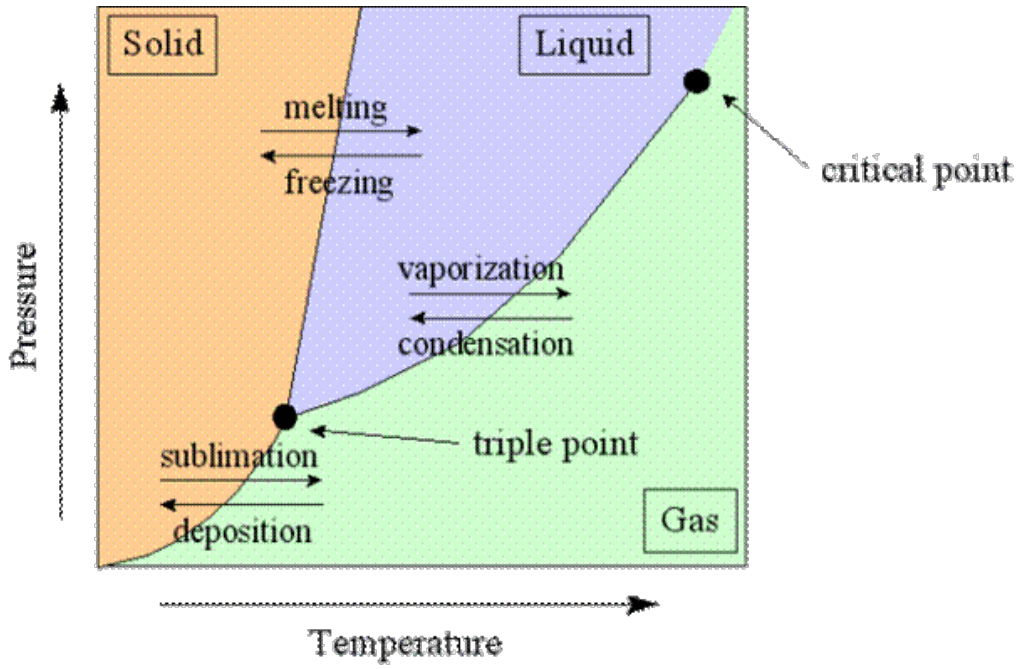
5) What were the earliest two chemical elements?

6) Why are these two elements so much rarer on Earth than they are in the universe as a whole?

Go to States of Matter.

7) Write the correct phase next to the description.
   a) _____ rigid, fixed volume, fixed shape
   b) _____ definite volume, but no definite shape.
   c) _____ no fixed shape, no fixed volume

8) A phase diagram shows the temperature-pressure relations among the liquid, solid, and vapor states of a substance, Using the diagram below, what process is responsible for each of the following changes?



   a) solid → liquid

   b) liquid → solid

   c) liquid → gas

   d) gas → liquid

   e) gas → solid

   f) solid → gas

Activity #4 - Prelab for *Lab 2.2: Mixture Separation*

Open The Mixtures Lab and perform the experiment. Fill in the following table:

	mixture	**separation mechanism**	***physical properties of each component that allow separation***
1	*sand & iron filings*		
2	*salad*		
3	*salt & water*		
4	*muddy water*		
5	*dust in air*		

In your upcoming lab, you will be separating a mixture of sand, salt, iron filings and poppy seeds.

1. What physical properties of each will help you to separate the components of this mixture?
    a. sand
    b. salt
    c. iron filings
    d. poppy seeds

2. What methods might you use to separate them?

3. In what order will you separate them?

Activity #5: Properties and Changes

Open Properties and Changes and navigate through the tutorial using the arrow keys at the bottom. Define the following words (clicking on the words in the tutorial will give you a pop-up definition from the glossary):

1) physical property
   a) definition

   b) examples:
      i) .
      ii) .
      iii) .
      iv) .
      v) .
      vi) .
      vii) .

2) chemical property
   a) definition

   b) examples:
      i) .
      ii) .
      iii) .

3) physical change
   a) definition

   b) are/are not easily reversible (circle one)
   c) examples
      i) .
      ii) .

4) chemical change
   a) definition

   b) three conditions that must be met for a chemical change
      i) .
      ii) .
      AND
      iii) .

   c) examples
      i) .
      ii) .
      iii) .
5) extensive property

a) definition

b) example

6) intensive property

a) definition

b) example

7) quiz yourself

Intensity of light	☐ extensive	or	☐ intensive
Temperature of the sun	☐ chemical	or	☐ physical
Use of coal as a fuel source	☐ chemical	or	☐ physical
Color of a flower	☐ extensive	or	☐ intensive
Height of a mountain	☐ chemical	or	☐ physical
Calories in a burger	☐ extensive	or	☐ intensive
Density of gold	☐ extensive	or	☐ intensive
Acidity of vinegar	☐ chemical	or	☐ physical

Question:

1. Dry ice sublimes; that is, it goes directly from the solid state to the gaseous state. This process is best described as a(n)

A physical change.

B chemical change.

C isothermal process.

D extensive property.

E

Question:

2. Children very often convert sugars in foods into dramatic amounts of energy. This process is best described as a(n)

A physical change.

B chemical change.

C isothermal process.

D intensive property.

E

Question:

3. One serving (1 oz.) of tortilla chips will produce 140 food calories (140 kcal) of energy. This process is best described as a(n)

A aqueous property.

B extensive property.

C intensive property.

D heterogeneous property.

E

8) Another quiz – Open Physical Vs Chemical Change and classify the following as a *physical (P)* or chemical *(C) change*.

a) Frying an Egg _____
b) Vaporization of Dry ice _____
c) Boiling water _____
d) Burning Gasoline _____
e) Breaking Glass _____
f) Souring Milk _____
g) Compression of a spring _____

Activity #6 –Evidence for Chemical Changes (Class Demos)

1. How do you know if a chemical change has occurred? Visit Chemical Change at *Wikipedia* and list ALL the things you should be looking for:

2. Define the following:
   a. endothermic

   b. exothermic

   c. precipitate

3. For each of the following demonstrations performed by your teacher, write down what evidence you observed that shows a chemical change took place. For reactions that involve an energy change, classify them as *endothermic* or *exothermic*.

   a. heating magnesium

   b. mixing a colorless solution of calcium chloride & sodium carbonate

   c. mixing a pale yellow solution of iron chloride and a colorless solution of potassium thiocyanate

   d. mixing solid magnesium and a solution of hydrochloric acid

   e. mixing a hydrochloric acid solution with a sodium hydroxide solution

   f. mixing solid barium hydroxide and solid ammonium chloride

Activity #7 –Measuring Matter

1) Open Measuring Matter and define:

   a) Inertia –

   b) Mass –

   c) Conservation of Mass –

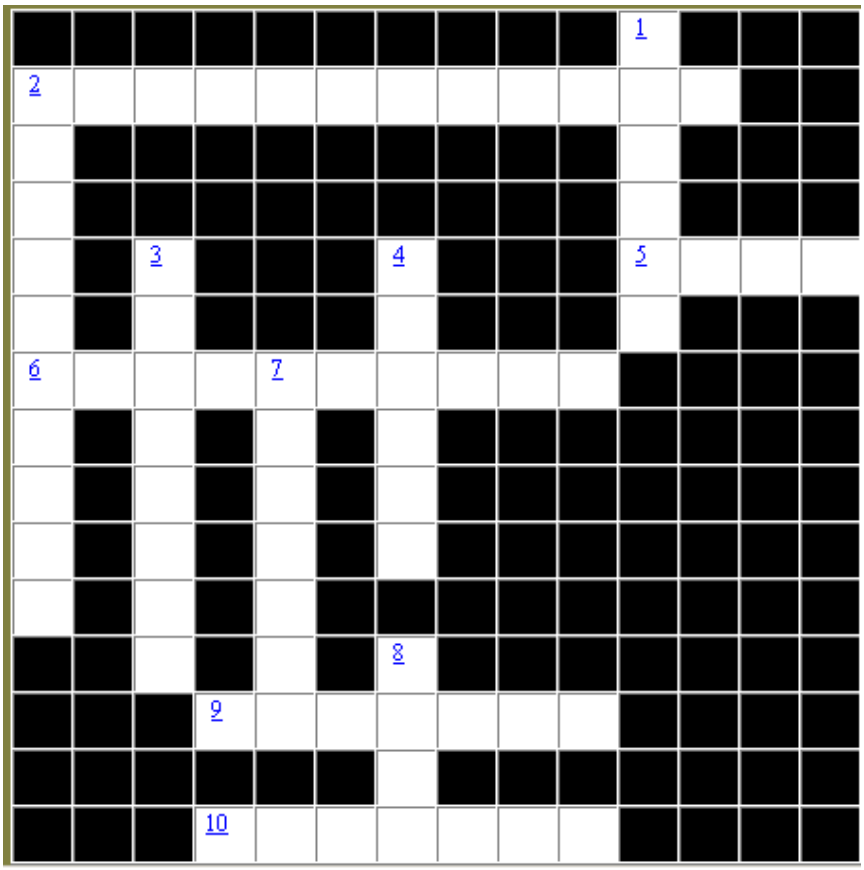
   d) Volume –

   e) Density –

   f) Weight –

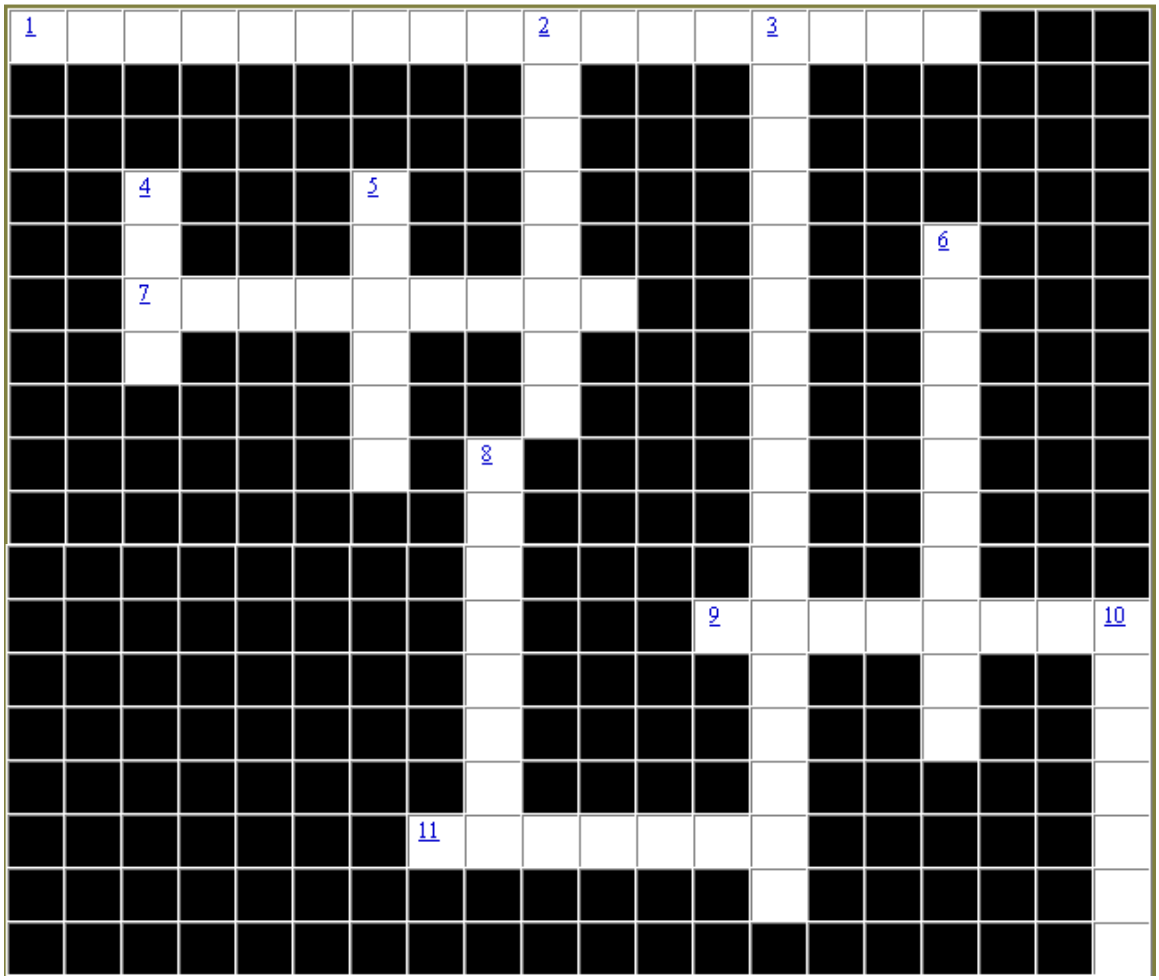
   g) Mole –

2) Open Measuring Matter Crossword, do the puzzle online, check it, & fill it in below:



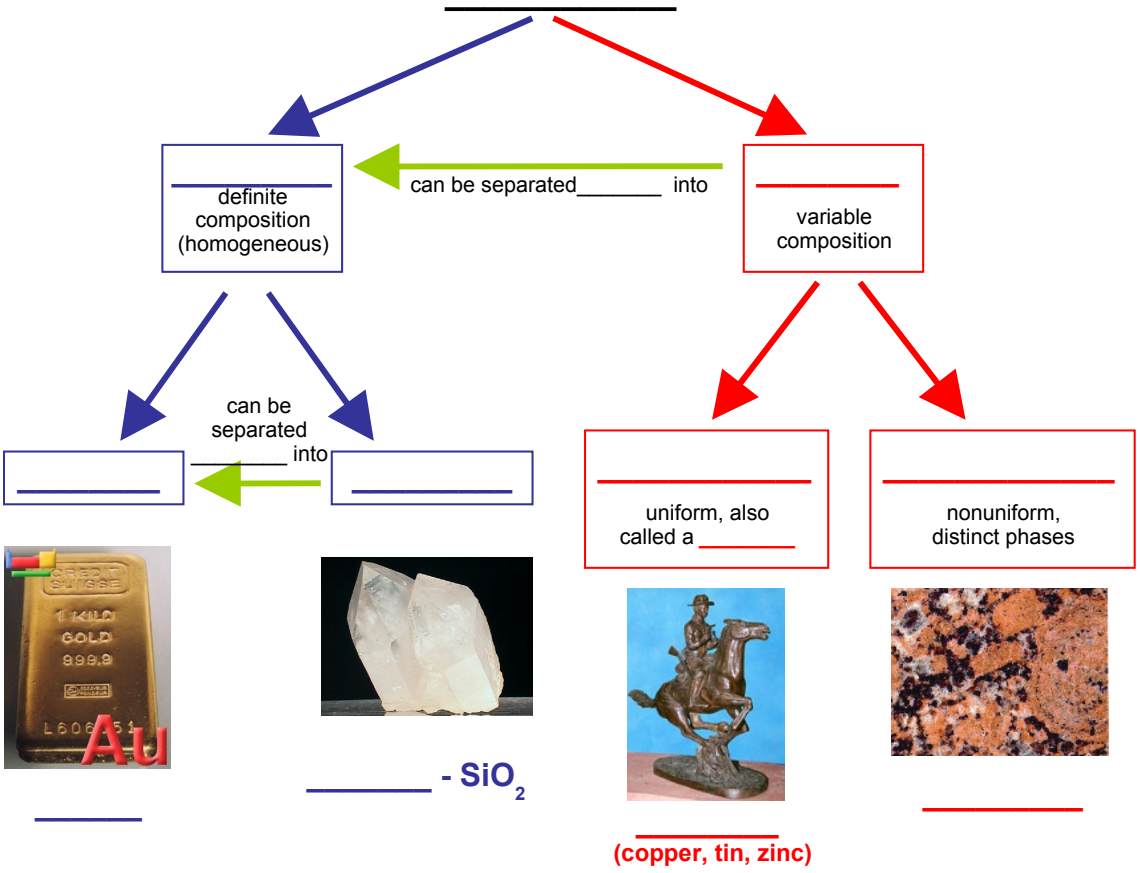
Review Activities:

1. Go to Introduction to Chemistry Vocabulary for the clues to this crossword puzzle. Do it online and then fill in your answers below.



2. Fill in this chart with the words below (have your teacher check this when you are done):

matter	substance	element
homogeneous	heterogeneous	chemically
physically	solution	alloy (bronze)
compound	quartz	granite
gold	mixture	



UNIT 1 CHECKLISTS

Unit 1 Homework (check off when done and passed in):

_____ Science Help Online Worksheet 1-4a Classification of Matter
_____ Science Help Online Worksheet 1-8a Elemental Names and Symbols
_____ Activity 2.3: Elemental Test
_____ Science Help Online Worksheet 1-5a Properties of Matter
_____ Science Help Online Worksheet 1-5d Changes in Matter

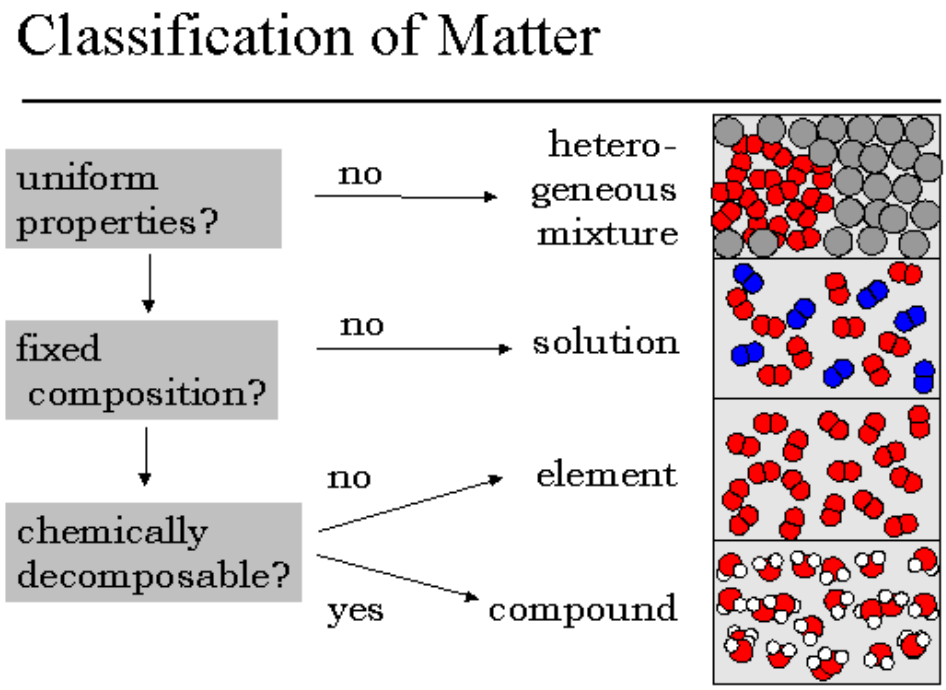
Unit 1 Web Activities (check off when done and passed in):

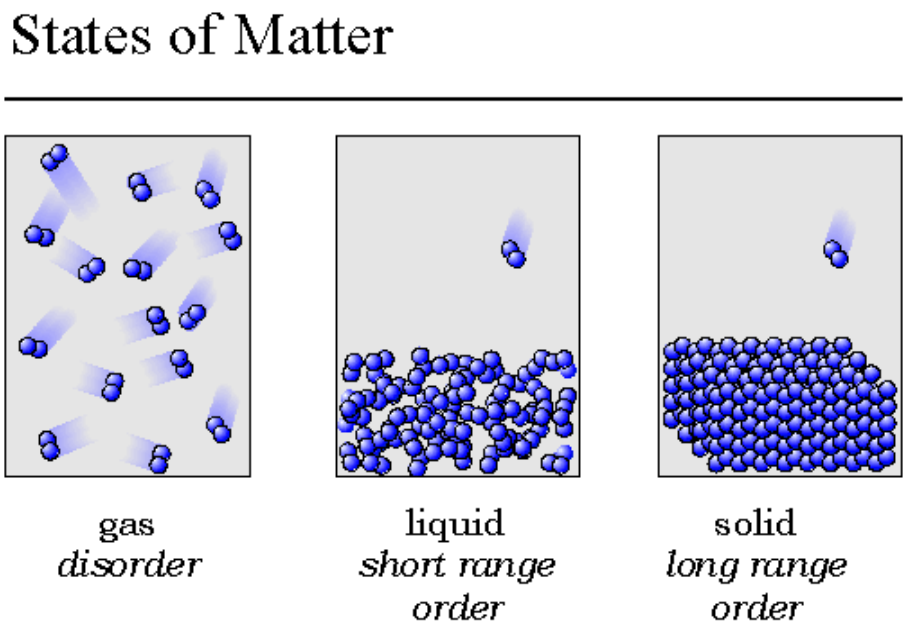
_____ Web Activity 2.2, 2.4 - Distinguishing Elements, Compounds & Mixtures
_____ Worksheet 2.2, 2.3 - More Elements Compounds and Mixtures
_____ Density - Virtual Lab

Unit 1 Labs (check off when done and passed in):

_____ Who Kidnapped Roger Rabbit?
_____ Lab 2.2: Mixture Separation
_____ Experiment 2.3 – 2.4 Electrolysis of Water
_____ Lab Addition to Ch. 2 - Density

Unit 1 Charts and diagrams:





PERIODIC CHART OF THE ELEMENTS

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIII		IB	IIB	IIIA	IVA	VA	VIA	VIIA	INERT GASES
1 H 1.00797																1 H 1.00797 / 2 He 4.0026
3 Li 6.939	4 Be 9.0122										5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312										13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	*57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.980	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	‡89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 ? (271)	111 ? (272)	112 ? (277)						

Numbers in parenthesis are mass numbers of most stable or most common isotope.

Atomic weights corrected to conform to the 1963 values of the Commission on Atomic Weights.

The group designations used here are the former Chemical Abstract Service numbers.

*Lanthanide Series

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
140.12	140.907	144.24	(147)	150.35	151.96	157.25	158.924	162.50	164.930	167.26	168.934	173.04	174.97

‡Actinide Series

90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr
232.038	(231)	238.03	(237)	(242)	(243)	(247)	(247)	(249)	(254)	(253)	(256)	(256)	(257)