BIG CHEM: Unit 2 - Matter — *Due: Friday, Oct 5, 2007*
Problem Set #2 — *Mr. Darlington*

Make sure you are following the problem set formatting guidelines as outlined in the course information sheet.

1 **Classify the following as matter or not-matter. Describe the characteristics all the items you classified as MATTER have in common that make them different from the items you classified as NOT MATTER.**

Cookie, air, water, ideas, tree, love, tune, noise, light, heat, sand, television, house, cat, thoughts, time, sound, baseball, cabinet, glass, luster, melody, force, computer

2 **What are the main differences between elements, compounds and mixtures?**

3 **Classify each of the following as element, compound or mixture:**
a silver
b sulfur dioxide
c milk
d aluminum
e oil
f copper sulfate
g seawater
h strontium
I cesium
j orange juice (shaken)

4 **Why is it that when you mix salt and water together it will stay salty and wet?**

5 **Hydrogen is an explosive gas, and oxygen supports combustion? How is it possible, then, for water, which is composed of hydrogen and oxygen, to put out fires?**

6 **What are the symbols for the following elements?**
a Hydrogen
b Oxygen
c Nitrogen
d Carbon
e Sulfur
f Fluorine

7 **What are the names of the elements with the following symbols?**
a Cesium
b Cerium
c Colbalt
d Californium
e Chromium
f Cadmium

8 **Prepare yourself for the next eaxm dealing with this topic. Mr. Darlington strongly suggests flashcards. On your problem set, simply write 'Memorize Elements' for this question. You must completely memorize the following element names with their corresponding symbols. You will be asked these on your next exam. The elements are listed after the last problem of this problem set.**

9 **Which form of matter can be decomposed by chemical means? Provide one example.**

10 **Classify the following materials as heterogeneous mixtures, homogeneous mixtures, compounds, or elements.**
a trail mix
b paper
c table salt
d alcohol
e apple
f milk
g plutonium
h water

11 **Indicate how you would demonstrate that each of the following is a heterogeneous mixture or a homogeneous mixture:**
a piece of lumber
b glass of soda
c sand from a beach
d chocolate pudding
e a bananna split with a cherry on top

12 **When sample X is passed through a filter paper a white residue, Y, remains on the paper and a clear liquid, Z, passes through. When liquid Z is vaporized, another white residue remains.**

Is sample X best classified as a homogeneous or heterogeneous mixture? Why?

13 **Filtration, condensation and distillation are processes to separate mixtures.**
Using common household items, design three brief experiments, one for each method mentioned above.
Write one paragraph about each experiment and Include a description of the properties of each mixture that allows them to be separated using the method described.

14 **Classify the following changes as chemical or physical:**
a digestion of food
b you get a haircut
c fading of dye in cloth
d growth of a plant
e mixing sugar and water
f melting of ice
g methanols is burned and leaves a residue
h baking cookies
I scratches are put in glass

j explosion of gasoline in a car engine
k formation of clouds in the air

15 Lead has a density of 11.34 g/cm^3 and oxygen has a density of 1.31 E -3 g/cm^3 at room temperature.
a How many cm^3 are occupied by one gram of lead?
b How many cm^3 are occupied by one gram of oxygen?

16 Mercury, ethyl alcohol and lead are poured into a cylinder. Three distinct layers are formed. The densities of the three substances are (each is measured in g/cm^3), mercury = 13.55, ethyl alcohol = 0.78, lead 11.4

Sketch the cylinder with the three layers. Identify the substance in each layer.

17 A piece of cement has a mass of 8.76 g and a volume of 3.07 cm3.
What is the density of this piece of cement?

18 Cork has a mass of 0.650 g and a volume of 2.71 cm3?
What is the density of a piece of cork with these measurements?

19 Ammonium magnesium chromate has a density of 1.84 g/cm3.
What is the mass of 6.96 cm3 of this substance?

20 Cerium sulfate has a density of 3.17 g/cm3.
What is the volume of 706 g of this substance?

21 The cup is a measure of volume widely used in cookbooks. One cup is equivalent to 225 mL.
What is the density of clover honey (in grams per millileter) if three quarters of a cup has a mass of 252 g?

22 A metal slug weighig 25.17 g is added to a flask with a volume of 59.7 mL. Its found that 43.7 g of methanol (d = 0.791 g/mL) must be added to the metal to fill the flask.

What is the density of the metal?

23 From the following list of qualitative observations: describe in your own words what each observation is and provide an example of something in your house that can be described by that qualitative observation.

color, texture, clarity, odor, taste, sound, malleability, ductility, brittleness, luster, conductivity, phase, hardness, reactivity, solubility, strength, elasticity

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Elements and symbols to memorize

1. Aluminum Al
2. Antimony Sb
3. Argon Ar
4. Arsenic As
5. Astatine At
6. Barium Ba
7. Berylium Be
8. Bismuth Bi
9. Boron B
10. Bromine Br
11. Cadmium Cd
12. Calcium Ca
13. Carbon C
14. Cerium Ce
15. Cesium Cs
16. Chlorine Cl
17. Chromium Cr
18. Cobalt Co
19. Copper Cu
20. Fluorine F
21. Francium Fr
22. Germanium Ge
23. Gold Au
24. Helium He
25. Hydrogen H
26. Iodine I
27. Iron Fe
28. Krypton Kr
29. Lead Pb
30. Lithium Li
31. Magnesium Mg
32. Manganese Mn
33. Mercury Hg
34. Neon Ne
35. Nickel Ni
36. Nitrogen N
37. Oxygen O
38. Phosphorus P
39. Platinum Pt
40. Potassium K
41. Radium Ra
42. Rubidium Rb
43. Selenium Se
44. Silicon Si
45. Silver Ag
46. Sodium Na
47. Strontium Sr
48. Sulfur S
49. Tin Sn
50. Uranium U
51. Xenon Xe
52. Zinc Zn