**Ch. 2: Matter homework problems**

Name and date submitted (3 pts):

Instructions: Create space in the Word document below, and write or type your answers. KEEP THE SAME NUMBER SYSTEM. Follow the turn-in instructions given in Canvas.

(20 questions, 3 points each)

1. State the operational description of matter.
2. State the operational description of energy.
3. Tell whether each of the following processes involves a chemical change, a physical change, or both.
4. Iron rusts
5. Molten aluminum solidifies
6. Sugar dissolves
7. Water freezes
8. Water is split into hydrogen and oxygen
9. Tell whether each of the following processes involves a chemical change, a physical change, or both.
	1. Wood burns
	2. A wafer of silicon being scored and cut into chips to be used in computer microprocessors
	3. Dynamite exploding and the resulting collapse of an old building
	4. A burning candlestick melting wax
10. States of Matter:

Write the correct description next to each phase change in ‘a – e’ below. Choose from this list:

Possible answers:

Condensation

Evaporation

Freezing

Melting

Sublimation

Enter the best answer next to each one below:

1. Solid to liquid
2. Liquid to gas
3. Solid to gas
4. Gas to liquid
5. Liquid to solid
6. Classify each of the following as an element or compound.
7. Oxygen (O2)
8. Carbon monoxide (CO)
9. Ozone (O3)
10. Helium (He)
11. Methane (CH4)
12. Hydrogen peroxide (H2O2)

The next 4 are essay questions. Research the chapter and the Internet. USE COMPLETE SENTENCES.

1. Man’s first flying machine was the hot air balloon. Explain how a hot air balloon works. Use correct chemistry terms, or I won’t give credit.
2. Why does a helium balloon rise even though the gas is not hot? Answer must have correct chemistry terms.
3. Why is the cooking time (listed on the package) for some foods dependent upon the elevation you’re at?
4. What is the difference between evaporation and boiling?

Multiple choice questions:

1. Only solids have
2. High compressibility
3. Low density
4. Definite shape
5. High-speed particles
6. The kinetic energy of a particle (atom or molecule for example) is directly related to its
7. Density
8. Temperature
9. Volume
10. Pressure
11. What happens to the pressure of a gas when it is heated at constant volume?
12. Decreases
13. Increases
14. Remains the same
15. Depends on which gas
16. Why do solids keep their shape?
17. The molecules move too fast
18. The molecules are locked in place
19. The molecules are still touching
20. The molecules diffuse
21. The thickness of a liquid is its
22. Density
23. Viscosity
24. Liquidity
25. Mass
26. How does the thickness of most liquids change as they heat up?
27. Less thick
28. More thick
29. No change
30. You may have noticed that when water boils, you can see bubbles that rise to the surface of the water. What is inside these bubbles?
31. Air
32. Hydrogen and oxygen gas from the H2O
33. Oxygen gas from the H2O
34. Water vapor
35. Carbon dioxide gas

Next 2 questions: The *Law of the Conservation of Mass* states that “Matter cannot be created or destroyed” in any chemical or physical process. Select the best answers, below:

1. Some students started with 1 kg of ice, melted it completely into liquid water, and then boiled that completely into steam vapor. They carefully collected all the steam vapor produced (by cleverly setting up a condenser, see picture), and determined the mass of the steam. Assuming no leaks or spills in their experiment, the mass of the steam was
2. 2 kg
3. 1 kg
4. 22.4 kg
5. 0.9 kg
6. Iron & Sulfur lab: Shirley mixed together and heated 56 grams of pure iron metal filings (Fe) and 32 grams of pure yellow powdered sulfur (S) in a container (this is an experiment we will do in this class), such that all of it was converted into a new compound called iron sulfide (FeS), a hard, black substance. She did the experiment carefully so that none of it splattered and none of it oxidized. When she measured the mass of iron sulfide produced, it was
7. 56 - 32 = 24 grams
8. 56 grams, since the Sulfur was just a powder
9. 56 + 32 grams = 88 grams
10. Can’t tell from the problem statement, because the iron and the sulfur undergo physical changes during the reaction

Experimentation and the Scientific Method

1. Confronted with the box shown in the diagram, you wish to discover something about its internal workings. You have no tools and cannot open the box. You pull on rope B, and it moves rather freely. When you pull on rope A, rope C appears to be pulled slightly into the box. When you pull on rope C, rope A almost disappears into the box.
2. Based on these observations, sketch a model for the interior mechanism of the box. Attach your sketch. SHOW THE MECHANISM, don’t scribble a bunch of circles and lines. MUST PRESENT A WORKABLE MECHANISM. This will require some creative thinking.

A B C

1. What further experiments could you do to refine your model?