1st Semester Exam Study Guide

1.) **Which of the following is NOT a compound? Explain why.**

a. H_2O

b. O_2

2.) **A chemist has discovered what she thinks is a new molecule. In order for it to be a *molecule*, it must _____.**

A. have the same properties as the elements from which it is made
B. be composed of the same elements
C. be made of two or more atoms of elements
D. contain different compounds bonded together

3.) **When iron fillings are mixed with sand, the iron can be removed using a magnet. This is evidence that the change that occurred when the two were mixed was**

A. physical.
B. chemical.
C. irreversible.
D. molecular.

4.) **Which of the following can result in the formation of a new compound?**

A. mixing food coloring and water
B. mixing iron filings and iron nails
C. combining sodium and chlorine to form sodium chloride
D. melting a solid to form a liquid

5.) **When a chemical reaction takes place, the reaction must end with the same _____ it began with.**

A. number of atoms
B. elements
C. mass of chemicals
D. All of the above

6.) According to the periodic table, which of the following elements contains more neutrons? Show your work when doing the atomic math calculations.

A. Mn
B. Fe
C. Co
D. Ni

7.) **The atoms in a can of soda (the actual drink) are _____.**

A. closely locked in position and can only vibrate
B. loosely connected and can collide and move past one another
C. free to move independently and collide frequently
D. loosely connected to one another and can flow, but do not collide

8.) Explain how the particle arrangement is effected when **a substance changes from a liquid to a solid.**

9.) **Calculate the density of an apple that has a mass of** 74.87 grams and a volume of 104.5 cm^3. Will this apple float or sink in water? Show your work and explain your answer.

10.) **An element can be classified as a metal based on its _____.**
A. malleability
B. shininess
C. ductility
D. All of the above

11.) **A student collects the following data during an experiment.**
Experimental Data
Mass of empty beaker 77.25 g
Mass of 100 mL water 100.00 g
Mass of salt 20.00 g
Total mass before mixing 197.25 g
After the salt and water are mixed in the beaker and stirred for 1 minute, what will be the mass of the Contents of the beaker? Show your work.

12.) **When ice begins to melt at 0°C, describe and illustrate what happens to the water molecules in regards to particle arrangement and molecular behavior.**

13.) **In the late 1700s, Antoine Lavoisier performed a series of experiments to find out what happened when a substance burned. In each experiment, he observed that the weight of a container and its contents were the same at the end of the experiment as it had been in the beginning. These observations led him to propose which Law? Write out what the law states.**

14.) **Based on their locations in the periodic table, write the names of 3 elements that have chemical properties MOST similar to those of calcium, Ca?**

15.) **Aluminum is an element. Which of the following BEST describes the smallest particle of aluminum that retains all the properties of aluminum?**
A. a molecule
B. an atom
C. a proton
D. an electron

16.) **When geologists are trying to identify certain rocks, they often place a few drops of diluted hydrochloric acid on the rocks. Sometimes the rocks effervesce when acid is dropped on them. What are the geologists MOST likely trying to determine?**
A. the age of the rocks
B. the density of the rocks
C. the amount of minerals in the rocks
D. the chemical properties of the rocks

17.) **A beaker contains a liquid and an object. The object is floating on top of the water. What must be true regarding the liquid and the object seen in the beaker?**
A. The liquid is denser than the object.
B. The object is less dense than the liquid.
C. The object has less mass than the liquid.
D. The liquid has more mass than the object.

18.) **The following are examples of how materials can change chemically.**
*Piece of iron left outdoors in the rain=> Rust forms
*Stack of firewood used in fireplace =>Becomes smoke and ashes
*Copper penny placed in vinegar=> Gas bubbles form
Explain why these changes are classified as chemical changes?

19.) **Which of the following choices BEST describes two atoms of oxygen that are chemically bonded to each other? Explain your answer with words and an illustration.**
A. molecule
B. compound
C. solution
D. mixture

20.) **A student studies three chemicals in a laboratory investigation:**
Sodium Chloride- table salt, Calcium, and Carbon Dioxide
Which of the three chemicals cannot be further broken down into other chemicals using ordinary laboratory processes? Explain your answer.

21.) **A potter molded wet clay into the shape of a bowl and let it dry. Explain if the clay went through a physical of a chemical change when it became a bowl.**

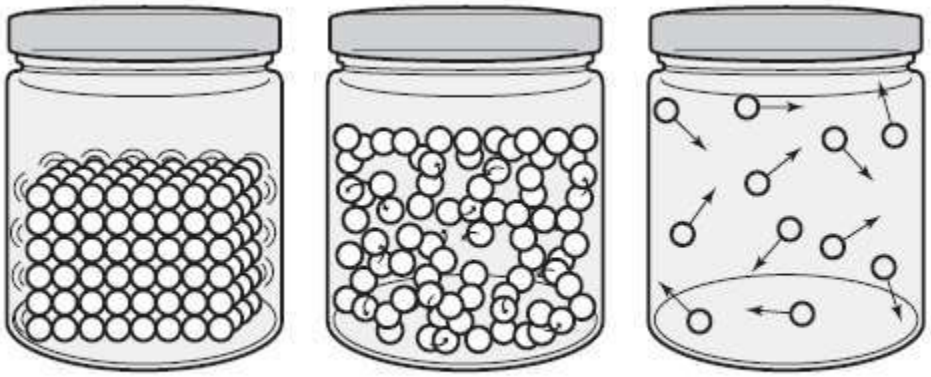
22.) **Using a closed system, a student heats 100 milliliters (mL) of distilled water in a flask. The steam from the water is captured, cooled, and condensed as shown in the diagram.**
How much water is MOST likely collected? Explain what a "closed system" means.

23.) **Jonas was making bread. The chart shows the steps in the recipe he was using.**
Steps in Bread Making
1. Combine two cups of flour with sugar, salt, and yeast.
2. Heat milk, water, and butter until warm.
3. Beat two minutes.
4. Add one egg and one cup of flour.
5. Knead (press) the dough until it is smooth.
6. Cover and place in a warm place so the dough can rise.
7. Place in a pan and bake at 325°F for 20 minutes.
When making fresh bread, which step involves a chemical change? Explain your answer.

24.) **A science class is studying the states of matter. One group of students freezes 100 grams (g) of water in a cup. Another group of students melts 50 g of ice in a cup. Which of these will MOST likely occur at the end of the experiment? Explain the Law that supports this scenario?**
A. The temperature of both cups will be the same.
B. Both samples in the cups will be in the same state.
C. Both groups will have the same mass with which they started.
D. The time required for the changes in states of matter will be the same.

25.) **The choices below show a number of changes occurring.**
Which one(s) is a chemical change? Explain your answer.
A. the melting of the wax
B. the burning wick of the candle
C. the sugar dissolving in the tea
D. the steam coming from the tea

26.) The three jars show the movement of particles in three states of matter.
Dry ice is solid carbon dioxide. As dry ice is heated, it goes directly from a solid to a gas through a process called sublimation.



Which sequence of jars shows the change in the motion of particles of dry ice as it sublimes?
A jar P to jar Q
B jar P to jar R
C jar Q to jar R
D jar R to jar P

27.) A student is heating water to make hot chocolate. He begins thinking about the effect of heating on the particles of water.
Which of these statements correctly describes how the particles of water are affected as the water is heated?
A The particles start moving faster.
B The particles start moving slower.
C The particles start vibrating in fixed positions.
D The particles start expanding to take up more space.

28.) A student performs an investigation to determine the properties of an iron nail. The list shows her findings.

The nail can rust.
The nail is denser than water.
The nail is very hard.
The nail can be bent.

Which statement is correct about the student's findings?
A Rusting is a physical property of iron.
B Hardness is a chemical property of iron.
C Rusting and bending are chemical properties of iron.
D Density and hardness are physical properties of iron.

29.) The table identifies characteristics of two substances, P and Q.

P	Q
Composed of the same type of atoms	Composed of two types of atoms
Has fixed melting point	Does not have fixed melting point

Which of these can be concluded about substances P and Q?
A P and Q are both compounds.
B P is an element and Q is a mixture.
C P is a mixture and Q is a compound.

D P is a compound and Q is an element.

30.) Kinetic and Potential Energy

a. Create a Venn Diagram to compare and contrast Kinetic and Potential Energy. Give at least 2 facts per section.

b. Create 2 different illustrations describing kinetic and potential energy.

1.) One of the two pictures should illustrate a scenario in which two objects are shown. One object should be shown having more kinetic energy due to its mass and speed.

2.) One of the two pictures should illustrate a scenario in which two objects are shown. One object should be shown having more potential energy due to its height and mass.