Study Guide: Structure and Chemistry of Matter

1. Define matter.

2. What is the difference between mass and weight?

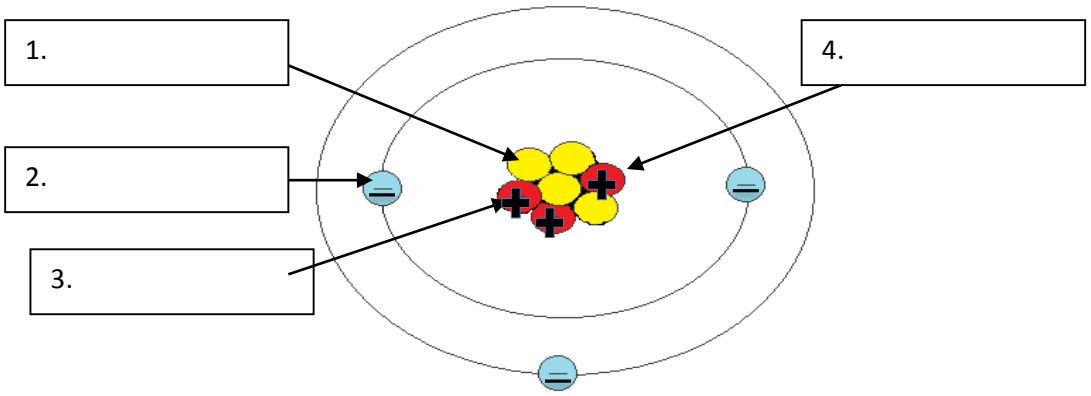
3. What is the difference between an element, an atom, and a molecule?

4. Draw an example of each.

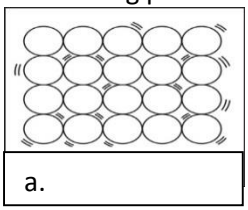
5. There are 3 subatomic particles in the atom. Fill in the blanks in the following chart, including the name, charge, and location of the particle.

Particle	Charge	Location

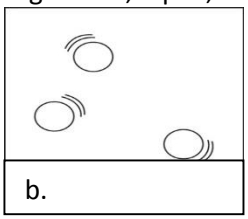
6. Label the atom below:



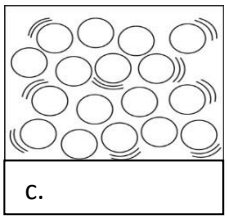
7. Label the following pictures as representing a solid, liquid, or gas.



a.



b.



c.

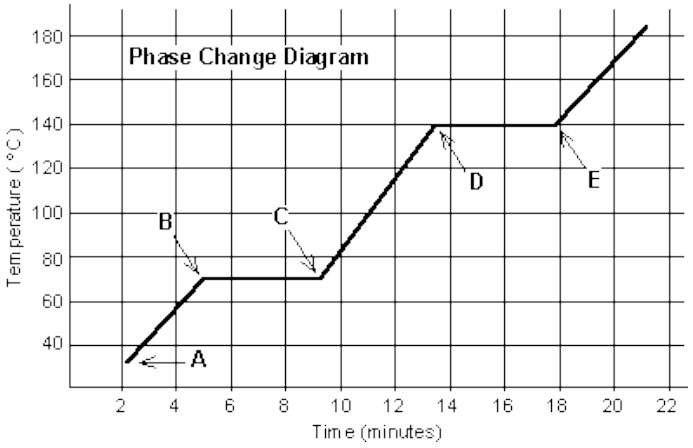
8. What is plasma?

9. The statements below describe solids, liquids, or gases. Rewrite the statements in the correct box in the table below, identifying if they describe solids, liquids, or gases.

-definite shape, definite volume
-INdefinite shape, definite volume
-matter is most dense
-matter vibrates in place
-matter is least dense
-takes shape of container
-molecules moving fast and spread far apart
-indefinite shape and indefinite volume
-molecules slide past each other

Solids	Liquids	Gases

Use the phase change diagram below to answer the questions beside them.



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a. What is the melting point of the substance? _____°C

b. What is the freezing point of the substance? _____°C

c. What is the boiling point of the substance? _____°C

11.

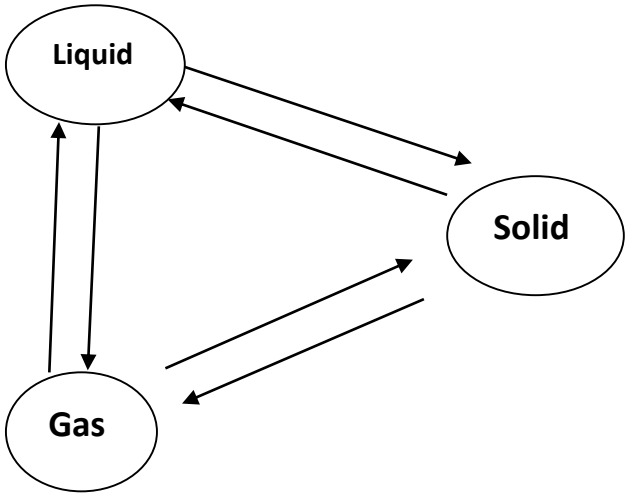
a. From point A-B, the substance is a _____.
a. solid b. liquid c. gas

b. From point C-D, the substance is a _____.
a. solid b. liquid c. gas

c. After point E, the substance is a _____.
a.solid b. liquid c. gas

12. Complete the following chart.

Phase Change		Endothermic or Exothermic?
	Solid → Liquid	
	Liquid → Solid	
	Liquid → Gas	
	Gas → Liquid	
	Solid → Gas	
	Gas → Solid	



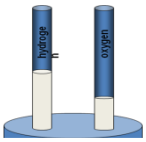
13. Determine whether the pictures below represent a physical change(P) or a chemical change (C).

a. 
Milk sours

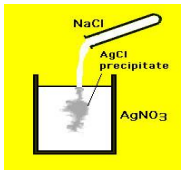
b 
Ice melts

c. 
A reaction produces light

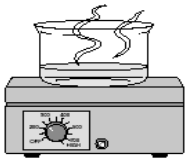
d. 
A can is crushed

e. 

Electricity used to separate water into H_2 and O_2

f. 

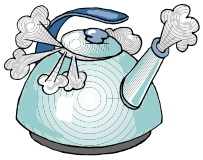
A precipitate forms when two substances are mixed

g. 
Salt water left to evaporate

h. 
An iron nail rusts

i. 
Cutting potatoes

j. 
Cooking pancakes

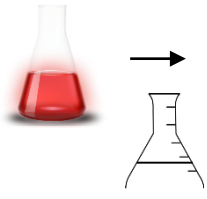
k. 
Water boils

l. 
Burning a match

m. 
A reaction produces a gas (bubbles)

n. 

o. 
Candle wax melts

p. 
A solution changes color when mixed with another

14. Determine whether the scenarios below represent a physical property (P) or a chemical property (C).

_____a. Oxygen is odorless and colorless.

_____b. Gold is nonflammable.

_____c. Copper turns green when exposed to the environment.

_____d. The silver spoon tarnished and turned dark.

_____e. The piece of metal is magnetic.

_____f. Water is a liquid.

_____g. The density of water is 1.0 g/mL

_____h. The boiling point of water is 100^{o} C.

_____i. Diamonds are a very hard substance.

_____j. The compound is combustible.

_____k. The tree is 8 meters tall.

_____l. The ball is yellow.

_____m. The soap is alkaline.

_____n. The mass of the bicycle is 20 kg.

_____o. Sodium reacts very easily with other elements.

_____p. The car travels at 100 meters per second.

_____q. Copper conducts electricity.

_____r. The lemon is acidic

_____s. The mass of the NaCl sample is 30 g.

_____t. Iron reacts with oxygen and forms

_____u. The honey's viscosity is greater than the viscosity of water.

_____t. Iron reacts with oxygen and forms rust.

15. What is the difference between an acid and a base?

16. How do we measure the difference mentioned in question 13?

17. Students working on their science fair experiment combined baking soda (20 g) and vinegar (30 g) in a beaker, resulting in a bubbly substance that expanded and overflowed. When the mixture settled, the mass was 48 grams.

a. Define the Law of Conservation of Mass.

b. Explain how the 2 grams of matter "disappeared."

18. What is the formula for calculating density? What are the units used to measure density?

19. You are asked to determine the identity of an unknown substance. You are given a 2 gram sample of the substance that has a volume of 5 cm^3. Which of the 4 substances in the table to the right do you have? **SHOW YOUR WORK!**

Substance	Density
Paraffin	0.8 g/cm^3
Graphite	0.4 g/cm^3
Charcoal	0.24 g/cm^3
Dextrose	0.5 g/cm^3

Use the chart below to answer the next 2 questions.

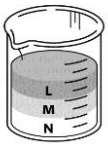
Substance	State	Density (g/cm^3)	Color
Helium	gas	0.0001663	colorless
Iron pyrite	solid	5.02	metallic yellow
Mercury	liquid	13.55	metallic gray
Oxygen	gas	0.001331	colorless
Water	liquid	1.00	colorless

20. If iron pyrite were dropped into a beaker of mercury, would it sink or float? Explain your answer.

21. If iron pyrite were dropped into a beaker of water, would it sink or float? Explain your answer.

For the questions below, calculate the density of each substance described. Then, use the chart to determine the identity of the substance. YOU MAY NEED TO ROUND! SHOW YOUR WORK & UNITS!

22. 49 g of this substance has a volume of 7 cm^3.



23. 14 g of this substance has a volume of 14 mL.

Substance	Density (g/mL)
Air	0.00129
Gasoline	0.70
Olive oil	0.89
Water	1.0
Ice (0 °C)	0.92
Aluminum	2.7
Zinc	7.0
Iron	7.8
Nickel	8.8
Silver	10.5
Gold	19.3
Platinum	21.4

24. 107 g of this substance has a volume of 5 cm^3.

25. 14 cm^3 of this substance has a mass of 147 g.

26. 10 mL of this substance has a mass of 8.9 g.

27. 8 cm^3 of this substance has a mass of 70.4 g.

28. 20 mL of this substance has a mass of 14 g.

29. Which substance in the beaker to the right has the greatest density?

30. Which substance in the beaker to the right is the least dense?