

#3 Structure of Matter: Each of the more than 100 elements of matter has distinct properties & a distinct atomic structure. All forms of matter are composed of one or more of the elements. (Chapters 3, 4, 12)

- Know the structure of the atom & know it is composed of protons, _____, & electrons.
- _____ are formed by combining two or more different elements & compounds have properties that are _____ from their constituent elements.
- Atoms & molecules form solids by building up repeating _____, such as the crystal structure of NaCl or long-chain polymers.
- The states of matter (solid, liquid, gas) depend on _____ motion.
- In _____ the atoms are closely locked in position & can only vibrate; in _____ the atoms & molecules are more loosely connected & can collide with & move past one another; and in _____ the atoms & molecules are free to move independently, colliding frequently.
- Know how to use the periodic table to identify elements in simple compounds.

Draw a "cube of each" solid, liquid & gas and show how their atomic structure is different

--	--	--

3. Classify each phrase as a **S** (solid), **L** (liquid) and/or **G** (gas).

SCORE 1/2pt ea _____/8

1. _____ molecular movement is the greatest 2. _____ takes shape of container 3. _____ weak bonds between molecules, may collide & move past one another 4. _____ spreads in all directions	5. _____ virtually no bonds between molecules, move independently 6. _____ molecule movement is the smallest 7. _____ spreads in direction of gravity 8. _____ atoms closely locked in position & vibration	9. _____ has mass 10. _____ has definite volume 11. _____ does not expand 12. _____ expands 13. _____ has shape of its own 14. _____ has no definite volume 15. _____ hard to deform 16. _____ takes up space
--	--	--

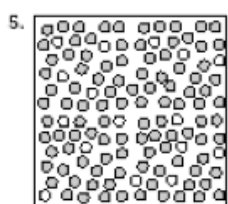
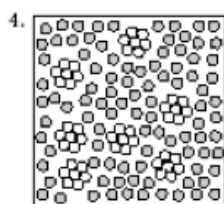
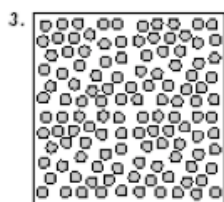
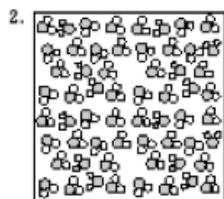
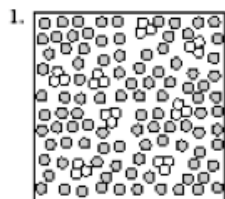
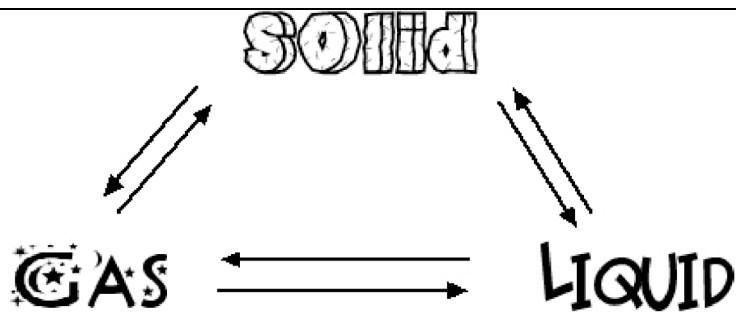
Definitions to know:

<p>Use these words</p> <p>Boiling</p> <p>Change of state</p> <p>Condensation</p> <p>Endothermic</p> <p>Evaporation</p> <p>Exothermic</p> <p>Freezing</p> <p>Gas</p> <p>Liquid</p> <p>Melting</p> <p>Plasma</p> <p>Solid</p> <p>States of matter</p> <p>Sublimation</p> <p>Vaporization</p> <p>SCORE 1/2pt ea _____/7</p>

- _____ : the physical forms in which a substance can exist
- _____ : state in which matter has a definite shape & volume
- _____ : state which matter takes the shape of its container but has a definite volume
- _____ : state in which matter changes and has NO definite shape or volume
- _____ : the state which matter doesn't have a definite shape/volume and particles are broken apart
- _____ : the conversion of a substance from one physical form to another
- _____ : the change of state from a solid to a liquid
- _____ : the change of state from a liquid to a solid
- _____ : term used to describe a change in which energy is absorbed
- _____ : term used to describe a change in which energy is released or removed
- _____ : the change of state from a liquid to a gas; includes boiling and evaporation
- _____ : vaporization that occurs throughout a liquid
- _____ : vaporization that occurs at the surface of a liquid below its boiling point
- _____ : the change of state from a gas to a liquid
- _____ : the change of state from a solid directly into a gas

4. Label the arrows (changes of states). Use the following terms:

condensation,
evaporation,
deposition,
freezing,
melting,
sublimation.



5. Different Substances

Label each box (1-5) below with the type of substance it BEST models: **colloid**, **compound**, **element**, **solution** or **suspension**.

Next to the box, explain WHY you matched the substance with that particular box. Use Chapter 4, pages 82-97.

Definitions to Know!

1. _____: some clumps still, not fully mixed

2. _____: particles are all identical, but made of two substances

3. _____: all particles are identical and of the same substance

4. _____: large clumps of solute, not all mixed up

Solution: most mixed substance, no clumps

For each pair, explain the differences in their meanings:

1. exothermic/endothemic: Exothermic changes _____ / endothermic changes _____

2. Boyle's Law / Charles's Law:

_____ states that when the pressure of a gas increases, its volume decreases.

_____ states that when the temperature of a gas increases, its volume increases

3. Evaporation/boiling:

_____ is the change of a liquid to a gas at the surface of a liquid.

_____ is the change of a liquid to a gas throughout a liquid.

Use Chapters 3, 4, and 12 to answer the following questions.

Please be sure to include the correct number and label the following parts: *nucleus*, *protons*, *neutrons*, *electrons*.

1. Draw the Lewis structure of a **carbon atom**.

2. Draw a Lewis structure of a **neon atom**.

Match the definition with the correct word: WRITE THE WORD IN THE BLANK!

Compound, element, proton, neutron, electron

_____ : positively charged particles in the nucleus

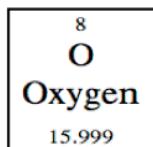
_____ : neutral (no charge) particles in the nucleus

_____ : negatively charged particles found in the electron cloud

_____ : a pure substance composed of 2 or more elements that are chemically combined

_____ : a pure substance that can't be separated or broken down into a simpler substance by chemical or physical means

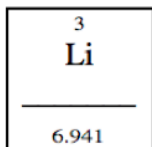
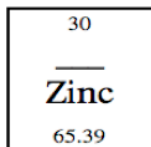
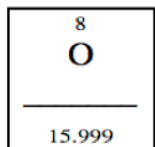
Fill in the Blanks



← _____
 ← _____
 ← _____
 ← _____

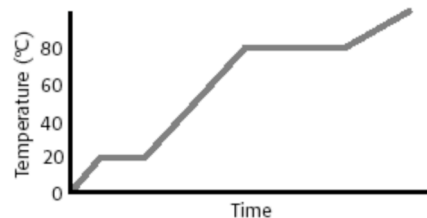
Atomic number equals the number of _____ or _____
 Atomic mass equals the number of _____ + _____

1 pt each ____/3



Atomic # = _____	Atomic # = _____	Atomic # = _____
Atomic Mass = _____	Atomic Mass = _____	Atomic Mass = _____
# of Protons = _____	# of Protons = _____	# of Protons = _____
# of Neutrons = _____	# of Neutrons = _____	# of Neutrons = _____
# of Electrons = _____	# of Electrons = _____	# of Electrons = _____

Examine the graph & answer the following questions.



1/2pt ea ____/2

1. What is the boiling point temp of the substance?
2. What is the melting point temp?
3. Which state is present at 30°C?
4. How will the substance change if energy is added to the liquid at 20°C?

4. Counting Atoms: State the name & number of each element in the following compounds. 1/2pt ea ____/2.5

CH ₄ Carbon – 1 Hydrogen – 4	FeBr ₂	PbSO ₃	H ₂ SO ₄	Na ₂ CO ₃	Zn(HCO ₃) ₂
---	-------------------	-------------------	--------------------------------	---------------------------------	------------------------------------

Sample Test Questions for Matter & Atoms: Do your BEST! Graded: SCORE 1/2pt ea ____/16.5

1. Which of the following **best** describes an atom?

- a) protons & electrons grouped together in a random pattern
- b) protons & electrons grouped together in an alternating pattern
- c) a core of protons & neutrons surrounded by electrons
- d) a core of electrons & neutrons surrounded by protons

2. Which of the following is found farthest from the center of an atom?

- a) nucleus
- b) proton
- c) neutron
- d) electron

3. When magnesium (Mg) metal is burned in the presence of oxygen (O₂), magnesium oxide (MgO) is produced. The properties of magnesium oxide are different than the individual properties of magnesium and oxygen because magnesium oxide is

- a) a solution
- b) a mixture
- c) a compound
- d) an element

4. The state of matter of a substance depends upon how the particles in that substance

- a) freeze.
- b) move.
- c) expand.
- d) shrink.

5. What are the chemical symbols for the two elements found in iron oxide?

- a) I and O
- b) Ir and O
- c) Fe and O
- d) Pb and O

6 Which of the following sentences best describes the process that occurs when liquid water becomes ice?

- a) Energy is added to the water, so its molecules move more slowly.
- b) Energy is added to the water, so its molecules move more quickly.
- c) Energy is removed from the water, so its molecules lock into place.
- d) Energy is removed from the water, so its molecules move apart.

7. Substances can undergo physical changes or chemical changes. What is the difference between these two kinds of changes?

- a) A chemical change can often be undone, & a physical change cannot.
- b) A physical change cannot be observed easily, and a chemical change can.
- c) A chemical change affects only the physical properties of a substance. A physical change changes the molecular structure of a substance.
- d) A physical change does not affect the identity of a substance. A chemical change changes the molecular structure of a substance.

8. An element is made up of

- a) two kinds of atoms.
- b) one kind of molecule.
- c) one kind of atom.
- d) two kinds of molecules.

9. A substance changes state from a liquid to a solid. Which of the following is true of that substance?

- a) It passes through a plasma state.
- b) It can return to a liquid state.
- c) It will soon become a gas.
- d) It will remain permanently solid.

10. Plasma is the most common state of matter in the universe. How are plasmas different from gases?

- a) Plasmas conduct electric currents.
- b) Plasmas have a definite shape.
- c) Plasmas have a definite volume.
- d) Plasmas are unaffected by magnetism

11. Within a substance, atoms that collide frequently and move independently of one another are most likely in a

- a) Liquid
- b) solid
- c) gas
- d) crystal

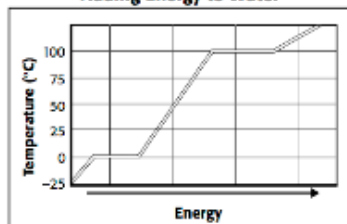
12. The molecules in an unknown substance collide with and slide past each other. They are moving quickly enough that the substance's vapor pressure equals the atmospheric pressure. How would you classify the unknown substance?

- a) It is a gas at its condensation point.
- b) It is a liquid at its boiling point.
- c) It is a solid at its melting point.
- d) It is a liquid at its freezing point.

13. Which of the following sentences best describes table salt, NaCl?

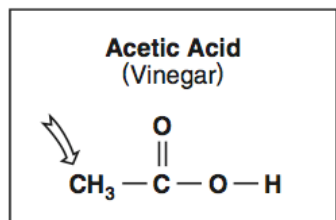
- a) Table salt is a compound made from two gases.
- b) Table salt is a compound made from a solid and a liquid.
- c) Table salt is a compound made from two metals.
- d) Table salt is a compound made from a metal and a nonmetal.

Adding Energy to Water



14. The graph shows the effect of adding energy to water at sea level. When the temperature reaches 100°C, what happens to the water molecules as energy continues to be added?

- a) The water molecules gain energy as the temperature continues to rise.
- b) The water molecules gain no energy and the temperature stays the same.
- c) The water molecules become more ordered as the state changes to a gas.
- d) The water molecules move farther apart as the state changes to a gas.



15. What is the name of the indicated atom in the acetic acid molecule shown?

- a) Carbon b) Calcium c) Chromium d) Copper

16. Which of the following statements best describes the particles contained in a glass of milk?

- a) They are closely locked into position and can only vibrate.
- b) They are loosely connected and can slide past each other.
- c) They have broken apart.
- d) They move about freely.

17. A change in the state of matter always includes

- a) a loss of energy.
- b) a gain of energy.
- c) a change in the chemical properties of a substance.
- d) a change in the physical form of a substance

18. WHAT STATE OF MATTER IS THIS? solid to liquid
a. boiling b. condensation c. evaporation d. melting

19. WHAT STATE OF MATTER IS THIS? solid to gas
a. sublimation b. condensation c. evaporation d. melting

20. WHAT STATE OF MATTER IS THIS? liquid to gas
a. sublimation b. condensation c. evaporation d. melting

21. WHAT STATE OF MATTER IS THIS? liquid to solid
a. sublimation b. condensation c. freezing d. melting

22. WHAT STATE OF MATTER IS THIS? gas to liquid
a. sublimation b. condensation c. freezing d. melting

23. WHAT STATE OF MATTER IS THIS? gas to solid
a. sublimation b. condensation c. freezing d. deposition

24. Dry ice sublimates. This means it goes directly from:
a. a liquid to a gas b. a solid to a liquid c. a solid to a gas d. a gas to a liquid

25. Something is a solid, liquid, or gas because of:
a. its name b. its chemical formula
c. how its molecules and atoms are moving (or not moving)
d. none of the above

26. To make a solid turn into a liquid, you must
a. put heat INTO the solid b. take heat OUT OF the solid
c. summon the help of little green aliens d. avoid the Bermuda Triangle

27. To make a liquid turn into a gas, you must
a. put heat INTO the liquid b. take heat OUT OF the liquid
c. summon the help of little green aliens d. avoid the Bermuda Triangle

28. To make a gas turn into a liquid, you must:
a. cool down the gas so that the molecules are TOUCHING.
b. compress the gas so that the molecules are TOUCHING.
c. I don't know. I was distracted by my cell phone in class
d. BOTH A & B.

29. In which state of matter are the molecules and atoms NOT touching each other most of the time?

- a. solid b. liquid c. gas d. water

30. What is an indicator such as litmus paper used for?

- a. Testing for chlorine b. Testing for salt
- c. Testing for acidic, basic, or neutral d. All of these

31. What are the molecules in a helium balloon doing?

- a. the molecules are stuck together and not moving (only vibrating in place)
- b. the molecules are TUMBLING AROUND
- c. the molecules are BOUNCING off of each other.
- d. aqueous

32. If litmus paper turns RED, this means the chemical being tested is:

- a. neither an acid nor a base (neutral) b. neutral c. a base d. an acid

33. What is true about any substance that has a CRYSTAL structure?

- a. There is a regularly repeating internal arrangement of its atoms.
- b. It is diamond-shaped. c. It is made out of carbon bonded to oxygen.
- d. They have magical powers.