Name: _____ Period: _____ Score: _____

LEARNING GUIDE 41: PRESSURE, VOLUME, AND TEMPERATURE

ANSWERS TO YOUR QUESTIONS

Q. What do I have to do?

Complete each section in this learning guide. As you are completing the exercises, think about the major concepts. Use colors to enhance your explanations in drawings and your concept map. Test yourself as you work through the guide. You should spend 45 minutes to 1 hour each night on this guide.

Q. How do I do it?

Start on the first night with the simple tasks, i.e. vocabulary, reading the textbook as well as the lecture notes, and complete the reading guides. The second night should be a "proof" night. Complete the problems near the end of the guide, complete the summary tables, and finish your concept map. If you have troubles with a section then seek help in tutoring.

Q. How do I know I learned it?

Each section builds on difficulty. You know you've learned the material if you are able to use the vocabulary in context, complete the summary tables, draw a concept map, and correctly answer the questions on the last page as well as solve the chemistry problems at the end of the learning guide.

Q. How do I show I learned it?

You show you have learned this material when there are no blanks and you turn in the completed work to earn full credit. Finally, you are able to correctly answer quiz and exam questions.

Q. What do I get when I learned it?

Each learning guide is equivalent to a take home exam (25%); this means each guide is worth 2.5% of your ***final*** grade. Missing four learning guides constitutes a drop of 1 full letter grade in the class!

STATE STANDARDS

- Learning Guide 41 is the fifth in a series focused on Unit 4
- 4. a. Students know the random motion of molecules and their collisions with a surface create the observable pressure on that surface.

Place your answers to learning guide 41 in your 3-ring binder, Unit 4.

Name: _____ Period: _____ Score: _____

MAJOR CONCEPTS

- Explain why gases are easier to compress than solids or liquids
- Describe the factors that affect gas pressure

VOCABULARY

Define each vocabulary word.

Absolute temperature scale p. 135	Diffusion	Pressure p. 399
Absolute zero p. 408	Effusion (L)	Random motion
Atmospheric pressure	Kelvin p. 135	Rate of diffusion
Barometer p. 400	Kinetic Molecular Theory p. 426	Standard atmosphere (atm)
Celsius p. 135	Molar volume p. 431	Standard temperature & Standard pressure p. 431
Collisions	Pascal p. 402	

Absolute temperature scale		
Absolute zero		
Atmospheric pressure		
Barometer		

Place your answers to learning guide 41 in your 3-ring binder, Unit 4.

Celsius		
Collisions		
Diffusion		
Effusion		
Kelvin		
Kelvin p. 135		
Kinetic Molecular Theory p. 426		

Molar volume p. 431		
Pascal p. 402		
Pressure p. 399		
Random motion		
Rate of diffusion		
Standard atmosphere (atm)		
Standard temperature & Standard pressure p. 431		

Name: _____ Period: _____ Score: _____

MIND MAP

Create a mind map using the vocabulary and concepts found in this workbook.

Name: _____ Period: _____ Score: _____

READING

Chapter 13.1, 13.8, 13.9, 13.10, & 13.11

Using one paragraph per section, summarize the five sections you just read.

Part I: Important Concepts (List seven important ideas found during the reading)

Section 13.1

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Section 13.8

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Section 13.9

1. _____
2. _____
3. _____
4. _____

5. _____
6. _____
7. _____

Section 13.10

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Section 13.11

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Name: _____ Period: _____ Score: _____

Part II: Summaries

Using one paragraph per section, summarize the three sections you just read.

Section 13.1

Section 13.8

Section 13.9

Name: _____ Period: _____ Score: _____

Section 13.10

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Section 13.11

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

READING GUIDE

Complete Reading Guide 41

13.1, 13.8, 13.9, 13.10, 13.11

Chapter 13

1. Scientists study matter by making _____ that are then formulated into _____.
2. An explanation of observations based on the microscopic world is a _____ or _____.
3. What happens to a gas sample's volume when you cool the gas?

4. What is the model called that is used to explain gas behavior?

Name: _____ Period: _____ Score: _____

13.1

8. 5. One property of a gas is that it exerts _____ on its surroundings.
9. 6. What causes the can to crumple?
10. What is a barometer?
11. What keeps the mercury in the tube?
12. Atmospheric pressure results from what?
13. What atmospheric event often accompanies a drop in atmospheric pressure?
14. The pressure units mm Hg (or torr) are based on the _____ of the mercury column.
15. How many torr are there in one standard atmosphere? _____ How many psi in 1 atm? _____

13.8

16. According to the kinetic molecular theory, gases consist of _____ particles that have essentially _____ volume. The particles are constantly _____ and do not attract or _____ each other. The average kinetic energy of these particles is directly proportional to the _____ temperature of the gas.

13.9

17. What does the temperature of a gas reflect?
18. The Kelvin temperature of a gas is directly proportional to what?
19. What happens to the impacts as the temperature increases and as particle speeds increase?
20. What does the kinetic molecular theory predict will happen to the volume of a gas as we raise its temperature at constant pressure?

13.10

21. What two assumptions have we made about the particles of an ideal gas?
22. Under what two conditions will the facts that real gases take up space and attract each other become important?

13.11

23. The molar volume of an ideal gas is 22.4 L at:

24. In a gas stoichiometry problem, what must we use if the conditions of the problem are different from STP?

LECTURE NOTES

Combine your notes from class with the notes on TheChemBook. Use the Cornell Notes Strategy to review your notes each night (5 min.).

Introduction to standard set 4.

Standard set 4 is the gas laws. Students are introduced to the kinetic molecular theory to explain pressure, temperature, properties of gases, factors influencing gas pressure, the gas laws, ideal gases, and finally diffusion and effusion explained through Graham's law.

Properties of Gases

A. Expansion

    1. Gases do not have a definite shape or volume

    2. Gases take the shape of their containers

    3. Gases evenly distribute themselves within a container

B. Fluidity

    1. Gas particles easily flow past one another

C. Low Density

    1. A substance in the gaseous state has 1/1000 the density of the same substance in the liquid or solid state

D. Compressibility

    1. Gases can be compressed, decreasing the distance between particles, and decreasing the volume occupied by the gas

The Kinetic Theory and a Model for Gases

A. Assumptions of the Kinetic-Molecular Theory

    1. Gases consist of large numbers of tiny particles that are far apart relative to their size

    2. Gas particles undergo elastic collisions

        a. Collisions in which no energy is lost

    3. Gas particles are in constant, rapid motion. They therefore possess kinetic

energy, the energy of motion

Kinetic Energy and Temperature

A. Formula for Kinetic Energy

KE = ½ mv^2, where m = mass and v = speed

B. Relationship to Temperature

1. The average kinetic energy of gas particles depends on the temperature
2. All gases at the same temperature have the same average kinetic energy
    a. Small molecules (small mass, *m*) have higher average speeds
3. Kelvin temperature is directly proportional to the average kinetic energy of a substance
    a. 0 Kelvin = absolute zero = NO kinetic energy

QUESTIONS AND PROBLEMS

1. Why is mercury used in barometers and monometers instead of water?

2. What is the SI unit for pressure?

3. How do chemists explain on a molecular basis the fact that gases in containers exert pressure on the walls of a container?

4. Temperature is a measure of the average _____ of the molecules in a sample of gas.

5. Explain, in terms of the kinetic molecular theory, how an increase in the temperature of a gas confined to a rigid container causes an increase in the pressure of a gas.

6. What does it mean for a gas to behave nonideally?

JOURNAL

What points in the material strike you as important?

_____
_____
_____
_____

Have you learned anything new? If so, what did you learn?

_____
_____
_____
_____

Do you have any questions about what you learned?

_____
_____
_____
_____

How does what you learned relate to other information that you have learned in this course?

_____
_____
_____
_____

How did the class work stimulate your thinking?

_____
_____
_____
_____