WLHS / Chem / Monson

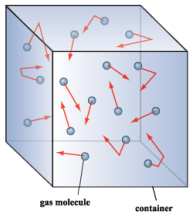
Name_____
Date_____Per_____

13.1 & 14.1 READING GUIDE: Gases & Kinetic Molecular Theory

1) Describe how gases, liquids, and solids compare using the following table.

	Solids	Liquids	Gases
Volume (definite or indefinite)			
Molecular Motion (high, med, low)			
Distance Between Molecules			

2) Read p. 420: What is **kinetic energy**? Describe **kinetic molecular theory**.



3) Identify each statement as **True or False**.

According to the basic assumption of kinetic molecular theory gas particles:

A) are far apart_____

B) have a significant volume with respect to the volume of the container they occupy_____

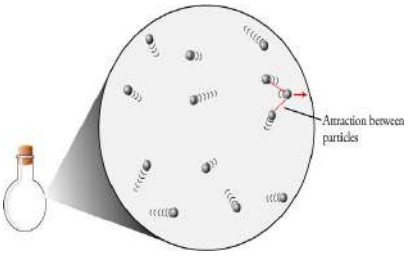
C) move rapidly in a constant random motion_____

D) lose kinetic energy when colliding_____

4) Give one economical reason why industrial companies prefer to store a condensed fuel as a liquid rather than a gas.

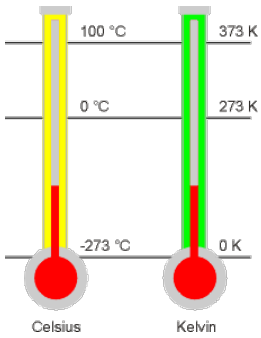
5) Using the kinetic molecular theory, explain why a gas can be easily compressed, while a liquid and a solid cannot?

6) Read pgs. 421 & 422: Describe the cause of pressure inside of any container filled with a gas. List three common units of pressure and their value at standard atmospheric pressure.



7) Read pgs 423-424: How does temperature relate to kinetic energy?

8) Why must **absolute temperature** (**Kelvin**) be used when working with gas data?



9) How are Kelvin (K) and celcius (°C) related?

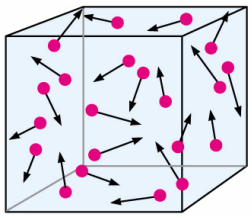
10) Inexpensive balloons filled with air deflate within a few days because the pores in the walls of the balloon are larger than most of the molecules that are found in air. Explain why inexpensive balloons filled with helium gas collapse more quickly than those filled with air. (think particle size!)

14.1 – Properties of Gases (p. 450-454)

Questions #11-14: Using the terms **particles, collisions, pressure, volume,** and **temperature** answer the following questions.

11) **Describe and explain** the effect of adding a gas to a container that cannot expand (rigid walls).

12) **Describe and explain** the effect of making the container size smaller.



13) **Describe and explain** the effect of cooling a gas in a container.

14) **Describe and explain** the effect of heating a gas in a container to twice its original temperature (in Kelvin) while also reducing the size of the container by ¼.

15) List the four variables used to measure / describe a gas and their respective units.

16) Why does a collision with an air bag cause less damage than a collision with a steering wheel?

17) If the temperature is constant, **what change in volume** would cause the **pressure** of an enclosed gas to be **reduced** to ¼ of its original value?

18) Assuming the gas in a container remains at a constant temperature, how could you increase the gas pressure in the container a hundredfold? (describe 2 ways that could work)

19) Perform the following temperature and pressure conversions: (see conversion factors below)

Temperature

22°C = _____K

-115°C = _____K

266°C = _____K

1078°C = _____K

-273 °C = _____K

354 K = _____°C

248 K = _____°C

675 K = _____°C

28 K = _____°C

110 K = _____°C

Pressure

1.15 atm = _____Pa

755 mm Hg = _____torr

12.7 atm = _____mm Hg

0.485 atm = _____kPa

772 torr = _____kPa

855 mm Hg = _____atm

244 kPa = _____atm

0.155 bar = _____atm

785 mm Hg = _____atm

355 mm Hg = _____atm

Temperature conversions:

Kelvin = °C + 273

Celsius = K – 273

Pressure conversions:

1 atm = 760 mm Hg = 760 torr

1 atm = 101.3 kPa = 101,300 Pa (1.013×10^5 Pa)

1 atm = 1.013 bar

20) A cylinder of oxygen gas is cooled from 27°C to -123 °C. By what factor does the average kinetic energy of the oxygen molecules in the cylinder decrease? (HINT: think Kelvin!)

21) The pressure at the top of Mt. Everest is 33.7 kPa. Is that pressure greater or less than 0.25 atm? (show work / reasoning) Why do climbers have to carry oxygen tanks?