Forestville Central School • AP Chemistry   Name _____
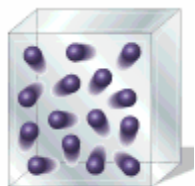
Gases

Directions: Use the Media CD to answer the following questions. SHOW all work for the problems and write in complete sentences when answering the questions. – *this is how you get full credit..hint..hint.*

Section 10.1: Characteristics of Gases

A. Describe three characteristics of gases

1. _____

2. _____

3. _____

B. Describe the arrangement and movement of particles and the sequence of heat flow in the following diagram

Gas   Liquid   Crystalline solid

Gas. _____
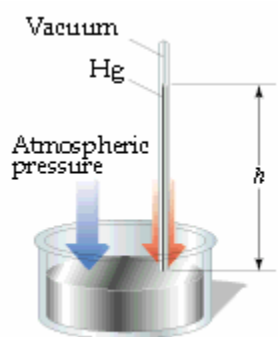
Liquid. _____

Solid. _____

C. Describe the properties of (3) of the common compounds that are gases. List the chemical formula, name and physical properties

1. _____

2. _____

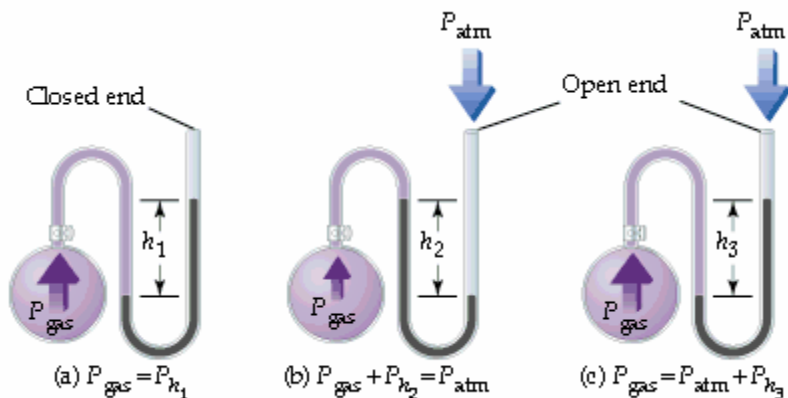3. _____

Section 10.2: Pressure

A. Define pressure including the pressure equation and units of measurement

_____
_____
_____

B. What is the following instrument used for? How does it work? _____

_____

_____

Vacuum

Hg

Atmospheric
pressure

h

The height of a column of liquid supported by atmospheric pressure is inversely proportional to the density of the liquid. Mercury has a density of 13.6 g/mL. How high a column of water (density = 1.00 g/mL) would be supported by an atmospheric pressure of 0.876 atm? (SHOW ALL WORK BELOW)

C. What is the following instrument used for? _____

_____

P_{atm}

P_{atm}

Closed end

Open end

h_1

h_2

h_3

P_{gas}

P_{gas}

P_{gas}

(a) $P_{gas} = P_{h_1}$

(b) $P_{gas} + P_{h_2} = P_{atm}$

(c) $P_{gas} = P_{atm} + P_{h_3}$

Perform the following conversions:

0.865 atm to torr

---

547 torr to kilopascals

---

755 mm Hg to atmospheres

96,300 Pa to atmospheres

Suppose that a women weighing 125 lb and wearing high-healed shoes momentarily places all her weight on the heal of one foot. If the area of the heal is 0.50 in², calculate the pressure exerted on the underlying surface in kilopascals.

An open-ended manometer containing mercury is connected to a container of gas. What is the pressure of the enclosed gas in torr in each of the following situations.

(a) The mercury in the arm attached to the gas is 5.7 cm higher than in the one open to the atmosphere; atmospheric pressure is 1.05 atm

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(b) The mercury in the arm attached to the gas is 41 mm lower that in the one open to the atmosphere: atmospheric pressure is 0.967 atm

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Section 10.3: The Gas Laws

A. What four variables must be specified to define the physical condition of a gas?

     1. _____

     2. _____

     3. _____

     4. _____

B. Define Boyle's Law including the equations

_____

_____

_____

C. Watch the video and answer the following questions:

What happens to the pressure and volume of the gas as it is compressed? _____

_____

What happens to the pressure and volume of the gas as it is uncompressed? _____

_____

D. Define Charles's Law including the equations

_____

_____

_____

E. What is Avogadro's Law? His hypothesis? _____

_____

_____

F. If you purchase a balloon filled with helium and take it outside on a cold day, you will notice that it shrinks and becomes less buoyant. What gas law explains this observation? How does it explain it?

_____

_____

G. A sample of gas occupies 10.0 L at 50°C. Assuming that pressure is constant, what volume will the gas occupy at 100°C? SHOW ALL WORK BELOW

H. Use the Gas Law machine to answer the following questions.

What is the Charles's law constant (in L/K) for 200 mg of carbon dioxide at 600 mm pressure?

○ $4.73 \times 10^{-4}\ L/K$

○ $5.64 \times 10^{-3}\ L/K$

○ $42.0\ L/K$

○ $2.11 \times 10^{3}\ L/K$

At a given temperature and pressure, which gas occupies the smallest volume per unit mass?

○ N_2

○ O_2

○ Ar

○ CO_2

○ Xe

A fixed quantity of gas at 23 degrees Celsius exhibits a pressure of 748 torr and occupies a volume of 10.3 L.
(a) Use Boyle's Law to calculate the volume the gas will occupy at 23 degrees Celsius if the pressure is increased to 1.55 atm

(b) Use Charle's Law to calculate the volume the gas will occupy if the temperature is increased to 145 degrees Celsius while the pressure is held constant.

Nitrogen and hydrogen gases react to form ammonia gas: $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

At certain temperature and pressure 0.70 L of N_2 reacts with 2.1L of H_2. If all the N_2 and H_2 are consumed, what volume of NH_3, at the same temperature and pressure, will be produced?

A sample of gas occupies a volume of 7.50 L at 0.998 atm and 28.0 Celsius.

(a) Calculate the pressure of the gas if its volume is decreased to 4.89 L while its temperature is held constant

(b) At what temperature in degrees Celsius is the volume of the gas 4.00 L if the pressure is kept constant?