

Kinetic Molecular Theory

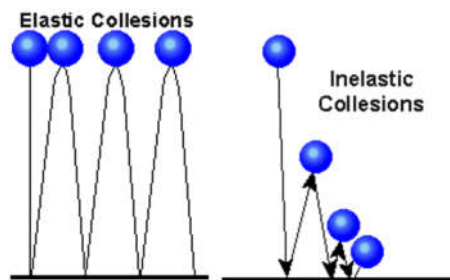
- States that particles of matter are always in _____
- Explains properties of gases, liquids, and solids in terms of energy using an *ideal gas*

Ideal Gas

- an _____ which fits all the assumptions of kinetic molecular theory

Assumptions of Kinetic Molecular Theory:

- 1.
- 2.
- 3.
- 4.
- 5.



***Note: An IDEAL GAS is THEORETICAL and is used to PREDICT the behavior of REAL GASES (O₂, H₂, He, etc.). The ASSUMPTIONS above are not true of REAL GASES.

Problems with KMT:

1. Gas atoms/molecules _____
2. _____ exist between gas molecules
3. Small volume containers result in _____ between gas molecules

Conditions in which a REAL GAS behaves MOST like an IDEAL GAS:

1. _____
2. _____ (fast moving)
3. _____
4. _____
5. _____ (more space to move, less likely to collide)

Physical Characteristics of Gases:

-
-
-

Variables that Define Gases

- _____ - how much space a gas takes up;
may be expressed in **liters, milliliters, cm³, dm³**.
- _____ – **Always expressed in Kelvin!!!!**

to convert between °C and Kelvin, you can use the following formula (yes you must know it!):

$K = ^\circ C + 273$	$K = \text{kelvin}$
	$^\circ C = \text{degrees Celsius}$

Temperature Conversion Examples:

1. The temperature of the room was measured to be 25°C. What is this temperature in Kelvins?
2. If the boiling point of a substance was measured to be 300K, what is this temperature in °C?

- _____ - how many particles are present in the sample of gas
- _____ -the force per unit area on a surface
 - Exerted by all gases on any surface they **collide** with
 - _____ cause pressure!
 - Units of Pressure: **Pascal** = Pa (SI unit of pressure); **Millimeter of mercury** = mmHg (used in a barometer); **Torr** = torr; **Atmosphere** = atm (pressure of the atmosphere at sea level=1 atm)

1 atm =

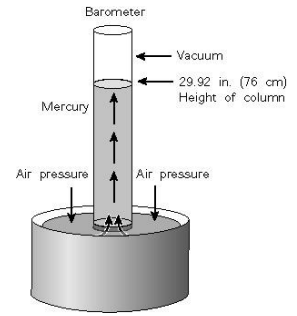
Pressure Conversion Examples:

1. What is the pressure in torr of 345mmHg?
2. What is the pressure in atm of 123 kPa?

Barometer

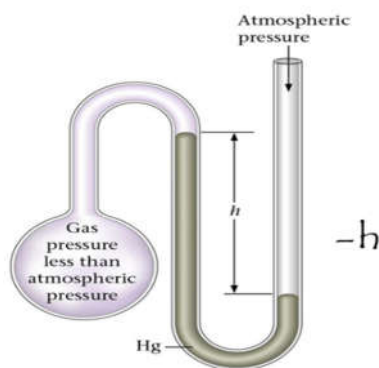
○ used to measure _____

○ The higher the altitude the _____ the atmospheric (air) pressure and the _____ the height of the mercury in the thermometer



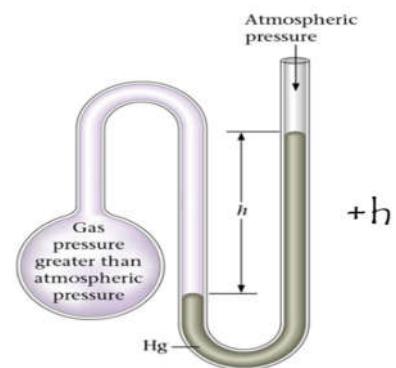
Manometer-

- measures the pressure of an enclosed sample
- Can be open or closed



(a)

Open Manometer



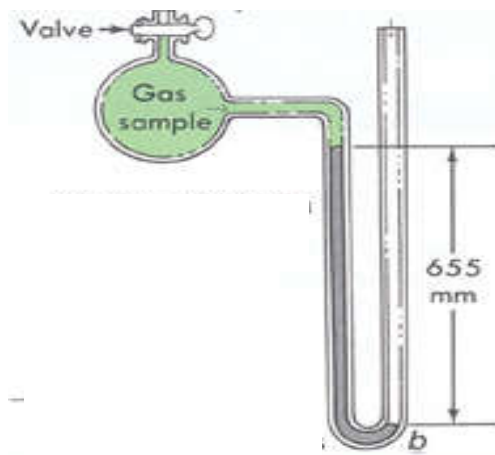
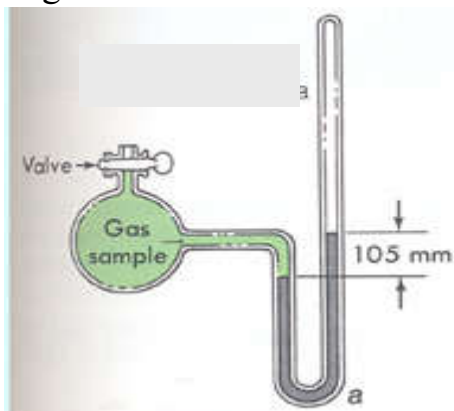
(b)

- Gas pressure is _____ than atmospheric (air) pressure when the height of the liquid in the manometer is higher on the _____. Therefore you will _____ the height and the atmospheric pressure.

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Examples:

If the atmospheric (air) pressure is 757.8mmHg, what is the pressure of the gas in each of the following manometers?



PRACTICE:

Convert the following temperatures.

1. Convert 32°C to Kelvin 2. Convert 12°C to Kelvin 3. Convert 450 K to $^{\circ}\text{C}$

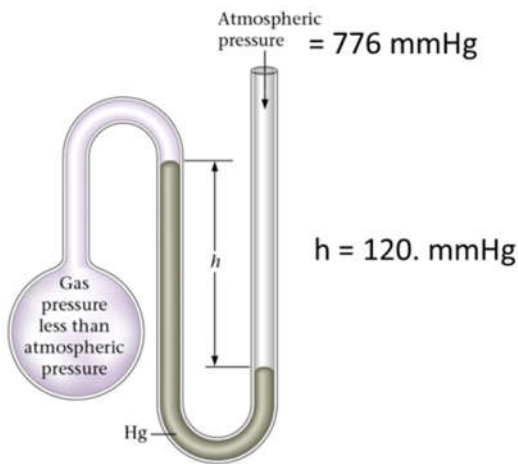
Convert the following pressures.

1. What is pressure of 1.45 atm in torr? 3. What is the pressure of 645 mmHg in kPa?

2. What is the pressure of 890 torr in Pa?

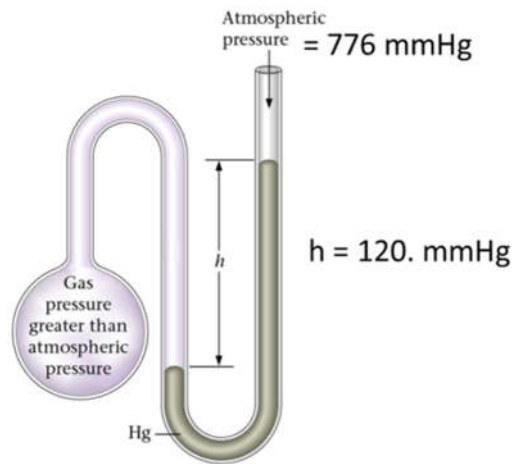
Calculate the pressure for each gas in the following open manometers.

1.



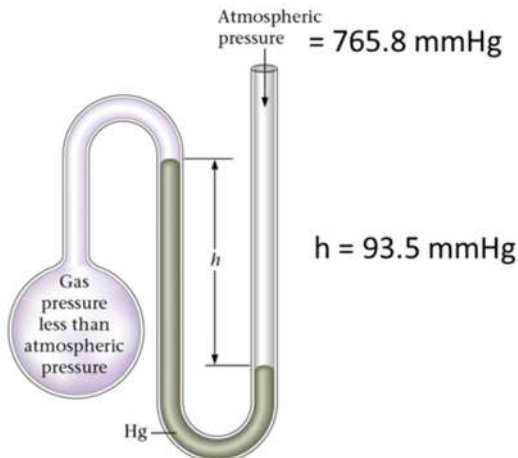
(a)

3.



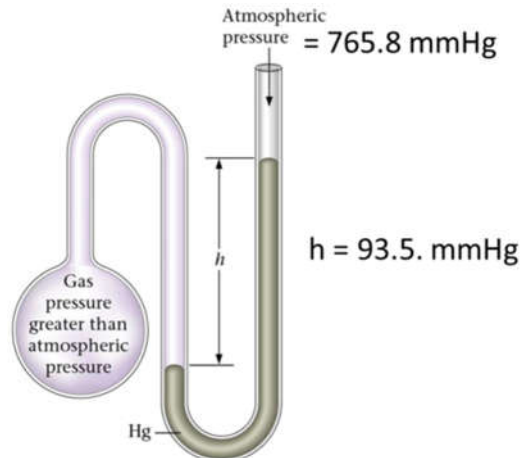
(b)

2.



(a)

4.



(b)

