Gases and Gas Laws **Name**_____

Characteristics of Gases

Read from **Lesson 1: Describing a Gas** in the **Chemistry Tutorial Section, Chapter 10** of **The Physics Classroom**:
Part a: The Nature of a Gas Part b: Pressure-Volume-Temperature-Moles

Gases have unique properties in addition to having no definite shape or volume.:

1. Gas particles are widely spaced, occupying much space.
2. Gases can be compressed due to the significant distance between particles.
3. Gas particles are treated as having mass but negligible volume.
4. The large spaces between particles result in low density.
5. Particles glide past one another easily, giving gases fluid-like behavior.
6. Gases lack a fixed shape or volume and expand to fill their container.
7. The spontaneous mixing of particles from two substances occurs due to random motion. Factors like particle speed, size, and attractive forces influence diffusion rates.
8. Gases are described by four variables.
   a. Pressure (**P**) is the force exerted by the gas per unit area, and is measured in atmospheres (atm), kiloPascals (kPa), millimeters mercury (mmHg), and torr. **1 atm = 101.3 kPa = 760 mm Hg = 760 torr**
   b. Volume **(V)** is the space occupied by a gas and is measured in liters (L) or milliliters (mL). (1000 mL = 1 L)
   c. Temperature (**T**) is a measure of the average kinetic energy of the gas particles and may be measured in Celsius but is converted to Kelvin (K) for calculations. **K = °C + 273.15**
   d. Amount of gas (**n**) is the quantity of gas present and is measured in moles (mol).

Part 1: Gas Variable Conversions

1. "Standard pressure" is defined as 1.00 atmosphere or atm. Convert the following pressures to atm. Remember to show your conversion factors.
   a. 798 torr

   b. 614 mmHg

   c. 98 kPa

2. "Standard temperature" is defined as 0 K or 273.15 °C. Convert these temperatures as indicated.
   a. "Room temperature" or 25 °C to K

   b. 546 K to °C

   c. -140 °C to K

3. Barry O'Meter drinks a 355 mL can of soda. What is this volume in liters?

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Part 2: Gas Vocabulary

Answer the following questions about gases to obtain clues about the words hidden in the word search.

1. Used to measure the average kinetic energy of a gas or a "speedometer"_____
2. The amount of space that a gas takes up: _____
3. A unit of pressure: _____
4. The trait of changing volume in response to changing pressure: _____
5. Gases have a lot of this between particles: _____
6. The intensity of a gas's pushing power upon the surfaces of the container: _____
7. _____ pressure is 101.3 kPa
8. Temperature scale with no negative numbers: _____
9. Type of energy involving motion: _____
10. SI unit for quantities of matter: _____
11. Its units are g/cm^3 or g/mL: _____
12. The spontaneous mixture of particles caused by random motion: _____
13. Measure of average kinetic energy of a gas: _____
14. Liquids and gases both have a variable one of these: _____
15. Unit of volume: _____

T Z C B O S P N K L I T E R Z
Z E M O S H Q C E E X F K U P
D B M P M A B V L E U W I U R
T Y N P U P W Y V O S J N R E
M H V M E E R M I F M V E A S
S D E O S R V E N P P I T T S
P E S R L T A H S I N E I M U
A N D B M U A T D S V E C O R
C S Q E E O M N U T I K K S E
E I P Z U Q M E D R J B V P R
G T V S J L K E C A E E L H D
D Y F G K P G H T C R X G E M
A K B M F V I W W E R D Z R O
D I F F U S I O N F R M D E L
Q R J Y E B S F T L M A A V E