Gas Laws & Vapor Pressure

1. Which statement describes particles of an ideal gas, based on the kinetic molecular theory?

   1) Gas particles are separated by distances smaller than the size of the gas particles.
   2) Gas particles do not transfer energy to each other when they collide.
   3) Gas particles have no attractive forces between them.
   4) Gas particles move in predictable, circular motion.

2. A sample of hydrogen gas will behave most like an ideal gas under the conditions of

   1) low pressure and low temperature
   2) low pressure and high temperature
   3) high pressure and low temperature
   4) high pressure and high temperature

3. Under which conditions of temperature and pressure does carbon dioxide gas behave most like an ideal gas?

   1) low temperature and low pressure
   2) low temperature and high pressure
   3) high temperature and low pressure
   4) high temperature and high pressure

4. At the same temperature and pressure, 1.0 liter of CO(g) and 1.0 liter of CO_2(g) have

   1) equal masses and the same number of molecules
   2) different masses and a different number of molecules
   3) equal volumes and the same number of molecules
   4) different volumes and a different number of molecules

5. A given sample of a gas has a volume of 3 liters at a pressure of 4 atmospheres. If temperature remains constant and the pressure is changed to 6 atmospheres, what will be the final volume of the gas?

   1) 9 2) 2 3) 18 4) 24

6. A rigid cylinder with a movable piston contains a sample of gas. At 300. K, this sample has a pressure of 240. kilopascals and a volume of 70.0 milliliters. What is the volume of this sample when the temperature is changed to 150. K and the pressure is changed to 160. kilopascals?

   1) 35.0 mL 2) 52.5 mL
   3) 70.0 mL 4) 105 mL

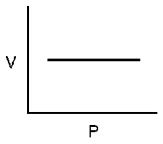
7. Which set of values represents standard pressure and standard temperature?

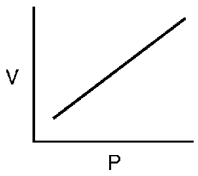
   1) 1 atm and 101.3 K
   2) 1 kPa and 273 K
   3) 101.3 kPa and 0°C
   4) 101.3 atm and 273°C

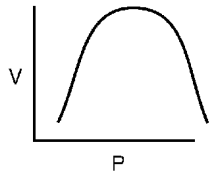
8. A cylinder with a movable piston contains a sample of gas having a volume of 6.0 liters at 293 K and 1.0 atmosphere. What is the volume of the sample after the gas is heated to 303 K, while the pressure is held at 1.0 atmosphere?

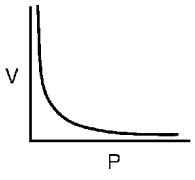
   1) 9.0 L 2) 6.2 L
   3) 5.8 L 4) 4.0 L

9. Which graph best represents the pressure-volume relationship for an ideal gas at constant temperature?

   1) 

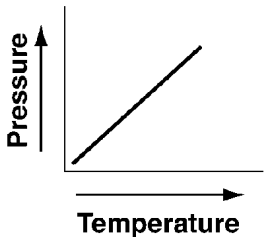
   2) 

   3) 

   4) 

More Practice

10. Which graph shows the pressure-temperature relationship expected for an ideal gas?

1)


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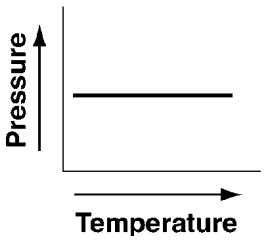

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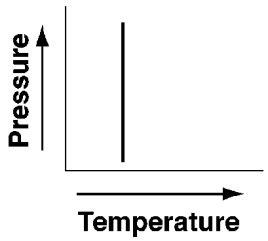

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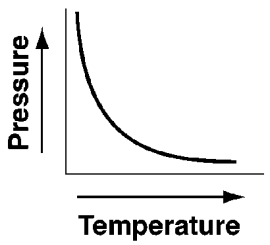

11. At which temperature is the vapor pressure of ethanol equal to 80. kPa?

1) $48^\circ C$ 2) $73^\circ C$
3) $80^\circ C$ 4) $101^\circ C$

12. According to Reference Table *H*, what is the vapor pressure of propanone at 45°C?

1) 22 kPa 2) 33 kPa
3) 70 kPa 4) 98 kPa

13. When the vapor pressure of a liquid is equal to the atmospheric pressure, the liquid will

1) freeze 2) boil
3) melt 4) condense

More Practice

Base your answers to questions **14** through **16** on the information below and on your knowledge of chemistry.

A sample of helium gas is placed in a rigid cylinder that has a movable piston. The volume of the gas is varied by moving the piston, while the temperature is held constant at 273 K. The volumes and corresponding pressures for three trials are measured and recorded in the data table below. For each of these trials, the product of pressure and volume is also calculated and recorded. For a fourth trial, only the volume is recorded.

Pressure and Volume Data for a Sample of Helium Gas at 273 K

Trial Number	Pressure (atm)	Volume (L)	P × V (L•atm)
1	1.000	0.412	0.412
2	0.750	0.549	0.412
3	0.600	0.687	0.412
4	?	1.373	?

____ 14. Compare the average distances between the helium atoms in trial 1 to the average distance between the helium atoms in trial 3.

____ 15. Determine the pressure of the helium gas in trial 4.

____ 16. State evidence found in the data table that allows the product of pressure and volume for the fourth trial to be predicted.

Answer Key
Gas Law and Vapor Pressure Practice

1. **3**
2. **2**
3. **3**
4. **3**
5. **2**
6. **2**
7. **3**
8. **2**
9. **4**
10. **1**
11. **2**
12. **3**
13. **2**
14. — The average distance between helium atoms is smaller in trial 1 than in trial 3. — In trial 3, the atoms are farther apart. — The separation is greater in trial 3. — Atoms are closer in trial 1. — The smaller the volume, the closer the gas molecules.
15. 0.300 atm
16. — Pressure times volume for the first three trials is constant at 0.412. — As the volume is increased, the pressure decreases proportionally. — There is no change for P x V. — $P_1V_1 = P_2V_2 = P_3V_3$ —PV = constant