

Name: CALVIN
Date:
Hour:

AP Chem ~ Ch.5 Quiz

Multiple Choice

- B 1) The volume of a balloon will increase when temperature increases because:
a) the particles expand c) the particles transform
b) the particles move faster d) the balloon shrinks
- D 2) Pressure of a gas in a container come from:
a) Needing to sink the game winning shot c) Needing to stick the landing
b) Needing to come through w/ 2 outs in the final inning d) gas particles colliding with the walls of the container
- B 3) The gas pressure inside a container decreases when
a) The # of gas particles is increased c) the temperature is increased
b) The # of gas particles is decreased d) the # of particles is increased and temp is increased
- C 4) If two items, X and Y, are directly proportional, what happens to X when Y is tripled?
a) Remains constant b) one third original value c) triples d) doubles
- D 5) If two items, P and Q, are inversely proportional, what happens to Q when P is cut in half?
a) Remains constant b) half original value c) triples d) doubles
- B 6) Which is an example of gas diffusion?
a) inflating a flat tire b) the odor of perfume spreading throughout a room
c) a cylinder of oxygen stored under high pressure d) All of these
- A 7) The density of a substance undergoes the greatest change when the substance changes from a
a) liquid to a gas b) liquid to a solid c) solid to a liquid d) density is constant
- B 8) Convert the pressure 2.50 atm to kPa.
a) 1 kPa b) 253 kPa c) 760 kPa d) 1000 kPa
$$\frac{2.50 \text{ atm}}{1 \text{ atm}} \times 101.3 \text{ kPa} = 253 \text{ kPa}$$
- C 9) Why does the air pressure inside the tires of a car increase when the car is driven?
a) some of the air has leaked out
b) the air particles collide with the tire after the car is in motion
c) the air particles inside the tire increase their speed because their temperature rises
d) the atmosphere compresses the tire

Short answer (use arrow format, circle constant... assume fixed mass of gas)

10) State Boyle's Law?

$P \uparrow V \downarrow$ (T)

11) State Charles' Law.

$T \uparrow V \uparrow$ (P)

12) State Gay-Lussac's Law

$T \uparrow P \uparrow$ (V)

13) Which gas law fits best: (abbreviate ~ C, B, or G-L's)

- a) SCUBA diver **B**
- b) Popcorn **G-L's**
- c) Adding air to your car tires in the winter **C or G-L's**
- d) Mylar balloon shrinking in the 'cold' **C or G-L's**
- e) Plunger **B**
- f) Breathing **B**
- g) Syringe **B**
- h) Peeps in the microwave **C**
- i) Do not incinerate a can! **G-L's**
- j) Squeezing water bottle and shooting off cap **B**
- k) CO₂ cartridge after firing many paintballs **G-L's**

14) Nitrous Oxide (N₂O) is used as an anesthetic. The pressure on 2.50L of N₂O changes from 125 kPa to 50.5 kPa. If the temperature is constant find the new volume.

$$V_1 = 2.50L$$

$$P_1 = 125kPa$$

$$P_2 = 50.5kPa$$

$$V_2 = ?$$

$$\frac{P_1 V_1}{P_2} = \frac{P_2 V_2}{P_2}$$

$$V_2 = \frac{P_1 V_1}{P_2} = \frac{(125kPa)(2.50L)}{(50.5kPa)} = \boxed{6.19L}$$

15) If a sample of gas occupies 6.80L at 325 Celsius and a volume of 12.0 L, what is the new temperature?

$$V_1 = 6.80L$$

$$T_1 = 325^\circ C \rightarrow 598K$$

$$V_2 = 12.0L$$

$$T_2 = ?$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$T_2 = \frac{V_2 T_1}{V_1} = \frac{(12.0L)(598K)}{(6.80L)} = 1055K \rightarrow \boxed{1060K}$$

16) Find the temperature of 36.04 g of water vapor confined in a 1.00L container if the pressure is 1.50 atm.

$$n = \frac{36.04g H_2O}{18.02g H_2O} \times \frac{1 \text{ mol } H_2O}{1} = 2.000 \text{ mol}$$

$$V = 1.00L$$

$$P = 1.50 \text{ atm}$$

$$T = ?$$

$$R = 0.0821 \frac{L \cdot atm}{mol \cdot K}$$

$$PV = nRT$$

$$T = \frac{PV}{nR} = \frac{(1.50 \text{ atm})(1.00L)}{(2.000 \text{ mol})(0.0821 \frac{L \cdot atm}{mol \cdot K})} = \boxed{9.14 K}$$

- 17) A gas has *final* conditions of 85.0°C, 637 torr, and 13L. If the initial gas conditions were 126°C, and 3.5 atm, find the starting volume of the gas.

$$T_2 = 85.0^\circ\text{C} \rightarrow 358\text{K}$$

$$P_2 = \frac{637 \text{ torr}}{760 \text{ torr}} \times 1 \text{ atm} = 0.838 \text{ atm}$$

$$V_2 = 13\text{L}$$

$$T_1 = 126^\circ\text{C} \rightarrow 399\text{K}$$

$$P_1 = 3.5 \text{ atm}$$

$$V_1 = ?$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$V_1 = \frac{P_2 V_2 T_1}{T_2 P_1}$$

$$V_1 = \frac{(0.838 \text{ atm})(13\text{L})(399\text{K})}{(358\text{K})(3.5 \text{ atm})} = \boxed{3.5\text{L}}$$

- 18) A gas occupies 2.50 L at STP. If the pressure increases to 605 kPa as the temperature is raised to 125 Celsius, find the new volume.

$$V_1 = 2.50\text{L}$$

$$T_1 = 0^\circ\text{C} \rightarrow 273\text{K}$$

$$P_1 = 1 \text{ atm}$$

$$P_2 = \frac{605 \text{ kPa}}{101.3 \text{ kPa}} \times 1 \text{ atm} = 5.97 \text{ atm}$$

$$T_2 = 125^\circ\text{C} \rightarrow 398\text{K}$$

$$V_2 = ?$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$V_2 = \frac{P_1 V_1 T_2}{T_1 P_2} = \frac{(1 \text{ atm})(2.50\text{L})(398\text{K})}{(273\text{K})(5.97 \text{ atm})} = \boxed{0.611\text{L}}$$

- 19) Based on Kinetic Molecular Theory, BRIEFLY explain why a Mylar® balloon deflates when taken outside in the winter and reinflates once back inside. DRAW 2 PICTURES!

Reas. (Be sure to say they S-L-O-W down)

- 21) Suppose you had a syringe filled with air. As you force the plunger down it becomes harder and harder to push. The factors you are changing for this gas are P and V. They are related by Boyle's Law.

→ BONUS: Draw a flamingo (not a flaming Z)

Reas.

GO VIKINGS!!