

Name _____

Honors Chemistry

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Gas Laws Review – Pre-Quiz Practice (Graded for 22 homework points.)

1. _____ When a sample of oxygen gas in a closed container of constant volume is heated until its absolute temperature is doubled, which of the following is also doubled?

- (A) The density of the gas (B) The pressure of the gas (C) The number of molecules per cm^3
(D) The average velocity of the gas molecules (E) The potential energy of the molecules

2. _____ Equal masses of three different ideal gases, X, Y, and Z, are mixed in a sealed rigid container. If the temperature of the system remains constant, which of the following statements about the partial pressure of gas X is correct?

- (A) It is equal to $1/3$ the total pressure
(B) It depends on the intermolecular forces of attraction between molecules of X, Y, and Z.
(C) It depends on the relative molecular masses of X, Y, and Z.
(D) It depends on the average distance traveled between molecular collisions.
(E) It can be calculated with knowledge only of the volume of the container.

3. _____ What is the volume of 3.00 mol of gas @ STP?

- (A) 22.4 L (B) 3×22.4 L (C) 3×22.4 L \times 760 (D) 3×22.4 L \times 273 / 760
(E) It cannot be determined without knowing which gas is involved.

4. _____ An ideal gas of volume 189 mL is collected over water at 30°C and 777 torr. The vapor pressure of water is 32 torr @ 30°C . What pressure is exerted by the dry gas under these conditions?

- (A) 320 torr (B) 745 torr (C) 777 torr (D) $32 / 77$ torr (E) 32×777 torr

5. _____ Two flexible containers for gases are at the same temperature and pressure. One holds 0.50 gram of hydrogen and the other holds 8.0 grams of oxygen. Which of the following statements regarding these gas samples is FALSE?

- (A) The volume of the hydrogen container is the same as the volume of the oxygen container.
(B) The number of molecules in the hydrogen container is the same as the number of molecules in the oxygen container.
(C) The density of the hydrogen sample is less than that of the oxygen sample.
(D) The average kinetic energy of the hydrogen molecules is the same as the average kinetic energy of the oxygen molecules.
(E) The average speed of the hydrogen molecules is the same as the average speed of the oxygen molecules.

6. _____ As the temperature is raised from 20°C to 40°C , the average kinetic energy of Ne atoms changes by a factor of

- (A) $1/2$ (B) $(313/293)^{1/2}$ (C) $313/293$ (D) 2 (E) 4

7. _____ Which of the following is the same for one mole samples of ideal monatomic gases at standard temperature and pressure?

- (A) The total kinetic energy of the molecules (B) The density of the sample
(C) The number of collisions per second of molecules with the wall (D) The average speed of the molecules
(E) The root-mean-square velocity of the molecules

8. _____ At 25°C , a sample of NH_3 (molar mass 17 grams) effuses at the rate of 0.050 mole per minute. Under the same conditions, which of the following gases effuses at approximately one-half that rate?

- (A) O_2 (molar mass 32 grams) (B) He (molar mass 4.0 grams) (C) CO_2 (molar mass 44 grams)
(D) Cl_2 (molar mass 71 grams) (E) CH_4 (molar mass 16 grams)

9. _____ Equal numbers of moles of He(g), Ar(g), and Ne(g) are placed in a glass vessel at room temperature. If the vessel has a pinhole-sized leak, which of the following will be true regarding the relative values of the partial pressures of the gases remaining in the vessel after some of the gas mixture has effused?

- (A) $P_{\text{He}} < P_{\text{Ne}} < P_{\text{Ar}}$ (B) $P_{\text{He}} < P_{\text{Ar}} < P_{\text{Ne}}$ (C) $P_{\text{Ne}} < P_{\text{Ar}} < P_{\text{He}}$
(D) $P_{\text{Ar}} < P_{\text{He}} < P_{\text{Ne}}$ (E) $P_{\text{He}} = P_{\text{Ar}} = P_{\text{Ne}}$

10. _____ A rigid metal tank contains oxygen gas. Which of the following applies to the gas in the tank when additional oxygen is added at constant temperature?

- (A) The volume of the gas increase. (B) The pressure of the gas decreases.
(C) The average speed of the gas molecules remains the same. (D) The total number of gas molecules remains the same.
(E) The average distance between the gas molecules increases.

11. _____ A sample of an ideal gas is cooled from 50.0 °C to 25.0 °C in a sealed container of constant volume. Which of the following values for the gas will decrease?
I. The average molecular mass of the gas II. The average distance between the molecules III. The average speed of the molecules
(A) I only (B) II only (C) III only (D) I and III (E) II and III
12. _____ Argon gas initially at 25°C is heated to 50°C in a closed container. Which statement is correct?
(A) The average kinetic energy of the argon atoms does not change. (B) The average kinetic energy of the argon atoms doubles.
(C) The pressure of the gas decreases by about 50 percent. (D) The pressure of the gas doubles.
(E) The pressure of the gas increases by about 8 percent.
13. _____ 100 grams of O₂(g) and 100 grams of He(g) are in separate containers of equal volume. Both gases are at 100°C. Which of the following statements is true?
(A) Both gases would have the same pressure.
(B) The average kinetic energy of the O₂ molecules is greater than that of the He molecules.
(C) The average kinetic energy of the He molecules is greater than that of the O₂ molecules.
(D) There are equal numbers of He molecules and O₂ molecules.
(E) The pressure of the He(g) would be greater than that of the O₂(g).
14. _____ Which of the following would express the approximate density of carbon dioxide gas at 0°C and 2.00 atm pressure (in grams per liter)?
(A) 2 g/L (B) 4 g/L (C) 6 g/L (D) 8 g/L (E) none of the above
15. _____ At 25°C, a sample of NH₃ (molar mass 17 grams) effuses at the rate of 0.050 mole per minute. Under the same conditions, which of the following gases effuses at approximately double that rate?
(A) O₂ (molar mass 32 grams) (B) He (molar mass 4.0 grams) (C) CO₂ (molar mass 44 grams)
(D) Cl₂ (molar mass 71 grams) (E) CH₄ (molar mass 16 grams)
16. _____ A sample of 0.0100 mole of oxygen gas is confined at 37°C and 0.216 atmosphere. What would be the pressure of this sample at 15°C and the same volume?
(A) 0.0876 atm (B) 0.175 atm (C) 0.201 atm (D) 0.233 atm (E) 0.533 atm
17. _____ A sample of 3.30 grams of an ideal gas at 150.0 °C and 1.25 atmospheres pressure has a volume of 2.00 liters. What is the molar mass of the gas? The gas constant, R, is 0.0821 L atm mol⁻¹ K⁻¹.
(A) 0.0218 gram/mole (B) 16.2 grams/mole (C) 37.0 grams/mole
(D) 45.8 grams/mole (E) 71.6 grams/mole
18. _____ A sample of 0.1973 mole of nitrogen gas is confined at 37° C and 0.216 atmosphere. What would be the pressure of this sample at 15° C and the same volume?
(A) 0.0876 atm (B) 0.175 atm (C) 0.201 atm (D) 0.233 atm (E) 0.533 atm
19. _____ A gas has a volume of 4.0 L at a pressure of 0.80 atm. What is the volume if the pressure is changed to 0.20 atm at constant temperature?
(A) 1.0 L (B) 2.0 L (C) 8.0 L (D) 16 L (E) 6 L
20. _____ Equal numbers of moles of CO₂(g), SO₂(g), and H₂O(g) are placed in a glass vessel at 400. K. If the vessel has a pinhole-sized leak, which of the following will be true regarding the relative values of the partial pressures of the gases remaining in the vessel after some of the gas mixture has effused?
(A) P_{CO2} < P_{SO2} < P_{H2O} (B) P_{CO2} < P_{H2O} < P_{SO2} (C) P_{SO2} < P_{CO2} < P_{H2O}
(D) P_{H2O} < P_{CO2} < P_{SO2} (E) P_{CO2} = P_{SO2} = P_{H2O}
21. _____ A 0.239 g sample of a gas in a 100-mL flask exerts a pressure of 1520 mmHg at 14 °C. What is the gas?
(A) chlorine (B) nitrogen (C) krypton (D) xenon (E) oxygen
22. _____ A sample of neon gas has a volume of 333 mL at 30.°C and a certain pressure. What volume would it occupy if it were heated to 60.°C at the same pressure?
(A) 366 mL (B) 399 mL (C) 333 mL (D) 666 mL (E) 167 mL