

Chapter 5**Warm-Up #1****Multiple Choice – No Calculator**

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?

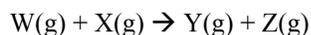
- (A) The density of the gas (B) The pressure of the gas (D) The number of molecules per cm^3
(C) The average velocity of the gas molecules (E) The potential energy of the molecules

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. Samples of F_2 gas and Xe gas are mixed in a container of fixed volume. The initial partial pressure of the F_2 gas is 8.0 atmospheres and that of the Xe gas is 1.7 atmospheres. When all of the Xe gas reacted, forming a solid compound, the pressure of the unreacted F_2 gas was 4.6 atmospheres. The temperature remained constant. What is the formula of the compound?

- (A) XeF (B) XeF_2 (C) XeF_4 (D) XeF_6 (E) XeF_8



4. Gases W and X react in a closed, rigid vessel to form gases Y and Z according to the equation above. The initial pressure of W(g) is 1.20 atm and that of X(g) is 1.60 atm. No Y(g) or Z(g) is initially present. The experiment is carried out at constant temperature. What is the partial pressure of Z(g) when the partial pressure of W(g) has decreased to 1.0 atm?

- (A) 0.20 atm (B) 0.40 atm (C) 1.0 atm (D) 1.2 atm (E) 1.4 atm

Essay – Calculator Allowed**2004B - #2**

Answer the following questions related to hydrocarbons.

(a) Determine the empirical formula of a hydrocarbon that contains 85.7 percent carbon by mass.

(b) The density of the hydrocarbon in part (a) is 2.0 g L^{-1} at 50°C and 0.948 atm.

(i) Calculate the molar mass of the hydrocarbon.

(ii) Determine the molecular formula of the hydrocarbon.

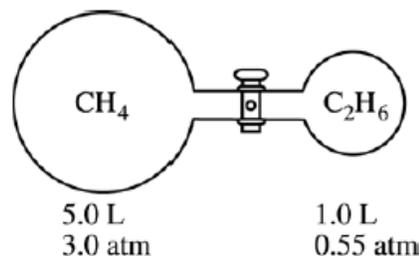
(c) Two flasks are connected by a stopcock as shown to the right. The 5.0 L flask contains CH_4 at a pressure of 3.0 atm, and the 1.0 L flask contains C_2H_6 at a pressure of 0.55 atm. Calculate the total pressure of the system after the stopcock is opened. Assume that the temperature remains constant.

(d) Octane, $\text{C}_8\text{H}_{18}(\text{l})$, has a density of 0.703 g mL^{-1} at 20°C . A 255

mL sample of $\text{C}_8\text{H}_{18}(\text{l})$ measured at 20°C reacts completely with excess oxygen as represented by the equation below.



Calculate the total number of moles of gaseous products formed.

**2006 #3b**

A different compound, which has the empirical formula CH_2Br , has a vapor density of 6.00 g L^{-1} at 375 K and 0.983 atm. Using these data, determine the following.

(i) The molar mass of the compound

(ii) The molecular formula of the compound

Name _____

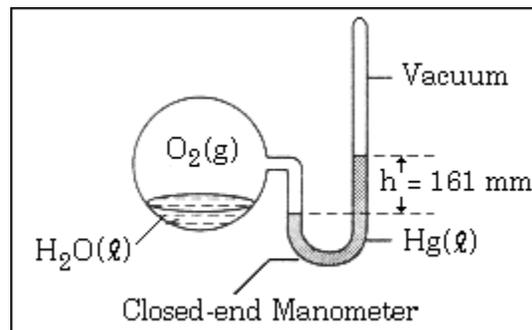
AP Chem

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Chapter 5**Warm-Up #2****Multiple Choice – No Calculator**

1. The system shown to the right is at equilibrium at 28°C. At this temperature, the vapor pressure of water is 28 millimeters of mercury. The partial pressure of O₂(g) in the system is:

- (A) 28 mm Hg (B) 56 mm Hg
(C) 133 mm Hg (D) 161 mm Hg
(E) 189 mm Hg



2. What is the volume of 3.00 mol of gas @ STP?
(A) 22.4 L (B) 3 x 22.4 L
(C) 3 x 22.4 L x 760 (D) 3 x 22.4 L x 273 / 760
(E) It cannot be determined without knowing which gas is involved.

3. 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 x 777 torr

4. In a closed inflexible system, 7.0 mol CO₂, 7.0 mol Ar, 7.0 mol N₂ and 4.0 mol Ne are trapped, with a total pressure of 10.0 atm. What is the partial pressure exerted by the neon gas?
(A) 1.6 atm (B) 4.0 atm (C) 10.0 atm (D) 21.0 atm (E) 29.0 atm

Essay – Calculator Allowed**2002B - #2**

A rigid 8.20 L flask contains a mixture of 2.50 moles of H₂, 0.500 mole of O₂, and sufficient Ar so that the partial pressure of Ar in the flask is 2.00 atm. The temperature is 127°C.

- (a) Calculate the total pressure in the flask.
(b) Calculate the mole fraction of H₂ in the flask.
(c) Calculate the density (in g L⁻¹) of the mixture in the flask.

The mixture in the flask is ignited by a spark, and the reaction represented below occurs until one of the reactants is entirely consumed. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$

- (d) Give the mole fraction of all species present in the flask at the end of the reaction.

2006B #8b

Use chemical and physical principles to account for the following.

The inside of a metal container was cleaned with steam and immediately sealed. Later, the container imploded.

2004 #8d

A 1.0 mole sample of CO(g) is heated at constant pressure. On the graph below, sketch the expected plot of volume versus temperature as the gas is heated.

