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AP Chemistry – Ready, Set, Go! – 28

Name _____Per ___

1. Ammonium sulfate, an important fertilizer, can be prepared by the reaction of ammonia and sulfuric acid:

$$2NH_{3(g)} + H_2SO_{4(aq)} \rightarrow (NH_4)_2SO_{4(aq)}$$

Calculate the volume of $NH_{3(g)}$ needed to at 42^oC and 15.6 atm to react with 87 kg of $H_2SO_{4(aq)}$.

2. Many gases are shipped in high-pressure containers. Consider a steel tank whose volume is 68.0 L and which contains O_2 gas at a pressure of 15,900 kPa at $23°^C$.

(a) What mass of O_2 does the tank contain?

(b) What volume would the gas occupy at STP?

(c) At what temperature would the pressure in the tank equal 170 atm?

(d) What would be the pressure of the gas, in kPa, if it were transferred to a container at $24°^C$ whose volume is 52.6 L?

3. Hydrogen gas is produced when zinc reacts with sulfuric acid. The other product is zinc sulfate.

(a) Write a balanced chemical equation for this reaction.

(b) If 159 mL of wet H_2 is collected over water at 24^{o}C and a barometric pressure of 738 torr, how many grams of zinc have been consumed? (The vapor pressure of water at 24^{o}C is 22.38 torr.)

4. The fluorocarbon compound $C_2Cl_3F_3$ has a normal boiling point of 47.6°^{C}. The specific heat of the liquid is 0.91 J/gK and 0.67 J/gK for the gas. The heat of vaporization of the compound is 27.49 kJ/mole. Calculate the heat required to convert 25.0 g from a liquid at 5.00°^{C} to a gas at 82.00°^{C}.

5. Acetone, $(CH_3)_2CO$, is widely used as an industrial solvent. (a) Draw the Lewis structure for the acetone molecule and predict the geometry around each carbon atom. (b) Is the acetone molecule polar or non-polar? (c) What kinds of intermolecular forces exist?