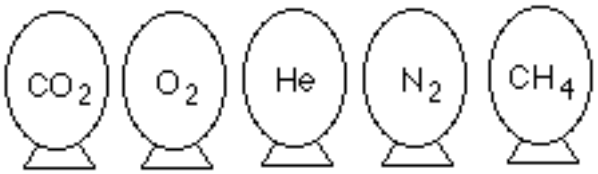
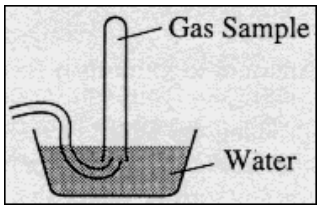
Review Packet #3 - Random Topics

Gases



1. Represented above are five identical balloons, each filled to the same volume at 25°C and 1.0 atmosphere pressure with the pure gas indicated.
(a) Which balloon contains the greatest mass of gas? Explain.
(b) Compare the average kinetic energies of the gas molecules in the balloons. Explain.
(c) Which balloon contains the gas that would be expected to deviate most from the behavior of an ideal gas? Explain.
(d) Twelve hours after being filled, all the balloons have decreased in size. Predict which balloon will be the smallest. Explain your reasoning.

2)



A student collected a sample of hydrogen gas by the displacement of water as shown by the diagram above. The relevant data are given in the following table.

GAS SAMPLE DATA	
Volume of sample	90.0 mL
Temperature	25° C
Atmospheric Pressure	745 mm Hg
Equilibrium Vapor Pressure of H_2O (25° C)	23.8 mm Hg

(a) Calculate the number of moles of hydrogen gas collected.
(b) Calculate the number of molecules of water vapor in the sample of gas.
(c) Calculate the ratio of the average speed of the hydrogen molecules to the average speed of the water vapor molecules in the sample.
(d) Which of the two gases, H_2 or H_2O, deviates more from ideal behavior? Explain your answer.

3) A mixture of $H_2(g)$, $O_2(g)$, and 2 milliliters of $H_2O(l)$ is present in 0.500-liter rigid container at 25 °C. The number of moles of H_2 and the number of moles of O_2 are equal. The total pressure is 1,146 millimeters of mercury. (The equilibrium vapor pressure of pure water is 24 millimeters mercury.)
The mixture is sparked, and H_2 and O_2 react until one reactant is completely consumed.
(a) Identify the reactant remaining and calculate the number of moles of the reactant remaining.
(b) Calculate the total pressure in the container at the conclusion of the reaction if the final temperature is 90 °C. (The equilibrium vapor pressure of water at 90 °C is 526 millimeters mercury.)
(c) Calculate the number of moles of water present as vapor in the container at 90 °C.