PRELABORATORY-Exp 6
The Ideal Gas Constant
and The Molar Volume of Hydrogen

Name _____F97
Last First

1) Define,or give a mathematical expression when applicable for, each of the following:
   a) Combined gas Law

   b) Dalton's Law of partial pressures

   c) Molar volume

(What is the expected numerical value (theoretical value) for the molar volume of a gas? Include the proper unit. Answer _____)

   d) Standard temperature and pressure (STP)

   e) Vapor pressure

2) Explain the terms "wet gas" and "dry gas".

3) Write a balanced equation for the reaction of Zn(s) with Dil HCl.

4) Why must the mass of zinc metal be no greater than 0.2400g ?

5) How can you tell when the zinc metal has reacted completely?

   a) _____

   b) _____

6) What measure of precaution should you take when working with :

   a) Hydrogen gas

   b) Dil HCl

7) List **FOUR** sources of experimental error other than those due to incorrect reading of the scales.

   a)

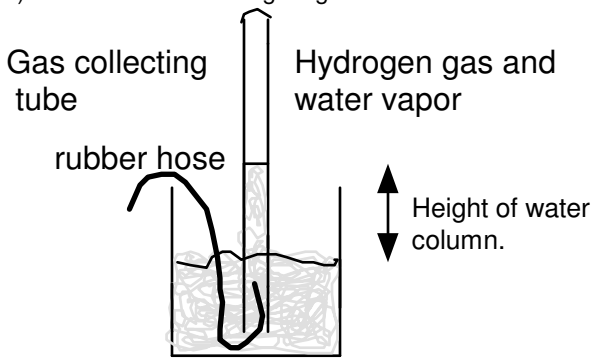
   b)

   c)

   d)

(NEXT PAGE)

8) Consider the following diagram:



A 0.1358 g zinc metal reacts completely with Dil HCl to produce 52.20 ml of H_2 (g) at 22.0 °C . The hydrogen gas is collected over water at 22.0 °C and a barometric pressure of 755 mm Hg. The water vapor pressure at 22.0 °C is 19.8 mm Hg and the height of water column in the gas collecting tube is 12.0 cm (the density of mercury is 13.6 g/ml).

a) Write a balanced equation for the reaction of zinc metal with Dil HCl.

b) Calculate the number of moles hydrogen gas produced from the mass of Zn(s) given above.
Setup:

Answer:_____

c) What is the partial pressure of hydrogen gas expressed in mm Hg? Hint: Apply Dalton's Law of partial pressures.

$P_{atmospheric} = P_{hydrogen\ gas} + P_{water\ vapor} + P_{height\ of\ water\ column}$

Setup:

Answer_____

d) Calculate the ideal gas constant, R, in units of L.atm/mol.K.
Setup:

e) Convert the volume of hydrogen gas collected into STP condition.
Setup:

Answer: _____

f) Calculate the molar volume of hydrogen gas. (You need the volume of H_2 at STP in step (e) and the corresponding number of moles in step (b) above.
Setup:

Answer: _____

g) Calculate the accuracy of the experimental molar volume.
Setup:

Answer _____