Name ______Mr. Perfect____________________________________ Date ____F09_______

Useful information:

PV = nRT R = 0.0821 (L atm/K mol) $M_w = m/n$

1. A 5.20 L sample at 18 °C and 2.00 atm contains 0.436 moles of a gas. If we add an additional 1.270 moles of the gas at the same temperature and pressure, what will the total volume occupied by the gas be? (3 pts)

n = 0.436 mol + 1.270 mol = 1.706 mol

PV = nRT

T = 18 + 273 = 291 K

$$V = \frac{nRT}{P} = \frac{(1.706\ mol)\left(0.0821 \frac{L\ atm}{mol\ K}\right)(291\ K)}{(2.00\ atm)} = 20.4\ L$$

2. A gas at 34 °C and 1.75 atm has a density of 3.40 g/L. Calculate the molecular weight of the gas. (3 pts)

T = 34 + 273 = 307 K

PV = nRT

$$PV = \left(\frac{m}{M_w}\right)RT \quad or \quad PM_w = \left(\frac{m}{V}\right)RT \quad or \quad PM_w = dRT$$

$$M_w = \frac{dRT}{P} = \frac{\left(3.40 \frac{g}{L}\right)\left(0.0821 \frac{L\ atm}{mol\ K}\right)(307\ K)}{(1.75\ atm)} = 50.0\ g/mol$$

3. Balance the following Redox reaction using the half-reaction method and clearly label the oxidation and reduction steps. (4 pts)

$Cu + HNO_3 \rightarrow Cu^{2+} + NO$ (acidic solution)

$3 \times (Cu \rightarrow Cu^{2+} + 2e^-)$ Oxidation

$2 \times (3e^- + 3H^+ + HNO_3 \rightarrow NO + 2H_2O)$ Reduction

$6H^+ + 3Cu + 2HNO_3 \rightarrow 3Cu^{2+} + 2NO + 4H_2O$