Gen Chem I (CHM 201) Fall 18 Dr. Hahn MWF 8 am Quiz VII form A 11/28 W Exam # _____

Name Key Name _____
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Please **show work on all questions** for **full credit & partial credit.** (20 total pts) green
° C + 273.15 = K 760 mm Hg = 1 atm PV = nRT, R = 0.08206 (L atm)/(mol K), $P_1V_1 / P_2V_2 = T_1 / T_2$

1. Convert the following: (show work) (4 pts)

25.2 ° C to 298.35 K $25.2 + 273.15 = 298.35$ NW-1

2. What are the conditions at STP ? (2 pts) P = 1 atm BA-3 attempt -1

3. In a steel cylinder with a movable piston, hydrogen gas is resting at 1.22 atm. 280.2 K at 2.32 Liters. When the gas reacts with a spark, the final conditions are 1.25 atm, 340.2 K ? What is the final volume of the gas after reaction ? (6 pts)

$P_1 = 1.22$ atm $T_1 = 280.2$ K $V_1 = 2.32$ l
$P_2 = 1.25$ atm $T_2 = 340.2$ K $V_2 = ?$

$V_2 = \left(\frac{340.2}{280.2}\right)\frac{(1.22)(2.32}{1.25}$

$\frac{P_2 V_2}{P_1 V_1} = \frac{T_2}{T_1} \rightarrow \frac{(1.25\text{ atm})(V_2)}{(1.22\text{ atm})(2.32\text{ l})} = \frac{340.2\text{ K}}{280.2\text{ K}}$ $V_2 = 2.75$ l

4. $CO(g) + 2\,H_2(g) \rightarrow CH_3OH(g)$ math/algebra -½ pt

For the above reaction if you start the reaction with 1.78 grams of H_2 (FW H_2 = 2.02 g/mol)

a. How many moles of the CH_3OH (g) will you make ? (4 pts) BA-2 attempt -1

$1.78\text{ g } H_2 \times \frac{1\text{ mol } H_2}{2.02\text{ g } H_2} \times \frac{1\text{ mol } CH_3OH}{2\text{ mol } H_2} = 0.441\text{ mol } CH_3OH$

b. How many Liters of the CH_3OH will you make at T=278.2 K and P = 0.78 atm (4 pts)

BA-2 attempt -1

$PV = nRT$

$(0.78\text{ atm})V = (0.441\text{ mol})(0.08206)(278.2\text{ K})$

$V = \frac{(0.441)(0.08206)(278.2)}{(0.78\text{ atm})} = 12.9$ l

Extra Credit: (4 pts) $4\,Fe(s) + 3\,O_2(g) \rightarrow 2\,Fe_2O_3(s)$ $\Delta H = -1652$ kJ
Given the above reaction if you do the reaction with 1.52 moles of Fe. how much heat is released ? Show work.

did not cover in quiz

$1.52\text{ mol Fe} \times \frac{-1652\text{ kJ}}{4\text{ mol Fe}} = -628\text{ kJ}$

If $P_T = 1.0$ $P_{O_2} = 0.20$ what is P_{N_2}

$P_T = P_{N_2} + P_{O_2}$
$1.0 = P_{N_2} + 0.20$
$P_{N_2} = 0.80$

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Please **show work on all questions** for **full credit & partial credit**. (20 total pts)
° C + 273.15 = K 760 mm Hg = 1 atm PV = nRT, R = 0.08206 (L atm)/(mol K), $P_1V_1 / P_2V_2 = T_1 / T_2$

1. Convert the following: (show work) (4 pts)

820.2 mm Hg = 1.079 atm

NW -1

$820.2\ mmHg \times \frac{1\ atm}{760\ mmHg} = 1.079$

2. What are the conditions at STP ? (2 pts) T = 0° C

3. In a steel cylinder with a movable piston, hydrogen gas is resting at 2.5 atm, 125.1 K at 1.78 Liters. When the gas reacts with a spark, the final conditions are 289.1 K, in 3.52 Liters? What is the final pressure of the gas after reaction ? (6 pts)

$P_1 = 2.5\ atm$ $T_1 = 125.1\ K$ $V_1 = 1.78$
$T_2 = 289.1\ K$ $V_2 = 3.52\ l$ $P_2 = ?$

$P_2 = \left(\frac{289.1}{125.1}\right)\frac{(2.5)(1.78)}{(3.52)}$

$\frac{(P_2)(3.52l)}{(2.5\ atm)(1.78l)} = \frac{289.1\ K}{125.1\ K}$ $P_2 = 2.9\ atm$

BA -3 attempt -1

Math/algebra -½ pt

4. $2\ KClO_3\ (s) \rightarrow 2\ KCl\ (s) + 3\ O_2\ (g)$

For the above reaction if you start the reaction with 2.78 grams of $KClO_3$ (FW $KClO_3$ = 122.60 g/mol)

BA -2 attempt -1

a. How many moles of the O_2 (g) will you make ? (4 pts)

$2.78\ g\ KClO_3 \times \frac{1\ mol\ KClO_3}{122.60\ g\ KClO_3} \times \frac{3\ mol\ O_2}{2\ mol\ KClO_3} = 0.03401\ mol$

b. How many Liters of the O_2 will you make at T=298.2 K and P = 0.98 atm (4 pts)

BA -2 attempt -1

$PV = nRT$

$(0.98\ atm)(V) = (0.03401\ mol)\left(0.08206\ \frac{l\ atm}{mol\ K}\right)(298.2\ K)$

$V = \frac{(0.03401)(0.08206)(298.2)}{(0.98)} = 0.849\ l$

$P_{O_2} = 0.2$
$1.0 = 0.80 + P_{O_2}$
$P_T = 1.0,\ P_{N_2} = 0.80$

Extra Credit: (4 pts) $4\ Fe\ (s) + 3\ O_2\ (g) \rightarrow 2\ Fe_2O_3\ (s)$ $\Delta H = -1652\ kJ$

did not cover by quiz

Given the above reaction if you make 3.12 moles of the Fe_2O_3 (s), how much heat is released ? Show work.

$3.12\ mol\ Fe_2O_3 \times \frac{1652\ kJ}{2\ mol\ Fe_2O_3} = 2577\ kJ$

$P_T = P_{N_2} + P_{O_2}$
~~$1.0 = 0.80 + P_{O_2}$~~ ~~$P_{O_2} = 0.2$~~