**Quiz 9A Chemical Principles I Chem 1984 Fall 2013**

**Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_/27**

**For all word problems, you must show work.**

**1.** An ideal gas at constant temperature is compressed from 50 L to 20 L. If the final

pressure is 200 atm, what was the original pressure ?

P1\*50=200\*20

P1=4000/50=80 \_80\_\_\_\_\_\_=Pinitial (atm)

5 pts

**2.**  Steam in a fixed-volume petroleum cracking tower, initially at 300 oC and 3 atm, is heated to 682.1 oC in order to convert crude oil to ethylene. What is the pressure in the cracking tower at the final temperature? [Note: T(K)=273.15 + T(oC)]

T1= 300oC=573.15 K T2=682.1oC=955.15 K

3/573.15=P2/955.15

3\*955.15/573.15=P2 =5 atm

\_\_**5**\_\_\_\_\_\_\_\_= Pfinal(atm)

6 pts

3. 60 grams of an unknown liquid is heated to 600 K in a steel tank with a volume of

5 L. At this temperature the liquid has converted entirely to gas and produces a

pressure of 12.844 atm. Circle the compound below are mostly likely to be our

unknown liquid. (R=0.08206 atm L/K mol)

**compound octane benzene butane acetone**

**Molecular weight (g/mol)**   **114 78 58 46**

Show the reasoning for your choice below: 8 pts

n=PV/RT =12.844\*5/(0.08206\*600)=1.3044 mol=> 60/1.3044= g/mol=46

(Over)

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**Quiz 9 (continued)**

**4. Factoids About Ideal and Real Gases (2 pts each/8 pts total)**

**a)** According to the Kinetic Theory of Ideal gases, an ideal gas particle:

i) has no mass

ii) has no velocity

iii) has no volume

iv) has no temperature

**b)** In the Van der Waal corrections for Real gases:

i) just the possibility of molecular attraction (`stickiness’) is corrected for

ii)the variable effects of velocity are corrected for.

iii) the finite size of gas particles and their molecular attractions are corrected for.

iv) The Maxwell-Boltmann activation energy for vaporization is used.

**c)** If n and T are constant for an Ideal Gas doubling P means:

i) V decreases by half

ii) particle velocity doubles

iii) V doubles

iv) The gas condenses

d) The partial pressures of Ar, Ne and He in a 5 L cylinder are, respectively, 1, 2 and 3

atm at 300 K. The total moles of Ar+Ne+He =ntotal are expressible as:

1) ntotal = [1/6+2/6+3/6]\*R\*300

5

2)ntotal =[ 1/6 + 2/6 + 3/6]\*5

R\*300

3)ntotal = (1+2+3)\*R\*300

5

4)ntotal = (1+2+3)\*5

R\*300

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