**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 100 atm, what was the original pressure ?

P1\*50=100\*20

P1=2000/50=40 \_40\_\_\_\_\_\_=Pinitial (atm)

5 pts

**2.**  Steam in a fixed-volume petroleum cracking tower, initially at 300 oC and 1.5 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

1.5/573.15=P2/955.15

1.5\*955.15/573.15=P2 =2.5 atm

\_\_\_2.5\_\_\_\_\_\_\_\_= 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 10.185 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 =10.185\*5/0.08206\*600=1.0344 mol=> 60/1.0344= g/mol=58

(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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