Chemistry 1501, Dr. Hunter

Fall 2007

Exam # 4 - Final Exam (Group Part)

Name:_____ **Answers** _____ Signature:_____

Name:_____,_____ Signature:_____

Name:_____,_____ Signature:_____

Name:_____,_____ Signature:_____

Name:_____,_____ Signature:_____

Last name **First** name

The group portion of this exam has this title page plus two pages of questions (for a total of three pages). Place the names (last name first) and signatures of each group member above. *Initial each page of the exam in the top right hand corner* using the initials of the all group members so that if your exam pages get separated I can match them to your group.

To obtain maximum credit for each question, show your work in detail. Partial credit for questions will not be assigned if no work is shown. **Indeed, no credit will be granted if complete work is not shown *even for correct answers*.** Feel free to use pictures/diagrams to illustrate your text answers and/or to use short text explanations to explain your drawings if your pictures are ambiguous. If you have to make assumptions, etc., to complete any answers, write me a short note stating and/or explaining your assumptions and testing them to the degree possible. Be very careful with significant figures on all answers. Note: Use the Atomic Masses from the table on the inside front cover of the text book that were also handed out with the exam.

You have 60 minutes for this exam. The twenty points for the individual part of this exam correspond to 10% of the 200 overall points for this course (i.e., this exam is worth 10% of the total course grade).

12 Groups (Including 43 People) Wrote the Group Exam & Turned in Answers

The Average & Median Grades Were Both 14.0 out of 20.

Grade /20 (Group grade)

1 (10 points in total). 12.0 moles of C_8H_8 were reacted with 2.00 moles of HCl in 128 L of solvent. Identify the final concentration of $C_8H_{12}Cl_4$.

$$\_\_\_C_8H_8 + \_\_\_HCl \rightarrow \_\_\_C_8H_{12}Cl_4$$

V = 128 L

$[C_8H_{12}Cl_4]$ = ???

$$\_\mathbf{1}\_C_8H_8 + \_\mathbf{4}\_HCl \rightarrow \_\mathbf{1}\_C_8H_{12}Cl_4$$

12.0 moles **2.00 moles**

Note: There are only 3 Significant Figures for this data]

12.0 moles of C_8H_8 would require 12.0 x 4 = 48.0 moles of HCl (which there is not), therefore there is excess C_8H_8.

C_8H_8 is in **Excess**

HCl is the **Limiting Reagent**

$$\_\mathbf{???}\_C_8H_8 + \_\mathbf{2.00}\_HCl \rightarrow \_\mathbf{???}\_C_8H_{12}Cl_4$$

$n_{C8H812Cl4} = n_{C8H8} = 1/4 \times n_{HCl} = 1/4 \times 2.00$ moles

$n_{C8H812Cl4} = 0.500$ moles

$n_{C8H12Cl4} = 1/4 \times n_{HCl} = 1/4 \times 2.00$ moles

$n_{C8H12Cl4}$ = **0.500 moles**

[ ] = n / V

$[C_8H_{12}Cl_4] = n_{C8H12Cl4} / V$

$[C_8H_{12}Cl_4]$ = 0.500 moles / 128 L

$[C_8H_{12}Cl_4]$ = ~~0.00390625~~ m/L

$[C_8H_{12}Cl_4] = 3.91 \times 10^{-3}$ m/L (or 0.00391 m/L)

[Note: Only 3 Significant Figures are allowed for this answer]

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2 (10 points in total). Calculate the Concentration of Barium Ions in a saturated solution of BaF_2. The appropriate $K_{sp} = 1.0 \times 10^{-6}$.

$K_{sp} = 1.0 \times 10^{-6}$

$[Ba^{+2}] = ???$

[Note: There are only 2 Significant Figure for this data.]

$BaF_2 \rightleftharpoons \_\_\_ Ba^{+2} + \_\_\_ F^-$

$BaF_2 \rightleftharpoons 1\ Ba^{+2} + 2\ F^-$

$K_{sp} = [Ba^{+2}][F^-]^2$

$[Ba^{+2}] = 0.5[F^-]$ or $[F^-] = 2[Ba^{+2}]$

$K_{sp} = [Ba^{+2}](2[Ba^{+2}])^2$

$K_{sp} = [Ba^{+2}]4[Ba^{+2}]^2 = 4[Ba^{+2}]^3$

$[Ba^{+2}]^3 = 0.25K_{sp}$

$[Ba^{+2}] = (0.25K_{sp})^{0.3333}$

$[Ba^{+2}] = (0.25 \times (1.0 \times 10^{-6}))^{0.3333}$

$[Ba^{+2}] = (0.25 \times 10^{-6})^{0.3333}$

$[Ba^{+2}] = \sout{6.2996} \times 10^{-3}$ m/L

$[Ba^{+2}] = 6.3 \times 10^{-3}$ m/L

[Note: There are only 2 Significant Figures allowed for this answer.]

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