

**Exam Two**  
**CHM 203 (Dr. Mattson)**  
**26 September 2005**

**Academic Integrity Pledge:**

*In keeping with Creighton University's ideals and with the Academic Integrity Code adopted by the College of Arts and Sciences, I pledge that this work is my own and that I have neither given nor received inappropriate assistance in preparing it.*

Signature:

**Instructions:** Show all work whenever a calculation is required! You will receive credit for how you worked each problem as well as for the correct answer. This exam is worth 50 points. **BOX YOUR ANSWERS!**

1. (3 pts) Determine the number of moles of calcium hydroxide present in a 14.55 g sample.

2. (3 pts) How many moles of fluorine atoms, F, are present in 55.9 g carbon tetrafluoride?

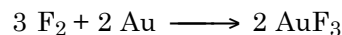
3. (3 pts) Use Avogadro's number to determine the actual number of platinum atoms, Pt, present in a filament of platinum with a mass of 75.3  $\mu\text{g}$ .

4. (3 points) Balance the following equation with the smallest whole number coefficients.

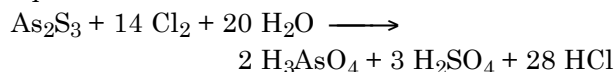


5. (3 pts) Calcium chloride reacts with sodium phosphide to produce calcium phosphide and sodium chloride. Balance the equation for this reaction.

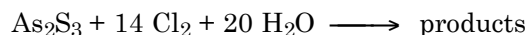
6. (3 pts) What mass of  $\text{F}_2$  is needed to react completely with 14.3 g gold?



7. (3 pts) Consider the following balanced equation:



Suppose 40.0 g  $\text{As}_2\text{S}_3$ , 150 g  $\text{Cl}_2$ , and 65 g  $\text{H}_2\text{O}$  were allowed to react according to the equation. Determine the limiting reagent. [MM(g/mol):  $\text{As}_2\text{S}_3 = 246.1$ ;  $\text{Cl}_2 = 70.9$ ;  $\text{H}_2\text{O} = 18.0$ ]

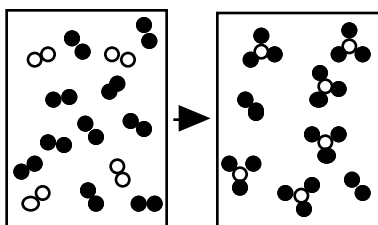


8. Again refer to the chemical equation in the previous problem. If 175 g  $\text{Cl}_2$  were allowed to react with excess  $\text{As}_2\text{S}_3$  and  $\text{H}_2\text{O}$  according to the equation given,

(a) (3 pts) determine the theoretical yield of  $\text{H}_3\text{AsO}_4$ . [MM:  $\text{H}_3\text{AsO}_4 = 141.94 \text{ g/mol}$ ]

(b) (3 pts) determine the percent yield of  $\text{H}_3\text{AsO}_4$  if the actual yield were 46 g  $\text{H}_3\text{AsO}_4$ .

9. (4 pts) In the reaction shown,  $\circ$  is A and  $\bullet$  is B. What is the reagent in excess and what is the balanced equation? Think!



- |    | excess       | Balanced equation   |
|----|--------------|---|
| A. | $\text{A}_2$ | $\text{A}_2 + 3 \text{B}_2 \longrightarrow 2 \text{AB}_3$                   |
| B. | $\text{B}_2$ | $\text{A}_2 + 3 \text{B}_2 \longrightarrow 2 \text{AB}_3$                   |
| C. | $\text{A}_2$ | $4 \text{A}_2 + 10 \text{B}_2 \longrightarrow 6 \text{AB}_3 + 2 \text{B}_2$ |
| D. | $\text{B}_2$ | $4 \text{A}_2 + 10 \text{B}_2 \longrightarrow 6 \text{AB}_3 + 2 \text{B}_2$ |
| E. | none         | $4 \text{A}_2 + 10 \text{B}_2 \longrightarrow 6 \text{AB}_3 + 2 \text{B}_2$ |

10. (3 pts) What is the molarity of a solution prepared by dissolving 40.0 g potassium iodide in water to make 750.0 mL solution? [MM(g/mol):  $\text{KI} = 166.0$ ]

11. (4 pts) A compound of nickel, phosphorus, and oxygen contains 48.11% Ni, 16.92% P, and the rest O. What is the formula for the compound?

- A.  $\text{Ni}_2\text{P}_3\text{O}_4$       B.  $\text{Ni}_3\text{P}_2\text{O}_4$   
 C.  $\text{Ni}_3\text{P}_2\text{O}_8$       D.  $\text{Ni}_2\text{P}_3\text{O}_8$   
 E.  $\text{NiP}_3\text{O}_6$

Show work here

12. (2 pts) The simplest formula of a substance is found to be  $\text{C}_2\text{H}_1\text{Cl}_1$ , and its molar mass is found by experiment to be *approximately*  $180 \text{ g}\cdot\text{mol}^{-1}$ . What is its exact molar mass?

- A.  $60.5 \text{ g}\cdot\text{mol}^{-1}$       B.  $180.0 \text{ g}\cdot\text{mol}^{-1}$   
 C.  $121.0 \text{ g}\cdot\text{mol}^{-1}$       D.  $181.4 \text{ g}\cdot\text{mol}^{-1}$   
 E.  $241.9 \text{ g}\cdot\text{mol}^{-1}$

Show work here

13. (10 pts) Circle each of the following as either "I" for ionic, "CM" for covalent molecular or "A" for acidic or "E" for element. Then determine if each is properly named. If it is, circle Ok; if not, circle Not.

	Circle:	Printed Name:	Circle:
$\text{CaF}_2$	I CM A E	<i>calcium difluoride</i>	Ok Not
$\text{FeSO}_4$	I CM A E	<i>iron sulfate</i>	Ok Not
$\text{P}_2\text{O}_5$	I CM A E	<i>phosphorus oxide</i>	Ok Not
$\text{H}_2\text{SO}_4$	I CM A E	<i>sulfuric acid</i>	Ok Not
$\text{KClO}_3$	I CM A E	<i>potassium chlorate</i>	Ok Not
$\text{N}_2$	I CM A E	<i>nitrogen</i>	Ok Not
$\text{HBrO}_2$	I CM A E	<i>bromous acid</i>	Ok Not
$\text{HIO}_3$	I CM A E	<i>iodic acid</i>	Ok Not
$\text{Na}_3\text{PO}_4$	I CM A E	<i>trisodium phosphate</i>	Ok Not
$\text{Li}_3\text{As}$	I CM A E	<i>lithium arsenide</i>	Ok Not

14. (BONUS! 1 point) Print your name here:

Your exam score (50 possible): \_\_\_\_\_

Determine your grade:

$\text{A} \geq 46.5$ ;  $\text{B}^+ \geq 43.5$ ;  $\text{B} \geq 41.0$ ;

$\text{C}^+ \geq 37.5$ ;  $\text{C} \geq 34.00$ ;  $\text{D} \geq 30.00$

Your exam score (50 possible): \_\_\_\_\_

Determine your grade:

$\text{A} \geq 46.5$ ;  $\text{B}^+ \geq 43.5$ ;  $\text{B} \geq 41.0$ ;

$\text{C}^+ \geq 37.5$ ;  $\text{C} \geq 34.00$ ;  $\text{D} \geq 30.00$

**Answers:**1. 0.196 mol Ca(OH)<sub>2</sub>

2. 2.54 mol of F

3. 2.32 x 10<sup>17</sup> Pt atoms4. C<sub>3</sub>H<sub>6</sub>Cl<sub>2</sub> + 4 O<sub>2</sub> → 3 CO<sub>2</sub> + 2 H<sub>2</sub>O + 2 HCl5. 3 CaCl<sub>2</sub> + 2 Na<sub>3</sub>P → Ca<sub>3</sub>P<sub>2</sub> + 6 NaCl6. 4.14 g F<sub>2</sub>7. Cl<sub>2</sub>8. (a) 50.0 g H<sub>3</sub>AsO<sub>4</sub> (b) 92 %

9. B

10. 0.321 M KI

11. C

12. D

13. Correct answers in red

	Circle:	Printed Name:	Circle:
CaF <sub>2</sub>	I CM A E	calcium difluoride	Ok Not
FeSO <sub>4</sub>	I CM A E	iron sulfate	Ok Not
P <sub>2</sub> O <sub>5</sub>	I CM A E	phosphorus oxide	Ok Not
H <sub>2</sub> SO <sub>4</sub>	I CM A E	sulfuric acid	Ok Not
KClO <sub>3</sub>	I CM A E	potassium chlorate	Ok Not
N <sub>2</sub>	I CM A E	nitrogen	Ok Not
HBrO <sub>2</sub>	I CM A E	bromous acid	Ok Not
HIO <sub>3</sub>	I CM A E	iodic acid	Ok Not
Na <sub>3</sub> PO <sub>4</sub>	I CM A E	trisodium phosphate	Ok Not
Li <sub>3</sub> As	I CM A E	lithium arsenide	Ok Not