

Exam Two
CHM 203 (Dr. Mattson)
24 September 2004

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 ammonium carbonate present in a 82.55 g sample.

2. (3 pts) How many moles of fluorine atoms are present in a 107 g sample of phosphorus trifluoride?

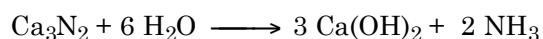
3. (3 pts) Use Avogadro's number to determine the actual number of carbon atoms present in a speck of carbon with a mass of 1.3 μg .

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

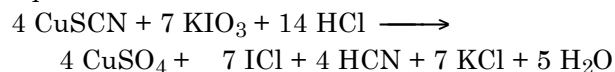


5. (3 pts) Iron(III) nitrate reacts with sodium sulfide to produce iron(III) sulfide and sodium nitrate. Balance the equation for this reaction.

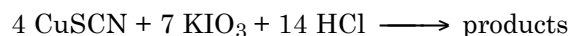
6. (3 pts) What mass of H_2O is needed to react completely with 14.3 g Ca_3N_2 ? [MM (g/mol): $\text{Ca}_3\text{N}_2 = 148.3$; $\text{H}_2\text{O} = 18.0$]



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



Suppose 50.0 g CuSCN , 130 g KIO_3 , and 25 g HCl were allowed to react according to the equation. Determine the limiting reagent. [MM(g/mol): $\text{CuSCN} = 121.6$; $\text{KIO}_3 = 214.0$; $\text{HCl} = 36.5$]

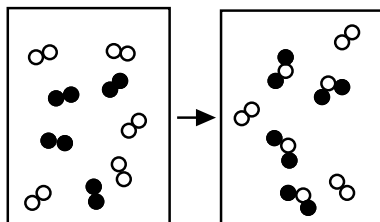


8. Again refer to the chemical equation in the previous problem. If 480 g CuSCN were allowed to react with excess potassium iodate and hydrochloric acid according to the equation,

(a) (3 pts) determine the theoretical yield of iodine monochloride. [MM: ICl = 162.4 g/mol]

(b) (3 pts) determine the actual yield (in grams) of ICl if the reaction occurred with a 78% yield.

9. (3 pts) In the reaction shown, \circ is A and \bullet is B. Which is the limiting reagent and what is the balanced equation? Think!



- | | | |
|----|----------------|--|
| | L. R. | Balanced equation |
| A. | A ₂ | 5 A ₂ + 4 B ₂ → 4 AB ₂ + 3 A ₂ |
| B. | A ₂ | A ₂ + 2 B ₂ → 2 AB ₂ |
| C. | B ₂ | 5 A ₂ + 4 B ₂ → 4 AB ₂ + 3 A ₂ |
| D. | B ₂ | A ₂ + 2 B ₂ → 2 AB ₂ |
| E. | none | A ₂ + 2 B ₂ → 2 AB ₂ + 3 A ₂ |

10. (3 pts) What is the molarity of a solution prepared by dissolving 24.0 g potassium iodide in water to make 500.0 mL solution?

11. (3 pts) A compound of sodium, sulfur, and oxygen contains 29.08% Na, 40.56% S, and 30.36% O. Which formula is correct?

- | | |
|--|--|
| A. Na ₂ SO ₃ | B. Na ₂ S ₂ O ₈ |
| C. Na ₂ SO ₄ | D. Na ₂ S ₄ O ₆ |
| E. Na ₂ S ₂ O ₃ | |

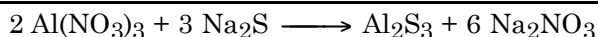
Show work here

12. (3 pts) The simplest formula of a substance is found to be CH₂O, and its approximate molar mass is found by experiment to be 93 g·mol⁻¹. What is its exact molar mass?

- | | |
|-----------------------------|-----------------------------|
| A. 30.0 g·mol ⁻¹ | B. 87.0 g·mol ⁻¹ |
| C. 90.0 g·mol ⁻¹ | D. 92.0 g·mol ⁻¹ |
| E. 93.0 g·mol ⁻¹ | |

Show work here

13. (3 pts) How many moles of Na₂S are required to react completely with 65.00 mL of a 0.25 M aqueous Al(NO₃)₃?



14. (7 pts) Circle each of the following as either "I" for ionic, "CM" for covalent molecular or "A" for acidic or "E" for element. Then name each.

	Circle:	Printed Name:
BrF ₅	I CM A E	
CuSO ₄ ·5H ₂ O	I CM A E	
Mg ₃ (PO ₄) ₂	I CM A E	
HClO ₂	I CM A E	
KClO ₂	I CM A E	
HNO ₃	I CM A E	
S ₈	I CM A E	
HIO ₃	I CM A E	
N ₂ O ₃	I CM A E	
NaC ₂ H ₃ O ₂	I CM A E	
O ₂	I CM A E	
(NH ₄) ₂ Cr ₂ O ₇	I CM A E	

15. (1 point) Print your name here:

Your exam score (50 possible): _____

Determine your grade:

A ≥ 46.5; B+ ≥ 43.5; B ≥ 41.0;

C+ ≥ 37.5; C ≥ 34.00; D ≥ 30.00

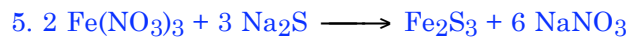
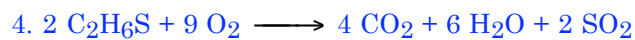
Determine your grade:
 A ≥ 46.5; B+ ≥ 43.5; B ≥ 41.0;
 C+ ≥ 37.5; C ≥ 34.00; D ≥ 30.00

Answers:

1. 0.86 mol ammonium carbonate

2. 3.65 mol F atoms

3. 6.5×10^{16} carbon atoms



6. 10.4 g H_2O

7. HCl is the limiting reagent.

8. (a) theoretical yield of iodine monochloride =
6.91 mol ICl = 1122 g ICl, (b) 875 g ICl

9. D

10. 0.289 mol KI/L

11. E

12. C

13. 0.0244 mol Na_2S

14.

		Printed Name:
BrF_5	CM	<i>bromine pentafluoride</i>
$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	I	<i>copper(II) sulfate pentahydrate</i>
$\text{Mg}_3(\text{PO}_4)_2$	I	<i>magnesium phosphate</i>
HClO_2	A	<i>chlorous acid</i>
KClO_2	I	<i>potassium chlorite</i>
HNO_3	A	<i>nitric acid</i>
S_8	E	<i>sulfur</i>
HIO_3	A	<i>iodic acid</i>
N_2O_3	CM	<i>dinitrogen trioxide</i>
$\text{NaC}_2\text{H}_3\text{O}_2$	I	<i>sodium acetate</i>
O_2	E	<i>oxygen</i>
$(\text{NH}_4)_2\text{Cr}_2\text{O}_7$	I	<i>ammonium dichromate</i>