

Exam Two
CHM 203 (Dr. Mattson)
20 September 2006

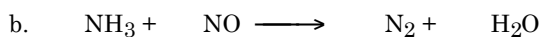
Academic Integrity Pledge:

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 100 points. **BOX YOUR ANSWERS!**

1. (10 points) Balance these reactions:



2. (15 points) In each of the following questions (a – c), you have a choice to do a 5 point question OR a simpler 3 pt question where the formula is already given. The exam adds up to 100 points using the 5 point questions and to 96 using the 3 pt questions. *Whenever possible, do the 5 point question. Do not do both.* What is molar mass (to the tenths place) of

a. (5 pts) dinitrogen trioxide OR (3 pts) V_2O_5

b. (5 pts) ammonium nitrate OR (3 pts) NH_4PF_6

c. copper(I) chloride OR (3 pts) $Sr_3(PO_4)_2$

3. (5 pts) How many moles of calcium carbonate (MM = 100.0 g/mol) are in a 750 mg tablet?

4. (5 pts) What mass of calcium chloride (MM = 110.9 g/mol) is present in a 25.0 mole sample?

5. (a) (5 pts) How many moles of each atom are present in a 0.80 mol sample of caffeine, $C_8H_{10}N_4O_2$?

(b) (3 pts) What is the total number of moles of atoms in this sample?

6. (5 pts) How many *molecules* of caffeine are present in a 12.5 g sample of caffeine, $C_8H_{10}N_4O_2$? (MM = 194 g/mol; $N_A = 6.02 \times 10^{23}$)

7. (5 points) Print (legibly!) the names for the following compounds.

Name	Formula
	ClO_2
	K_2CO_3
	$KC_2H_3O_2$
	NH_4CN
	$Be(NO_3)_2$

8. (4 pts) What are the formulas for the following compounds?

- | |
|----------------------------|
| (a) vanadium(II) bromide |
| (b) vanadium (III) bromide |
| (c) vanadium (IV) bromide |
| (d) vanadium (VI) bromide |

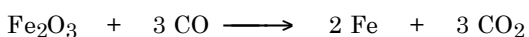
Use the following balanced equation to answer the next four questions.



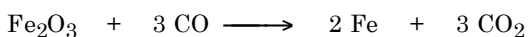
9. (5 pts) How many moles of CO are needed to react with 0.472 mol Fe₂O₃?

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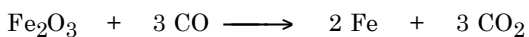
10. (5 pts) How many moles of Fe are expected (theoretical yield) if 0.40 mol Fe₂O₃ are reacted with 1.40 mol CO?



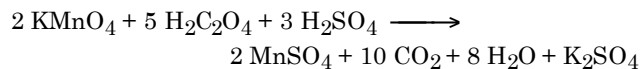
11. (5 pts) How many moles of excess reagent remain if 0.40 mol Fe₂O₃ are reacted with 1.40 mol CO?



12. (5 pts) Suppose 1.05 mol Fe₂O₃ were reacted with excess CO. What is the percent yield if 81 g Fe were obtained?



13. (5 pts) Consider the reaction:



Determine the limiting reagent if the following quantities of reagents are used: 270 g KMnO₄ (MM = 158 g/mol), 350 g H₂C₂O₄ (MM = 90 g/mol), and 220 g H₂SO₄ (MM = 98 g/mol)

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14. (5 pts) What is the molarity of a solution prepared by dissolving 3.116 g NaCl (MM = 58.5 g/mol) in water to make 250.0 mL?

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15. (5 pts) Suppose a 10.0 mL sample of a 0.824 M solution of ammonium bromide were diluted to a volume of 500.0 mL. What is the new concentration (molarity)?

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16. (5 pts) What is the empirical formula of stannous bromide? Its mass percent composition is 57.38% Br and 42.62% Sn.

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17. (3 pts) Print your name here:

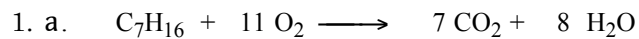
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Your exam score (100 possible): _____

Determine your grade:

$A+ \geq 95$; $A \geq 90$; $B+ \geq 85$; $B \geq 80$; $C+ \geq 75$; $C \geq 70$; $D \geq 6$

Answers:



2.

a. 76.0 g/mol

b. 80.1 g/mol

c. 99.0 g/mol

3. (5 pts) 0.0075 mol calcium carbonate

4. (5 pts) 2772 g calcium chloride

5.

6.4 mol C

8.0 mol H

3.2 mol N

1.6 mol O

19.2 mol atoms total

6. 3.88×10^{22} molecules $C_8H_{10}N_4O_2$

7.

chlorine dioxide

potassium carbonate

potassium acetate

ammonium cyanide

beryllium nitrate

8. (4 pts) What are the formulas for the following compounds?

(a) VBr_2

(b) VBr_3

(c) VBr_4

(d) VBr_5

9. 1.42 mol CO

10. 0.80 mol Fe

11. 0.20 mol excess CO

12. 69%

13. H_2SO_4

14. 0.213 M NaCl

15. 0.0165 M NH_4Br

16. $SnBr_2$