Exam One **CHM 203 (Dr. Mattson)** **6 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 <u>how</u> you worked each problem as well as for the correct answer. This exam is worth 100 points. BOX YOUR ANSWERS!

1. (10 points) Write the atomic symbols for each of these elements.

Sulfur	Silver
Chlorine	Argon
Lithium	Boron
Sodium	Iron
Nitrogen	Fluorine

2. (11 points) Refer to the periodic table labeled "Question 2" on the data sheet to complete this question. Match the letter A – J with the description below. Each letter is used once.

_____ Actinides _____ Halogen

_____ Alkali metals _____ Lanthanides

_____ Alkaline earths _____ Noble gas

_____ Group III element _____ Semimetal

_____ Group V element _____ Transition metals

_____ Group VI element

3. (3 pts) Which of the elements listed in Question 2 are non-metals? Circle all that are:

A B C D E F G H I J K

4. (6 points) Indicate which of these are intensive and extensive properties by circling I or E.

color I E mass I E

melting point I E volume I E

solubility I E density I E

5. (6 pts) True or false.

T F 1 mm = 1 x 10^{-3} m	T F 1 nm = 1 x 10^{9} m
T F 1 pL = 1 x 10^{-12} L	T F 1 g = 1 x 10^{-6} mg
T F 1 μm = 1 x 10^{-9} m	T F 1 pg = 1 x 10^{-12} g

6. (5 pts) With the "Genie in the Bottle" demo, there were a number of examples of physical (P) and chemical (C) changes. Rate each of the following:

1. Hydrogen peroxide was dissolved in water before the demo too place: Circle: P or C
2. The catalyst used, manganese(IV) oxide, is a high melting solid. Circle: P or C
3. Hydrogen peroxide forms water and oxygen. Circle: P or C
4. So much heat is released during the reaction that the water boils. Circle: P or C
5. The "genie" is observed as the steam condenses back into a liquid water fog. Circle: P or C

7. (5 points) Temperature on the Mattson scale (^{O}M) is related to the Fahrenheit scale by the equation:

$$T_M = T_F^2 + 1000$$

What is the temperature in Mattson degrees if it is 80 ^{O}F? *Note: You must show all of your work whenever a box is provided.*

8. (5 pts) How many picograms are in 35 ng?

9. (5 pts) The density of chloroform is 1.4832 g/mL. What volume would you use if you needed 150 g chloroform?

10. (5 pts) Suppose the cholesterol level in a patient's blood was 2.0 mg/mL. Convert this concentration to units of micrograms per liter.

11. (5 pts) Which of the following pairs is/are example(s) of the law of multiple proportions? (May be more than one answer. Circle all possible answers)

(a) SO_2 and SO_3

(b) P_4O_6 and P_4O_{10}

(c) O_2 and O_3

(d) CO and CO_2

(e) ${}^{2}_{1}H$ and ${}^{1}_{1}H$

12. (5 points) Suppose that scientists were able to determine the exact mass and abundance of the two isotopes of rutherfordium, element 104 as given here:

Isotope	**abundance**	**Exact mass**
${}^{259}_{104}Rf$	23 %	258.953 amu
${}^{262}_{104}Rf$	77 %	261.961 amu

Determine the atomic mass of rutherfordium as it would appear on the periodic table

13. (5 pts) Matching. The following examples are either heterogeneous mixtures, homogeneous mixtures or pure substances. Indicate your answer by circling your choice after each.

(a) Brass Het mix Hom mix Pure sub

(b) Pancake syrup Het mix Hom mix Pure sub

(c) Raisin cookie Het mix Hom mix Pure sub

(d) Salt Het mix Hom mix Pure sub

(e) Table sugar Het mix Hom mix Pure sub

14. (9 points) How many protons, neutrons and electrons are in each of these?

	Protons	Neutrons	electrons
${}^{56}_{26}Fe^{+3}$			
${}^{127}_{53}I^{-}$			
${}^{52}_{24}Cr$			

15. (5 pts) When naming compounds, it is necessary to first determine if ionic rules or covalent-molecular rules are to be used. Indicate which rules you would use for these compounds:

(a) KBr Ionic Covalent-Molecular

(b) SF_4 Ionic Covalent-Molecular

(c) ClO_2 Ionic Covalent-Molecular

(d) Na_2S Ionic Covalent-Molecular

(e) $(NH_4)_2CO_3$ Ionic Covalent-Molecular

16. (5 pts) Print the names the following ions. Spelling counts.

Ion	Name
NH_4^+	
NO_2^-	
NO_3^-	
CO_3^{-2}	
PO_4^{-3}	

17. (5 points) Write the formulas for the following compounds.

Name	Formula
phosphorus tribromide	
iron(III) chloride	
dinitrogen pentoxide	
calcium sulfate	
Potassium sulfide	

Print your name here:

Your exam score (100 possible): _____

Determine your grade:
A+ ≥ 95; A ≥ 90; B+ ≥ 85; B ≥ 80; C+ ≥ 75; C ≥ 70; D ≥ 60

Answers:

1.

S	Ag
Cl	Ar
Li	B
Na	Fe
N	F

2.

K Actinides

A Alkali metals

B Alkaline earths

D Group III element

F Group V element

G Group VI element

H Halogen

J Lanthanides

I Noble gas

E Semimetal

C Transition metals

3. F G H I

4.

color	I	mass	E
melting point	I	volume	E
solubility	I	density	I

5. True or false.

T 1 mm = 1 x 10^{-3} m	F 1 nm = 1 x 10^{9} m
T 1 pL = 1 x 10^{-12} L	F 1 g = 1 x 10^{-6} mg
T 1 μm = 1 x 10^{-9} m	T 1 pg = 1 x 10^{-12} g

6. (5 pts) With the "Genie in the Bottle" demo, there were a number of examples of physical (P) and chemical (C) changes. Rate each of the following:

a. P
b. P
c. C
d. P
e. P

7. 7400 ^{o}M

8. 3.5 x 10^{4} pg

9. 101 mL

10. 2.0 x 10^{6} μg/L

11.

SO_2 and SO_3

P_4O_6 and P_4O_{10}

CO and CO_2

12. 261.269 g/mol

13.

Brass	Hom mix
Pancake syrup	Hom mix
Raisin cookie	Het mix
Salt	Pure sub
Table sugar	Pure sub

14.

	Protons	Neutrons	electrons
$^{56}_{26}Fe^{+3}$	26	30	23
$^{127}_{53}I^{-}$	53	74	54
$^{52}_{24}Cr$	24	28	24

15.

(a) KBr Ionic

(b) SF_4 Covalent-Molecular

(c) ClO_2 Covalent-Molecular

(d) Na_2S Ionic

(e) $(NH_4)_2CO_3$ Ionic

16. (5 pts)

Ion	Name
NH_4^+	ammonium
NO_2^-	nitrite
NO_3^-	nitrate
CO_3^{-2}	carbonate
PO_4^{-3}	phosphate

17. (5 points) Write the formulas for the following compounds.

Name	Formula
phosphorus tribromide	PBr_3
iron(III) chloride	$FeCl_3$
dinitrogen pentoxide	N_2O_5
calcium sulfate	$CaSO_4$
Potassium sulfide	K_2S