Exam One **CHM 203 (Dr. Mattson)** **10 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 points) Convert 177 pm to nanometers.

2. (3 points) Convert 770.0 μL to dL.

3. (3 points) A beaker has a base with an area of 25.8 cm^2. To what depth, in cm, will 250 mL liquid fill the beaker?

4. (3 points) Express the following answers to the correct number of significant figures.

(a) 94.9 + 8.18 =

(b) 0.00034 / 14.6 =

(c) 0.04500 X 22.117 =

5. (1 point) Which is an extensive property?
   A. melting point
   B. density
   C. color
   D. volume
   E. boiling point

6. (1 point) Which is an chemical property?
   A. melting point
   B. reactivity
   C. color
   D. density
   E. solubility

7. (6 points) Give an example of each of the following using only the first 36 elements:

alkali metal
alkaline earth metal
halogen
main group element
noble gase
non-metal
transition metal

8. (3 pts) A sample thought to be pyrite has the shape of a box with 90° corners. The exact dimensions of the sample are 12.5 mm, 11.7 mm and 10.2 mm. If the sample has a mass of 7.46 g, is the sample possibly pyrite, given the density of actual pyrite is 5.0 g/cm^3.

9. (3 pts) Copper has a density of 8.90 g/cm^3. If a sample of copper with a mass of 102.5 g were lowered into a graduated cylinder containing 45.0 mL water, what would be the new total volume of the contents of the graduated cylinder?

10. (4 points) How many protons, neutrons and electrons are in each of these?

	Protons	Neutrons	electrons
$^{88}_{38}Sr^{+2}$			
$^{93}_{41}Nb$			
$^{31}_{15}P^{-3}$			

11. (4 points) Use the rules for naming ionic compounds to complete the following table.

Name	Formula
barium hydroxide	
cobalt(III) sulfide	
ammonium nitrate	
sodium carbonate	
	$CrCl_3$
	$KHSO_4$
	Fe_3P_2
	$Ca(CN)_2$

12. (4 points) Use the rules for naming covalent compounds to complete the following table.

Name	Formula
chlorine dioxide	
carbon disulfide	
dinitrogen monoxide	
sulfur tetrafluoride	
	PCl_3
	SO_3
	B_2O_3
	$SiBr_4$

13. (3 points) Not much is know about astatine, atomic number 85. Use the rules for naming acids to complete the following table.

Name	Formula
	HAt
	$HAtO$
	$HAtO_2$
	$HAtO_3$
	$HAtO_4$

14. (4 points) Suppose an element existed in two isotopic forms with exact masses of 148.9985 and 149.9979. If the atomic mass were actually 149.80, what is the relative percent of each? Choose (A) – (E), below

	% with mass 148.9985	% with mass 149.9979
(A)	20 %	80 %
(B)	50 %	50 %
(C)	80 %	20 %
(D)	100 %	0 %
(E)	60 %	40 %

15. (4 points) A transition metal chloride exists in two forms, one that is 67.62% Cl and the other that is 77.68% Cl. Show how these two compounds are consistent with the Law of Multiple Proportions.

16. (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

Answers:

1. 0.177 nm

2. 7.700 x 10^{-3} dL.

3. 9.7 cm

4.

(a) 94.9 + 8.18 = 103.1
(b) 0.00034 / 14.6 = 2.3 x 10^{-5}
(c) 0.04500 X 22.117 = 9.953

5. D

6. B

7.

alkali metal — Na
alkaline earth metal — Ca
halogen — Cl
main group element — C
noble gas — Ne
non-metal — S
transition metal — Fe

8. Yes because the sample also has a density of 5.0 g/cm^3.

9. 56.5 mL

10.

	Protons	Neutrons	electrons
$^{88}_{38}Sr^{+2}$	38	50	36
$^{93}_{41}Nb$	41	52	41
$^{31}_{15}P^{-3}$	15	16	18

11.

Name	Formula
barium hydroxide	$Ba(OH)_2$
cobalt(III) sulfide	Co_2S_3
ammonium nitrate	NH_4NO_3
sodium carbonate	Na_2CO_3
chromium(III) chloride	$CrCl_3$
potassium bisulfate or potassium hydrogen sulfate	$KHSO_4$
iron(II) phosphide or ferrous phosphide	Fe_3P_2
calcium cyanide	$Ca(CN)_2$

12.

Name	Formula
chlorine dioxide	ClO_2
carbon disulfide	CS_2
dinitrogen monoxide	N_2O
sulfur tetrafluoride	SF_4
phosphorus trichloride	PCl_3
sulfur trioxide	SO_3
diboron trioxide	B_2O_3
silicon tetrabromide	$SiBr_4$

13.

Name	Formula
hydroastatic acid	HAt
hypochorous acid	HAtO
astatous acid	$HAtO_2$
astatic acid	$HAtO_3$
Perastatic acid	$HAtO_4$

14. A

15. The first compound has a Cl/M ratio of 67.62%/32.38% = 2.09 Cl/M and the other one has a Cl/M ratio of 77.68%/22.32 Cl/M. The ratio of the ratios is 3.48/2.09 = 1.665 or 5/3. The simple ratio, 5:3, is consistent with the LMP.