

Exam One
CHM 203 (Dr. Mattson)
12 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. (5 points) Complete the following table.

Element Name	Atomic symbol
sodium	
	K
gold	
	Cu
iron	

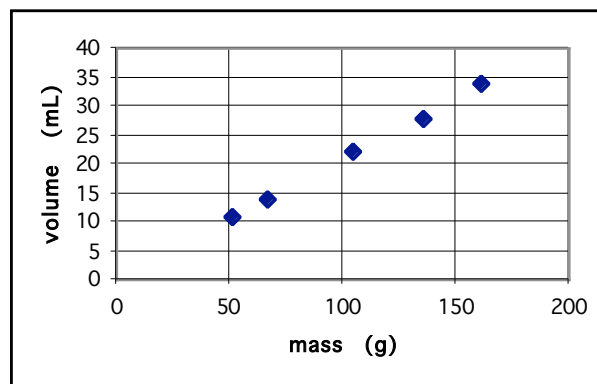
2. (3 points) The distance between the two hydrogen atoms in H₂ is 74 pm. Convert this length to cm.

3. (3 points) Femto is the prefix used to represent 1 x 10⁻¹⁵ just as nano represents 1 x 10⁻⁹. Convert 4400 fL (femtoliters) into picoliters (pL).

4. (4 points) Match the element with the group. Write A – G (not atomic symbol) in the blanks.

- | | |
|----------------------------|-------|
| _____ alkali metal | A. Br |
| _____ alkaline earth metal | B. Fe |
| _____ halogen | C. C |
| _____ actinide | D. Ar |
| _____ noble gas | E. As |
| _____ Group IV | F. Rb |
| _____ transition metal | G. Ca |
| _____ semi-metal | H. U |

5. (3 pts) Various samples of a pure substance were measured for mass and volume. The data are summarized in this graph. How could the slope of the line be used to calculate the density of the sample?



6. (1 point) Which is an intensive property?
 A. length
 B. density
 C. mass
 D. volume
 E. weight

7. (4 pts) Digitalis, a drug used to control atrial fibrillation in heart patients is administered at a dosage of 20.0 µg/kg body weight. What mass, in mg, should be administered to a 175 pound patient? [Given: 1 pound = 454 g]

8. (1 pt) Which one of the following pairs of substances would serve as an example of the law of multiple proportions?

- A. H₂O and H₂
- B. P₄O₆ and P₄O₁₀
- C. P₂O₅ and P₄O₁₀
- D. O₂ and O₃
- E. FCl and ClF

9. (3 pts) Copper has a density of 8.90 g/cm³. What is the volume (in mL) of 57 g piece of copper?

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10. (5 points) How many protons, neutrons and electrons are in each of these?

	Protons	Neutrons	electrons
${}^{41}_{20}\text{Ca}^{+2}$			
${}^{115}_{49}\text{In}$			
${}^{31}_{15}\text{P}^{-3}$			

11. (4 points) Complete the table of ion names.

Name of ion (PRINT!)	Formula
hydroxide	
sulfide	
ammonium	
carbonate	
	NO ₃ ⁻
	SO ₄ ⁻²
	PO ₄ ⁻³
	CN ⁻

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

Name (PRINT!)	Formula
	KNO ₃
cobalt(III) sulfide	
	NH ₄ NO ₃
sodium carbonate	

13. (4 points) Use the rules for naming covalent compounds to complete the following table.

Name (PRINT!)	Formula
dinitrogen monoxide	
silicon tetrafluoride	
	SO ₃
	SiBr ₄

14. (4 points) With the ion note cards, you learned how to name the series of oxygen-chlorine anions, ClO⁻, ClO₂⁻, ClO₃⁻, and ClO₄⁻. The analogous series of “oxyanions” for bromine and iodine is named using the same pattern, where the root word “chlor” in each name is replaced with “brom” or “iod” (e.g. perchlorate, perbromate, periodate). The series with fluorine has yet to be discovered, however we know how they would be named using the pattern. Use the naming pattern for oxyanions to complete the following table.

Name (PRINT!)	Formula
	FO ⁻
	FO ₂ ⁻
	FO ₃ ⁻
	FO ₄ ⁻

15. (2 points) Meitnerium (Mt, element 109) has only been made a few atoms at a time. Suppose that a method were worked out to make lots of it and it was determined that existed in two isotopic forms. The dominant isotope, Mt-270 represented about 90% of all meitnerium and the rest was Mt-272. What would be the approximate atomic mass of Mt?

Approx. atomic mass

- (A) 270.0
- (B) 270.1
- (C) 270.2
- (D) 271.0
- (E) 272.0

16. (1 pt BONUS) Print your name here:

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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.

Element Name	Atomic symbol
sodium	Na
potassium	K
gold	Au
copper	Cu
iron	Fe

2. 7.4×10^{-9} cm

3. 4.40 pL

4. F, G, A, H, D, C, B, E

5. The slope of the line, $m = \Delta y / \Delta x$, has units of mL/g — the opposite to that of density's units, g/mL. Thus, the slope is the inverse of the density.

6. B

7. 1.59 mg

8. B

9. 6.4 mL

10.

	Protons	Neutrons	electrons
${}_{20}^{41}\text{Ca}^{+2}$	20	21	18
${}_{49}^{115}\text{In}$	49	66	49
${}_{15}^{31}\text{P}^{-3}$	15	16	18

11.

Name of ion (PRINT!)	Formula
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hydroxide	OH^-
sulfide	S^{2-}
ammonium	NH_4^+
carbonate	CO_3^{2-}
nitrate	NO_3^-
sulfate	SO_4^{2-}
phosphate	PO_4^{3-}
cyanide	CN^-

12.

Name (PRINT!)	Formula
potassium nitrate	KNO_3
cobalt(III) sulfide	Co_2S_3
ammonium nitrate	NH_4NO_3
sodium carbonate	Na_2CO_3

13.

Name (PRINT!)	Formula
dinitrogen monoxide	N_2O
silicon tetrafluoride	SiF_4
sulfur trioxide	SO_3
silicon tetrabromide	SiBr_4

14.

Name (PRINT!)	Formula
hypofluorite	FO^-
fluorite	FO_2^-
fluorate	FO_3^-
perfluorate	FO_4^-

15. C