

**Exam 1 Chm 203 (Dr Mattson) 11 September 2017****Name:****Academic Integrity Pledge:** *In keeping with Creighton University's ideals and with the Academic Integrity Code, I pledge that this work is my own and that I have neither given nor received inappropriate assistance in preparing it.***Chemistry Student Number (1 bonus pt):** \_\_\_\_\_**Signature:**

**Instructions:** Show all work whenever a calculation box is provided! Write legibly. Include units whenever appropriate. You will receive credit for **how** you worked each problem as well as for the correct answer. If you need more space, you may use the back of the periodic table provided — Write: "See periodic table!" in the answer box — then write your name on the periodic table and turn it in with your exam. On your desk you are allowed only pencils (but no pencil pouch), an eraser, and a non-programmable calculator without a slipcover. Backpacks, bags, and purse-like items must be stored in the rear section of the room. Cell phones must be silent and placed in your backpack/bag/purse — not in your pocket.

1. (6 pts) Which of these prefixes are correct? **Circle all that are.**

micro- is  $10^{-6}$ pico- is  $10^{+12}$ kilo- is  $10^{-3}$ nano- is  $10^{-9}$ centi- is  $10^{-2}$ mega is  $10^{+6}$ 

2. (6 pts) Provide either the prefix word or symbol for each of these. First row is an example.

kilo-	<i>k</i>
micro-	
mega-	
milli-	

c	<i>centi-</i>
p	
G	
n	

2. (3 pts) Which **three** of these quantities are **not** SI units? **Circle your three choices.**

A. mass    B. length    C. temperature    D. density  
E. time    F. volume    G. energy

3. (3 pts) Convert  $5.25 \times 10^{-6}$  cm into nm.

You must show work for credit.

Answer with units: \_\_\_\_\_

4. (4 pts) What is the area, in  $m^2$ , of a rectangle measuring 84.0 cm x 24.2 cm? **Note units:  $m^2$**

You must show work for credit.

Answer with units: \_\_\_\_\_

5. (4 pts) Molecular vibrations takes place on very small time scales. A typical frequency for a molecular vibration is  $5 \times 10^{+13}$  vibrations  $s^{-1}$ . What is the length of time for just one vibration, in units of femtoseconds? **Hint: What units do you have and what do you want?**

You must show work for credit.

Answer with units: \_\_\_\_\_

6. (4 pts). A typical soccer ball has a radius of 11 cm. Using the formula of a sphere,  $V = \frac{4}{3} \pi r^3$ , calculate the volume of a soccer ball and express it in liters.

You must show work for credit.

Answer with units: \_\_\_\_\_

- 7a. (3 pts) Liquid nitrogen boils at 77 K. Convert this to  $^{\circ}C$ . **Given:  $T_K = T_C + 273$**

You must show work for credit.

Answer with units: \_\_\_\_\_

- 7b. (4 pts) Continuing with the previous problem, convert this to  $^{\circ}F$ . **Given:  $T_C = \frac{5}{9} (T_F - 32)$**

You must show work for credit.

Answer with units: \_\_\_\_\_

8. (4 pts) The density of chromium is  $7.19 \text{ g/cm}^3$ . What is the mass of a sample of chromium that displaces 44.4 mL water?

You must show work for credit.

Answer with units: \_\_\_\_\_

9. (4 pts) Imagine a box with dimensions of 35 x 25 x 45 cm. How many gallons would this box hold? **Given: 1 gallon = 4 quarts (exact) and 1 L = 1.06 quarts.**

You must show work for credit.

Answer with units: \_\_\_\_\_

10. (4 pts) The dosage for ibuprofen is 400 mg for a 150 pound person. Calculate the dose, in mg, for a 30 kg child. Given: 1 pound = 454 g

You must show work for credit.

Answer with units: \_\_\_\_\_

11. (8 pts) Some elements have atomic symbols that do not resemble their names. In each case, provide the name or the atomic symbol.

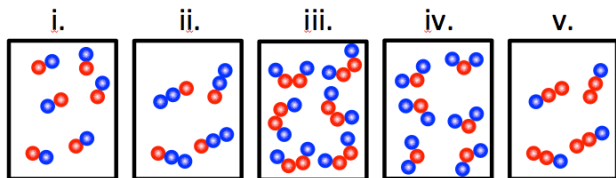
potassium	Au
silver	Fe
copper	Sn
mercury	Pb

12. (6 pt) Identify each element being described. Write the atomic symbol in the box provided.

- 12a. Halogen in Period 3
- 12b. Transition metal with 22 protons
- 12c. Group 4 semimetal
- 12d. Noble gas with smallest atomic mass
- 12e. Alkaline earth element from Period 5.
- 12f. Alkali metal from Period 4.

13. (6 pts) Which of these pairs of compounds in the boxes below represent examples of the law of multiple proportions? Circle all that are examples.

- A. i and ii    B. i and iii    C. iii and iv  
D. iv and v    E. ii and iii    F. ii and iv



14. (4 pts) The following elements form the periodic table exist as only one isotope. How many protons, neutrons and electrons does each of these elements have?

Element	Protons	Neutrons	Electrons
fluorine			
sodium			
phosphorus			

15. (4 pts) How many protons, and neutrons does each of these isotopes have?

$^{35}_{17}\text{Cl}$	$^{39}_{19}\text{K}$
$^{200}_{80}\text{Hg}$	$^{131}_{54}\text{Xe}$

16. (4 pts) How many moles of copper are in a sample with a mass of 1.23 kg?

You must show work for credit.

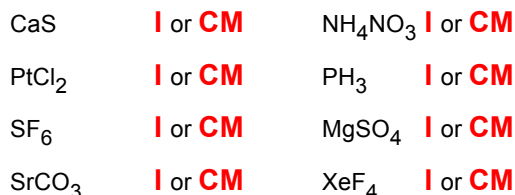
Answer with units: \_\_\_\_\_

17. (4 pts) Copper has two stable isotopes,  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$ . The first isotope constitutes 69.15% of all copper and has an exact mass of 62.9295975. The second isotope has an exact mass of 64.9277895. What is the average atomic mass of copper?

You must show work for credit.

Answer with units: \_\_\_\_\_

18. (4 pts) Which of these is predicted to be ionic (I) and which is predicted to be covalent molecular (CM)? Circle either I or CM for each.



19. (10 pts) Naming. Circle either Ok if the name and formula pair are ok. Circle X if there is an error in the pair and circle the error. If you were notified by e-mail that you are nomenclature certified, skip this question.

- A. Ok X ammonium sulfide     $(\text{NH}_4)_2\text{S}$   
B. Ok X potassium oxalate     $\text{KC}_2\text{O}_4$   
C. Ok X calcium chlorate     $\text{Ca}(\text{ClO}_2)_2$   
D. Ok X iodine fluoride    IF  
E. Ok X vanadium(III) sulfite     $\text{V}_2(\text{SO}_3)_3$   
F. Ok X copper(II) acetate     $\text{CuC}_2\text{H}_3\text{O}_2$   
G. Ok X dinitrogen tetrachloride     $\text{N}_2\text{Cl}_4$   
H. Ok X iron(II) bicarbonate     $\text{Fe}(\text{HCO}_3)_2$   
I. Ok X rubidium dichromate     $\text{Rb}_2\text{Cr}_2\text{O}_7$   
J. Ok X gold tricyanide     $\text{Au}(\text{CN})_3$

Total score (out of 100): \_\_\_\_\_

A+ ≥ 95% A ≥ 90% B+ ≥ 85% B ≥ 80% C+ ≥ 75% C ≥ 70% D ≥ 60%

## Answers:

1. micro- is  $10^{-6}$  nano- is  $10^{-9}$   
centi- is  $10^{-2}$  mega is  $10^{+6}$

2.

micro-	$\mu$
mega-	M
milli-	m

p	Pico
G	Giga
n	nano

2. D, F, G  
3. 52.5 nm  
4.  $0.20 \text{ m}^2$   
5. 20 fs  
6. 5.6 L  
7a.  $-196 \text{ }^\circ\text{C}$ .  
7b.  $-321 \text{ }^\circ\text{F}$ .  
8. 319 g  
9. 10.4 gal  
10. 176 mg

11.

potassium	K
silver	Ag
copper	Cu
mercury	Hg

Au	gold
Fe	iron
Sn	tin
Pb	lead

12. a. Cl, b. Ti, c. Si (or Ge), d. He, e. Sr, f. K

13. A, C, D, and E

14.

Element	Protons	Neutrons	Electrons
fluorine	9	10	9
sodium	11	12	11
phosphorus	15	16	15

15.

$^{35}_{17}\text{Cl}$ 17 p and 18 n	$^{39}_{19}\text{K}$ 19 p and 20 n
$^{200}_{80}\text{Hg}$ 80 p and 120 n	$^{131}_{54}\text{Xe}$ 54 p and 77 n

16. 19.4 mol  
17. 63.55 amu

18.

CaS	I	$\text{NH}_4\text{NO}_3$	I
$\text{PtCl}_2$	I	$\text{PH}_3$	CM
$\text{SF}_6$	CM	$\text{MgSO}_4$	I
$\text{SrCO}_3$	CM	$\text{XeF}_4$	CM

19.

- A. Ok  
B. X  $\text{K}_2\text{C}_2\text{O}_4$   
C. X chlorite or  $\text{Ca}(\text{ClO}_3)_2$   
D. X iodine monofluoride  
E. Ok  
F. X copper(I) acetate or  $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2$   
G. Ok  
H. Ok  
I. Ok  
J. X gold tricyanide