Exam 1 Chm 203 (Dr Mattson) 9 September 2013

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.*

Signature:

Name:

Circle your Folder group:

H He Li Be B C N O F Ne Na Mg Al Si

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 PT" in the answer box and then hand the periodic table 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 and purses must be closed and stored on the floor. Cell phones must be OFF and placed in your backpack/purse or in the front of the room – but not in your pocket.

Useful information: $N_A = 6.02 \times 10^{23}$

1. (4 pts) Give the atomic symbol for each of these elements

strontium	phosphorus
potassium	manganese

2. (4 pts) Give the element's name for each of these atomic symbols.

Ca	Cr
Co	Cu

3. (5 pts) Fill in the blanks.
   A. Magnesium is a member of Group IIA, also known as the _____ _____ _____.
   B. Molybdenum is a _____ _____.
   C. Nitrogen is a member of the_____ period.
   D. Krypton is a member of Group VIIIA, also known as the _____ _____.
   E. Sodium is a member of Group IA, also known as the _____ _____.

4. (5 pts) In a class demonstration, I cut potassium with a spatula and dropped a small chunk of the metal into a 2-L bottle with some water in it. A purplish flame was observed. Circle I for the statements that describe an intensive property and E for those that describe a extensive property. All of the statements are true.
   I E Potassium is a soft that can be cut with a spatula or knife.
   I E The flame we observed was small because the size of the chunk was small.
   I E Potassium's melting point is 63.4 ^{o}C, so it was a liquid as it was reacting on the surface of the water.
   I E Potassium's density is less than water, so it floated on the water as it burned.
   I E Heat was produced as the potassium reacted with the water.

5. (5 pts) Circle C for the statements that describe a chemical property and P for those that describe a physical property. All statements are true and refer to propane, the substance that is used with a BBQ grill set.
   C P Propane burns with a blue flame.
   C P Propane, when burned, produces carbon dioxide and water.
   C P Propane is a compressed liquid that evaporates when the tank is opened.
   C P Propane burns in air.
   C P Propane is a colorless, odorless gas.

6. (4 pts) Express these values (a) in scientific notation and (b) with the appropriate abbreviation for the units. (Do NOT convert the units into more appropriate units)

7,300 milligrams
0.000 004 260 nanometers
0.4670 milliliters
8,090 microseconds

7. (3 pts) Convert 4.9×10^{-7} μm into pm. Start with m =

Answer with units:_____

8. (4 pts) Convert the density of air, which is approximately 1.19×10^{-3} g/mL, into units of kg/m^3.

Answer with units:_____

9. (4 pts) The density of elemental potassium is 0.89 g/mL. What is the mass of a box-shaped piece of potassium measuring 15.4 cm x 10.8 cm x 0.807 cm?

Answer with units:_____

10. (4 pts) Express 45 mi/hr in units of m/s, given 1 mile = 5280 ft; 1 ft = 12 inches; 1 inch = 2.54 cm.

Answer with units:_____

11. (1 pt) Which example demonstrates the law of multiple proportions.
A. There are three known oxides of iron, only one of which contains 72.7% iron.
B. Oxides of iron always have at least two oxygen atoms present.
C. Oxides of iron are always ionic.
D. An oxide of iron, known to be pure, always contains 72.7% iron.
E. There are multiple oxides of iron because iron exists in more than one isotopic form.

12. (9 pts) How many protons, neutrons and electrons are present in each of these:

	Protons	Neutrons	Electrons
$^{51}_{23}V$			
$^{88}_{38}Sr^{2+}$			
$^{81}_{35}Br^{-}$			

13. (4 pts) Gallium exists in two stable isotopic forms, ^{69}Ga and ^{71}Ga. The former has an exact mass of 68.9256 and an abundance of 60.108%. Using your periodic table for the missing piece of information, what is the exact mass of ^{71}Ga?

Answer with units:_____

14. (3 pts) How many moles of gallium are in a sample weighing 82.1 g?

Answer with units:_____

15. (4 pts) How many gallium atoms are in the sample?

Answer:_____

16. (1 pt) What analogy best approximates the relationship between the radius of an atom and the radius of its nucleus?
A. A fly in a cathedral.
B. A speck of dust and the moon.
C. An avocado and its pit.
D. A dog and its fleas.

17. (6 pts) Covalent-molecular (CM) compounds are considerably different from ionic compounds. In upcoming chapters we will learn a lot about these differences, but for now, we know how to recognize whether a compound is ionic or CM compounds. Circle I for ionic or CM for covalent molecular.

I CM MgF_2 I CM N_2S_5

I CM $(NH_4)_2SO_3$ I CM SO_3

I CM $Ca(NO_3)_2$ I CM $CuSO_4$

Note: If you are Nomenclature Certified (as per e-mail message from last Friday, September 6th), you may stop at this time.

18. (5 pts) Name these ions

SO_3^{-2}
SO_4^{-2}
ClO_2^{-}
PO_4^{-3}
NH_4^{+}

19. (5 pts) Circle the correct formula for each of these.

A. calcium carbonate

$Ca(CO_3)_2$ Ca_2CO_3 $CaHCO_3$
$CaCO_3$ CaC_2

B. barium sulfate

BaS Ba_2SO_4 $BaSO_3$
$BaSO_4$ $Ba(SO_4)_2$

C. bromine trifluoride

BrF Br_3F BFO_3
$Br(FO_3)_3$ BrF_3

D. chromium(III) oxide

Cr_3O CrO_3 Cr_2O_3
Cr_3O_2 Ch_3O

E. diphosphorus pentoxide

P_2O_5 Ph_2O_4 PO_5
$P_2(O_2)_5$ $PO_{2.5}$

Subtotal from exam: _____

Folder work: (20 max) _____

Total: _____

Answers

1.

Sr	P
K	Mn

2.

calcium	chromium
cobalt	copper

3.

A. alkaline earth metal

B. transition metal

C. second

D. noble gases

E. alkali metals

4. I E I I E

5. P C P C P

6.

7.3 x 10^{3} mg
4.260 x 10^{-6} nm
4.670 x 10^{-1} mL
8.09 x 10^{3} μs

7. 0.49 pm

8. 1.19 kg/m^{3}

9. 120 g

10. 20 m/s

11. A

12.

	Protons	Neutrons	Electrons
$^{51}_{23}V$	23	28	23
$^{88}_{38}Sr^{2+}$	38	50	36
$^{81}_{35}Br^{-}$	35	46	36

13. 70.917 amu

14. 1.18 mol Ga

15. 7.09 x 10^{23} Ga atoms

16. A

17.

I	MgF_2	CM	N_2S_5
I	$(NH_4)_2SO_3$	CM	SO_3
I	$Ca(NO_3)_2$	I	$CuSO_4$

18. (5 pts) Name these ions

SO_3^{-2} sulfite
SO_4^{-2} sulfate
ClO_2^{-} chlorite
PO_4^{-3} phosphate
NH_4^{+} ammonium

19.

A. calcium carbonate $CaCO_3$

B. barium sulfate $BaSO_4$

C. bromine trifluoride BrF_3

D. chromium(III) oxide Cr_2O_3

E. diphosphorus pentoxide P_2O_5