

Name Key (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) How many significant figures are there in the answer for the following problem?  
 $56.4$   
 $+ 0.8822$   
 $+ 21$   


---

 $78.2822$   
 A) one      B) two      C) three      D) four      1) B
- 2) What symbol is used to represent the factor  $10^3$ ?  
 A) n      B) k      C)  $\mu$       D) M      2) B
- 3) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called  
 A) the Law of Definite Proportions.  
 B) the Law of Conservation of Mass.      3) B  
 C) Dalton's Atomic Theory.  
 D) the Scientific Method.  
 E) the Law of Multiple Proportions.
- 4) Identify a liquid. (type in test bank, A + C)  
 A) no definite shape and definite volume      B) no definite shape and no definite volume  
 C) definite volume and no definite shape      D) definite volume and definite shape      4) A or C
- 5) How many significant figures are in 0.00523980 mL?  
 A) 7      B) 5      C) 4      D) 6      E) 3      5) D
- 6) Identify a cation.  
 A) An atom that has lost an electron.      6) A  
 B) An atom that has gained an electron. — isotope  
 C) An atom that has gained a neutron. — different element  
 D) An atom that has lost a proton and a neutron. — anion (-)
- 7) Which of the following statements is FALSE?  
 A) The alkali metals are fairly unreactive. — very reactive      7) A  
 B) Zn is a transition metal.  
 C) Noble gases do not usually form ions. — unreactive  
 D) Sulfur is a main group element.  
 E) Halogens are very reactive elements.
- 8) Identify the compound with covalent bonds.  
 A) Kr      B) KBr      C) NaCl      D) Li      E) CH<sub>4</sub>      8) E  
 no bonds      ionic      ionic      element      covalent  
 element

- 9) Ions differ in the number of  
A) neutrons and protons.  
B) electrons and protons.  
C) neutrons.  
 D) electrons.  
E) protons.

9) D

- 10) Choose the element from the list below.

A) Na Cl      B) H<sub>2</sub>O<sub>2</sub>      C) Fe<sub>2</sub>O<sub>3</sub>      D) H<sub>2</sub>O       E) He

all others are compounds

10) E

- 11) Which of the following are examples of intensive properties?

A) mass  
B) volume  
 C) density ← independent of amounts  
D) None of the above are examples of intensive properties.  
E) All of the above are examples of intensive properties.

11) C

- 12) If the melting point of vanadium metal is 1910°C, what is its melting point in Kelvin? ( $K = ^\circ C + 273.15$ )

A) 3470 K      B) 1029 K      C) 1637 K       D) 2183 K

12) D

- 13) An ionic bond is best described as

A) the attraction that holds the atoms together in a polyatomic ion. (covalent)  
 B) the transfer of electrons from one atom to another.  
C) the attraction between 2 metal atoms. (metallic)  
D) the sharing of electrons. covalent  
E) the attraction between 2 nonmetal atoms. covalent

13) B

$$1910^\circ C + 273.15 = 2183.15 K$$

**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

H

Na

P

Ne

I

N

halogens +  
H<sub>2</sub>O<sub>2</sub>

2 Using the periodic table, for the element (1 pt per blank, 9 pts total) Ca

What is the element name? calcium

give: atomic mass 40.078 amu atomic number 20

number of protons 20 number of electrons 20 number of neutrons 40-20=20  
(show work for above in the space below if needed for partial credit)

What is the group number for the element IIA  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? +2 (show work below if necessary)

How many total electrons does the ionic form of the element have? 18e<sup>-</sup> (show work below)  
20-2 = 18

3 Given the following series of experimentally determined numbers to measure an object, are the measurements

true measurement = 7.278

experimental measurements: 10.558, 10.557, 10.559 (average = 10.558)

[(accurate but not precise) or (precise but not accurate)] (circle one) (5 pts)

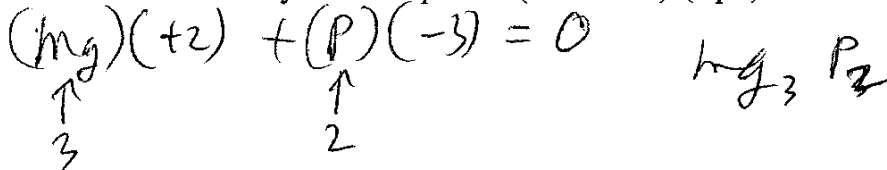
4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

Mg and P

a. The ionic charge for the Mg (magnesium) is +2 (1 pt)

The ionic charge for the P (phosphorus) is -3 (1 pt)  $5-8 = -3$

- b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)



- c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

binary ionic - no prefix magnesium phosphide  
 Mg - magnesium  
 P = phosphorus - orus + ide

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) Transition metal element      (b) main group element      (c) lanthanide / actinides  
 (d) alkali metals                    (e) alkaline earth metals      (f) chalcogen  
 (g) halogen                            (h) noble gases

Periodic Table of the Elements

(b)

(g)

**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**

**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound (16 pts))

14.55 cm to miles

$$14.55 \text{ cm} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} \times \frac{1 \text{ foot}}{12 \text{ inches}} \times \frac{1 \text{ mile}}{5280 \text{ feet}} =$$
$$9.040 \times 10^{-5} \text{ miles}$$

2 You have 27.5 mL of the element gold (Au). The density of gold is 19.3 g/mL (6 pts each part, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating part a and get a wrong number, if you use that incorrect number and manage to answer part (b) and part (c) correctly showing your correct work, then you will get full credit for part (b) and part (c). Conversely if you get the final correct number for part (c) but there is no way that you could have gotten your part (c) number from your incorrect part (a) and the way you set up your calculation, then you will lose all credit for part (c).}

a. Use density as a conversion factor to convert mL of the element Au into grams of Au. (show work. Density = mass / volume)

$$27.5 \text{ mL Au} \times \frac{19.3 \text{ g Au}}{\text{mL Au}} = 530.75 \text{ g Au}$$

w sig fig  
↓  
531

b. Given the number of grams of the element from your part (a) above, how many moles of the element Au is that? (show work)

atomic mass Au = 196.96655

$$1 \text{ mol Au} = 196.97 \text{ g Au}$$

$$530.75 \text{ g Au} \times \frac{1 \text{ mol Au}}{196.97 \text{ g Au}} = 2.70 \text{ moles Au}$$

c. Given your number of moles from your part (b) above, how many atoms of the element Au is that? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

1 mole =  $6.022 \times 10^{23}$  atoms

$$2.70 \text{ mol Au} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol Au}} = 1.63 \times 10^{24} \text{ atoms Au}$$

orange

Exam I General Chemistry I Lecture Fall 2013 9/18/13 Wednesday 9:30 B Dr. Hahn Exam # \_\_\_\_\_

Name Key (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) An ionic bond is best described as 1) A  
 A) the transfer of electrons from one atom to another.  
 B) the attraction between 2 nonmetal atoms.  
 C) the attraction between 2 metal atoms.  
 D) the attraction that holds the atoms together in a polyatomic ion.  
 E) the sharing of electrons.
- 2) How many significant figures are in 0.00523980 mL? 2) C  
A) 5                      B) 4                       C) 6                      D) 7                      E) 3
- 3) If the melting point of vanadium metal is  $1910^{\circ}\text{C}$ , what is its melting point in Kelvin? ( $\text{K} = ^{\circ}\text{C} + 273.15$ ) 3) B  
A) 1637 K                       B) 2183 K                      C) 1029 K                      D) 3470 K
- 4) Identify a liquid. 4) B  
A) no definite shape and definite volume                       B) definite volume and no definite shape  
C) definite volume and definite shape                      D) no definite shape and no definite volume
- 5) Which of the following statements is FALSE? 5) E  
A) Noble gases do not usually form ions.  
B) Sulfur is a main group element.  
C) Zn is a transition metal.  
D) Halogens are very reactive elements.  
 E) The alkali metals are fairly unreactive.
- 6) What symbol is used to represent the factor  $10^3$ ? 6) C  
A) M                      B)  $\mu$                        C) k                      D) n
- 7) Which of the following are examples of intensive properties? 7) C  
A) volume  
B) mass  
 C) density  
D) None of the above are examples of intensive properties.  
E) All of the above are examples of intensive properties.

8) Identify a cation.

- A) An atom that has lost an electron.
- B) An atom that has gained a neutron.
- C) An atom that has gained an electron.
- D) An atom that has lost a proton and a neutron.

8) A

9) Choose the element from the list below.

- A) Na Cl      B) H<sub>2</sub>O<sub>2</sub>      C) Fe<sub>2</sub>O<sub>3</sub>      D) H<sub>2</sub>O       E) He

9) E

10) Ions differ in the number of

- A) neutrons and protons.
- B) electrons and protons.
- C) neutrons.
- D) electrons.
- E) protons.

10) D

11) Identify the compound with covalent bonds.

- A) CH<sub>4</sub>      B) NaCl      C) Li      D) KBr      E) Kr

11) A

12) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called

- A) the Scientific Method.
- B) the Law of Definite Proportions.
- C) the Law of Conservation of Mass.
- D) the Law of Multiple Proportions.
- E) Dalton's Atomic Theory.

12) C

13) How many significant figures are there in the answer for the following problem?

$$56.4 + 0.8822 + 21 = ?$$

- A) one       B) two      C) three      D) four

13) B



**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

Ne I N H Na P

*all halogens  
+ H<sub>2</sub>O*

2. Using the periodic table, for the element (1 pt per blank, 9 pts total) P

What is the element name? phosphorus

give: atomic mass 30.974 amu atomic number 15

number of protons 15 number of electrons 15 number of neutrons  $30.974 - 15 = 16$   
(show work for above in the space below if needed for partial credit)

What is the group number for the element IVA  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? -3 (show work below if necessary)  
 $5 - 8 = -3$

How many total electrons does the ionic form of the element have? 18 e<sup>-</sup> (show work below)  
 $15 e^- + 3 = 18$

3 Given the following series of experimentally determined numbers to measure an object, are the measurements

true measurement = 7.278

experimental measurements: 7.353, 8.178, 6.292 (average = 7.274)

[(accurate but not precise)] or (precise but not accurate)] (circle one) (5 pts)

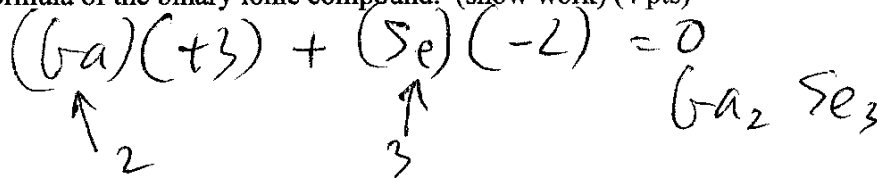
4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

Ga and Se

a. The ionic charge for the Ga (gallium) is +3 (1 pt)

The ionic charge for the Se (selenium) is -2 (1 pt)

- b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)



- c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

cation - gallium      gallium selenide  
 anion - selenium - ide  
no # prefix bc ionic

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) transition metal element      (b) main group element      (c) lanthanide / actinides  
 (d) alkali metals      (e) alkaline earth metals      (f) chalcogen  
 (g) halogen      (h) noble gases

Periodic Table of the Elements (a)

I A																II A										III A										IV A										V A										VI A										VII A										VIII A										IX A										X A										XI A										XII A										I B										II B										III B										IV B										V B										VI B										VII B										VIII B										IX B										X B										XI B										XII B																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
H																He										Li										Be										B										C										N										O										F										Ne										Na										Mg										Al										Si										P										S										Cl										Ar										K										Ca										Sc										Ti										V										Cr										Mn										Fe										Co										Ni										Cu										Zn										Ga										Ge										As										Se										Br										Kr										Rb										Sr										Y										Zr										Nb										Mo										Tc										Ru										Rh										Pd										Ag										Cd										In										Sn										Sb										Te										I										Xe										Cs										Ba										La										Ce										Pr										Nd										Pm										Sm										Eu										Gd										Tb										Dy										Ho										Er										Tm										Yb										Lu										Fr										Ra										Ac										Th										Pa										U										Np										Pu										Am										Cm										Bk										Cf										Es										Fm										Md										No										Lr									

**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**

**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound (16 pts))

25.5 yards to kilometers

$$25.5 \text{ yards} \times \frac{3 \text{ feet}}{1 \text{ yard}} \times \frac{12 \text{ inches}}{1 \text{ foot}} \times$$

$$\frac{2.54 \text{ cm}}{1 \text{ inch}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1000 \text{ m}} = 0.0233 \text{ km}$$

2 You have 78.2 mL of the element iron (Fe). The density of iron is 7.86 g/mL (6 pts each, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Fe into grams of Fe. (show work. Density = mass / volume)

$$78.2 \text{ mL Fe} \times \frac{7.86 \text{ g Fe}}{\text{mL Fe}} = 615 \text{ g Fe}$$

b. Given the number of grams of the element from your part (a) above, how many moles of the element Fe is that? (show work)

$$1 \text{ mol Fe} = 55.85 \text{ g Fe}$$
$$615 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} = 11.0 \text{ mol Fe}$$

c. Given your number of moles from your part (b) above, how many atoms of the element Fe is that? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

$$1 \text{ mol Fe} = 6.022 \times 10^{23} \text{ atoms Fe}$$
$$11.0 \text{ mol Fe} \times \frac{6.022 \times 10^{23} \text{ atoms Fe}}{1 \text{ mol}} = 6.62 \times 10^{24} \text{ atoms Fe}$$

Name Key (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

1) Identify a cation.

- A) An atom that has lost a proton and a neutron.  
 B) An atom that has gained a neutron.  
 C) An atom that has gained an electron.  
 D) An atom that has lost an electron.

1) D2) The factor  $10^{-3}$  corresponds to which prefix?

- A) centi       B) milli      C) deci      D) deka

2) B3) A covalent bond is best described as

- A) a bond between a metal and a polyatomic ion.  
 B) a bond between a metal and a nonmetal.  
 C) the sharing of electrons between atoms.  
 D) the transfer of electrons.  
 E) a bond between two polyatomic ions.

3) C4) Which of the following statements is FALSE?

- A) The alkali metals are fairly unreactive.  
 B) Noble gases do not usually form ions.  
 C) Zn is a transition metal.  
 D) Sulfur is a main group element.  
 E) Halogens are very reactive elements.

4) A

5) Identify a solid.

- A) definite volume and definite shape      B) no definite shape and no definite volume  
 C) definite volume and no definite shape      D) no definite shape and definite volume

5) A

6) Identify the compound with ionic bonds.

- A) Ne      B) CO       C) KBr      D) N<sub>2</sub>      E) H<sub>2</sub>O

6) C

7) How many significant figures are in the measurement, 463.090 m?

- A) 3      B) 5      C) 4      D) 2       E) 6

7) E

8) Isotopes differ in the number of

- A) neutrons.
- B) protons.
- C) electrons.
- D) neutrons and protons.
- E) beta particles.

8) A

9) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called

- A) the Law of Conservation of Mass.
- B) the Law of Multiple Proportions.
- C) Dalton's Atomic Theory.
- D) the Scientific Method.
- E) the Law of Definite Proportions.

9) A

10) How many significant figures are there in the answer to the following problem?

$(9.992 \times 3.200) + 0.610 = ?$

- A) one
- B) two
- C) three
- D) four

10) D

11) If a solution has a temperature of 255 K, what is its temperature in degrees celsius? ( $K = ^\circ C + 273.15$ )

- A) 123.9°C
- B) 355°C
- C) 491°C
- D) 528°C
- E) -18°C

11) E

12) Choose the compound from the list below.

- A) Li *element*
- B) CH<sub>4</sub>
- C) Ne *element*
- D) He *element*
- E) Au *element*

12) B

13) Which of the following are examples of extensive properties?

- A) odor
- B) mass
- C) density
- D) color
- E) temperature

*- depends on amount*

13) B

$255 K = ^\circ C + 273.15$

$255 K - 273.15 = ^\circ C$

$-18.15 = ^\circ C$

*4 sig fig*

$$\begin{array}{r} 31.97 \\ + 0.610 \\ \hline 32.58 \end{array}$$

**Part II Short Answer:** Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

(H) (I) (N) Na P Ne

all halogens +  
HON

2 Using the periodic table, for the element (1 pt per blank, 9 pts total) Br

What is the element name? bromine

give: atomic mass 79.904 amu atomic number 35

number of protons 35 number of electrons 35 number of neutrons 44.9 = 45  
(show work for above in the space below if needed for partial credit)

$$79.904 - 35 = 44.904$$

What is the group number for the element VII A  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? -1 (show work below if necessary)

$$7 - 8 = -1$$

How many total electrons does the ionic form of the element have? 36 (show work below)

$$35 + 1 = 36$$

3 Given the following series of experimentally determined numbers to measure an object, are the measurements:

true measurement = 7.278

experimental measurements: 10.558, 10.557, 10.559 (average = 10.558)

[(precise but not accurate)] or (accurate but not precise) (circle one) (5 pts)

4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

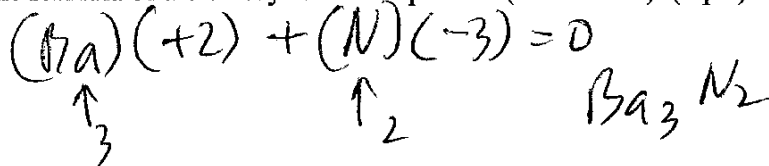
Ba and N group IIA \_\_\_\_\_ +2 5-8 = -3

group VA \_\_\_\_\_ -3

a. The ionic charge for the Ba (barium) is +2 (1 pt)

The ionic charge for the N (nitrogen) is -3 (1 pt)

- b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)



- c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

cation barium                      barium nitride  
 anion nitrogen - 0 g s + ide 1 Ionic no  
# prefix

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) Transition metal element                      (b) main group element                      (c) lanthanide / actinides  
 (d) alkali metals                                      (e) alkaline earth metals                      (f) chalcogen  
 (g) halogen    (h) noble gases

Periodic Table of the Elements

1	2	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A	18A																																																																																
H	He	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Cobalt	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr



**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**

**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound (16 pts))

78.999 milligrams to ounces

$$78.999 \text{ mg} \times \frac{\cancel{\text{g}}}{1000 \cancel{\text{mg}}} \times \frac{1 \cancel{\text{lb}}}{453.6 \cancel{\text{g}}} \times \frac{16 \text{ ounces}}{1 \cancel{\text{lb}}}$$
$$= 2.7866 \times 10^{-3} \text{ ounces}$$

2 You have 5.22 mL of the element platinum (Pt). The density of platinum is 21.4 g/mL (6 pts each part, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Pt into grams of Pt. (show work. Density = mass / volume)

$$5.22 \cancel{\text{ mL}} \text{ Pt} \times \frac{21.4 \text{ g Pt}}{\cancel{\text{ mL Pt}}} = 112 \text{ g Pt}$$

b. Given the number of grams of the element from your part (a) above, how many moles of the element Pt is that? (show work)

$$112 \cancel{\text{ g Pt}} \times \frac{1 \text{ mol Pt}}{195.08 \cancel{\text{ g Pt}}} = 0.574 \text{ mol Pt}$$

c. Given your number of moles from your part (b) above, how many atoms of the element Pt is that? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

$$0.574 \cancel{\text{ mol}} \text{ Pt} \times \frac{6.022 \times 10^{23} \text{ atoms Pt}}{1 \cancel{\text{ mol Pt}}} = 3.46 \times 10^{23} \text{ atoms Pt}$$

original

Name Kely (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) Which of the following are examples of extensive properties? 1) B  
A) odor  
 B) mass  
C) color  
D) temperature  
E) density
- 2) A covalent bond is best described as 2) A  
 A) the sharing of electrons between atoms.  
B) a bond between a metal and a nonmetal.  
C) the transfer of electrons.  
D) a bond between two polyatomic ions.  
E) a bond between a metal and a polyatomic ion.
- 3) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 3) E  
A) the Scientific Method.  
B) Dalton's Atomic Theory.  
C) the Law of Multiple Proportions.  
D) the Law of Definite Proportions.  
 E) the Law of Conservation of Mass.
- 4) Identify a solid. 4) C  
A) no definite shape and no definite volume  
B) definite volume and no definite shape  
 C) definite volume and definite shape  
D) no definite shape and definite volume
- 5) How many significant figures are in the measurement, 463.090 m? 5) B  
A) 5  B) 6 C) 2 D) 4 E) 3
- 6) Identify a cation. 6) B  
A) An atom that has gained a neutron.  
 B) An atom that has lost an electron.  
C) An atom that has gained an electron.  
D) An atom that has lost a proton and a neutron.
- 7) Choose the compound from the list below. 7) A  
 A) CH<sub>4</sub> B) Li C) He D) Au E) Ne

- 8) If a solution has a temperature of 255 K, what is its temperature in degrees celsius? ( $K = ^\circ C + 273.15$ ) 8) E  
A) 123.9°C      B) 491°C      C) 355°C      D) 528°C      E) -18°C
- 9) Isotopes differ in the number of 9) D  
A) beta particles.  
B) protons.  
C) neutrons and protons.  
D) neutrons.  
E) electrons.
- 10) The factor  $10^{-3}$  corresponds to which prefix? 10) C  
A) deka      B) deci      C) milli      D) centi
- 11) How many significant figures are there in the answer to the following problem? 11) D  
( $9.992 \times 3.200$ ) + 0.610 = ?  
A) one      B) two      C) three      D) four
- 12) Identify the compound with ionic bonds. 12) B  
A)  $N_2$       B) KBr      C) Ne      D) CO      E)  $H_2O$
- 13) Which of the following statements is FALSE? 13) D  
A) Zn is a transition metal.  
B) Halogens are very reactive elements.  
C) Sulfur is a main group element.  
D) The alkali metals are fairly unreactive.  
E) Noble gases do not usually form ions.

**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

P Ne I H Na N *all halogens + H<sub>2</sub>O*

2. Using the periodic table, for the element (1 pt per blank, 9 pts total) Na

What is the element name? sodium

Give: atomic mass 22.99 amu atomic number 11

number of protons 11 number of electrons 11 number of neutrons 12  
(show work for above in the space below if needed for partial credit)

$$22.99 - 11 = 11.99$$

What is the group number for the element IA  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? +1 (show work below if necessary)

How many total electrons does the ionic form of the element have? 10 e<sup>-</sup> (show work below)

$$11 - 1 = 10$$

3 Given the following series of experimentally determined numbers to measure an object, are the measurements:

true measurement = 7.278

experimental measurements: 10.558, 10.557, 10.559 (average = 10.558)

[(accurate but not precise) or (precise but not accurate)](circle one) (5 pts)

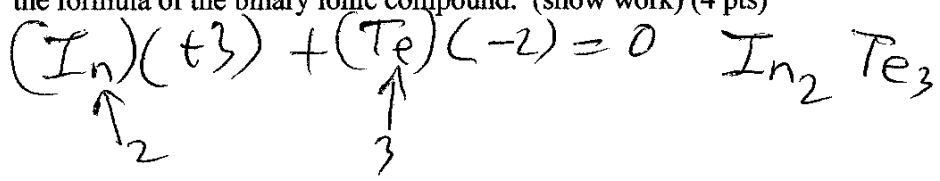
4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

In and Te  $\begin{matrix} \text{IIA} & +3 \\ \text{VIA} & 6-8 = -2 \end{matrix}$

a. The ionic charge for the In (indium) is +3 (1 pt)

The ionic charge for the Te (tellurium) is -2 (1 pt)

b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)



c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

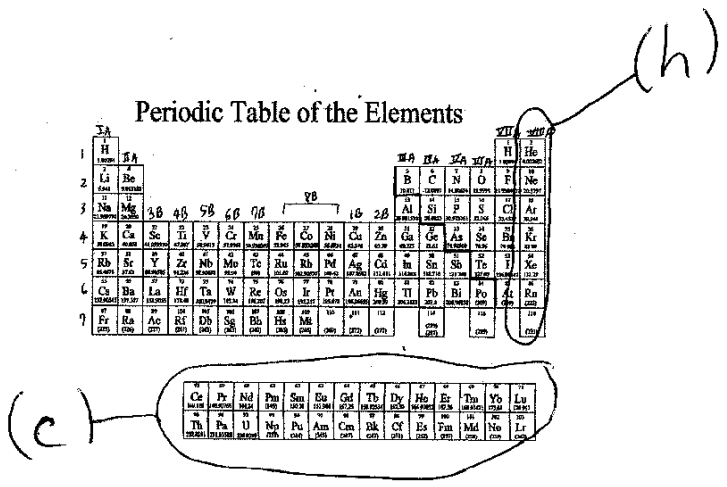
cation indium indium telluride NO #  
prefix  
ionic  
anion Tellurium - ium + ide

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) transition metal element
- (b) main group element
- (c) lanthanide / actinides
- (d) alkali metals
- (e) alkaline earth metals
- (f) chalcogen
- (g) halogen
- (h) noble gases

Periodic Table of the Elements

I A																II A										III A										IV A										V A										VI A										VII A										VIII										IX										X										XI										XII										I										II										III										IV										V										VI										VII										VIII										IX										X										XI										XII									
-----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	------	--	--	--	--	--	--	--	--	--	-------	--	--	--	--	--	--	--	--	--	------	--	--	--	--	--	--	--	--	--	-----	--	--	--	--	--	--	--	--	--	------	--	--	--	--	--	--	--	--	--	-------	--	--	--	--	--	--	--	--	--	------	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	-----	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	-----	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	-----	--	--	--	--	--	--	--	--	--	------	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--	----	--	--	--	--	--	--	--	--	--	-----	--	--	--	--	--	--	--	--	--



**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**

**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound) (16 pts)

88.92 kiloliters to cups

$$88.92 \text{ kiloliter} \times \frac{1000 \cancel{\text{L}}}{1 \cancel{\text{kL}}} \times \frac{1.06 \cancel{\text{qt}}}{1 \cancel{\text{L}}} \times \frac{4 \text{ cups}}{1 \cancel{\text{quart}}} = 377020.8$$
$$3.770 \times 10^5 \text{ cups}$$

2 You have 12.2 mL of the element mercury (Hg). The density of mercury is 13.55 g/mL (6 pts each part, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Hg into grams of Hg. (show work. Density = mass / volume)

$$12.2 \text{ mL Hg} \times \frac{13.55 \text{ g Hg}}{\text{mL Hg}} = 165 \text{ g Hg}$$

b. Given the number of grams of the element from your part (a) above, how many moles of the element Hg is that? (show work)

$$165 \text{ g Hg} \times \frac{1 \text{ mol Hg}}{200.59 \text{ g Hg}} = 0.823 \text{ mol Hg}$$

c. Given your number of moles from your part (b) above, how many atoms of the element Hg is that? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

$$0.823 \text{ mol Hg} \times \frac{6.022 \times 10^{23} \text{ atoms Hg}}{1 \text{ mol Hg}} = 4.96 \times 10^{23} \text{ atoms Hg}$$



Name \_\_\_\_\_ (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) How many significant figures are there in the answer for the following problem? 1) \_\_\_\_\_  
 $56.4 + 0.8822 + 21 = ?$   
 A) one                      B) two                      C) three                      D) four
- 2) What symbol is used to represent the factor  $10^3$ ? 2) \_\_\_\_\_  
 A) n                      B) k                      C)  $\mu$                       D) M
- 3) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 3) \_\_\_\_\_  
 A) the Law of Definite Proportions.  
 B) the Law of Conservation of Mass.  
 C) Dalton's Atomic Theory.  
 D) the Scientific Method.  
 E) the Law of Multiple Proportions.
- 4) Identify a liquid. 4) \_\_\_\_\_  
 A) no definite shape and definite volume                      B) no definite shape and no definite volume  
 C) definite volume and no definite shape                      D) definite volume and definite shape
- 5) How many significant figures are in 0.00523980 mL? 5) \_\_\_\_\_  
 A) 7                      B) 5                      C) 4                      D) 6                      E) 3
- 6) Identify a cation. 6) \_\_\_\_\_  
 A) An atom that has lost an electron.  
 B) An atom that has gained an electron.  
 C) An atom that has gained a neutron.  
 D) An atom that has lost a proton and a neutron.
- 7) Which of the following statements is FALSE? 7) \_\_\_\_\_  
 A) The alkali metals are fairly unreactive.  
 B) Zn is a transition metal.  
 C) Noble gases do not usually form ions.  
 D) Sulfur is a main group element.  
 E) Halogens are very reactive elements.
- 8) Identify the compound with covalent bonds. 8) \_\_\_\_\_  
 A) Kr                      B) KBr                      C) NaCl                      D) Li                      E) CH<sub>4</sub>

- 9) Ions differ in the number of \_\_\_\_\_  
A) neutrons and protons.  
B) electrons and protons.  
C) neutrons.  
D) electrons.  
E) protons.
- 10) Choose the element from the list below. \_\_\_\_\_  
A) Na Cl            B) H<sub>2</sub>O<sub>2</sub>            C) Fe<sub>2</sub>O<sub>3</sub>            D) H<sub>2</sub>O            E) He
- 11) Which of the following are examples of intensive properties? \_\_\_\_\_  
A) mass  
B) volume  
C) density  
D) None of the above are examples of intensive properties.  
E) All of the above are examples of intensive properties.
- 12) If the melting point of vanadium metal is 1910°C, what is its melting point in Kelvin? (K = °C + \_\_\_\_\_  
273.15)  
A) 3470 K            B) 1029 K            C) 1637 K            D) 2183 K
- 13) An ionic bond is best described as \_\_\_\_\_  
A) the attraction that holds the atoms together in a polyatomic ion.  
B) the transfer of electrons from one atom to another.  
C) the attraction between 2 metal atoms.  
D) the sharing of electrons.  
E) the attraction between 2 nonmetal atoms.

**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

H Na P Ne I N

2 Using the periodic table, for the element (1 pt per blank, 9 pts total) **Ca**

What is the element name? \_\_\_\_\_

give: atomic mass \_\_\_\_\_ amu atomic number \_\_\_\_\_

number of protons \_\_\_\_\_ number of electrons \_\_\_\_\_ number of neutrons \_\_\_\_\_  
(show work for above in the space below if needed for partial credit)

What is the group number for the element \_\_\_\_\_  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? \_\_\_\_\_ (show work below if necessary)

How many total electrons does the ionic form of the element have? \_\_\_\_\_ (show work below)

3 Given the following series of experimentally determined numbers to measure an object, are the measurements

true measurement = 7.278

experimental measurements: 10.558, 10.557, 10.559 (average = 10.558)

[(accurate but not precise) or (precise but not accurate)] (circle one) (5 pts)

4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

Mg and P

- a. The ionic charge for the Mg (magnesium) is \_\_\_\_\_ (1 pt)

The ionic charge for the P (phosphorus) is \_\_\_\_\_ (1 pt)

- b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)

- c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) Transition metal element  
(d) alkali metals  
(g) halogen

- (b) main group element  
(e) alkaline earth metals  
(h) noble gases

- (c) lanthanide / actinides  
(f) chalcogen

Periodic Table of the Elements

**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**  
**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound (16 pts))

14.55 cm to miles

2 You have 27.5 mL of the element gold (Au). The density of gold is 19.3 g / mL (6 pts each part, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Au into grams of Au . (show work. Density = mass / volume )

b. Given the number of grams of the element from your part (a) above, how many moles of the element Au is that ? (show work)

c. Given your number of moles from your part (b) above, how many atoms of the element Au is that ? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

Name \_\_\_\_\_ (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) An ionic bond is best described as \_\_\_\_\_  
 A) the transfer of electrons from one atom to another.  
 B) the attraction between 2 nonmetal atoms.  
 C) the attraction between 2 metal atoms.  
 D) the attraction that holds the atoms together in a polyatomic ion.  
 E) the sharing of electrons.
- 2) How many significant figures are in 0.00523980 mL? \_\_\_\_\_  
 A) 5                      B) 4                      C) 6                      D) 7                      E) 3
- 3) If the melting point of vanadium metal is  $1910^{\circ}\text{C}$ , what is its melting point in Kelvin? ( $\text{K} = ^{\circ}\text{C} + 273.15$ ) \_\_\_\_\_  
 A) 1637 K                      B) 2183 K                      C) 1029 K                      D) 3470 K
- 4) Identify a liquid. \_\_\_\_\_  
 A) no definite shape and definite volume                      B) definite volume and no definite shape  
 C) definite volume and definite shape                      D) no definite shape and no definite volume
- 5) Which of the following statements is FALSE? \_\_\_\_\_  
 A) Noble gases do not usually form ions.  
 B) Sulfur is a main group element.  
 C) Zn is a transition metal.  
 D) Halogens are very reactive elements.  
 E) The alkali metals are fairly unreactive.
- 6) What symbol is used to represent the factor  $10^3$ ? \_\_\_\_\_  
 A) M                      B)  $\mu$                       C) k                      D) n
- 7) Which of the following are examples of intensive properties? \_\_\_\_\_  
 A) volume  
 B) mass  
 C) density  
 D) None of the above are examples of intensive properties.  
 E) All of the above are examples of intensive properties.

- 8) Identify a cation. 8) \_\_\_\_\_  
A) An atom that has lost an electron.  
B) An atom that has gained a neutron.  
C) An atom that has gained an electron.  
D) An atom that has lost a proton and a neutron.
- 9) Choose the element from the list below. 9) \_\_\_\_\_  
A) Na Cl            B) H<sub>2</sub>O<sub>2</sub>            C) Fe<sub>2</sub>O<sub>3</sub>            D) H<sub>2</sub>O            E) He
- 10) Ions differ in the number of 10) \_\_\_\_\_  
A) neutrons and protons.  
B) electrons and protons.  
C) neutrons.  
D) electrons.  
E) protons.
- 11) Identify the compound with covalent bonds. 11) \_\_\_\_\_  
A) CH<sub>4</sub>            B) NaCl            C) Li            D) KBr            E) Kr
- 12) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 12) \_\_\_\_\_  
A) the Scientific Method.  
B) the Law of Definite Proportions.  
C) the Law of Conservation of Mass.  
D) the Law of Multiple Proportions.  
E) Dalton's Atomic Theory.
- 13) How many significant figures are there in the answer for the following problem? 13) \_\_\_\_\_  
56.4 + 0.8822 + 21 = ?  
A) one            B) two            C) three            D) four



**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

Ne      I      N      H      Na      P

2. Using the periodic table, for the element (1 pt per blank, 9 pts total) P

What is the element name? \_\_\_\_\_

give: atomic mass \_\_\_\_\_ amu      atomic number \_\_\_\_\_

number of protons \_\_\_\_\_ number of electrons \_\_\_\_\_ number of neutrons \_\_\_\_\_

(show work for above in the space below if needed for partial credit)

What is the group number for the element \_\_\_\_\_  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? \_\_\_\_\_ (show work below if necessary)

How many total electrons does the ionic form of the element have? \_\_\_\_\_ (show work below)

3 Given the following series of experimentally determined numbers to measure an object, are the measurements

true measurement = 7.278

experimental measurements: 7.353, 8.178, 6.292 (average = 7.274)

[(accurate but not precise) or (precise but not accurate)] (circle one) (5 pts)

4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

Ga and Se

- a. The ionic charge for the Ga (gallium) is \_\_\_\_\_ (1 pt)

The ionic charge for the Se (selenium) is \_\_\_\_\_ (1 pt)

- b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)

- c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) transition metal element  
(d) alkali metals  
(g) halogen

- (b) main group element  
(e) alkaline earth metals  
(h) noble gases

- (c) lanthanide / actinides  
(f) chalcogen

Periodic Table of the Elements

1	IA	IIA	VB										VIA	VIIA	VIIIA			
2	Li	Be	B	C	N	O	F	Ne										
3	Na	Mg	Al	Si	P	S	Cl	Ar										
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt									

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**  
**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound (16 pts))

25.5 yards to kilometers

2 You have 78.2 mL of the element iron (Fe). The density of iron is 7.86 g / mL (6 pts each, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Fe into grams of Fe . (show work.  
Density = mass / volume )

b. Given the number of grams of the element from your part (a) above, how many moles of the element Fe is that ? (show work)

c. Given your number of moles from your part (b) above, how many atoms of the element Fe is that ? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

Name \_\_\_\_\_ (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) Identify a cation. 1) \_\_\_\_\_  
A) An atom that has lost a proton and a neutron.  
B) An atom that has gained a neutron.  
C) An atom that has gained an electron.  
D) An atom that has lost an electron.
- 2) The factor  $10^{-3}$  corresponds to which prefix? 2) \_\_\_\_\_  
A) centi                      B) milli                      C) deci                      D) deka
- 3) A covalent bond is best described as 3) \_\_\_\_\_  
A) a bond between a metal and a polyatomic ion.  
B) a bond between a metal and a nonmetal.  
C) the sharing of electrons between atoms.  
D) the transfer of electrons.  
E) a bond between two polyatomic ions.
- 4) Which of the following statements is FALSE? 4) \_\_\_\_\_  
A) The alkali metals are fairly unreactive.  
B) Noble gases do not usually form ions.  
C) Zn is a transition metal.  
D) Sulfur is a main group element.  
E) Halogens are very reactive elements.
- 5) Identify a solid. 5) \_\_\_\_\_  
A) definite volume and definite shape                      B) no definite shape and no definite volume  
C) definite volume and no definite shape                      D) no definite shape and definite volume
- 6) Identify the compound with ionic bonds. 6) \_\_\_\_\_  
A) Ne                      B) CO                      C) KBr                      D) N<sub>2</sub>                      E) H<sub>2</sub>O
- 7) How many significant figures are in the measurement, 463.090 m? 7) \_\_\_\_\_  
A) 3                      B) 5                      C) 4                      D) 2                      E) 6

- 8) Isotopes differ in the number of \_\_\_\_\_  
A) neutrons.  
B) protons.  
C) electrons.  
D) neutrons and protons.  
E) beta particles.
- 9) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called \_\_\_\_\_  
A) the Law of Conservation of Mass.  
B) the Law of Multiple Proportions.  
C) Dalton's Atomic Theory.  
D) the Scientific Method.  
E) the Law of Definite Proportions.
- 10) How many significant figures are there in the answer to the following problem? \_\_\_\_\_  
 $(9.992 \times 3.200) + 0.610 = ?$   
A) one                      B) two                      C) three                      D) four
- 11) If a solution has a temperature of 255 K, what is its temperature in degrees celsius? ( $K = ^\circ C + 273.15$ ) \_\_\_\_\_  
A) 123.9°C              B) 355°C              C) 491°C              D) 528°C              E) -18°C
- 12) Choose the compound from the list below. \_\_\_\_\_  
A) Li                      B) CH<sub>4</sub>                      C) Ne                      D) He                      E) Au
- 13) Which of the following are examples of extensive properties? \_\_\_\_\_  
A) odor  
B) mass  
C) density  
D) color  
E) temperature

**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

H I N Na P Ne

2 Using the periodic table, for the element (1 pt per blank, 9 pts total) **Br**

What is the element name? \_\_\_\_\_

give: atomic mass \_\_\_\_\_ amu atomic number \_\_\_\_\_

number of protons \_\_\_\_\_ number of electrons \_\_\_\_\_ number of neutrons \_\_\_\_\_  
(show work for above in the space below if needed for partial credit)

What is the group number for the element \_\_\_\_\_  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? \_\_\_\_\_ (show work below if necessary)

How many total electrons does the ionic form of the element have? \_\_\_\_\_ (show work below)

3 Given the following series of experimentally determined numbers to measure an object, are the measurements:

true measurement = 7.278

experimental measurements: 10.558, 10.557, 10.559 (average = 10.558)

[(precise but not accurate) or (accurate but not precise)] (circle one) (5 pts)

4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

Ba and N

a. The ionic charge for the Ba (barium) is \_\_\_\_\_ (1 pt)

The ionic charge for the N (nitrogen) is \_\_\_\_\_ (1 pt)

b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)

c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

(a) Transition metal element

(b) main group element

(c) lanthanide / actinides

(d) alkali metals

(e) alkaline earth metals

(f) chalcogen

(g) halogen

(h) noble gases

Periodic Table of the Elements

1	H	He																	H	He																										
2	Li	Be											B	C	N	O	F	Ne																												
3	Na	Mg											Al	Si	P	S	Cl	Ar																												
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																													
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																												
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																												
7	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																													
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>																			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Tb	Dy	Ho	Er	Tm	Yb	Lu							
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu																																	
Tb	Dy	Ho	Er	Tm	Yb	Lu																																								



**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**  
**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound (16 pts))

78.999 milligrams to ounces

2 You have 5.22 mL of the element platinum (Pt). The density of platinum is 21.4 g/mL. (6 pts each part, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Pt into grams of Pt. (show work.  
Density = mass / volume )

b. Given the number of grams of the element from your part (a) above, how many moles of the element Pt is that ? (show work)

c. Given your number of moles from your part (b) above, how many atoms of the element Pt is that ? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)

Name \_\_\_\_\_ (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (1 pts print and sign exam) If you run out of space, please continue on the back page of the exam and clearly tell me where the remaining answer can be found. Avogadro's number =  $6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 26 pts total)**

- 1) Which of the following are examples of extensive properties? 1) \_\_\_\_\_  
A) odor  
B) mass  
C) color  
D) temperature  
E) density
  
- 2) A covalent bond is best described as 2) \_\_\_\_\_  
A) the sharing of electrons between atoms.  
B) a bond between a metal and a nonmetal.  
C) the transfer of electrons.  
D) a bond between two polyatomic ions.  
E) a bond between a metal and a polyatomic ion.
  
- 3) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 3) \_\_\_\_\_  
A) the Scientific Method.  
B) Dalton's Atomic Theory.  
C) the Law of Multiple Proportions.  
D) the Law of Definite Proportions.  
E) the Law of Conservation of Mass.
  
- 4) Identify a solid. 4) \_\_\_\_\_  
A) no definite shape and no definite volume      B) definite volume and no definite shape  
C) definite volume and definite shape              D) no definite shape and definite volume
  
- 5) How many significant figures are in the measurement, 463.090 m? 5) \_\_\_\_\_  
A) 5                      B) 6                      C) 2                      D) 4                      E) 3
  
- 6) Identify a cation. 6) \_\_\_\_\_  
A) An atom that has gained a neutron.  
B) An atom that has lost an electron.  
C) An atom that has gained an electron.  
D) An atom that has lost a proton and a neutron.
  
- 7) Choose the compound from the list below. 7) \_\_\_\_\_  
A) CH<sub>4</sub>              B) Li                      C) He                      D) Au                      E) Ne

- 8) If a solution has a temperature of 255 K, what is its temperature in degrees celsius? ( $K = ^\circ C + 273.15$ ) 8) \_\_\_\_\_  
A) 123.9°C      B) 491°C      C) 355°C      D) 528°C      E) -18°C
- 9) Isotopes differ in the number of 9) \_\_\_\_\_  
A) beta particles.  
B) protons.  
C) neutrons and protons.  
D) neutrons.  
E) electrons.
- 10) The factor  $10^{-3}$  corresponds to which prefix? 10) \_\_\_\_\_  
A) deka      B) deci      C) milli      D) centi
- 11) How many significant figures are there in the answer to the following problem? 11) \_\_\_\_\_  
( $9.992 \times 3.200$ ) + 0.610 = ?  
A) one      B) two      C) three      D) four
- 12) Identify the compound with ionic bonds. 12) \_\_\_\_\_  
A)  $N_2$       B) KBr      C) Ne      D) CO      E)  $H_2O$
- 13) Which of the following statements is FALSE? 13) \_\_\_\_\_  
A) Zn is a transition metal.  
B) Halogens are very reactive elements.  
C) Sulfur is a main group element.  
D) The alkali metals are fairly unreactive.  
E) Noble gases do not usually form ions.

**Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit. (38 pts)**

1 Which of the following elements is a diatomic in its elemental most stable form? (Circle all elements which form diatomic molecules in its most stable state.) (6 pts)

P Ne I H Na N

2. Using the periodic table, for the element (1 pt per blank, 9 pts total) Na

What is the element name? \_\_\_\_\_

Give: atomic mass \_\_\_\_\_ amu atomic number \_\_\_\_\_

number of protons \_\_\_\_\_ number of electrons \_\_\_\_\_ number of neutrons \_\_\_\_\_

(show work for above in the space below if needed for partial credit)

What is the group number for the element \_\_\_\_\_  
(use the number given in the periodic table attached to this exam)

What is the charge on the element in its ionic form? \_\_\_\_\_ (show work below if necessary)

How many total electrons does the ionic form of the element have? \_\_\_\_\_ (show work below)

3 Given the following series of experimentally determined numbers to measure an object, are the measurements:

true measurement = 7.278

experimental measurements: 10.558, 10.557, 10.559 (average = 10.558)

[(accurate but not precise) or (precise but not accurate)] (circle one) (5 pts)

4. Give the formula of the following ionic compound with the correct ratios of the ions and then give the name of the binary ionic compound. To do this you will complete (a) through (c) Show work. (10 pts total)

In and Te

a. The ionic charge for the In (indium) is \_\_\_\_\_ (1 pt)

The ionic charge for the Te (tellurium) is \_\_\_\_\_ (1 pt)

b. Give the correct formula (as in show the ratios) for the binary ionic compound and then write the formula of the binary ionic compound. (show work) (4 pts)

c. Name the binary ionic compound whose formula you gave above. (show work) (4 pts)

5. Match the following words by inputting the letter associated with the word into the parenthesis given. Do not make up your own parenthesis. Each parenthesis should have a single letter matching the parenthesis. You may use each word given one time, many times or not at all. (4 pts each, 8 pts total)

- (a) transition metal element
- (d) alkali metals
- (g) halogen

- (b) main group element
- (e) alkaline earth metals
- (h) noble gases

- (c) lanthanide / actinides
- (f) chalcogen

Periodic Table of the Elements

**Part III. Long Answer Please show work for full credit and to receive partial credit. (34 pts)**  
**\*\*\*\* Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.\*\*\*\***

1. Convert the following using dimensional analysis. Show work. If you come up with the final correct numerical answer but show no work, you will lose all points. You may find the following useful or not useful. (1 inch = 2.54 cm, 12 inches = 1 foot, 3 feet = 1 yard, 5280 feet = 1 mile, 1 liter = 1.06 quarts, 4 quarts = 1 gallon, 4 cups = 1 quart, 453.6 grams = 1 pound, 2000 pounds = 1 ton, 16 ounces = 1 pound) (16 pts)

88.92 kiloliters to cups

2 You have 12.2 mL of the element mercury (Hg). The density of mercury is 13.55 g/mL (6 pts each part, 18 pts total)

{The way that this long answer question will be graded is not by the final correct number. If you make a mistake in calculating **part a** and get a wrong number, if you use that incorrect number and manage to answer **part (b) and part (c)** correctly showing your correct work, then you will get full credit for **part (b) and part (c)**. Conversely if you get the final correct number for **part (c)** but there is no way that you could have gotten your **part (c)** number from your **incorrect part (a) and the way you set up your calculation**, then you will lose all credit for **part (c)**.}

a. Use density as a conversion factor to convert mL of the element Hg into grams of Hg. (show work. Density = mass / volume )

b. Given the number of grams of the element from your part (a) above, how many moles of the element Hg is that ? (show work)

c. Given your number of moles from your part (b) above, how many atoms of the element Hg is that ? (Avogadro's number =  $6.022 \times 10^{23}$ ) (show work)