

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. (2 pts print and sign exam) If you run out of space, please continue on the scratch paper but clearly label where the remaining answer can be found. (If I can't find your answer, I obviously cannot grade it).

density = mass (g) / volume (mL) Kelvin = °C + 273.15  $N_A = 6.022 \times 10^{23}$

green

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. No partial credit for MC. (2 pts per question, 24 pts total)

1) A physical change

- A) occurs when propane ( $C_3H_8$ ) is burned to produce heat,  $CO_2$  and  $H_2O$ .  
 B) occurs when Na and Cl combine to make NaCl.  
 C) occurs when glucose ( $C_6H_{12}O_6$ ) is converted into energy and  $CO_2$  and  $H_2O$  within your cells.  
 D) occurs when iron (Fe) rusts to produce (FeO and  $Fe_3O_4$ ).  
 E) occurs when water (liquid) is evaporated to water vapor (gas).

1) E

2) Isotopes differ in the number of

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

2) C

3) Identify the charges of the protons, neutrons, and electrons.

- A) protons 0, neutrons +1, electrons -1  
 B) protons +1, neutrons -1, electrons 0  
 C) protons +1, neutrons 0, electrons -1  
 D) protons -1, neutrons 0, electrons +1  
 E) protons 0, neutrons -1, electrons +1

3) C

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

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

4) C

5) Which of the following elements is a nonmetal?

- A) Be      B) Ce      C) N      D) Ba      E) K

5) C

6) The atomic mass for cadmium is (cd)

- A) 40.08      B) 48      C) 20      D) 112.41

6) D

7) A substance composed of two or more elements in a fixed, definite proportion is

7) A

- A) a compound.
- B) a homogeneous mixture.
- C) an alloy.
- D) a heterogeneous mixture.
- E) a solution.

8) Determine the number of protons, neutrons and electrons in the following:

8) A

$^{25}_{12}\text{X}$

- A)  $p^+ = 12$      $n^0 = 13$      $e^- = 12$  —  $25 - 12 = 13$
- B)  $p^+ = 12$      $n^0 = 12$      $e^- = 13$
- C)  $p^+ = 12$      $n^0 = 13$      $e^- = 25$
- D)  $p^+ = 25$      $n^0 = 12$      $e^- = 13$
- E)  $p^+ = 12$      $n^0 = 25$      $e^- = 12$

9) Which of the following are examples of intensive properties?

9) B

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

extensive ←  
independent of amount

10) Identify a liquid.

10) A

- A) definite volume and no definite shape
- B) definite volume and definite shape
- C) no definite shape and no definite volume
- D) none of the above are true

11) Identify an anion.

11) B

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

zero to right of decimal is significant

12) How many significant figures are in 0.00523980 mL?

12) D

- A) 5
- B) 4
- C) 3
- D) 6
- E) 7

place holder zeros not significant

**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.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (41 pts)

1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$1.2993 + 20.30 =$  calculator spits out 21.5993

a. Number of significant figures in 1.2993

5

b. Number of significant figures in 20.30

4

c. Number of significant figures in your sum

4

Handwritten addition:  
$$\begin{array}{r} 1.2993 \\ 20.30 \\ \hline 21.5993 \end{array}$$
  
A circled note with an arrow pointing to the result says: "same 21.6000"

Part 2: multiplication / division

$1.2993 * 20.30 =$  calculator spits out 26.37579

d. Number of significant figures in your multiplication product

4

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

1 kilometers = 1000 meters

Handwritten conversion:  
 $1 \text{ km} = 1000 \text{ m}$   
A circled note says: "- 1 1/2 pts"

3. The following all refers to the element Sb (13 pts, 1 pt per blank)

a. Write the symbol of the element in the format  ${}^A_Z X$  51 Sb (1 pts)

121.760 → rounding 122

b. Number of protons in the element is 51 protons (1 pt)

c. Number of electrons for a neutral atom is 51 electrons (1 pt)

d. Number of neutrons is 71 neutrons. (1 pt) Show work. (1 pt)

$$122 - 51 = 71$$

graded consistently  
math error - 1/2 pt

e. Atomic number for the element is 51 (1 pt)

f. Atomic mass for the element is 121.760 (1 pt)

g. How many atoms does **one mole** of the element contain  $6.022 \times 10^{23}$  (1 pt)

h. How much does **one atom** of the element weigh 121.760 amu (1 pt)

i. How much does **one mole** of the element weigh 121.760 grams (1 pt)

j. What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write you answer as an Arabic number or you will lose points.)?

IIA (1 pt)

not periodic table # - 1/2 pt

such as 5

k. If the element is in its ionic state, what is the charge of the atom. -3 (1 pt) Show work. (1 pt)

$$5 - 8 = -3$$

wrong sign - 1/2 pt

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any lanthanide or actinide element Pu (3 pt)

gave La + Ac OK

Nd etc,

b. Elements from Na to Ar is the [(group) or (period)] circle one (3 pts)

3 (give the symbol from the provided periodic table for group or period exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element carbon is C (4 pts)

b. The name of the element Cu is

Copper (4 pts)

(spelling error OK)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 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.\*\*\*\*

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work otherwise, I obviously cannot grade work I cannot find.

1. Conversion Problem: (15 pts)

If you have 25.9 cups of the compound ethanol, how many milligrams of ethanol do you have? (1.06 quarts = 1 liter, 4 cups = 1 quart, density of ethanol = 0.789 g/mL) (show all work)

$$25.9 \text{ cups ethanol} \times \frac{1 \text{ quart}}{4 \text{ cups}} \times \frac{1 \text{ liter}}{1.06 \text{ quart}} \times \frac{1000 \text{ mL}}{1 \text{ liter}} \times 0.789 \frac{\text{g}}{\text{mL}}$$

$$\times \frac{1000 \text{ mg}}{1 \text{ g}} = 4,819,599.057 \text{ mg}$$

calculator spits out

3 sig fig

$$4.82 \times 10^6 \text{ mg ethanol}$$

attempt 6 pt  
 bad attempt -8  
 math -1 pt

extra wrong -1 pt  
 1/2 wrong step -1 pt  
 upside down -1 pt

2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts, 6 pts per letter) (show work for full credit and for partial credit)

If you have 1.778 moles of the element Ni

- a. Give the definition of the mole relating moles, atoms and grams.

$$\overset{2pt}{1 \text{ mol}}_{\text{Ni}} = \overset{2pt}{6.022 \times 10^{23}} \text{ atoms Ni} = \overset{2pt}{58.69 \text{ g Ni}}$$

- b. How many atoms of the element Ni do you have? show work. ( $N_A = 6.022 \times 10^{23}$ )

$$\overset{3pt}{1.778 \text{ mol}}_{\text{Ni}} \times \frac{\overset{2pt}{6.022 \times 10^{23}} \text{ atoms Ni}}{\overset{2pt}{1 \text{ mol}}_{\text{Ni}}} = \overset{1pt}{1.071 \times 10^{24}} \text{ atoms Ni}$$

- c. How many grams is that many moles of the element Ni? (show work).

$$\overset{3pt}{1.778 \text{ mol}}_{\text{Ni}} \times \frac{\overset{2pt}{58.69 \text{ g Ni}}}{\overset{2pt}{1 \text{ mol}}_{\text{Ni}}} = 104.35082$$

calculator sports out  $\overset{1pt}{104}$

attempt 3pt  
bad attempt -4pt  
extra ptg -1pt  
1/2 wrong -1pt  
upside down -1

math -1pt

4 sig figs

104.3 g Ni

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density = mass (g) / volume (mL)      Kelvin = °C + 273.15       $N_A = 6.022 \times 10^{23}$

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. No partial credit for MC. (2 pts per question, 24 pts total)

- 1) The atomic mass for cadmium is 1) B  
 A) 40.08      B) 112.41      C) 20      D) 48
- 2) A substance composed of two or more elements in a fixed, definite proportion is 2) A  
A) a compound.  
 B) a homogeneous mixture.  
 C) an alloy.  
 D) a solution.  
 E) a heterogeneous mixture.
- 3) Which of the following are examples of intensive properties? 3) A  
A) density      *independent of amount*  
 B) mass      *extensive*  
 C) volume  
 D) None of the above are examples of intensive properties.  
 E) All of the above are examples of intensive properties.
- 4) Which of the following elements is a nonmetal? 4) B  
 A) Ce      B) N      C) Ba      D) K      E) Be
- 5) Identify an anion. 5) C  
 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 neutron and a proton.
- 6) Isotopes differ in the number of 6) B  
 A) electrons.  
B) neutrons.  
 C) neutrons and protons.  
 D) beta particles.  
 E) protons.
- 7) How many significant figures are in 0.00523980 mL? 7) C  
 A) 4      B) 3      C) 6      D) 5      E) 7  
*placeholder zero not significant*



8) A physical change

- A) occurs when propane ( $C_3H_8$ ) is burned to produce heat,  $CO_2$  and  $H_2O$ .
- B) occurs when iron (Fe) rusts to produce (FeO and  $Fe_3O_4$ ).
- C) occurs when Na and Cl combine to make NaCl .
- D) occurs when water (liquid) is evaporated to water vapor (gas) .
- E) occurs when glucose ( $C_6H_{12}O_6$ ) is converted into energy and  $CO_2$  and  $H_2O$  within your cells.

8) D

9) Identify the charges of the protons, neutrons, and electrons.

- A) protons +1, neutrons 0, electrons -1
- B) protons -1, neutrons 0, electrons +1
- C) protons 0, neutrons +1, electrons -1
- D) protons 0, neutrons -1, electrons +1
- E) protons +1, neutrons -1, electrons 0

9) A

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

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

10) D

11) Identify a liquid.

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

- B) definite volume and no definite shape
- D) none of the above are true

11) B

12) Determine the number of protons, neutrons and electrons in the following:

$^{25}_{12}X$

- A)  $p^+ = 12$      $n^0 = 13$      $e^- = 12$
- B)  $p^+ = 12$      $n^0 = 25$      $e^- = 12$
- C)  $p^+ = 12$      $n^0 = 13$      $e^- = 25$
- D)  $p^+ = 12$      $n^0 = 12$      $e^- = 13$
- E)  $p^+ = 25$      $n^0 = 12$      $e^- = 13$

12) A

**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.

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1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$0.90 + 200.9 =$  calculator spits out 201.8

a. Number of significant figures in 0.90 2

b. Number of significant figures in 200.9 4

c. Number of significant figures in your sum 4

$$\begin{array}{r} 0.90 \\ 200.9 \\ \hline 201.8 \end{array}$$

← Same 201.8 OK

Part 2: multiplication / division

$0.90 * 200.9 =$  calculator spits out 180.81

d. Number of significant figures in your multiplication product 2

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

100 centiliters = 1 liters

3/100 - 1/2 pts

3. The following all refers to the element Cs (13 pts, 1 pt per blank)

a. Write the symbol of the element in the format  ${}^A_Z X$   ${}^{133}_{55} Cs$  (1 pts)

132,91 →  
Round up  
133

or not  
round up  
- 1/2 pt

b. Number of protons in the element is 55 protons (1 pt)

c. Number of electrons for a neutral atom is 55 electrons (1 pt)

d. Number of neutrons is 78 neutrons. (1 pt) Show work (1 pt)

$$133 - 55 = 78$$

Graded consistent w/ other  
math error - 1/2 pt

e. Atomic number for the element is 55 (1 pt)

f. Atomic mass for the element is 133 (1 pt)

g. How many atoms does **one mole** of the element contain  $6.022 \times 10^{23}$  (1 pt)

h. How much does **one atom** of the element weigh 132,91 amu (1 pt)

i. How much does **one mole** of the element weigh 132,91 grams (1 pt)

j. What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write you answer as an Arabic number or you will lose points.)?

IA (1 pt) Not periodic table # such as 1 - 1/2 pt

k. If the element is in its ionic state, what is the charge of the atom. +1 (1 pt) Show work. (1 pt)

group # = + (group #)  
(element left side)  
wrong sign  
1/2 pt

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any **Main Group** element Li, C, (3 pt)

b. Elements from **O to Po** is the [(group) or (period)] circle one (3 pts)

S, Ar etc.

VIA (give the symbol for the group or period from the provided periodic table exactly as written) (3 pts)

(left off A/OK)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element **hydrogen** is H (4 pts)

b. The name of the element **Se** is

selenium (4 pts)

(spelling error OK)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 pts)  
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1. Conversion Problem: (15 pts)

If you have 1.55 fluid ounces of a substance, how many grams of the substance do you have? (1.06 quarts = 1 liter, 4 cups = 1 quart, 8 fluid ounces = 1 cup, density of substance = 1.293 g/mL) (show all work)

$$\begin{array}{l}
 \textcircled{3pt} \\
 1.55 \text{ fluid} \\
 \text{ounces} \times \frac{\textcircled{2pt}}{1 \text{ cup}} \times \frac{\textcircled{2pt}}{4 \text{ cups}} \times \frac{\textcircled{2pt}}{1.06 \text{ quart}} \times \frac{\textcircled{2pt}}{1000 \text{ mL}} \\
 \times \frac{\textcircled{2pt}}{1.293 \text{ g}} = 59.1 \text{ g substance} \quad \textcircled{2pt} \\
 \textcircled{2pt}
 \end{array}$$

attempt -6pt  
 bad attempt -8pt  
 math -1pt  
 extra wrong -1pt  
 1/2 wrong step -1pt  
 upside down -1pt

2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts, 6 pts per letter) (show work for full credit and for partial credit)

If you have 32.99 moles of the element Sn

- a. Give the definition of the mole relating moles, atoms and grams.

$$\begin{array}{l} \textcircled{2\text{pt}} \\ 1 \text{ mole} \\ \text{Sn} \end{array} = \begin{array}{l} \textcircled{2\text{pt}} \\ 6.022 \times 10^{23} \\ \text{atoms} \\ \text{Sn} \end{array} = \begin{array}{l} \textcircled{2\text{pt}} \\ 118.710 \text{ g} \\ \text{Sn} \end{array}$$

- b. How many atoms of the element Sn do you have? show work. ( $N_A = 6.022 \times 10^{23}$ )

$$\begin{array}{l} 32.99 \text{ mol} \\ \text{Sn} \end{array} \times \frac{6.022 \times 10^{23} \text{ atoms Sn}}{1 \text{ mol Sn}} = \begin{array}{l} 1.987 \text{ atoms} \\ \times 10^{25} \text{ of Sn} \end{array}$$

$\textcircled{3\text{pt}}$        $\textcircled{2\text{pt}}$        $\textcircled{1\text{pt}}$

- c. How many grams is that many moles of the element Sn? (show work).

$$\begin{array}{l} 32.99 \text{ mol} \\ \text{Sn} \end{array} \times \frac{118.710 \text{ g Sn}}{1 \text{ mol Sn}} = 3916.2429 \text{ g Sn}$$

$\textcircled{3\text{pt}}$        $\textcircled{2\text{pt}}$        $\textcircled{1\text{pt}}$

↓ sig fig

3916 g Sn

attempt - 3pt  
 bad attempt - 4pt  
 extra step - 1pt  
 1/2 wrong step - 1pt

matz - 1/2 pt  
 upside down step - 1

Salmon color

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

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$$\text{density} = \text{mass (g)} / \text{volume (mL)} \quad \text{Kelvin} = ^\circ\text{C} + 273.15 \quad N_A = 6.022 \times 10^{23}$$

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. No partial credit for MC. (2 pts per question, 24 pts total)

1) Identify a solid.

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

- B) no definite shape and no definite volume  
 D) none of the above are true

1) C

2) Identify a cation.

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

2) A

3) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.71 g/mL, 1.73 g/mL, 1.70 g/mL, 1.69 g/mL. (average = 1.71 g/mL) If the actual value for the density of the sugar solution is 1.40 g/mL, which statement below best describes her results?

- A) Her results are precise, but not accurate.  
 B) Her results are accurate, but not precise.  
 C) Her results are both precise and accurate  
 D) Her results are neither precise nor accurate.  
 E) It isn't possible to determine with the information given.

3) A

4) Identify the element that has an atomic number of 15.

- A) sulfur                      B) silicon                       C) phosphorus

D) oxygen

4) C

5) Isotopes differ in the number of

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

5) E

6) A substance that can't be chemically broken down into simpler substances is

- A) an element.  
 B) a heterogeneous mixture.  
 C) an electron.  
 D) a compound.  
 E) a homogeneous mixture.

6) A

7) How many significant figures are in the measurement, 463.090 m?  
A) 3      B) 6      C) 5      D) 4      E) 2

7) B

8) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to?  
A) Law of the Conservation of Mass  
B) First Law of Thermodynamics  
C) Law of Modern Atomic Theory  
D) Law of Multiple Proportions  
E) Law of Definite Proportions

8) A

9) A chemical change  
A) occurs when methane (CH<sub>4</sub>) gas is burned into [CO<sub>2</sub>(g) and H<sub>2</sub>O(g)].  
B) occurs when salt (NaCl solid) is dissolved in water NaCl (aq).  
C) occurs when paper is shredded.  
D) occurs when sucrose [sugar (s)] is stirred into water to form [sugar (aq)].  
E) occurs when water (liquid) is vaporized to water vapor (gas).

9) A

10) Determine the number of protons, neutrons and electrons in the following:

10) B

<sup>25</sup>X  
<sub>12</sub>

- A) p<sup>+</sup> = 12    n<sup>o</sup> = 25    e<sup>-</sup> = 12  
B) p<sup>+</sup> = 12    n<sup>o</sup> = 13    e<sup>-</sup> = 12  
C) p<sup>+</sup> = 25    n<sup>o</sup> = 12    e<sup>-</sup> = 13  
D) p<sup>+</sup> = 12    n<sup>o</sup> = 12    e<sup>-</sup> = 13  
E) p<sup>+</sup> = 12    n<sup>o</sup> = 13    e<sup>-</sup> = 25

11) The atomic mass number is equal to  
A) the sum of the number of the electrons and protons.  
B) the sum of the number of protons, neutrons, and electrons.  
C) the sum of the number of protons and neutrons.  
D) the sum of the number of the neutrons and electrons.

11) C

12) Which of the following elements is a metal?  
A) Kr      B) Br      C) As      D) Fe      E) S

12) D



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1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$20.70 + 799.1 =$  calculator spits out 819.8

a. Number of significant figures in 20.70 4

b. Number of significant figures in 799.1 4

c. Number of significant figures in your sum 4

$$\begin{array}{r} 20.70 \\ 799.1 \\ \hline 819.8 \end{array}$$

← gave 819.8 OK

Part 2: multiplication / division

$20.70 * 799.1 =$  calculator spits out 16541.37

d. Number of significant figures in your multiplication product 4

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

1000 millimeters = 1 meters

$\frac{1}{1000}$  -1 pt

3. The following all refers to the element Te (13 pts, 1 pt per blank)

a. Write the symbol of the element in the format  ${}^A_Z X$   ${}^{128}_{52} \text{Te}$  (1 pts) or not  
very up  
-1 pt

127.60 → round up 128

b. Number of protons in the element is 52 protons (1 pt)

c. Number of electrons for a neutral atom is 52 electrons (1 pt)

d. Number of neutrons is 76 neutrons. (1 pt) Show work. (1 pt)  
 $128 - 52 = 76$  math error -1 pt graded consistent w above

e. Atomic number for the element is 52 (1 pt)

f. Atomic mass for the element is 128 or 127.60 (1 pt)

g. How many atoms does **one mole** of the element contain  $6.022 \times 10^{23}$  (1 pt)

h. How much does **one atom** of the element weigh 127.60 amu (1 pt)

i. How much does **one mole** of the element weigh 127.60 grams (1 pt)

j. What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write you answer as an Arabic number or you will lose points.)?

VI A (1 pt) not periodic table  
such as 6 -1 pt

k. If the element is in its ionic state, what is the charge of the atom. -2 (1 pt) Show work. (1 pt)  
 $6 - 8 = -2$

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any lanthanide or actinide element Gd (3 pt)

Hg etc.

b. Elements from Rb to Xe is the [(group) or (period)] circle one (3 pts)

9 (give the symbol of the group or period from the provided periodic table exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element nitrogen is N (4 pts)

b. The name of the element Be is

beryllium (4 pts)  
(sp error ok)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 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.\*\*\*\*

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work otherwise, I obviously cannot grade work I cannot find.

1. Conversion Problem: (15 pts)

attempt - 2pt  
 bad attempt - 3pt  
 math - 2pt  
 extrastep - 2pt  
 Graded consistent

a. You have an unknown compound of 1.299 pounds. How many grams is that? (453.59 grams = 1 pound) (5 pts)

$$1.299 \text{ pounds} \times \frac{453.59 \text{ g}}{1 \text{ pound}} = 589.21341 \text{ g}$$

2pt (circled)      1 sig fig (circled)      1pt (circled)  
 589.2 grams

b. If you have an unknown compound of 1.992 gallons, how many mL is that? (1.06 quarts = 1 liter, 1 gallon = 4 quarts) (5 pts)

$$1.992 \text{ gal} \times \frac{4 \text{ quarts}}{1 \text{ gallon}} \times \frac{1 \text{ liter}}{1.06 \text{ quart}} \times \frac{1000 \text{ mL}}{1 \text{ L}}$$

1pt (circled)      1pt (circled)      1pt (circled)  
 = 7516.981132 → 7517 mL  
 sig figs

c. What is the density of the unknown compounds (density = mass (grams) / volume (mL)) (5 pts)

$$\text{density} = \frac{589.2 \text{ g}}{7517 \text{ mL}} = 0.07838 \text{ g/mL}$$

4pt (circled)      1pt (circled)

2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts, 6 pts per letter) (show work for full credit and for partial credit)

attempt 3 pt math 2 pt

If you have  $7.22 \times 10^{15}$  atoms of the element Ba :

bad attempt -4 pt

- a. Give the definition of the mole relating moles, atoms and grams for the element Ba

2 pt                      2 pt                      2 pt

$$1 \text{ mol Ba} = \frac{6.022 \times 10^{23} \text{ atoms Ba}}{137.327 \text{ g Ba}}$$

- b. How many moles of Ba do you have? show work

1 pt

$$7.22 \times 10^{15} \text{ atoms Ba} \times \frac{1 \text{ mol Ba}}{6.022 \times 10^{23} \text{ atoms Ba}} = 1.19893724 \times 10^{-8}$$

3 pt                      2 pt                      sig fig

$$1.20 \times 10^{-8} \text{ mol Ba}$$

- c. How many grams of the element Ba do you have? Show work

2 pt                      2 pt

$$7.22 \times 10^{15} \text{ atoms Ba} \times \frac{137.327 \text{ g Ba}}{6.022 \times 10^{23} \text{ atoms Ba}} = 1.65 \times 10^{-6} \text{ g Ba}$$

2 pt                      2 pt

or

$$1.20 \times 10^{-8} \text{ mol Ba} \times \frac{137.327 \text{ g Ba}}{1 \text{ mol Ba}} = 1.65 \times 10^{-6} \text{ g Ba}$$

3 pt                      2 pt                      1 pt

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. (2 pts print and sign exam) If you run out of space, please continue on the scratch paper but clearly label where the remaining answer can be found. (If I can't find your answer, I obviously cannot grade it).

$$\text{density} = \text{mass (g)} / \text{volume (mL)} \quad \text{Kelvin} = ^\circ\text{C} + 273.15 \quad N_A = 6.022 \times 10^{23}$$

**Part I MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question. No partial credit for MC. (2 pts per question, 24 pts total)

- 1) A substance that can't be chemically broken down into simpler substances is 1) E  
 A) a heterogeneous mixture.  
 B) a homogeneous mixture.  
 C) a compound.  
 D) an electron.  
 E) an element.
- 2) Identify a solid. 2) A  
 A) definite volume and definite shape      B) no definite shape and definite volume  
 C) no definite shape and no definite volume      D) none of the above are true
- 3) Determine the number of protons, neutrons and electrons in the following: 3) D  
 $^{25}_{12}\text{X}$   
 A)  $p^+ = 12$      $n^\circ = 25$      $e^- = 12$   
 B)  $p^+ = 12$      $n^\circ = 12$      $e^- = 13$   
 C)  $p^+ = 12$      $n^\circ = 13$      $e^- = 25$   
 D)  $p^+ = 12$      $n^\circ = 13$      $e^- = 12$   
 E)  $p^+ = 25$      $n^\circ = 12$      $e^- = 13$
- 4) How many significant figures are in the measurement, 463.090 m? 4) C  
 A) 4      B) 2       C) 6      D) 5      E) 3
- 5) A chemical change 5) C  
 A) occurs when paper is shredded.  
 B) occurs when salt (NaCl solid) is dissolved in water NaCl (aq).  
 C) occurs when methane (CH<sub>4</sub>) gas is burned into [CO<sub>2</sub>(g) and H<sub>2</sub>O(g)].  
 D) occurs when sucrose [sugar (s)] is stirred into water to form [sugar (aq)].  
 E) occurs when water (liquid) is vaporized to water vapor (gas).

- 6) Isotopes differ in the number of 6) C  
A) beta particles.  
B) neutrons and protons.  
 C) neutrons.  
D) protons.  
E) electrons.
- 7) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to? 7) A  
 A) Law of the Conservation of Mass  
B) Law of Multiple Proportions  
C) Law of Modern Atomic Theory  
D) Law of Definite Proportions  
E) First Law of Thermodynamics
- 8) Identify the element that has an atomic number of 15. 8) D  
A) oxygen                      B) silicon                      C) sulfur                       D) phosphorus
- 9) The atomic mass number is equal to 9) A  
 A) the sum of the number of protons and neutrons.  
B) the sum of the number of the neutrons and electrons.  
C) the sum of the number of protons, neutrons, and electrons.  
D) the sum of the number of the electrons and protons.
- 10) Which of the following elements is a metal? 10) C  
A) Kr                      B) As                       C) Fe                      D) S                      E) Br
- 11) Identify a cation. 11) C  
A) An atom that has gained a neutron.  
B) An atom that has lost a proton and a neutron.  
 C) An atom that has lost an electron.  
D) An atom that has gained an electron.
- 12) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.71 g/mL, 1.73 g/mL, 1.70 g/mL, 1.69 g/mL. (average = 1.71 g/mL) If the actual value for the density of the sugar solution is 1.40 g/mL, which statement below best describes her results? 12) B  
A) Her results are both precise and accurate  
 B) Her results are precise, but not accurate.  
C) Her results are accurate, but not precise.  
D) Her results are neither precise nor accurate.  
E) It isn't possible to determine with the information given.

**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.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (41 pts)

1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

42.789 + 3.20 = calculator spits out 45.989

a. Number of significant figures in 42.789 5

b. Number of significant figures in 3.20 3

c. Number of significant figures in your sum 4  
calculator 45.9908

42.789  
3.20  
-----  
45.989

Part 2: multiplication / division

42.789 \* 3.20 = calculator spits out 136.9248

d. Number of significant figures in your multiplication product 3

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

1000 liters = 1 kiloliters

$\frac{1}{1000} - 1\frac{1}{2} \text{ pt}$



3. The following all refers to the element **Bi** (13 pts, 1 pt per blank)

a. Write the symbol of the element in the format  ${}^A_Z X$   ${}^{209}_{83} \text{Bi}$  (1 pts)

208.98038  $\rightarrow$  round up 209

5 or 10A  
round up  
-1/2  
pt

b. Number of protons in the element is 83 protons (1 pt)

c. Number of electrons for a neutral atom is 83 electrons (1 pt)

d. Number of neutrons is 126 neutrons. (1 pt) Show work. (1 pt)

$$209 - 83 = 126$$

math error -1/2 pt

graded consistent w above

e. Atomic number for the element is 83 (1 pt)

f. Atomic mass for the element is 209 (1 pt)

g. How many atoms does **one mole** of the element contain  $6.022 \times 10^{23}$  (1 pt)

h. How much does **one atom** of the element weigh 208.98 amu (1 pt)

i. How much does **one mole** of the element weigh 208.98 grams (1 pt)

j. What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write your answer as an Arabic number or you will lose points?)

VA (1 pt)

not periodic table #  
such as 5 -1/2 pt

k. If the element is in its ionic state, what is the charge of the atom. -3 (1 pt) Show work. (1 pt)

$$5 - 8 = -3$$

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any Transition Metal element

Co, (3 pt)

b. Elements from C to Pb is the [(group) or (period)] circle one (3 pts)

Ni, Ru, Pt  
etc.

IV A (give the symbol for the group or period from the provided periodic table exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element oxygen is O (4 pts)

b. The name of the element Ga is

gallium

(4 pts)

(spelling error OK)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 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. \*\*\*\*

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work otherwise, I obviously cannot grade work I cannot find.

attempt - 2pt  
 extra step - 1pt  
 bad attempt - 3pt  
 math - 1pt  
 graded consistent

1. Conversion Problem: (15 pts)

a. You have an unknown compound of 4.339 pounds. How many grams is that? (453.59 grams = 1 pound) (5 pts)

$$4.339 \text{ pounds} \times \frac{453.59 \text{ g}}{\text{pound}} = 1968.12701 \text{ g}$$

2pt (circled)      2pt (circled)      1pt (circled)      1pt (circled)

1968 g (circled)      w sig fig (circled)

b. If you have an unknown compound of 1.992 gallons, how many mL is that? (1.06 quarts = 1 liter, 1 gallon = 4 quarts) (5 pts)

$$1.992 \text{ gallons} \times \frac{4 \text{ quarts}}{1 \text{ gallon}} \times \frac{1 \text{ liter}}{1.06 \text{ quart}} \times \frac{1000 \text{ mL}}{1 \text{ liter}} = 7516.981152 \text{ mL}$$

1pt (circled)      1pt (circled)      1pt (circled)      1pt (circled)

7517 mL (circled)      w sig fig (circled)

c. What is the density of the unknown compounds [density = mass (grams) / volume (mL)] (5 pts)

$$\text{density} = \frac{1968 \text{ g}}{7517 \text{ mL}} = 0.2618 \text{ g/mL}$$

4pt (circled)      1pt (circled)

2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts/6 pts per letter) (show work for full credit and for partial credit)

If you have  $1.55 \times 10^{20}$  atoms of the element Kr:

- a. Give the definition of the mole relating moles, atoms and grams for the element Kr.

(2pt) (2pt) (2pt)

$$1 \text{ mole Kr} = 6.022 \times 10^{23} \text{ atoms Kr} = 83.80 \text{ g Kr}$$

- b. How many moles of Kr do you have? show work

$$1.55 \times 10^{20} \text{ atoms Kr} \times \frac{1 \text{ mol Kr}}{6.022 \times 10^{23} \text{ atoms Kr}} = 2.57 \times 10^{-4} \text{ mol Kr}$$

(3pt) (2pt) (1pt)

- c. How many grams of the element Kr do you have? Show work.

$$1.55 \times 10^{20} \text{ atoms Kr} \times \frac{83.80 \text{ g Kr}}{6.022 \times 10^{23} \text{ atoms Kr}} = 0.0216 \text{ g Kr}$$

or (2pt) (2pt) (1pt)

$$2.57 \times 10^{-4} \text{ mol Kr} \times \frac{83.80 \text{ g Kr}}{1 \text{ mol Kr}} = 0.0216 \text{ g Kr}$$

(3pt) (2pt) (1pt)

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. (2 pts print and sign exam) If you run out of space, please continue on the scratch paper but clearly label where the remaining answer can be found. (If I can't find your answer, I obviously cannot grade it).

density = mass (g) / volume (mL)      Kelvin = °C + 273.15       $N_A = 6.022 \times 10^{23}$

green

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**  
No partial credit for MC. (2 pts per question, 24 pts total)

- 1) A physical change 1) \_\_\_\_\_  
 A) occurs when propane ( $C_3H_8$ ) is burned to produce heat,  $CO_2$  and  $H_2O$ .  
 B) occurs when Na and Cl combine to make NaCl .  
 C) occurs when glucose ( $C_6H_{12}O_6$ ) is converted into energy and  $CO_2$  and  $H_2O$  within your cells.  
 D) occurs when iron (Fe) rusts to produce (FeO and  $Fe_3O_4$ ).  
 E) occurs when water (liquid) is evaporated to water vapor (gas) .
- 2) Isotopes differ in the number of 2) \_\_\_\_\_  
 A) neutrons and protons.  
 B) protons.  
 C) neutrons.  
 D) beta particles.  
 E) electrons.
- 3) Identify the charges of the protons, neutrons, and electrons. 3) \_\_\_\_\_  
 A) protons 0, neutrons +1, electrons -1  
 B) protons +1, neutrons -1, electrons 0  
 C) protons +1, neutrons 0, electrons -1  
 D) protons -1, neutrons 0, electrons +1  
 E) protons 0, neutrons -1, electrons +1
- 4) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 4) \_\_\_\_\_  
 A) the Scientific Method.  
 B) the Law of Multiple Proportions.  
 C) the Law of Conservation of Mass.  
 D) Dalton's Atomic Theory.  
 E) the Law of Definite Proportions.
- 5) Which of the following elements is a nonmetal? 5) \_\_\_\_\_  
 A) Be                      B) Ce                      C) N                      D) Ba                      E) K
- 6) The atomic mass for cadmium is 6) \_\_\_\_\_  
 A) 40.08                      B) 48                      C) 20                      D) 112.41

7) A substance composed of two or more elements in a fixed, definite proportion is 7) \_\_\_\_\_  
A) a compound.  
B) a homogeneous mixture.  
C) an alloy.  
D) a heterogeneous mixture.  
E) a solution.

8) Determine the number of protons, neutrons and electrons in the following: 8) \_\_\_\_\_  
 $^{25}_{12}\text{X}$

- A)  $p^+ = 12$      $n^\circ = 13$      $e^- = 12$   
B)  $p^+ = 12$      $n^\circ = 12$      $e^- = 13$   
C)  $p^+ = 12$      $n^\circ = 13$      $e^- = 25$   
D)  $p^+ = 25$      $n^\circ = 12$      $e^- = 13$   
E)  $p^+ = 12$      $n^\circ = 25$      $e^- = 12$

9) Which of the following are examples of intensive properties? 9) \_\_\_\_\_  
A) mass  
B) density  
C) volume  
D) None of the above are examples of intensive properties.  
E) All of the above are examples of intensive properties.

10) Identify a liquid. 10) \_\_\_\_\_  
A) definite volume and no definite shape      B) definite volume and definite shape  
C) no definite shape and no definite volume    D) none of the above are true

11) Identify an anion. 11) \_\_\_\_\_  
A) An atom that has gained a neutron.  
B) An atom that has gained an electron.  
C) An atom that has lost an electron.  
D) An atom that has lost a neutron and a proton.

12) How many significant figures are in 0.00523980 mL? 12) \_\_\_\_\_  
A) 5                      B) 4                      C) 3                      D) 6                      E) 7

**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.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (41 pts)

1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$$1.2993 + 20.30 = \text{calculator spits out } 21.5993$$

- a. Number of significant figures in 1.2993 \_\_\_\_\_
- b. Number of significant figures in 20.30 \_\_\_\_\_
- c. Number of significant figures in your sum \_\_\_\_\_

Part 2: multiplication / division

$$1.2993 * 20.30 = \text{calculator spits out } 26.37579$$

- d. Number of significant figures in your multiplication product \_\_\_\_\_

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

$$1 \text{ kilometers} = \text{_____} \text{ meters}$$

3. The following all refers to the element **Sb** (13 pts, 1 pt per blank)
- a. Write the symbol of the element in the format  ${}^A_Z X$  \_\_\_\_\_ (1 pts)
- b. Number of protons in the element is \_\_\_\_\_ protons (1 pt)
- c. Number of electrons for a neutral atom is \_\_\_\_\_ electrons (1 pt)
- d. Number of neutrons is \_\_\_\_\_ neutrons. (1 pt) Show work. (1 pt)
- e. Atomic number for the element is \_\_\_\_\_ (1 pt)
- f. Atomic mass for the element is \_\_\_\_\_ (1 pt)
- g. How many atoms does **one mole** of the element contain \_\_\_\_\_ (1 pt)
- h. How much does **one atom** of the element weigh \_\_\_\_\_ amu (1 pt)
- i. How much does **one mole** of the element weigh \_\_\_\_\_ grams (1 pt)
- j. What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write you answer as an Arabic number or you will lose points.)?  
\_\_\_\_\_ (1 pt)
- k. If the element is in its ionic state, what is the charge of the atom. \_\_\_\_\_ (1 pt) Show work.(1 pt)



4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any **lanthanide or actinide** element \_\_\_\_\_ (3 pt)

b. Elements from **Na to Ar** is the [(group) or (period)] circle one (3 pts)

\_\_\_\_\_ (give the symbol from the provided periodic table for group or period exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element **carbon** is \_\_\_\_\_ (4 pts)

b. The name of the element **Cu** is

\_\_\_\_\_ (4 pts)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 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.\*\*\*\***

**Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work otherwise, I obviously cannot grade work I cannot find.**

1. Conversion Problem: (15 pts)

If you have 25.9 cups of the compound ethanol, how many milligrams of ethanol do you have? (1.06 quarts = 1 liter, 4 cups = 1 quart, density of ethanol = 0.789 g/mL ) (show all 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. (2 pts print and sign exam) If you run out of space, please continue on the scratch paper but clearly label where the remaining answer can be found. (If I can't find your answer, I obviously cannot grade it).

density = mass (g) / volume (mL)      Kelvin = °C + 273.15       $N_A = 6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**  
No partial credit for MC. (2 pts per question, 24 pts total)

- 1) The atomic mass for cadmium is \_\_\_\_\_  
A) 40.08                      B) 112.41                      C) 20                      D) 48
  
- 2) A substance composed of two or more elements in a fixed, definite proportion is \_\_\_\_\_  
A) a compound.  
B) a homogeneous mixture.  
C) an alloy.  
D) a solution.  
E) a heterogeneous mixture.
  
- 3) Which of the following are examples of intensive properties? \_\_\_\_\_  
A) density  
B) mass  
C) volume  
D) None of the above are examples of intensive properties.  
E) All of the above are examples of intensive properties.
  
- 4) Which of the following elements is a nonmetal? \_\_\_\_\_  
A) Ce                      B) N                      C) Ba                      D) K                      E) Be
  
- 5) Identify an anion. \_\_\_\_\_  
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 neutron and a proton.
  
- 6) Isotopes differ in the number of \_\_\_\_\_  
A) electrons.  
B) neutrons.  
C) neutrons and protons.  
D) beta particles.  
E) protons.
  
- 7) How many significant figures are in 0.00523980 mL? \_\_\_\_\_  
A) 4                      B) 3                      C) 6                      D) 5                      E) 7

- 8) A physical change 8) \_\_\_\_\_  
 A) occurs when propane ( $C_3H_8$ ) is burned to produce heat,  $CO_2$  and  $H_2O$ .  
 B) occurs when iron (Fe) rusts to produce (FeO and  $Fe_3O_4$ ).  
 C) occurs when Na and Cl combine to make NaCl .  
 D) occurs when water (liquid) is evaporated to water vapor (gas) .  
 E) occurs when glucose ( $C_6H_{12}O_6$ ) is converted into energy and  $CO_2$  and  $H_2O$  within your cells.
- 9) Identify the charges of the protons, neutrons, and electrons. 9) \_\_\_\_\_  
 A) protons +1, neutrons 0, electrons -1  
 B) protons -1, neutrons 0, electrons +1  
 C) protons 0, neutrons +1, electrons -1  
 D) protons 0, neutrons -1, electrons +1  
 E) protons +1, neutrons -1, electrons 0
- 10) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 10) \_\_\_\_\_  
 A) the Law of Definite Proportions.  
 B) the Scientific Method.  
 C) the Law of Multiple Proportions.  
 D) the Law of Conservation of Mass.  
 E) Dalton's Atomic Theory.
- 11) Identify a liquid. 11) \_\_\_\_\_  
 A) definite volume and definite shape  
 B) definite volume and no definite shape  
 C) no definite shape and no definite volume  
 D) none of the above are true
- 12) Determine the number of protons, neutrons and electrons in the following: 12) \_\_\_\_\_  
 $^{25}_{12}X$   
 A)  $p^+ = 12$      $n^0 = 13$      $e^- = 12$   
 B)  $p^+ = 12$      $n^0 = 25$      $e^- = 12$   
 C)  $p^+ = 12$      $n^0 = 13$      $e^- = 25$   
 D)  $p^+ = 12$      $n^0 = 12$      $e^- = 13$   
 E)  $p^+ = 25$      $n^0 = 12$      $e^- = 13$

**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.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (41 pts)

1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$$0.90 + 200.9 = \text{calculator spits out } 201.8$$

- a. Number of significant figures in 0.90 \_\_\_\_\_
- b. Number of significant figures in 200.9 \_\_\_\_\_
- c. Number of significant figures in your sum \_\_\_\_\_

Part 2: multiplication / division

$$0.90 * 200.9 = \text{calculator spits out } 180.81$$

- d. Number of significant figures in your multiplication product \_\_\_\_\_

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

$$\text{_____ centiliters} = 1 \text{ liters}$$

3. The following all refers to the element **Cs** (13 pts, 1 pt per blank)
- Write the symbol of the element in the format  ${}^A_Z\text{X}$  \_\_\_\_\_ (1 pts)
  - Number of protons in the element is \_\_\_\_\_ protons (1 pt)
  - Number of electrons for a neutral atom is \_\_\_\_\_ electrons (1 pt)
  - Number of neutrons is \_\_\_\_\_ neutrons. (1 pt) Show work. (1 pt)
  - Atomic number for the element is \_\_\_\_\_ (1 pt)
  - Atomic mass for the element is \_\_\_\_\_ (1 pt)
  - How many atoms does **one mole** of the element contain \_\_\_\_\_ (1 pt)
  - How much does **one atom** of the element weigh \_\_\_\_\_ amu (1 pt)
  - How much does **one mole** of the element weigh \_\_\_\_\_ grams (1 pt)
  - What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write you answer as an Arabic number or you will lose points.)?  
 \_\_\_\_\_ (1 pt)
  - If the element is in its ionic state, what is the charge of the atom. \_\_\_\_\_ (1 pt) Show work.(1 pt)

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any **Main Group** element \_\_\_\_\_ (3 pt)

b. Elements from **O to Po** is the [(group) or (period)] circle one (3 pts)

\_\_\_\_\_ (give the symbol for the group or period from the provided periodic table exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element **hydrogen** is \_\_\_\_\_ (4 pts)

b. The name of the element **Se** is

\_\_\_\_\_ (4 pts)



**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 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.\*\*\*\***

**Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work otherwise, I obviously cannot grade work I cannot find.**

1. Conversion Problem: (15 pts)

If you have 1.55 fluid ounces of a substance, how many grams of the substance do you have? (1.06 quarts = 1 liter, 4 cups = 1 quart, 8 fluid ounces = 1 cup, density of substance = 1.293 g/mL) (show all work)

2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts, 6 pts per letter) (show work for full credit and for partial credit)

If you have 32.99 moles of the element Sn

a. Give the definition of the mole relating moles, atoms and grams.

b. How many atoms of the element Sn do you have? show work. ( $N_A = 6.022 \times 10^{23}$ )

c. How many grams is that many moles of the element Sn? (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. (2 pts print and sign exam) If you run out of space, please continue on the scratch paper but clearly label where the remaining answer can be found. (If I can't find your answer, I obviously cannot grade it).

density = mass (g) / volume (mL)      Kelvin = °C + 273.15       $N_A = 6.022 \times 10^{23}$

salmon

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**  
**No partial credit for MC. (2 pts per question, 24 pts total)**

- 1) Identify a solid. 1) \_\_\_\_\_
  - A) no definite shape and definite volume
  - B) no definite shape and no definite volume
  - C) definite volume and definite shape
  - D) none of the above are true
  
- 2) Identify a cation. 2) \_\_\_\_\_
  - A) An atom that has lost an electron.
  - B) An atom that has gained an electron.
  - C) An atom that has lost a proton and a neutron.
  - D) An atom that has gained a neutron.
  
- 3) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.71 g/mL, 1.73 g/mL, 1.70 g/mL, 1.69 g/mL. (average = 1.71 g/mL) If the actual value for the density of the sugar solution is 1.40 g/mL, which statement below best describes her results? 3) \_\_\_\_\_
  - A) Her results are precise, but not accurate.
  - B) Her results are accurate, but not precise.
  - C) Her results are both precise and accurate
  - D) Her results are neither precise nor accurate.
  - E) It isn't possible to determine with the information given.
  
- 4) Identify the element that has an atomic number of 15. 4) \_\_\_\_\_
  - A) sulfur
  - B) silicon
  - C) phosphorus
  - D) oxygen
  
- 5) Isotopes differ in the number of 5) \_\_\_\_\_
  - A) neutrons and protons.
  - B) protons.
  - C) electrons.
  - D) beta particles.
  - E) neutrons.
  
- 6) A substance that can't be chemically broken down into simpler substances is 6) \_\_\_\_\_
  - A) an element.
  - B) a heterogeneous mixture.
  - C) an electron.
  - D) a compound.
  - E) a homogeneous mixture.

- 7) How many significant figures are in the measurement, 463.090 m? \_\_\_\_\_  
 A) 3                      B) 6                      C) 5                      D) 4                      E) 2
- 8) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to? \_\_\_\_\_  
 A) Law of the Conservation of Mass  
 B) First Law of Thermodynamics  
 C) Law of Modern Atomic Theory  
 D) Law of Multiple Proportions  
 E) Law of Definite Proportions
- 9) A chemical change \_\_\_\_\_  
 A) occurs when methane (CH<sub>4</sub>) gas is burned into [CO<sub>2</sub>(g) and H<sub>2</sub>O(g)].  
 B) occurs when salt (NaCl solid) is dissolved in water NaCl (aq).  
 C) occurs when paper is shredded.  
 D) occurs when sucrose [sugar (s)] is stirred into water to form [sugar (aq)].  
 E) occurs when water (liquid) is vaporized to water vapor (gas).
- 10) Determine the number of protons, neutrons and electrons in the following: \_\_\_\_\_  
 $^{25}_{12}\text{X}$   
 A) p<sup>+</sup> = 12      n<sup>o</sup> = 25      e<sup>-</sup> = 12  
 B) p<sup>+</sup> = 12      n<sup>o</sup> = 13      e<sup>-</sup> = 12  
 C) p<sup>+</sup> = 25      n<sup>o</sup> = 12      e<sup>-</sup> = 13  
 D) p<sup>+</sup> = 12      n<sup>o</sup> = 12      e<sup>-</sup> = 13  
 E) p<sup>+</sup> = 12      n<sup>o</sup> = 13      e<sup>-</sup> = 25
- 11) The atomic mass number is equal to \_\_\_\_\_  
 A) the sum of the number of the electrons and protons.  
 B) the sum of the number of protons, neutrons, and electrons.  
 C) the sum of the number of protons and neutrons.  
 D) the sum of the number of the neutrons and electrons.
- 12) Which of the following elements is a metal? \_\_\_\_\_  
 A) Kr                      B) Br                      C) As                      D) Fe                      E) S

**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.

**Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (41 pts)**

1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$$20.70 + 799.1 = \text{calculator spits out } 819.8$$

- a. Number of significant figures in 20.70 \_\_\_\_\_
- b. Number of significant figures in 799.1 \_\_\_\_\_
- c. Number of significant figures in your sum \_\_\_\_\_

Part 2: multiplication / division

$$20.70 * 799.1 = \text{calculator spits out } 16541.37$$

- d. Number of significant figures in your multiplication product \_\_\_\_\_

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

\_\_\_\_\_ millimeters = 1 meters

3. The following all refers to the element **Te** (13 pts, 1 pt per blank)
- Write the symbol of the element in the format  ${}^A_Z X$  \_\_\_\_\_ (1 pts)
  - Number of protons in the element is \_\_\_\_\_ protons (1 pt)
  - Number of electrons for a neutral atom is \_\_\_\_\_ electrons (1 pt)
  - Number of neutrons is \_\_\_\_\_ neutrons. (1 pt) Show work. (1 pt)
  - Atomic number for the element is \_\_\_\_\_ (1 pt)
  - Atomic mass for the element is \_\_\_\_\_ (1 pt)
  - How many atoms does **one mole** of the element contain \_\_\_\_\_ (1 pt)
  - How much does **one atom** of the element weigh \_\_\_\_\_ amu (1 pt)
  - How much does **one mole** of the element weigh \_\_\_\_\_ grams (1 pt)
  - What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write you answer as an Arabic number or you will lose points.)?  
\_\_\_\_\_ (1 pt)
  - If the element is in its ionic state, what is the charge of the atom. \_\_\_\_\_ (1 pt) Show work.(1 pt)

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any **lanthanide or actinide** element \_\_\_\_\_ (3 pt)

b. Elements from **Rb to Xe** is the [(group) or (period)] circle one (3 pts)

\_\_\_\_\_ (give the symbol of the group or period from the provided periodic table exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element **nitrogen** is \_\_\_\_\_ (4 pts)

b. The name of the element **Be** is

\_\_\_\_\_ (4 pts)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 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.\*\*\*\*

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work otherwise, I obviously cannot grade work I cannot find.

1. Conversion Problem: (15 pts)

a. You have an unknown compound of 1.299 pounds. How many grams is that ? (453.59 grams = 1 pound) (5 pts)

b. If you have an unknown compound of 1.992 gallons, how many mL is that ? (1.06 quarts = 1 liter, 1 gallon = 4 quarts) (5 pts)

c. What is the density of the unknown compounds (density = mass (grams) / volume (mL)) (5 pts)



2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts, 6 pts per letter) (show work for full credit and for partial credit)

If you have  $7.22 \times 10^{15}$  atoms of the element **Ba** :

- a. Give the definition of the mole relating moles, atoms and grams for the element **Ba**.

- b. How many moles of **Ba** do you have ? show work

- c. How many grams of the element **Ba** do you have ? 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. (2 pts print and sign exam) If you run out of space, please continue on the scratch paper but clearly label where the remaining answer can be found. (If I can't find your answer, I obviously cannot grade it).

density = mass (g) / volume (mL)      Kelvin = °C + 273.15       $N_A = 6.022 \times 10^{23}$

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. No partial credit for MC. (2 pts per question, 24 pts total)**

- 1) A substance that can't be chemically broken down into simpler substances is 1) \_\_\_\_\_  
 A) a heterogeneous mixture.  
 B) a homogeneous mixture.  
 C) a compound.  
 D) an electron.  
 E) an element.
- 2) Identify a solid. 2) \_\_\_\_\_  
 A) definite volume and definite shape      B) no definite shape and definite volume  
 C) no definite shape and no definite volume      D) none of the above are true
- 3) Determine the number of protons, neutrons and electrons in the following: 3) \_\_\_\_\_  
 ${}_{12}^{25}\text{X}$   
 A)  $p^+ = 12$      $n^0 = 25$      $e^- = 12$   
 B)  $p^+ = 12$      $n^0 = 12$      $e^- = 13$   
 C)  $p^+ = 12$      $n^0 = 13$      $e^- = 25$   
 D)  $p^+ = 12$      $n^0 = 13$      $e^- = 12$   
 E)  $p^+ = 25$      $n^0 = 12$      $e^- = 13$
- 4) How many significant figures are in the measurement, 463.090 m? 4) \_\_\_\_\_  
 A) 4      B) 2      C) 6      D) 5      E) 3
- 5) A chemical change 5) \_\_\_\_\_  
 A) occurs when paper is shredded.  
 B) occurs when salt (NaCl solid) is dissolved in water NaCl (aq).  
 C) occurs when methane ( $\text{CH}_4$ ) gas is burned into [ $\text{CO}_2(\text{g})$  and  $\text{H}_2\text{O}(\text{g})$ ].  
 D) occurs when sucrose [sugar (s)] is stirred into water to form [sugar (aq)].  
 E) occurs when water (liquid) is vaporized to water vapor (gas).

- 6) Isotopes differ in the number of \_\_\_\_\_  
A) beta particles.  
B) neutrons and protons.  
C) neutrons.  
D) protons.  
E) electrons.
- 7) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to? \_\_\_\_\_  
A) Law of the Conservation of Mass  
B) Law of Multiple Proportions  
C) Law of Modern Atomic Theory  
D) Law of Definite Proportions  
E) First Law of Thermodynamics
- 8) Identify the element that has an atomic number of 15. \_\_\_\_\_  
A) oxygen                      B) silicon                      C) sulfur                      D) phosphorus
- 9) The atomic mass number is equal to \_\_\_\_\_  
A) the sum of the number of protons and neutrons.  
B) the sum of the number of the neutrons and electrons.  
C) the sum of the number of protons, neutrons, and electrons.  
D) the sum of the number of the electrons and protons.
- 10) Which of the following elements is a metal? \_\_\_\_\_  
A) Kr                      B) As                      C) Fe                      D) S                      E) Br
- 11) Identify a cation. \_\_\_\_\_  
A) An atom that has gained a neutron.  
B) An atom that has lost a proton and a neutron.  
C) An atom that has lost an electron.  
D) An atom that has gained an electron.
- 12) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.71 g/mL, 1.73 g/mL, 1.70 g/mL, 1.69 g/mL. (average = 1.71 g/mL) If the actual value for the density of the sugar solution is 1.40 g/mL, which statement below best describes her results? \_\_\_\_\_  
A) Her results are both precise and accurate  
B) Her results are precise, but not accurate.  
C) Her results are accurate, but not precise.  
D) Her results are neither precise nor accurate.  
E) It isn't possible to determine with the information given.

**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.

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1. Significant figures in calculations: (give the answer to the correct number of significant figures, NOTE: The number that the calculator spits out may have more significant figures than noted below because some of the significant numbers may be zeros.) (8 pts, 2 pts each)

Part 1: addition / subtraction

$$42.789 + 3.20 = \text{calculator spits out } 45.989$$

a. Number of significant figures in 42.789 \_\_\_\_\_

b. Number of significant figures in 3.20 \_\_\_\_\_

c. Number of significant figures in your sum \_\_\_\_\_

Part 2: multiplication / division

$$42.789 * 3.20 = \text{calculator spits out } 136.9248$$

d. Number of significant figures in your multiplication product \_\_\_\_\_

2. Metric Stuff Memorized: Fill in the blanks. (3 pts)

\_\_\_\_\_ liters = 1 kiloliters

3. The following all refers to the element **Bi** (13 pts, 1 pt per blank)
- Write the symbol of the element in the format  ${}^A_Z X$  \_\_\_\_\_ (1 pts)
  - Number of protons in the element is \_\_\_\_\_ protons (1 pt)
  - Number of electrons for a neutral atom is \_\_\_\_\_ electrons (1 pt)
  - Number of neutrons is \_\_\_\_\_ neutrons. (1 pt) Show work. (1 pt)
  - Atomic number for the element is \_\_\_\_\_ (1 pt)
  - Atomic mass for the element is \_\_\_\_\_ (1 pt)
  - How many atoms does **one mole** of the element contain \_\_\_\_\_ (1 pt)
  - How much does **one atom** of the element weigh \_\_\_\_\_ amu (1 pt)
  - How much does **one mole** of the element weigh \_\_\_\_\_ grams (1 pt)
  - What is the group number of the element exactly as written in the periodic table which you have attached to your exam (If the number on my periodic table is written as a Roman numeral write your answer as a Roman numeral. If the number on my periodic table is written as an Arabic number, write your answer as an Arabic number or you will lose points.)?  
\_\_\_\_\_ (1 pt)
  - If the element is in its ionic state, what is the charge of the atom. \_\_\_\_\_ (1 pt) Show work.(1 pt)

4 Periodic Table: (9 pts, 3 pts each)

a. In the periodic table give the symbol for any **Transition Metal** element \_\_\_\_\_ (3 pt)

b. Elements from **C to Pb** is the [(group) or (period)] circle one (3 pts)

\_\_\_\_\_ (give the symbol for the group or period from the provided periodic table exactly as written) (3 pts)

5 Name of elements and element symbols: (8 pts, 4 pts each)

a. The symbol for the element **oxygen** is \_\_\_\_\_ (4 pts)

b. The name of the element **Ga** is

\_\_\_\_\_ (4 pts)

**Part III. Long Answer** Please show work for full credit and to receive partial credit. (33 pts)

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a. You have an unknown compound of 4.339 pounds. How many grams is that ? (453.59 grams = 1 pound) (5 pts)

b. If you have an unknown compound of 1.992 gallons, how many mL is that ? (1.06 quarts = 1 liter, 1 gallon = 4 quarts) (5 pts)

c. What is the density of the unknown compounds [density = mass (grams) / volume (mL) ] (5 pts)

2. Mole Problem: (hint: Write out the 3 part definition of the mole for partial credit before you start to complete the problem. (18 pts, 6 pts per letter) (show work for full credit and for partial credit)

If you have  $1.55 \times 10^{20}$  atoms of the element Kr :

- a. Give the definition of the mole relating moles, atoms and grams for the element Kr.

- b. How many moles of Kr do you have ? show work

- c. How many grams of the element Kr do you have ? Show work.