

Name Key (NA = not attempt) (print) Name NW = no work (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 = 6.022×10^{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) NO partial credit MC

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

$^{65}_{29}\text{X}$

$p^+ = \text{proton}$, $n^0 = \text{neutron}$, $e^- = \text{electrons}$

1) C

- A) $p^+ = 29$ $n^0 = 36$ $e^- = 36$
- B) $p^+ = 29$ $n^0 = 29$ $e^- = 36$
- C) $p^+ = 29$ $n^0 = 36$ $e^- = 29$
- D) $p^+ = 36$ $n^0 = 29$ $e^- = 36$
- E) $p^+ = 36$ $n^0 = 36$ $e^- = 29$

$\rightarrow 65 - 29 = 36 = n^0$

2) How many significant figures are in the measurement, 463.090 m²?

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

2) D

3) Two or more substances in variable proportions, where the composition is variable throughout are

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

3) E

4) 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 Law of Definite Proportions.
- E) the Scientific Method.

4) A

5) Which of the following elements is a alkali metal?

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

5) D

6) Which of the following elements is a nonmetal?

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

6) C

7) Which of the following contains the FEWEST atoms? You shouldn't need to do a calculation here.

- A) 10.0 g Na
- B) 10.0 g Ar
- C) 10.0 g Cs
- D) 10.0 g Li
- E) 10.0 g Kr

7) C

- 8) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 8) E
 A) 24 B) 1.5 C) 1,521 D) 3.1×10^5 E) 313
- 9) The factor 10^{-3} corresponds to which prefix? 9) B
 A) deka B) milli C) centi D) deci
- 10) NO₂ is an example of 10) C
 A) a heterogeneous mixture. B) an element.
C) a compound. D) a homogeneous mixture.
- 11) Identify a cation. 11) A
A) An atom that has lost an electron.
 B) An atom that has gained a neutron.
 C) An atom that has lost a proton and a neutron.
 D) An atom that has gained an electron.
- 12) Which of the following are examples of physical change? 12) E
 A) salt is dissolved in water
 B) water (solid) to water (liquid)
 C) water freezes
 D) melt solid gold to liquid gold
E) All of these are examples of physical change.

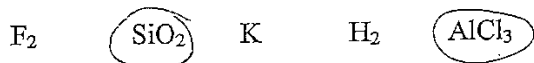
→

$$115 \frac{\text{lb}}{\text{person}} \times \frac{453.59 \text{ g}}{1 \text{ lb}} \times \frac{6.00 \text{ mg drug}}{1000 \text{ g}} = 313 \text{ mg}$$

Elixophyllin
for
115 lb person

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. (42 pts)

1 From the given list, circle all compounds. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)



2 Sand in water is an example of a [(homogenous) or (heterogenous)] mixture (circle one). (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

said 0.001 - 1

(a) one KiloLiter = 1,000 L

(b) rewrite what you wrote in (a) as 2 possible conversion factors with a numerator and denominator (put the numerator over the line and the denominator under the line)

Conversion factor #1 = $\frac{1 \text{ kL}}{1000 \text{ L}}$ graded consistent w/ @ Conversion factor #2 = $\frac{1000 \text{ L}}{1 \text{ kL}}$

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$(13.21 + 300.2) * 2.6 = 814.866$

only graded sig fig not math

did not need to show scientific notation

$$\begin{array}{r} 13.21 \\ 300.2 \\ \hline 313.4 \end{array} * 2.6 = 810 = 8.1 \times 10^2$$

 4 sig fig 2 sig fig 2 sig fig

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

bad spelling - 1 pt

K potassium

nitrogen N

6. Fill in the blank with **one** of the following **letters** which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

extravagant

(d)

Periodic Table of the Elements

(e)

7. For the element B

Group number is (a) [(2) or (IIIA)] (circle one)

Period number is (b) [(2) or (IIIA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: Ca has (10 pts, 1 pt each blank)

atomic mass 40.078 (give #)

atomic number 20 (give #)

protons 20 (give #)

electrons (for neutral atoms) 20 (give #)

neutrons 20.1 (give #). (show work for last part) (1 pt show work)

$$40.1 - 20 = 20.1$$

charge on the element (in its most common ionic state) is +2 (show work or explain) (1 pt show work)

*group IIA - charge = gp # = 2 = +2
 cation left side*

The molar mass of the element is 40.078 g (give number).

A mole of the element above has 6.022×10^{23} atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 1.72 cups to grams (use density as a conversion factor, density = 1.00 grams / mL) (1.06 liter = quart, 4 cups = 1 quart)

1.72 cups \rightarrow grams

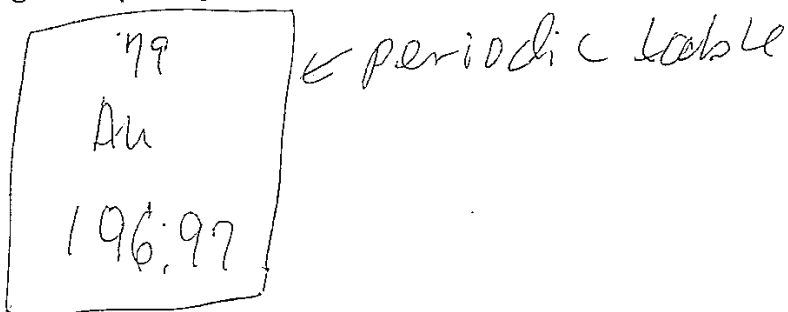
$$1.72 \text{ cups} \times \frac{1 \text{ quart}}{4 \text{ cups}} \times \frac{1.06 \text{ L}}{1 \text{ quart}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1.00 \text{ grams}}{1 \text{ mL}} = 456 \text{ grams}$$

Handwritten annotations: (3pt) above 1.72 cups, (3pt) above 1 quart, (3pt) above 1.06 L, (3pt) above 1000 mL, (3pt) above 1.00 grams/mL, (2pt) above 456 grams.

attempt -7 pt
 bad attempt -9 pt
 upside down or half way $\frac{1}{2}$ credit $-\frac{1}{2}$ pt

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a block of gold (Au) which weighs 73.5 pounds, how many atoms of gold do you have in your block of gold? (453.6 grams = one pound, 6.022×10^{23} = Avogadro's number)



1 mole Au = 196.97 grams Au

1 mole Au = 6.022×10^{23} atoms Au

$$\begin{aligned}
 & 73.5 \text{ pounds Au} \times \frac{453.6 \text{ g Au}}{1 \text{ pound Au}} \times \frac{1 \text{ mole Au}}{196.97 \text{ grams Au}} \\
 & \times \frac{6.022 \times 10^{23} \text{ atoms Au}}{1 \text{ mole Au}} = 1.02 \times 10^{26} \text{ atoms Au}
 \end{aligned}$$

attempt -7
 bad attempt -9
 upside down or half wrong → 1/2 credit

NW = NO WORK

Exam I General Chemistry I Lecture Spring 2014 1/28/14 Tuesday form 8:30-B—Dr. Hahn Exam # _____

Name Key (print) Name N/A = not attempted (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 = 6.022×10^{23}

NO PARTIAL CREDIT MC

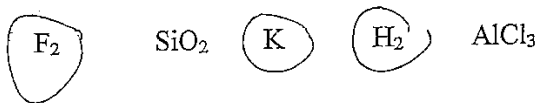
Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. No partial credit for MC. (2 pts per question, 24 pts total)

- 1) Identify a cation. 1) D
A) An atom that has lost a proton and a neutron.
B) An atom that has gained an electron.
C) An atom that has gained a neutron.
D) An atom that has lost an electron.
- 2) Which of the following elements is an alkali metal? 2) A
A) K B) Ce C) N D) Br E) Be
- 3) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 3) B
A) the Scientific Method.
B) the Law of Conservation of Mass.
C) the Law of Multiple Proportions.
D) Dalton's Atomic Theory.
E) the Law of Definite Proportions.
- 4) How many significant figures are in the measurement, 463.090 m? 4) A
A) 6 B) 4 C) 2 D) 5 E) 3
- 5) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 5) C
A) 24 B) 1.5 C) 313 D) 3.1×10^5 E) 1,521
- 6) NO₂ is an example of 6) D
A) an element.
B) a homogeneous mixture.
C) a heterogeneous mixture.
D) a compound.
- 7) Which of the following elements is a nonmetal? 7) E
A) K B) ~~Br~~ Cr C) Be D) Ce E) N
- 8) Two or more substances in variable proportions, where the composition is variable throughout are 8) B
A) a homogeneous mixture.
B) a heterogeneous mixture.
C) a solution.
D) a compound.
E) an amorphous solid..

- 9) Which of the following contains the FEWEST atoms? You shouldn't need to do a calculation here. 9) A
 A) 10.0 g Cs B) 10.0 g Li C) 10.0 g Ar D) 10.0 g Na E) 10.0 g Kr
- 10) Which of the following are examples of physical change? 10) E
 A) water (solid) to water (liquid)
 B) salt is dissolved in water
 C) melt solid gold to liquid gold
 D) water freezes
 E) All of these are examples of physical change.
- 11) The factor 10^{-3} corresponds to which prefix? 11) A
 A) milli B) deka C) deci D) centi
- 12) Determine the number of protons, neutrons and electrons in the following: 12) D
 ${}_{29}^{65}\text{X}$
 A) $p^+ = 29$ $n^0 = 36$ $e^- = 36$
 B) $p^+ = 36$ $n^0 = 29$ $e^- = 36$
 C) $p^+ = 36$ $n^0 = 36$ $e^- = 29$
 D) $p^+ = 29$ $n^0 = 36$ $e^- = 29$
 E) $p^+ = 29$ $n^0 = 29$ $e^- = 36$

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. (42 pts)

1 From the given list, circle elements. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)



2 Sand in water is an example of a [heterogenous] or (homogenous)] mixture (circle one). (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

said 0.01 - 1

(a) 100 CentiGram = one gram

(b) rewrite what you wrote in (a) as 2 possible conversion factors with a numerator and denominator (put the numerator over the line and the denominator under the line).

Conversion factor #1 = $\frac{100 \text{ cg}}{1 \text{ g}}$ Conversion factor #2 = $\frac{1 \text{ g}}{100 \text{ cg}}$

graded consistent w @

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$467.2 \sqrt{(240.2 - 1.227)} = 1.95503$

↑ 4 sig fig ↓ 1.955

$\frac{240.2}{1.227} = 238.97 \rightarrow 239.0$

only graded sig. fig not math

did not need to show

↑ 4 sig fig

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

bad spelling - 1 pt *chloride - 1*

scientific notation

Cl chlorine sodium Na

6. Fill in the blank with **one** of the following **letters** which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

extra wrong - 1

Periodic Table of the Elements

Sc	Ti	V	Cr	Mn	Fe	Cobalt	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	

7. For the element Na

Period number is (a) (3) or (IA) (circle one)

Group number is (b) (3) or (IA) (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: As has (10 pts, 1 pt each blank)

atomic mass 74.9216 (give #) atomic number 33 (give #)

protons 33 (give #) # electrons (for neutral atoms) 33 (give #)

neutrons 42 (give #). (show work for last part) (1 pt show work)

$$75 - 33 = 42$$

charge on the element (in its most common ionic state) is -3 (show work or explain) (1 pt show work)

group V A → 5 - 8 = -3 anion

The molar mass of the element is 74.92 g (give number).

A mole of the element above has 6.022×10^{23} atoms (give number).

sign -1/2

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 32.55 pounds to liters (use density as a conversion factor, density = 4.22 grams / mL) (453.6 grams = pound)

32.55 lb \rightarrow liters 4pt 3pt 3pt

$$32.55 \text{ pounds} \times \frac{453.6 \text{ g}}{1 \text{ pound}} \times \frac{1 \text{ mL}}{4.22 \text{ g}} \times \frac{1 \text{ L}}{1000 \text{ mL}} =$$

4pt 3,499 liters

||| 3pt

3,501 liters

3 sig fig
assuming
not absolute #

attempt -7

bad attempt -9

upside down
or half way

1/2 credit

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a necklace made of solid silver (Ag) which weighs 19.2 ounces, how many atoms of Ag do you have in your necklace? (16 ounces = 1 pound, 453.6 grams = 1 pound, 6.022×10^{23} = Avogadro's number)

$$\begin{array}{cccc}
 \textcircled{4 \text{ pt}} & \textcircled{2 \text{ pt}} & \textcircled{2 \text{ pt}} & \textcircled{2 \text{ pt}} \\
 19.2 & \times \frac{1 \text{ pound}}{16 \text{ Ag ounces}} & \times \frac{453.6 \text{ g}}{1 \text{ pound}} & \times \frac{1 \text{ mol Ag}}{107.8682 \text{ g}} \\
 \text{ounces} & & & \\
 \text{Ag} & & & \\
 \end{array}$$

$$\begin{array}{c}
 \text{Infinite} \\
 \# \text{ sig.} \\
 \text{fig.}
 \end{array}$$

$$\begin{array}{c}
 \textcircled{2 \text{ pt}} \\
 \times \frac{6.022 \times 10^{23} \text{ atoms Ag}}{1 \text{ mol Ag}} =
 \end{array}$$

$$\begin{array}{c}
 \textcircled{47} \\
 \text{Ag} \\
 107.8682
 \end{array}$$

$$3.04 \times 10^{24} \text{ atoms Ag}$$

$$\textcircled{5 \text{ pt}}$$

attempt -7
 full attempt -9
 upside down or half wrong $\frac{1}{2}$ credit

NA = not attempted

Exam I. General Chemistry I Lecture Spring 2014 1/28/14 Tuesday form 9:55 am A Dr. Hahn Exam # _____

Name Key (print) Name NW = no work (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 = 6.022×10^{23}

no partial credit MC

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) Ag is an example of 1) C
 - A) a compound.
 - C) an element.
 - B) a heterogeneous mixture.
 - D) a homogeneous mixture.

- 2) Which of the following are examples of physical change? 2) E
 - A) salt is dissolved in water
 - B) melt solid gold to liquid gold
 - C) water freezes
 - D) water (solid) to water (liquid)
 - E) All of these are examples of physical change.

- 3) The recommended adult dose of Elixophyllin®, a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 3) D
 - A) 1.5
 - B) 1,521
 - C) 24
 - D) 313
 - E) 3.1×10^5

- 4) Iodine belongs to the _____ group of the periodic table. 4) C
 - A) alkaline earth metal
 - C) halogen
 - B) alkali metal
 - D) noble gas

- 5) What symbol is used to represent the factor 10^3 ? 5) B
 - A) Mega
 - B) kilo
 - C) nano
 - D) micro

- 6) Which of the following contains the MOST atoms? You shouldn't need to do a calculation here. 6) D
 - A) 10.0 g Rb
 - B) 10.0 g Cs
 - C) 10.0 g Ca
 - D) 10.0 g Ne
 - E) 10.0 g Mg

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

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

$^{40}_{18}\text{X}$

 - A) $p^+ = 22$ $n^0 = 18$ $e^- = 18$
 - B) $p^+ = 18$ $n^0 = 18$ $e^- = 22$
 - C) $p^+ = 40$ $n^0 = 22$ $e^- = 18$
 - D) $p^+ = 18$ $n^0 = 22$ $e^- = 40$
 - E) $p^+ = 18$ $n^0 = 22$ $e^- = 18$

9) Which of the following elements is a metal? (to left of metalloid line) 9) D
 A) S B) Kr C) As D) Fe E) Br

10) A substance that can't be chemically broken down into simpler substances is 10) B
 A) a homogeneous mixture.
B) an element.
 C) a heterogeneous mixture.
 D) a compound.
 E) an electron.

11) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 11) D
 A) Dalton's Atomic Theory.
 B) the Scientific Method.
 C) the Law of Definite Proportions.
D) the Law of Conservation of Mass.
 E) the Law of Multiple Proportions.

12) Identify an anion. 12) 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.

#6 need 132g of Cs for 6.022×10^{23} atoms
 need 20.2g of Ne for 6.022×10^{23} atoms
 so element with lowest atomic mass has most # atoms for same mass (Ne)

#3 $115 \text{ lb person} \times \frac{453.59 \text{ g person}}{1 \text{ lb person}} \times \frac{6.00 \text{ mg drug}}{1000 \text{ g person}} = 313 \text{ mg drug}$

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. (42 pts)

1 From the given list, circle all compounds. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)

AgBr Fe Si CH₄ N₂

2. Salt in water is an example of a (homogenous) or (heterogeneous) mixture (circle one) (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

said 0.001 - 1

(a) 1000 Millimeters = one meter

(b) rewrite what you wrote in (a) as 2 possible conversion factors with a numerator and denominator (put the numerator over the line and the denominator under the line)

graded consistent w @

Conversion factor #1 = $\frac{1000\text{mm}}{1\text{m}}$ Conversion factor #2 = $\frac{1\text{m}}{1000\text{mm}}$

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

only graded sig fig

$(300.2 - 1.777) / 1.2 = 248.685833$
 $\frac{300.2}{-1.777} = 298.423 = 298.4$ (4 sig fig)
 $\frac{298.4}{1.2} = 248.685833$ (2 sig fig)
 250 or 2.5×10^2

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

F fluorine copper Cu

bad spelling - 1/2
fluoride - 1

ambiguous
 did not need to show scientific notation

6. Fill in the blank with **one** of the following **letters** which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

(a) or (g)

Periodic Table of the Elements

(f)

gave extra wrong -1

7. For the element Se the Period number is (a) [(4) or (VIA)] (circle one) the Group number is (b) [(4) or (VIA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: Ge has (10 pts, 1 pt each blank)

atomic number 32 (give #) atomic mass 72.61 (give #)
 # protons 32 (give #) # electrons (for neutral atoms) 32 (give #)
 # neutrons 41 (give #). (show work for last part) (1 pt show work)

neutrons = $72.6 - 32 = 40.6$

Ok if said no charge

charge on the element (in its most common ionic state) is +4 or -4 (show work or explain) (1 pt show work)

be in group IV could be +4 (+group #)
 or $4 - 8 = -4$

The molar mass of the element is 72.61 g (give number).

A mole of the element above has 6.022×10^{23} atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 73.4 kiloliter / seconds to cups per hour (1.06 quart = 1 Liter, 4 cups = quart)

$$\begin{array}{l}
 \frac{73.4 \text{ kL}}{\text{sec}} \rightarrow \frac{\text{cups}}{\text{hr}} \\
 \frac{73.4 \text{ kL}}{\text{sec}} \times \frac{1000 \text{ L}}{1 \text{ kL}} \times \frac{1.06 \text{ quart}}{1 \text{ L}} \times \frac{4 \text{ cups}}{1 \text{ quart}} \\
 \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hour}} = 1120377600 \\
 \underline{3 \text{ sig fig}} \quad 1 \text{ pt} \\
 1.12 \times 10^9 \frac{\text{cups}}{\text{hour}}
 \end{array}$$

Handwritten notes: "infinite # sig fig" with arrows pointing to the conversion factors 1.06 and 4 cups/quart. "3pt" is circled next to the 1.06 and 4 cups/quart terms. "2pt" is circled next to the 60 sec/min and 60 min/hr terms. "1pt" is circled next to the final answer.

attempt - 7

bad attempt - 9

upside down or half wrong 1/2 credit

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a piece of pure platinum (Pt) which occupies a volume of 1.73 cups, how many atoms of Pt do you have if the density of Pt is 21.4 g/mL (use density as a conversion factor)? (4 cups = 1 quart, 1.06 quart = 1 Liter, 6.022×10^{23} = Avogadro's number)

$$\begin{aligned}
 & 1.73 \text{ cups Pt} \times \frac{1 \text{ quart Pt}}{4 \text{ cups Pt}} \times \frac{1 \text{ L Pt}}{1.06 \text{ quart Pt}} \times \frac{1000 \text{ mL Pt}}{1 \text{ L Pt}} \\
 & \times \frac{21.4 \text{ g Pt}}{1 \text{ mL Pt}} \times \frac{1 \text{ mol Pt}}{195.078 \text{ g Pt}} \times \frac{6.022 \times 10^{23} \text{ atoms Pt}}{1 \text{ mol Pt}} \\
 & = 2.70 \times 10^{25} \text{ atoms Pt}
 \end{aligned}$$

78
Pt
195.078

↑
Periodic
table

$$195.078 \text{ g} = 1 \text{ mol}$$

$$1 \text{ mol Pt} = 6.022 \times 10^{23} \text{ atoms}$$

attempt - 7

bad attempt - 9

upside down
or half wrong

1/2 credit

orange

Exam I General Chemistry I Lecture Spring 2014 1/28/14 Tuesday form 9:55 am B Dr. Hahn Exam # _____

Name Key (print) Name NA = not attempted (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 = 6.022×10^{23}

NO partial credit in C

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)

NW = NO WORK

- 1) Which of the following contains the MOST atoms? You shouldn't need to do a calculation here. 1) E
A) 10.0 g Mg B) 10.0 g Ca C) 10.0 g Rb D) 10.0 g Cs (E) 10.0 g Ne
- 2) Which of the following elements is a metal? 2) E
A) As B) Kr C) S D) Br (E) Fe
- 3) A substance that can't be chemically broken down into simpler substances is 3) A
(A) an element.
B) a heterogeneous mixture.
C) a homogeneous mixture.
D) a compound.
E) an electron.
- 4) How many significant figures are in 0.00523980 mL? 4) E
A) 7 B) 4 C) 3 D) 5 (E) 6
- 5) Which of the following are examples of physical change? 5) E
A) water freezes
B) water (solid) to water (liquid)
C) salt is dissolved in water
D) melt solid gold to liquid gold
(E) All of these are examples of physical change.
- 6) Iodine belongs to the _____ group of the periodic table. 6) B
A) alkaline earth metal (B) halogen
C) alkali metal D) noble gas
- 7) Determine the number of protons, neutrons and electrons in the following: 7) C
 ${}_{18}^{40}\text{X}$
A) $p^+ = 40$ $n^0 = 22$ $e^- = 18$
B) $p^+ = 22$ $n^0 = 18$ $e^- = 18$
(C) $p^+ = 18$ $n^0 = 22$ $e^- = 18$
D) $p^+ = 18$ $n^0 = 22$ $e^- = 40$
E) $p^+ = 18$ $n^0 = 18$ $e^- = 22$

- 8) Ag is an example of
A) a homogeneous mixture.
C) a heterogeneous mixture.
 B) an element.
D) a compound. 8) B
- 9) What symbol is used to represent the factor 10^3 ?
A) micro B) nano C) Mega D) kilo 9) D
- 10) Identify an anion.
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 neutron and a proton. 10) B
- 11) 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 Definite Proportions.
C) Dalton's Atomic Theory.
D) the Scientific Method.
E) the Law of Multiple Proportions. 11) A
- 12) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 12) A
 A) 313 B) 24 C) 3.1×10^5 D) 1,521 E) 1.5

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. (42 pts)

1 From the given list, circle all elements. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)



2 Salt in water is an example of a [(heterogenous) or (homogenous)] mixture (circle one) (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

(a) 1000 gram = one KiloGram

said
0.001 - 1

(b) rewrite what you wrote in (a) as 2 possible conversion factors with a numerator and denominator (put the numerator over the line and the denominator under the line)

Conversion factor #1 = $\frac{1000 \text{ g}}{1 \text{ kg}}$ Conversion factor #2 = $\frac{1 \text{ kg}}{1000 \text{ g}}$

Graded Consistent w @

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$50.227 / (73.2 - 0.08) = 0.686911925$

$$\begin{array}{r} 73.2 \\ - 0.08 \\ \hline 73.12 \end{array}$$

Sig fig column

$73.12 \rightarrow 73.1 - 3 \text{ sig fig}$

$50.227 \leftarrow 5 \text{ sig fig}$

$73.1 \leftarrow 3 \text{ sig fig}$

Only graded
sig fig
not math
0.687
3 sig fig

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

bad spelling
- 2 pt

o Oxygen silver Ag

did not
need to
show
scientific
notation

6. Fill in the blank with **one** of the following **letters** which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

Periodic Table of the Elements

7. For the element **P** the Period number is (a) [(3) or (VA)] (circle one) the Group number is (b) [(3) or (VA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: **Sr** has (10 pts, 1 pt each blank)

atomic mass 87.62 (give #) atomic number 38 (give #)
 # protons 38 (give #) # electrons (for neutral atoms) 38 (give #)
 # neutrons 50 (give #). (show work for last part) (1 pt show work)

$$87.62 - 38 = 49.62$$

← wrong sign - 1/2

charge on the element (in its most common ionic state) is +2 (show work or explain) (1 pt show work)
 Sr group IIA → (+2)

The molar mass of the element is 87.62g (give number).

A mole of the element above has 6.022×10^{23} atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 27.88 milliLiter / hour to quarts per second (1.06 liter = 1 quart)

$$\begin{aligned}
 & \frac{27.88 \text{ ml}}{\text{hr}} \rightarrow \frac{\# \text{ quart}}{\text{sec}} \quad \leftarrow \text{3 sig fig} \\
 & \frac{27.88 \text{ ml}}{\text{hr}} \times \frac{1 \text{ quart}}{1000 \text{ ml}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ sec}} = 7.31 \times 10^{-6} \frac{\text{quart}}{\text{sec}} \\
 & \text{4 pt} \quad \text{3 pt} \quad \text{3 pt} \quad \text{2 pt} \quad \text{infinite sig fig}
 \end{aligned}$$

attempt -7
 bad attempt -9
 upside down or half wrong -2 credit

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a piece of pure iron (Fe) which occupies a volume of 25.7 gallons, how many atoms of Fe do you have if the density of the Fe is 7.86 g/mL (use density as a conversion factor)? (1.06 liter = 1 quart, 4 quarts = 1 gallon, 6.022×10^{23} = Avogadro's number)

26
Fe
55.845

← periodic table
 $1 \text{ mol Fe} = 55.845 \text{ g Fe}$
 $1 \text{ mol Fe} = 6.022 \times 10^{23} \text{ atoms Fe}$

$$\begin{aligned}
 & 25.7 \text{ gal Fe} \times \frac{4 \text{ quart Fe}}{1 \text{ gal Fe}} \times \frac{1.06 \text{ liter Fe}}{1 \text{ quart Fe}} \times \frac{1000 \text{ mL Fe}}{1 \text{ liter Fe}} \\
 & \times \frac{7.86 \text{ g Fe}}{1 \text{ mL Fe}} \times \frac{1 \text{ mol Fe}}{55.845 \text{ g Fe}} \times \frac{6.022 \times 10^{23} \text{ atoms Fe}}{1 \text{ mol Fe}} \\
 & = 9.24 \times 10^{27} \text{ atoms Fe}
 \end{aligned}$$

attempt -7

bad attempt -9

upside down or half wrong

1/2 credit

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 = 6.022×10^{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) Determine the number of protons, neutrons and electrons in the following: 1) _____



- A) $p^+ = 29$ $n^{\circ} = 36$ $e^- = 36$
B) $p^+ = 29$ $n^{\circ} = 29$ $e^- = 36$
C) $p^+ = 29$ $n^{\circ} = 36$ $e^- = 29$
D) $p^+ = 36$ $n^{\circ} = 29$ $e^- = 36$
E) $p^+ = 36$ $n^{\circ} = 36$ $e^- = 29$

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

3) Two or more substances in variable proportions, where the composition is variable throughout are 3) _____
A) an amorphous solid.
B) a compound.
C) a homogeneous mixture.
D) a solution.
E) a heterogeneous mixture.

4) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 4) _____
A) the Law of Conservation of Mass.
B) the Law of Multiple Proportions.
C) Dalton's Atomic Theory.
D) the Law of Definite Proportions.
E) the Scientific Method.

5) Which of the following elements is a alkali metal? 5) _____
A) N B) Be C) Ce D) K E) Br

6) Which of the following elements is a nonmetal? 6) _____
A) ~~Br~~ ^{Cr} B) Be C) N D) Ce E) K

7) Which of the following contains the FEWEST atoms? You shouldn't need to do a calculation here. 7) _____
A) 10.0 g Na B) 10.0 g Ar C) 10.0 g Cs D) 10.0 g Li E) 10.0 g Kr

- 8) The recommended adult dose of Elixophyllin®, a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 8) _____
A) 24 B) 1.5 C) 1,521 D) 3.1×10^5 E) 313
- 9) The factor 10^{-3} corresponds to which prefix? 9) _____
A) deka B) milli C) centi D) deci
- 10) NO_2 is an example of 10) _____
A) a heterogeneous mixture. B) an element.
C) a compound. D) a homogeneous mixture.
- 11) Identify a cation. 11) _____
A) An atom that has lost an electron.
B) An atom that has gained a neutron.
C) An atom that has lost a proton and a neutron.
D) An atom that has gained an electron.
- 12) Which of the following are examples of physical change? 12) _____
A) salt is dissolved in water
B) water (solid) to water (liquid)
C) water freezes
D) melt solid gold to liquid gold
E) All of these are examples of physical change.

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. (42 pts)

1 From the given list, circle all compounds. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)

F₂ SiO₂ K H₂ AlCl₃

2 Sand in water is an example of a [(homogenous) or (heterogenous)] mixture (circle one). (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

(a) one KiloLiter = _____ L

(b) rewrite what you wrote in (a) as **2 possible conversion factors** with a numerator and denominator (put the numerator over the line and the denominator under the line)

Conversion factor #1 = _____ Conversion factor #2 = _____

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$$(13.21+300.2)*2.6 = 814.866$$

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

K _____ nitrogen _____

6. Fill in the blank with **one** of the following **letters** which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

Periodic Table of the Elements

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

7. For the element **B**

Group number is (a) [(2) or (IIIA)] (circle one)

Period number is (b) [(2) or (IIIA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: **Ca** has (10 pts, 1 pt each blank)

atomic mass _____ (give #) atomic number _____ (give #)

protons _____ (give #) # electrons (for neutral atoms) _____ (give #)

neutrons _____ (give #). (show work for last part) (1 pt show work)

charge on the element (in its most common ionic state) is _____ (show work or explain) (1 pt show work)

The molar mass of the element is _____ (give number).

A mole of the element above has _____ atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 1.72 cups to grams (use density as a conversion factor, density = 1.00 grams / mL) (1.06 liter = quart, 4 cups = 1 quart)

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a block of gold (Au) which weighs 73.5 pounds, how many atoms of gold do you have in your block of gold? (453.6 grams = one pound, 6.022×10^{23} = Avogadro's number)

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 = 6.022×10^{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 cation. 1) _____
A) An atom that has lost a proton and a neutron.
B) An atom that has gained an electron.
C) An atom that has gained a neutron.
D) An atom that has lost an electron.
- 2) Which of the following elements is a alkali metal? 2) _____
A) K B) Ce C) N D) Br E) Be
- 3) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 3) _____
A) the Scientific Method.
B) the Law of Conservation of Mass.
C) the Law of Multiple Proportions.
D) Dalton's Atomic Theory.
E) the Law of Definite Proportions.
- 4) How many significant figures are in the measurement, 463.090 m? 4) _____
A) 6 B) 4 C) 2 D) 5 E) 3
- 5) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 5) _____
A) 24 B) 1.5 C) 313 D) 3.1×10^5 E) 1,521
- 6) NO₂ is an example of 6) _____
A) an element. B) a homogeneous mixture.
C) a heterogeneous mixture. D) a compound.
- 7) Which of the following elements is a nonmetal? 7) _____
A) K B) ~~Br~~ C) Be D) Ce E) N
- 8) Two or more substances in variable proportions, where the composition is variable throughout are 8) _____
A) a homogeneous mixture.
B) a heterogeneous mixture.
C) a solution.
D) a compound.
E) an amorphous solid..

- 9) Which of the following contains the FEWEST atoms? You shouldn't need to do a calculation here. 9) _____
A) 10.0 g Cs B) 10.0 g Li C) 10.0 g Ar D) 10.0 g Na E) 10.0 g Kr
- 10) Which of the following are examples of physical change? 10) _____
A) water (solid) to water (liquid)
B) salt is dissolved in water
C) melt solid gold to liquid gold
D) water freezes
E) All of these are examples of physical change.
- 11) The factor 10^{-3} corresponds to which prefix? 11) _____
A) milli B) deka C) deci D) centi
- 12) Determine the number of protons, neutrons and electrons in the following: 12) _____
 ${}_{29}^{65}\text{X}$
A) $p^+ = 29$ $n^0 = 36$ $e^- = 36$
B) $p^+ = 36$ $n^0 = 29$ $e^- = 36$
C) $p^+ = 36$ $n^0 = 36$ $e^- = 29$
D) $p^+ = 29$ $n^0 = 36$ $e^- = 29$
E) $p^+ = 29$ $n^0 = 29$ $e^- = 36$

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. (42 pts)

1 From the given list, circle elements. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)

F₂ SiO₂ K H₂ AlCl₃

2 Sand in water is an example of a [(heterogenous) or (homogenous)] mixture (circle one). (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

(a) _____ CentiGram = one gram

(b) rewrite what you wrote in (a) as **2 possible conversion factors** with a numerator and denominator (put the numerator over the line and the denominator under the line)

Conversion factor #1 = _____ Conversion factor #2 = _____

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$$467.2 / (240.2 - 1.227) = 1.95503$$

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

Cl _____ sodium _____

6. Fill in the blank with **one** of the following letters which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6.pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

Periodic Table of the Elements

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

7. For the element **Na**

Period number is (a) [(3) or (IA)] (circle one)

Group number is (b) [(3) or (IA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: **As** has (10 pts, 1 pt each blank)

atomic mass _____ (give #)

atomic number _____ (give #)

protons _____ (give #)

electrons (for neutral atoms) _____ (give #)

neutrons _____ (give #). (show work for last part) (1 pt show work)

charge on the element (in its most common ionic state) is _____ (show work or explain) (1 pt show work)

The molar mass of the element is _____ (give number).

A mole of the element above has _____ atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 32.55 pounds to liters (use density as a conversion factor, density = 4.22 grams / mL) (453.2 grams = pound)

-
2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a necklace made of solid silver (Ag) which weighs 19.2 ounces, how many atoms of Ag do you have in your necklace? (16 ounces = 1 pound, 453.6 grams = 1 pound, 6.022×10^{23} = Avogadro's number)

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 = 6.022×10^{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) Ag is an example of _____
A) a compound. B) a heterogeneous mixture.
C) an element. D) a homogeneous mixture.
- 2) Which of the following are examples of physical change? _____
A) salt is dissolved in water
B) melt solid gold to liquid gold
C) water freezes
D) water (solid) to water (liquid)
E) All of these are examples of physical change.
- 3) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. _____
A) 1.5 B) 1,521 C) 24 D) 313 E) 3.1×10^5
- 4) Iodine belongs to the _____ group of the periodic table. _____
A) alkaline earth metal B) alkali metal
C) halogen D) noble gas
- 5) What symbol is used to represent the factor 10^3 ? _____
A) Mega B) kilo C) nano D) micro
- 6) Which of the following contains the MOST atoms? You shouldn't need to do a calculation here. _____
A) 10.0 g Rb B) 10.0 g Cs C) 10.0 g Ca D) 10.0 g Ne E) 10.0 g Mg
- 7) How many significant figures are in 0.00523980 mL? _____
A) 3 B) 4 C) 5 D) 7 E) 6
- 8) Determine the number of protons, neutrons and electrons in the following: _____
 $^{40}_{18}\text{X}$
A) $p^+ = 22$ $n^\circ = 18$ $e^- = 18$
B) $p^+ = 18$ $n^\circ = 18$ $e^- = 22$
C) $p^+ = 40$ $n^\circ = 22$ $e^- = 18$
D) $p^+ = 18$ $n^\circ = 22$ $e^- = 40$
E) $p^+ = 18$ $n^\circ = 22$ $e^- = 18$

- 9) Which of the following elements is a metal? 9) _____
A) S B) Kr C) As D) Fe E) Br
- 10) A substance that can't be chemically broken down into simpler substances is 10) _____
A) a homogeneous mixture.
B) an element.
C) a heterogeneous mixture.
D) a compound.
E) an electron.
- 11) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 11) _____
A) Dalton's Atomic Theory.
B) the Scientific Method.
C) the Law of Definite Proportions.
D) the Law of Conservation of Mass.
E) the Law of Multiple Proportions.
- 12) Identify an anion. 12) _____
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.

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. (42 pts)

1 From the given list, circle all compounds. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)

AgBr Fe Si CH₄ N₂

2. Salt in water is an example of a [(homogenous) or (heterogeneous)] mixture (circle one) (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

(a) _____ MilliMeters = one meter

(b) rewrite what you wrote in (a) as **2 possible conversion factors** with a numerator and denominator (put the numerator over the line and the denominator under the line)

Conversion factor #1 = _____ Conversion factor #2 = _____

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$$(300.2 - 1.777) / 1.2 = 248.685833$$

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

F _____ copper _____

6. Fill in the blank with **one** of the following letters which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

Periodic Table of the Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	H	He										B	C	N	O	F	Ne	
2	Li	Be																
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	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	

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

7. For the element Se the Period number is (a) [(4) or (VIA)] (circle one) the Group number is (b) [(4) or (VIA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: **Ge** has (10 pts, 1 pt each blank)

atomic number _____ (give #)

atomic mass _____ (give #)

protons _____ (give #)

electrons (for neutral atoms) _____ (give #)

neutrons _____ (give #). (show work for last part) (1 pt show work)

charge on the element (in its most common ionic state) is _____ (show work or explain) (1 pt show work)

The molar mass of the element is _____ (give number).

A mole of the element above has _____ atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 73.4 kiloliter / seconds to cups per hour (1.06 quart = 1 Liter, 4 cups = quart)

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a piece of pure platinum (Pt) which occupies a volume of 1.73 cups, how many atoms of Pt do you have if the density of Pt is 21.4 g / mL (use density as a conversion factor)? (4 cups = 1 quart, 1.06 quart = 1 Liter, 6.022×10^{23} = Avogadro's number)

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 = 6.022×10^{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) Which of the following contains the MOST atoms? You shouldn't need to do a calculation here. 1) _____
A) 10.0 g Mg B) 10.0 g Ca C) 10.0 g Rb D) 10.0 g Cs E) 10.0 g Ne
- 2) Which of the following elements is a metal? 2) _____
A) As B) Kr C) S D) Br E) Fe
- 3) A substance that can't be chemically broken down into simpler substances is 3) _____
A) an element.
B) a heterogeneous mixture.
C) a homogeneous mixture.
D) a compound.
E) an electron.
- 4) How many significant figures are in 0.00523980 mL? 4) _____
A) 7 B) 4 C) 3 D) 5 E) 6
- 5) Which of the following are examples of physical change? 5) _____
A) water freezes
B) water (solid) to water (liquid)
C) salt is dissolved in water
D) melt solid gold to liquid gold
E) All of these are examples of physical change.
- 6) Iodine belongs to the _____ group of the periodic table. 6) _____
A) alkaline earth metal B) halogen
C) alkali metal D) noble gas
- 7) Determine the number of protons, neutrons and electrons in the following: 7) _____
 ${}_{18}^{40}\text{X}$
A) $p^+ = 40$ $n^0 = 22$ $e^- = 18$
B) $p^+ = 22$ $n^0 = 18$ $e^- = 18$
C) $p^+ = 18$ $n^0 = 22$ $e^- = 18$
D) $p^+ = 18$ $n^0 = 22$ $e^- = 40$
E) $p^+ = 18$ $n^0 = 18$ $e^- = 22$

- 8) Ag is an example of
A) a homogeneous mixture. B) an element.
C) a heterogeneous mixture. D) a compound. 8) _____
- 9) What symbol is used to represent the factor 10^3 ?
A) micro B) nano C) Mega D) kilo 9) _____
- 10) Identify an anion.
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 neutron and a proton. 10) _____
- 11) 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 Definite Proportions.
C) Dalton's Atomic Theory.
D) the Scientific Method.
E) the Law of Multiple Proportions. 11) _____
- 12) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg / 1000 g of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g. 12) _____
A) 313 B) 24 C) 3.1×10^5 D) 1,521 E) 1.5

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. (42 pts)

1 From the given list, circle all elements. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (5 pts, 1 pts each)

AgBr Fe Si CH₄ N₂

2 Salt in water is an example of a [(heterogenous) or (homogenous)] mixture (circle one) (2 pts)

3 metric conversions (6 pts, 2 pts per blank)

(a) _____ gram = one KiloGram

(b) rewrite what you wrote in (a) as 2 possible conversion factors with a numerator and denominator (put the numerator over the line and the denominator under the line)

Conversion factor #1 = _____ Conversion factor #2 = _____

4 If the number that comes out of your calculator is the following, give the final correct number taking into account the significant figure and rounding up rules. Show work. (3 pts)

$$50.227 / (73.2 - 0.08) = 0.686911925$$

5 For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

O _____ silver _____

6. Fill in the blank with **one** of the following letters which best fits the circled portion of the periodic table. The letters may be used once, many times or not at all: (6 pts total, 3 pts each)

- (a) transition metal elements (b) chalcogen (c) main group element (d) alkali metals
 (e) actinide / lanthanide (f) alkaline earth metals (g) transition metal element (h) halogens

Periodic Table of the Elements

The periodic table shows elements from Hydrogen (H) to Oganesson (Og). A circled region is located in the middle-right part of the table, encompassing elements from Group 13 to Group 18, Periods 4 to 6. The circled elements are: Ga, Ge, As, Se, Br, Kr, Ag, Cd, In, Sn, Sb, Te, I, Xe.

7. For the element **P** the Period number is (a) [(3) or (VA)] (circle one) the Group number is (b) [(3) or (VA)] (circle one) (4 pts, 2 pts each)

8. Complete the following for the element given by consulting the periodic table: **Sr** has (10 pts, 1 pt each blank)

atomic mass _____ (give #) atomic number _____ (give #)

protons _____ (give #) # electrons (for neutral atoms) _____ (give #)

neutrons _____ (give #). (show work for last part) (1 pt show work)

charge on the element (in its most common ionic state) is _____ (show work or explain) (1 pt show work)

The molar mass of the element is _____ (give number).

A mole of the element above has _____ atoms (give number).

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 for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

Convert 27.88 milliliter / hour to quarts per second (1.06 liter = 1 quart)

2. Use the definition of the mole to answer this question. Show work for partial and full credit. If you come up with the final correct numerical answer but show no work, you will lose all points. (17 pts)

If you have a piece of pure iron (Fe) which occupies a volume of 25.7 gallons, how many atoms of Fe do you have if the density of the Fe is 7.86 g/mL (use density as a conversion factor)? (1.06 liter = 1 quart, 4 quarts = 1 gallon, 6.022×10^{23} = Avogadro's number)