Chemistry 120
Rio Hondo College
Spring 2017 Exam 1

Name Key

Exam #1 – 100 points
Directions: Answer each question below to the best of your ability. Show all work where calculations are required. An information sheet with a periodic table is attached to the back of the exam; you may remove it if you wish.

1. (10) Complete the table below by providing a symbol for the given element, or the element for the given symbol.

Symbol	Element Name
O	oxygen
U	uranium
Ar	argon
Rb	rubidium
N	nitrogen
Cr	chromium
Fe	iron
He	helium
Bi	bismuth
Sb	antimony

Element Name	Symbol
Carbon	C
Mercury	Hg
Bromine	Br
Phosphorus	P
Silver	Ag
Calcium	Ca
Sodium	Na
Nickel	Ni
Fluorine	F
Hydrogen	H

2. (4) Label each example below as a physical change (P) or a chemical change (C).
   - C Hydrogen car releases water vapor as exhaust
   - C Gasoline vapor ignites
   - P A broken bone
   - P Spilled gasoline evaporates

3. (10) True or False
   a. T When executing the Scientific Method one would make a series of observations before they propose a reasonable hypothesis
   b. F A nanogram is represented by both 10^9 and 0.000000001
   c. T The '3' in the measured value 76.453 is digit which is said to be uncertain
   d. F Exact numbers should be used in the determination of significant figures
   e. F Density cannot be used to identify an unknown metal

f. F You cannot be precise without being accurate
g. F Amorphous solids are highly ordered arrangements
h. T One of the early atomic models was called the 'plum pudding model'
i. T Filtration cannot be used to separate the components in a homogenous solution
j. F The chemical equation '$CH_4 + H_2O \rightarrow CH_3OH + Cl_2$' is an example of the Law of Conservation of Mass

4. (26) Convert each of the following measurements to the indicated units. Express each answer with the correct units and number of significant figures. Show all units in your work!
   a. 3.55 kg to pounds (lbs)

$$3.55\,kg \times \frac{1000g}{1kg} \times \frac{1lbs}{453.6g} = 7.84279\,lbs$$

7.84 lbs

   b. 13,000 gallons per minute to kiloliters per second

$$\frac{13{,}000\,gal}{min} \times \frac{3.785L}{1gal} \times \frac{1\,KL}{1000L} \times \frac{1min}{60sec} = 0.82008$$

0.82 KL/sec

   c. 9.8 cubic inches (in^3) to cubic decimeters (dm^3)

$$9.8in^3 \times \left(\frac{2.54\,cm}{1in}\right)^3 \times \left(\frac{1m}{100cm}\right)^3 \left(\frac{10\,dm}{1m}\right)^3 = 0.1605932$$

↳ 0.16 dm^3

   d. 2.6×10^{13} seconds to years

$$2.6 \times 10^{13} sec \times \frac{1min}{60sec} \times \frac{1hr}{60min} \times \frac{1day}{24hr} \times \frac{1yr.}{365day}$$

$= 824454.5916$

↳ 8.2×10^5 yrs.

   e. 6345 microliters to picoliters

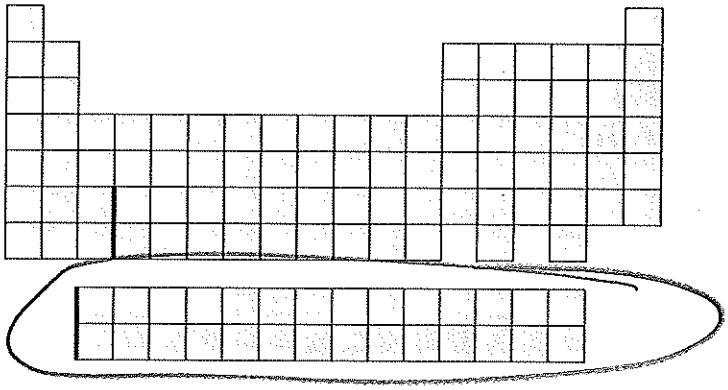
$$6345\mu L \times \frac{1L}{10^6\mu L} \times \frac{10^{12}pL}{1L} =$$

$6.345000 \times 10^9\,pL$

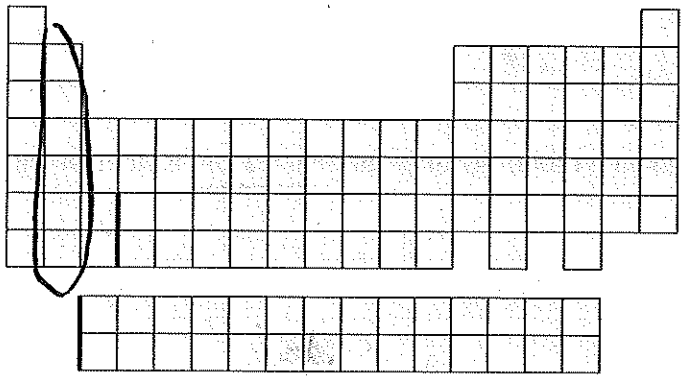
$6.345 \times 10^9\,pL$

5. (9) Using the periodic tables below, identify the group or location that best represents the statement

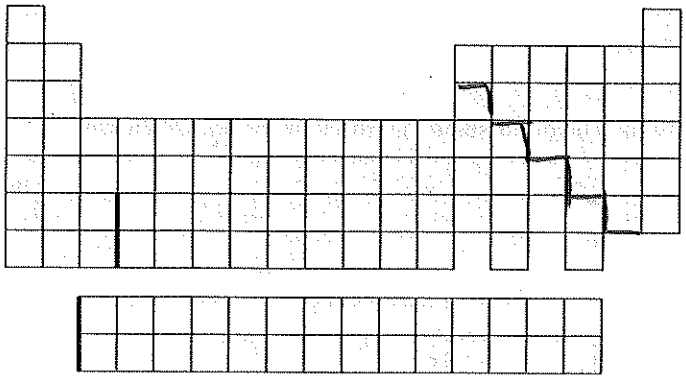
The inner-transition metals



The alkali earth metals



Underline the 'staircase' pattern of the metalloids



6. (6 Extra Credit) During a recent trip to South America, I stumbled across a farmers market that used a unique bartering system. Using the bartering system below, how many mangos can a customer obtain in exchange for 15 guavas?

   3 mangos = 1 lbs of rice
   1 bread fruit = 6 oranges
   1 coconut = 4 lbs of coffee
   3 lbs of coffee = 1 lbs of rice
   2 guavas = 1 oranges
   5 bananas = 1 coconut
   3 bananas = 1 bread fruit
   1 coconut = 4 mangos

$$15\text{guava} \times \frac{1\text{orange}}{2\text{guava}} \times \frac{1\text{breadfruit}}{6\text{oranges}} \times \frac{3\text{banana}}{1\text{breadfruit}} \times \frac{1\text{cocnut}}{5\text{banana}} \times \frac{4\text{mangos}}{1\text{coconut}} = 3\text{mangos}.$$

7. (10) Complete the following table. Assume that each atom is neutral unless otherwise indicated.

Complete Symbol	Number of Protons	Number of Neutrons	Number of Electrons
Se^{2-}	34	45	36
"I"	53	58	54
$^{114}Ba^{2+}$	56	58	54
N^{2-}	7	7	9
For the problem below, assume that this is an ion with 3- charge			
$^{32}P^{-3}$	15	17	18

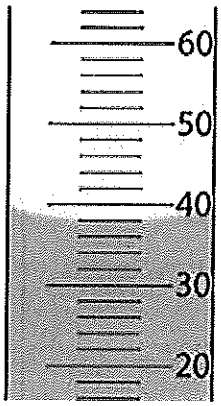
8. (5) A typical backyard swimming pool holds 150 yd^3 of water. What is the mass in pounds of the water?
   Density of water is 1.0 g/mL
   1 meter = 1.094 yd
   1 lb = 453.59 g

$$150\,yd^3 \times \left(\frac{1m}{1.094\,yd}\right)^3 \times \left(\frac{100cm}{1m}\right)^3 \times \frac{1ml}{1cm^3} \times \frac{1.0g}{1ml} \times \frac{1lb}{453.6g}$$

$$= 252560.976\ lbs$$

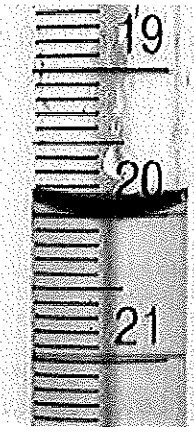
$$\hookrightarrow 2.5 \times 10^5\ lbs.$$

9. (6) Give the correct reading including units for each piece of equipment shown in the figures.



uncertain digit.

Volume reading 38 ml



Volume reading: 20.00 ml

10. (8) Europium has only two naturally occurring isotopes: Eu-151 with a mass of 150.9181 amu and a natural abundance of 47.8%, and Eu-153. Use the atomic mass of europium to find the mass and natural abundance of Eu-153.

	Abun.	AMU
Eu-151	0.478	150.9181
Eu-153	0.522	x

151.96 amu = [(0.478)(150.9181 amu) + (0.522)(x)]

provided in class

x = 152.9140 77 amu

∴ Eu-153 AMU = 152.91

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11. (12) If your front lawn is 18.0 feet wide and 20.0 feet long, and each square foot of lawn accumulates 1450 new snowflakes every minute, how much snow (in ~~kilograms)~~ accumulates on your lawn per hour? Assume an average snowflake has a mass of 1.80 mg.

Per sq ft.

$1450 \text{ snow}/1\text{min}$

$20.0\text{ft} \mid \quad 360\text{ft}^2$

18.0ft

$\therefore 360\text{ft}^2 \times \frac{1450 \text{ snow}/\text{min}}{\text{ft}^2} = 522000 \text{ snowflakes}/\text{min}$

$1\text{hr} \times \frac{60\text{min}}{1\text{hr}} \times \frac{522000 \text{ snowflake}}{\text{min}} \times \frac{1.80\text{mg}}{1\text{snowflake}}$

$\times \frac{1\text{g}}{1000\text{mg}} \times \frac{1\text{kg}}{1000\text{g}}$

$= 56.376\text{ kg}$

$\therefore 56.4\text{ kg}$ of snow