Chemistry 120
Rio Hondo College
Fall 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
Hg	mercury
Br	bromine
P	phosphorus
Ag	silver
Ca	calcium
Na	sodium
He	helium
S	sulfur
C	carbon

Element Name	Symbol
Platinum	Pt
Arsenic	As
Xenon	Xe
Titanium	Ti
Nitrogen	N
Chromium	Cr
Iron	Fe
Nickel	Ni
Barium	Ba
Antimony	Sb

2. (4) Label each example below as a physical change (P) or a chemical change (C).

P Chocolate melting
C Eggs being cooked
P Mixing salt and pepper
C Two substances are mixed and produce heat

3. (10) True or False
   a. F When executing the Scientific Method one would make a series of observations before they propose a reasonable theory
   b. F A "micro" is represented by both 10^{-6} and 1,000,000
   c. F The '5' in the measured value 76.453 is a digit which is said to be uncertain
   d. T Exact numbers should not be used in the determination of significant figures
   e. T Density can be used to identify an unknown metal

f. F You can be accurate without being precise
g. T Crystalline solids are highly ordered arrangements
h. F One of the early atomic models was called the 'Cheerios model'
i. F Gravity filtration can be used to separate the components in a homogenous solution
j. T The chemical equation '$2CH_4 + O_2 \rightarrow 2CH_3OH$' 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. 5.35 lbs to megagrams (Mg)

$$5.35\text{lbs} \times \frac{453.6\text{ g}}{1\text{lb}} \times \frac{1\text{Mg}}{10^6\text{ g}} = 2.431296 \times 10^{-3}\text{ Mg}$$

$$2.43 \times 10^{-3}\text{ Mg}$$

b. 16,000 kiloliters per sec to gallons per hour

$$\frac{16000\text{ kL}}{\text{sec}} \times \frac{1000\text{ L}}{1\text{ kL}} \times \frac{1.057\text{ qt}}{1\text{ L}} \times \frac{1\text{ gal}}{4\text{ qt}} \times \frac{60\text{ sec}}{1\text{ min}} \times \frac{60\text{ min}}{1\text{ hr}}$$

$$1.522\,08 \times 10^{10}\text{ gal/hr}$$

$$1.5 \times 10^{10}\text{ gal/hr}$$

c. 9.8 cubic inches (in^3) to cubic centimeters (cm^3)

$$9.8\text{in}^3 \times \left(\frac{2.54\text{cm}}{1\text{in}}\right)^3 = 160\text{ cm}^3$$

d. 3.6×10^{10} milliseconds to years

$$3.6 \times 10^{10}\text{ msec} \times \frac{1\text{ sec}}{1000\text{ msec}} \times \frac{1\text{ min}}{60\text{ sec}} \times \frac{1\text{ hr}}{60\text{ min}} \times \frac{1\text{ day}}{24\text{ hr}} \times \frac{1\text{ year}}{365\text{ day}}$$

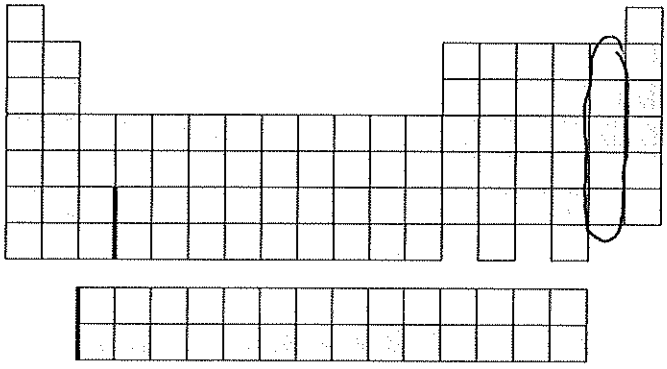
$$= 1.14155\text{ years} = 1.1\text{ years.}$$

e. 6.345×10^{-5} microliters to nanoliters

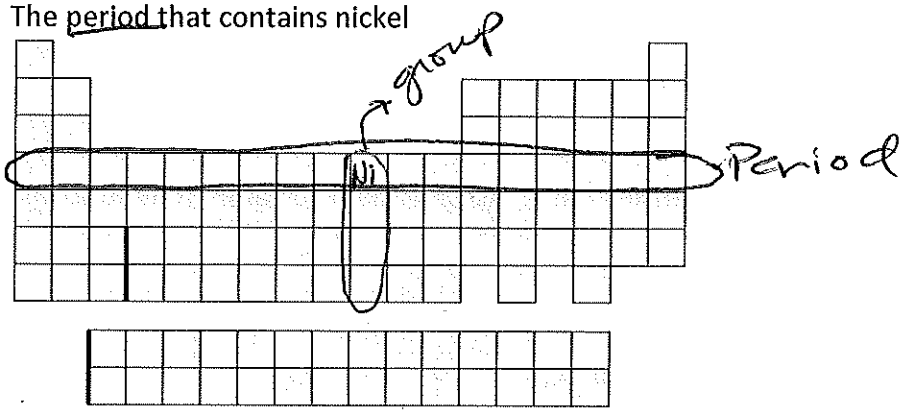
$$6.345 \times 10^{-5}\,\mu\text{L} \times \frac{1\text{ L}}{10^6\,\mu\text{L}} \times \frac{10^9\text{ nL}}{1\text{ L}} = 6.345 \times 10^{-2}\text{ nL}$$

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

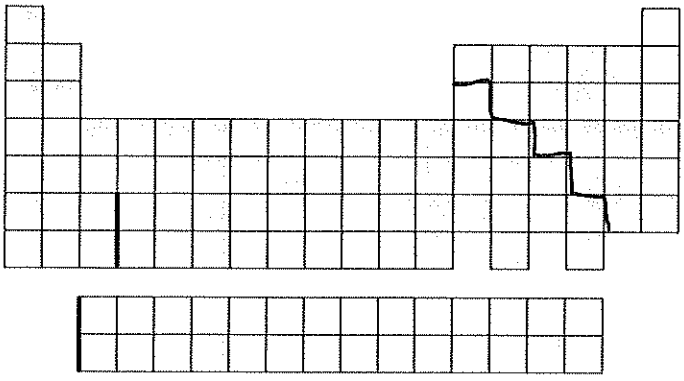
Group 7A (VIIA)



The period that contains nickel



Underline the 'staircase' pattern of the metalloids



6. (6) 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

$$15\text{guava} \times \frac{1\text{orange}}{2\text{guava}} \times \frac{1\text{breadfruit}}{6\text{orange}} \times \frac{3\text{bananas}}{1\text{breadfruit}} \times \frac{1\text{coconut}}{5\text{bananas}} \times \frac{4\text{mango}}{1\text{coconut}}$$

$$= 3\text{mangos}$$

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

Complete Symbol	Number of Protons	Number of Neutrons	Number of Electrons
$^{42}Ca^{2+}$	20	22	18
$^{197}Au^{+}$	79	82	78
$^{156}Ir^{2+}$	77	79	75
$^{17}O^{2-}$	8	9	10
For the problem below, assume that this is an ion with 3- charge			
$^{107}I^{-3}$	53	54	56

8. (5) A backyard swimming pool holds 500 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

$$500\ yd^3 \times \left(\frac{1m}{1.094yd}\right)^3 \times \left(\frac{100cm}{1m}\right)^3 \times \frac{1ml}{1cm^3} \times \frac{1.0g}{1ml} \times \frac{1lb}{453.59g}$$

$$= 8.418864801 \times 10^5\ lb$$

$$8 \times 10^5\ lbs$$

9. (12) Several isotopes of a certain atom "X" exist. 4.35% of all X atoms have a mass of 39.946 amu. 83.79% have a mass of 41.941 amu, 9.50% have a mass of 42.941 amu, and 2.36% have a mass of 43.939 amu. What is the average atomic mass of atom X?

amu	% Ab
39.946	4.35%
41.941	83.79%
42.94	~~2.36%~~ 9.50%
43.939	2.36%

$$[(39.946\text{ amu})(0.0435)] + [(41.941\text{ amu})(0.8379)] + [(42.941\text{amu})(0.095)] + [(43.939)(0.0236)]$$

$= 41.996$ amu

accepting 3 or 5 sig fig.

3 sig fig $= 42.0$ amu

5 sig fig $= 41.996$ amu

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10. (8) Rolls of aluminum foil are 304 mm wide and 0.016 mm thick. What maximum length of aluminum foils can be made from 1.10 kg of aluminum?
    $Density_{Al}$ = 2.70 g/cm3
    $Molecular\ Wt_{Al}$ = 26.98 g/mole
    1000g = 1kg
    1000mm = 1 m
    V_{cube} = lwh

$$304\ mm \times \frac{100\ cm}{1000\ mm} = 30.4\ cm$$

$$0.016\ mm \times \frac{100\ cm}{1000\ mm} = 0.0016\ cm$$

$$1.10\ kg\ Al \times \frac{1000\ g}{1\ kg} \times \frac{1\ cm^3}{2.70\ g} = 407.407\ cm^3\ (vol)$$

$$V_{cube} = lwh$$

$$l = \frac{Vol_{cub}}{wh}$$

$$= \frac{407.407\ cm^3}{(30.4\ cm)(0.0016\ cm)}$$

$$= 8.37597 \times 10^3\ cm$$

$$8.38 \times 10^3\ cm$$