Chemistry 115 Name KEY

Martin Larter

Exam 1 Summer 2015

 Multiple Choice (30 points)

 Page 5 (24 points)

 Page 6 (24 points)

 Page 7 (20 points)

 Page 8 (7 points)

 Total (105 points)

All work must be shown to receive credit. Give all answers to the correct number of significant figures

Grossmont College

Periodic Table

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  IA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | VIIA | NOBLE GASES |
| 1**H**1.008 | IIA |  |  |  |  |  |  |  |  |  |  | IIIA | IVA | VA | VIA | 1**H**1.008 | 2**He**4.002 |
| 3**Li**6.941 | 4**Be**9.012 |  |  |  |  |  |  |  |  |  |  | 5**B**10.81 | 6**C**12.01 | 7**N**14.01 | 8**O**16.00 | 9**F**19.00 | 10**Ne**20.18 |
| 11**Na**23.00 | 12**Mg**24.30 | IIIB | IVB | VB | VIB | VIIB |  VIII VIII VIII | IB | IIB | 13**Al**27.00 | 14**Si**28.09 | 15**P**30.97 | 16**S**32.06 | 17**Cl**35.45 | 18**Ar**39.95 |
| 19**K**39.10 | 20**Ca**40.08 | 21**Sc**44.96 | 22**Ti**47.90 | 23**V**50.94 | 24**Cr**52.00 | 25**Mn**54.94 | 26**Fe**55.85 | 27**Co**58.93 | 28**Ni**58.70 | 29**Cu**63.55 | 30**Zn**65.38 | 31**Ga**69.72 | 32**Ge**72.59 | 33**As**74.92 | 34**Se**78.96 | 35**Br**79.90 | 36**Kr**83.80 |
| 37**Rb**85.47 | 38**Sr**87.62 | 39**Y**88.91 | 40**Zr**91.22 | 41**Nb**92.91 | 42**Mo**95.94 | 43**Tc**(99) | 44**Ru**101.1 | 45**Rh**102.9 | 46**Pd**106.4 | 47**Ag**107.9 | 48**Cd**112.4 | 49**In**114.8 | 50**Sn**118.7 | 51**Sb**121.8 | 52**Te**127.6 | 53**I**126.9 | 54**Xe**131.3 |
| 55**Cs**132.9 | 56**Ba**137.3 | 57**La**138.9 | 72**Hf**178.5 | 73**Ta**180.9 | 74**W**183.9 | 75**Re**186.2 | 76**Os**190.2 | 77**Ir**192.2 | 78**Pt**195.1 | 79**Au**197.0 | 80**Hg**200.6 | 81**Tl**204.4 | 82**Pb**207.2 | 83**Bi**209.0 | 84**Po**(209) | 85**At**(210) | 86**Rn**(222) |
| 87**Fr**(223) | 88**Ra**226.0 | 89**Ac**227.0 | 104**Rf**(261) | 105**Db**(262) | 106**Sg**(263) | 107**Bh**(262) | 108**Hs**(265) | 109**Mt**(266) | 110**??**(269) |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 58**Ce**140.1 | 59**Pr**140.9 | 60**Nd**144.2 | 61**Pm**(147) | 62**Sm**150.4 | 63**Eu**152.0 | 64**Gd**157.3 | 65**Tb**158.9 | 66**Dy**162.5 | 67**Ho**164.9 | 68**Er**167.3 | 69**Tm**168.9 | 70**Yb**173.0 | 71**Lu**175.0 |
| 90**Th**232.0 | 91**Pa**231.0 | 92**U**238.0 | 93**Np**(237) | 94**Pu**(244) | 95**Am**(243) | 96**Cm**(247) | 97**Bk**(247) | 98**Cf**(251) | 99**Es**(252) | 100**Fm**(257) | 101**Md**(258) | 102**No**(259) | 103**Lr**(260) |

Lanthanide series

Actinide series

Part 1 – Multiple Choice (30 points)

1. Measured values are written to the correct number of significant figures
2. To match the significant figures used by your instructor.
3. To demonstrate the precision of the measurement.
4. To keep numbers smaller and easier to work with.
5. For no particular reason.
6. To confuse students.
7. There is more traffic between 8 and 9 in the morning because most people start work at 9. This is an example of

|  |  |  |
| --- | --- | --- |
| 1. An observation.
 | 1. An experiment.
 | 1. A hypothesis.
 |
| 1. A theory.
 | 1. The scientific method.
 |  |

1. A pure substance consists of matter with a composition that
2. Always contains oxygen.
3. Varies according to the amount of water present.
4. Depends on the temperature.
5. Always contains two or more substances.
6. Is fixed in a definite proportion at all times.
7. The specific heat of a substance is
8. The heat level at the melting point.
9. The amount of heat required to change the temperature of 1 g of that substance by 1 °C.
10. The heat held in a 100 g sample of the substance.
11. The heat required to convert 1 g of a solid to a liquid.
12. The energy required to heat the object to its boiling point.
13. Which of the following changes is/are classified as chemical?

|  |  |  |
| --- | --- | --- |
| 1. Dissolving vinegar in water
 | 1. Evaporation of rubbing alcohol
 | 1. Crushing rock
 |
| 1. Fermenting apple juice
 | 1. Softening a glass tube by heating it
 |  |

 a. i only b. iv only c. i and iv d. i and ii e. i, iv, and v

1. According to the law of definite proportions:
2. If the same two elements form two different compounds, they do so in the same ratio.
3. It is not possible for the same two elements to form more than one compound.
4. The total mass after a chemical change is the same as before the change.
5. If the same two elements form two different compounds, they don’t always form in whole number ratios
6. The ratio of the masses of the elements in a compound is always the same.
7. 3.17g of sodium combines with chlorine to form 8.00g of sodium chloride. What is the mass of chlorine in this sample of sodium chloride?

|  |  |  |
| --- | --- | --- |
| 1. 3.17g
 | 1. 8.00g
 | 1. 11.17g
 |
| 1. 6.34g
 | 1. 4.83g
 |  |

1. How many oxygen atoms are in hydroxyapatite, Ca5(PO4)3OH, a major compound in human bones and teeth?

|  |  |  |
| --- | --- | --- |
| 1. 13
 | 1. 5
 | 1. 4
 |
| 1. 3
 | 1. 1
 |  |

1. Arrange the following from largest to smallest: kilogram, decigram, microgram, gram
	1. gram > kilogram > decigram > microgram
	2. kilogram > gram > decigram > microgram
	3. microgram > decigram > gram > kilogram
	4. kilogram > gram > microgram > decigram
	5. gram > decigram > microgram > kilogram
2. Which of the following is an incorrect element classification?
3. Element 11 is an alkali metal.
4. Element 2 is a noble gas.
5. Element 9 is a halogen.
6. Element 14 is a metalloid.
7. Element 22 is an inner transition metal.
8. If a sample of matter is uniform throughout and cannot be separated into other substances by physical processes, but can be decomposed into other substances by chemical processes, it is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a) Compound b) Heterogeneous mixture

 c) Element d) Homogeneous mixture

 e) Both B and D

1. Which of the following observations is evidence for a physical change?
2. adding vinegar to baking soda and producing carbon dioxide
3. smoking tobacco and producing smoke and ash
4. digesting starch and producing glucose sugar
5. grinding sucrose crystals and producing powdered sugar
6. none of the above
7. A \_\_\_\_\_ is highly compressible.

|  |  |  |
| --- | --- | --- |
| 1. plasma
 | 1. solid
 | 1. gas
 |
| 1. liquid
 | 1. all of the above
 |  |

1. The elements on the periodic table are placed in order of increasing

|  |  |  |
| --- | --- | --- |
| * 1. Density
 | * 1. Atomic number
 | * 1. Boiling point
 |
| * 1. Atomic mass
 | * 1. Atomic size
 |  |

1. Which of the following is the correct symbol for iron?

|  |  |  |
| --- | --- | --- |
| * 1. I
 | * 1. I2
 | * 1. Fe
 |
| * 1. FE
 | * 1. None of these
 |  |

Part II- Short answer (75 points)

1. (7 points) Referring to your periodic table, write the **name** of an element that fits each of the following descriptions. Although there may be more than one correct answer, please put only ONE answer in each blank.

|  |  |  |  |
| --- | --- | --- | --- |
|  Lithium | an alkali metal in the second period  | Krypton | a noble gas in the fourth period |
| Iodine | a halogen in the fifth period | Barium | an alkaline earth metal in the 6th period |
| Silicon | a semimetal in the third period | Uranium | an inner transition element |
| Silver | a transition metal in the 5th period |  |  |

1. (3 points) To how many significant digits is each measurement expressed?

 a) 500100 ft\_\_\_4\_\_\_\_ b) 2.0304050 Gm\_\_\_8\_\_\_\_\_ c) 0.000678 kL \_\_\_\_3\_\_\_\_

1. (6 points) Express the following answers in scientific notation with the **correct number of significant figures**:

 $\frac{35.8 x 0.3457 x 15.75}{45.8 x 10^{3}}=0.0042559=4.26 x 10^{-3}$

 $35.89+35.789+16.453=87.132=8.713 x 10^{1} $

 $\frac{\left(72.67-72.63\right) x \left(4.2694\right)}{\left(9.72+0.01\right)}=0.01755=2 x 10^{-2}$

1. The following questions relate to temperature
2. What is the temperature of Figure A in Celsius? \_\_\_61.5 °C \_\_\_\_\_\_\_
3. Convert your answer above to Fahrenheit.

$$℉=\frac{9}{5}℃+32=\frac{9}{5}\left(61.5\right)+32=110.7+32=142.7 ℉≈143 ℉$$

1. Convert your answer to Kelvin.

$$K=℃+273.15=61.5+273.15=334.65 K≈334.7 K$$

1. (18 points) Perform the following unit conversions using **dimensional analysis**
	1. 325 km to cm

$$325 km × \frac{1000 m}{1km} × \frac{100 cm}{1 m }=3.25 ×10^{7}cm$$

* 1. 7.33 x 10-6 feet to nm

$$7.33 ×10^{-6} feet× \frac{12 inch}{1 ft} × \frac{2.54 cm}{1 inch }× \frac{1 m}{100 cm }× \frac{1 ×10^{9} nm}{ 1 m}=2.23 ×10^{3} nm$$

* 1. 8.09 lb/gal to g/cm3 (four quarts in a gallon)

$$\frac{8.09 lb}{1 gal}× \frac{454 g}{1 lb} × \frac{1 gal}{4 qts }× \frac{1 qt}{946 mL }× \frac{1 mL}{ 1 cm^{3}}=\frac{0.971 g }{1 cm^{3}}$$

1. (6 points) A graduated cylinder is filled with 20.0 mL of salt water. A metal cylinder with a mass of 39.483 g is then submerged in the salt water increasing the volume to 34.1 mL.
	1. What is the density of the metal cylinder in g/mL?

$$mass cylinder=39.483 g$$

$$volume cylinder=34.1 mL-20.0 mL=14.1 mL$$

$$density= \frac{mass}{volume}=\frac{39.483 g}{14.1 mL}=2.80 {g}/{mL}$$

* 1. If the density of the salt water is 1.27 g/mL, what is the mass of salt water in the graduated cylinder?

$$?g salt water=20.0 mL×\frac{1.27 g}{1 mL}=25.4 g salt water$$

1. (6 points) A Mexican restaurant has the reputation of serving the hottest salsa in town. In order to maintain this standard, they must have a minimum of 8.41% by mass of cayenne pepper. If the restaurant just received a 3.26 kg shipment of cayenne pepper, how many pounds of salsa can they make

$$?lb salsa=3.26 kg cayenne×\frac{1000 g}{1kg}×\frac{100 g salsa}{8.41 g cayenne}×\frac{1 lb}{454 g}=85.3 lb$$

1. (10 points) A ham sandwich contains 18 g of protein, 47 g of carbohydrate, and 4.5 g of fat. Using the table on the right, determine the number of Calories in that ham sandwich.

|  |  |
| --- | --- |
| protein | 4 kcal |
| Fat | 9 kcal |
| carbohydrate | 4 kcal |

$$4.5 g fat×\frac{9.0 Kcal}{1 g fat}=41 Kcal$$

$$47 g carb×\frac{4.0 Kcal}{1 g carb}=188 Kcal$$

$$18 g protein×\frac{4.0 Kcal}{1 g protein}=72 Kcal$$

Total Calories = $41 Kcal$ +$188 Kcal$ +$72 Kcal$ = $301 Kcal × \frac{1 Cal}{1 Kcal}= 301 Cal$

b. If jumping rope for 1 hour uses up 844 Calories, how many minutes must you jump rope to burn the calories consumed by eating the ham sandwich?

$$?min=301 Cal×\frac{1 hr}{844 Cal}×\frac{60 min}{1 hr}=21.4 min$$

1. (4 points) A mixture of celery, carrots, and broccoli is prepared from 48.2 g of celery, 83.6 g of carrot, and 28.5 g of broccoli. What is the mass percent of carrot in the mixture?

$$total mass veggies=48.2 g celery+86.3 g carrot+28.5 g broccoli=163.0 g$$

$$\% carrot=\left(\frac{86.3 g carrot}{163.0 g veggies}\right)×100=52.1\% carrot$$

1. (4 points) What is the difference between a homogeneous mixture and a heterogeneous mixture?

In a homogeneous mixture all parts of the mixture are the same and have the same composition.

In a heterogeneous mixture, it is possible to see the individual components and each aliquot taken from the mixture may have a different composition

1. (3 points) How is a chemistry calorie (cal) different from a food calorie (Cal)?

A food calorie is equal to a kcal or 1000 chemistry calories.