Chemistry 115 Name key

Dr. Cary Willard

Exam 1b September 15, 2010

 Multiple Choice (30 points)

 Page 3 (18 points)

 Page 4 (14 points)

 Page 5 (20 points)

 Page 6 (23 points)

 Page 7 (15 points)

 Page 8 (16 points)

 Total (136 points)

 Percent (100 %)

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

Avogadros number = 6.022 x 1023 /mol

4 quarts = 1 gallon

36 in = 1 yard

1 mi = 5280 ft

1 ft = 12 in

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. In this list, which substance can be classified as a chemical?
	1. sleep
	2. salt
	3. heat
	4. cold
	5. temperature
2. The first step in the scientific method is \_\_\_\_\_\_\_\_.
	1. making observations
	2. using technology
	3. forming a hypothesis
	4. doing experiments
	5. proposing a theory
3. One way to enhance your learning in chemistry is to \_\_\_\_\_\_\_\_.
	1. study a little every day
	2. form a study group
	3. go to office hours
	4. be an active learner
	5. all the above
4. The amount of space occupied by a substance is its \_\_\_\_\_\_\_\_.
	1. mass
	2. density
	3. weight
	4. volume
	5. length
5. Which of the following numbers is the smallest?
	1. 4.0 × 10-6
	2. 4.0 × 10-8
	3. 4.0 × 10-12
	4. 4.0 × 10-2
	5. 4.0 × 1015
6. Which of the following is the largest unit?
	1. millimeter
	2. micrometer
	3. meter
	4. kilometer
	5. decimeter
7. The cubic centimeter (cm3 or cc) has the same volume as a \_\_\_\_\_\_\_\_.
	1. cubic inch
	2. cubic liter
	3. centimeter
	4. cubic decimeter
	5. milliliter
8. Compounds are pure substances that by definition consist of \_\_\_\_\_\_\_\_.
	1. a single element
	2. oxygen and hydrogen
	3. solids
	4. gases
	5. two or more elements in combination
9. When gold is melted and formed in a mold to make a piece of jewelry, what type of change is taking place?
	1. a chemical change
	2. a change of size
	3. a physical change
	4. evaporation
	5. boiling
10. When you observe the formation of fog on a cool, humid day, what type of event are you observing?
	1. a physical change in water
	2. a chemical change in oxygen
	3. a physical change in air
	4. a chemical change in water
	5. a combination of nitrogen and oxygen
11. The dietary calorie (Cal) is equal to \_\_\_\_\_\_\_\_.
	1. 1 kilocalorie
	2. 1 000 kilocalories
	3. 100 kilocalories
	4. 100 calories
	5. 10 calories
12. According to the Atomic Theory,
	1. all atoms are different.
	2. atoms are created and destroyed during a chemical reaction.
	3. all matter is made up of tiny particles called electrons.
	4. atoms of different element combine to form compounds.
	5. a compound can contain different numbers of atoms as long as it has the same kinds of atoms.
13. The mass number of an atom can be calculated from the \_\_\_\_\_\_\_\_.
	1. number of electrons
	2. number of protons
	3. number of neutrons
	4. number of electrons plus protons
	5. number of protons plus neutrons
14. Protons, neutrons, and electrons are examples of \_\_\_\_\_\_\_\_.
	1. elements
	2. subatomic particles
	3. ions
	4. compounds
	5. metals
15. The smallest particle of an element that retains the characteristics of the element is a(n) \_\_\_\_\_\_\_\_.
	1. electron
	2. neutron
	3. atom
	4. proton
	5. nucleus

Part 2 – 70 points (54)

1. (4 points) Give the length of the stick to the correct number of significant figures.

4.5 cm

1. ( 10 points) Perform the appropriate action on each of the following numbers or calculations
	1. Round 38.4957634 to three significant figures. 38.5
	2. How many significant figures are in 0.000420010? 6
	3. Write the number 389245612 in scientific notation with 4 significant figures.

3.892 x 108

* 1. Perform the following calculations to the correct number of significant figures.

$642.957 cm+542.8 cm= $1185.8 cm

$62.874 g PbO\_{2}×\frac{1 mol PbO\_{2}}{239.1 g PbO\_{2}}×\overset{this is exact}{\overbrace{\frac{2 mol O}{1 mol PbO\_{2}}}}×\frac{16.0 g O}{1 mol O}=$8.41 g O

1. (5 points) In England, a person is weighed in stones. If one stone is 14.0 lb, what is the mass, in kilograms, of a person who weighs 10.9 stones?

$$?kg=10.9 stones×\frac{14.0 lb}{1 stone}×\frac{1 kg}{2.20 lb}=69.4 kg$$

1. (5 points) In a candy factory, the nutty chocolate bars contain 41.0% by mass pecans. If 12.8 kg of pecans were used for candy last Tuesday, how many pounds of nutty chocolate bars were made?

$$?lb ncb=12.8 kg pecans×\frac{100 kg ncb}{41.0 kg pecans}×\frac{2.20 lb ncb}{1 kg ncb}=68.7 lb ncb$$

1. (5 points) A gem has a mass of 8.64 g. When the gem is placed in a graduated cylinder containing 5.00 mL of water, the water level rises to 7.34 mL. What is the density of the gem?

$$volume gem=7.34 mL-5.00 mL=2.34 mL$$

$$density=\frac{mass gem}{volume gem}=\frac{8.64 g}{2.34 mL}={3.69 g}/{mL}$$

1. (5 points) A wooden sculpture has a density of 1.21 g/mL. If the sculpture has a mass of 8.34 kg, what is the volume of the sculpture in gallons? (1 gallon = 4 quarts)

$$?vol=8.34 kg wood×\frac{1000 g }{1 kg }×\frac{1 mL}{1.21 g}×\frac{1 qt}{946 mL}×\frac{1 gal}{4 qt}=1.82 gal$$

1. (5 points) A car travels at 55 miles per hour and gets 13.5 km per liter of gasoline. How many liters of gasoline are needed for a 4.00 hour trip?

$$?gal=4 hr×\frac{55 mi}{1 hr}×\frac{5280 feet}{1 mi}×\frac{12 in}{1 ft}×\frac{2.54 cm}{1 in }×\frac{1 m}{100 cm}×\frac{1 km}{1000 m}×\frac{1 L}{13.5 km}=26.2 L$$

1. (10 points) Classify each of the following substances as an element, a compound, a mixture. (Check the appropriate box for each substance.)

|  |  |  |  |
| --- | --- | --- | --- |
| Substance | Element | Compound | Mixture |
| Helium gas (He) | X |  |  |
| Methane (CH4) in natural gas |  | X |  |
| Ice (H2O) |  | X |  |
| Bronze (an alloy of Cu and Sn) |  |  | X |
| A soft drink |  |  | X |

1. (5 points) A German cookie recipe calls for a cooking temperature of 165oC. What is this temperature in oF?

$$℉=\left(℃×\frac{180℉}{100℃}\right)+32℉=\left(165℃×\frac{180℉}{100℃}\right)+32℉=344℉+32℉=376℉$$

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

1. (5 points) A chocolate chip cookie contains 3.0 g of protein, 32.0 g of carbohydrate, and 12.0 g of fat. Using the table on the right, determine the number of kcal in that chocolate chip cookie. (Ignore significant figures here and calculate value to the nearest kcal.)

$$Cal from protein=3.0 g pro×\frac{4 Cal}{1 g pro}=12 Cal$$

$$Cal from Fat=12.0 g fat×\frac{9 Cal}{1 g fat}=108 Cal$$

$$Cal from Carbs=32.0 g carb×\frac{4 Cal}{1 g carb}=128 Cal$$

Total Cal = 12+108+128=248 Cal or 248 kcal

1. (10 points) Give an example of each of the following:

|  |  |
| --- | --- |
| A noble gas | Neon, Argon, Krypton, Helium, Radon, Xenon |
| A metallic element | Iron, copper |
| A transition metal | Manganese |
| A halogen | Fluorine, Chlorine, Bromine, Iodine |
| An alkaline earth | Calcium, Magnesium, Barium  |

1. (6 points) What are the number of protons, neutrons, and electrons in the following isotope?

$$$$

Protons\_\_\_24\_\_\_\_\_\_\_ Neutrons\_\_\_\_31\_\_\_\_\_ Electrons\_\_\_\_24\_\_\_\_\_\_