Chemistry 115 Name

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Exam 1a 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. heat
	3. cold
	4. salt
	5. temperature
2. The first step in the scientific method is \_\_\_\_\_\_\_\_.
	1. using technology
	2. making observations
	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. volume
	3. density
	4. weight
	5. length
5. Which of the following numbers is the smallest?
	1. 4.0 × 10-12
	2. 4.0 × 10-6
	3. 4.0 × 10-8
	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. decimeter
	5. kilometer
7. The cubic centimeter (cm3 or cc) has the same volume as a \_\_\_\_\_\_\_\_.
	1. cubic inch
	2. cubic liter
	3. milliliter
	4. centimeter
	5. cubic decimeter
8. Compounds are pure substances that by definition consist of \_\_\_\_\_\_\_\_.
	1. a single element
	2. oxygen and hydrogen
	3. solids
	4. two or more elements in combination
	5. gases
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 physical change
	2. a chemical change
	3. a change of size
	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 chemical change in oxygen
	2. a physical change in air
	3. a physical change in water
	4. a chemical change in water
	5. a combination of nitrogen and oxygen
11. The dietary calorie (Cal) is equal to \_\_\_\_\_\_\_\_.
	1. 1 000 kilocalories
	2. 100 kilocalories
	3. 100 calories
	4. 10 calories
	5. 1 kilocalorie
12. According to the Atomic Theory,
	1. all atoms are different.
	2. atoms are created and destroyed during a chemical reaction.
	3. atoms of different element combine to form compounds.
	4. all matter is made up of tiny particles called electrons.
	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 plus neutrons
	3. number of protons
	4. number of electrons plus protons
	5. number of neutrons
14. Protons, neutrons, and electrons are examples of \_\_\_\_\_\_\_\_.
	1. elements
	2. ions
	3. compounds
	4. subatomic particles
	5. metals
15. The smallest particle of an element that retains the characteristics of the element is a(n) \_\_\_\_\_\_\_\_.
	1. electron
	2. neutron
	3. proton
	4. atom
	5. nucleus

Part 2 – 70 points (54)

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

3.0 cm

1. ( 10 points) Perform the appropriate action on each of the following numbers or calculations
	1. Round 93.592299 to three significant figures. 93.6
	2. How many significant figures are in 0.00042010? 5
	3. Write the number 29508132502 in scientific notation with 4 significant figures.

2.951 x 1010

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

$432.811 cm+729.3 cm= $1162.1 cm

$35.342 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}=$4.73 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 12.4 stones?

$$?kg=12.4 stones×\frac{14.0 lb}{1 stone}×\frac{1 kg}{2.20 lb}=78.9 kg$$

1. (5 points) In a candy factory, the nutty chocolate bars contain 32.0% by mass pecans. If 12.8 kg of pecans were used for candy last Tuesday, how many pounds of nutty chocolate bars were made?

$$?lb ncb=12.8 kg pecans×\frac{100 kg ncb}{32.0 kg pecans}×\frac{2.20 lb ncb}{1 kg ncb}=88.0 lb ncb$$

1. (5 points) A gem has a mass of 5.62 g. When the gem is placed in a graduated cylinder containing 5.00 mL of water, the water level rises to 6.34 mL. What is the density of the gem?

$$volume gem=6.34 mL-5.00 mL=1.34 mL$$

$$density=\frac{mass gem}{volume gem}=\frac{5.62 g}{1.34 mL}={4.19 g}/{mL}$$

1. (5 points) A wooden sculpture has a density of 1.21 g/mL. If the sculpture has a mass of 6.47 kg, what is the volume of the sculpture in gallons? (1 gallon = 4 quarts)

$$?vol=6.47 kg wood×\frac{1000 g }{1 kg }×\frac{1 mL}{1.21 g}×\frac{1 qt}{946 mL}×\frac{1 gal}{4 qt}=1.41 gal$$

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 6.00 hour trip?

$$?gal=6 hr×\frac{55 mi}{1 hr}×\frac{5280 feet}{1 mi}×\frac{12 in}{1 ft}×\frac{2.54 cm}{1 in }×\frac{1 m}{100 cm}×\frac{1 km}{1000 m}×\frac{1 L}{13.5 km}=39.3 L$$

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

1. (5 points) A German cookie recipe calls for a cooking temperature of 145oC. What is this temperature in oF?

$$℉=\left(℃×\frac{180℉}{100℃}\right)+32℉=\left(145℃×\frac{180℉}{100℃}\right)+32℉=261℉+32℉=293℉$$

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

1. (5 points) A chocolate chip cookie contains 2.0 g of protein, 30.0 g of carbohydrate, and 10.0 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.)

$$Cal from protein=2.0 g pro×\frac{4 Cal}{1 g pro}=8 Cal$$

$$Cal from Fat=10.0 g fat×\frac{9 Cal}{1 g fat}=90 Cal$$

$$Cal from Carbs=30.0 g carb×\frac{4 Cal}{1 g carb}=120 Cal$$

Total Cal = 8+90+120=210 Cal or 210 kcal

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

|  |  |
| --- | --- |
| * 1. A metallic element
 | Iron, copper |
| * 1. A transition metal
 | Manganese |
| * 1. A halogen
 | Fluorine, Chlorine, Bromine, Iodine |
| * 1. A noble gas
 | Neon, Argon, Krypton, Helium, Radon, Xenon |
| * 1. An alkaline earth
 | Calcium, Magnesium, Barium  |

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

$$$$

Protons\_\_\_13\_\_\_\_\_\_\_ Neutrons\_\_\_\_14\_\_\_\_\_ Electrons\_\_\_\_13\_\_\_\_\_\_