

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

**Fall Semester Final Review 2016****Conversions****Show ALL work and round answers appropriately.**

- 1 How many grams are in 5.49 kg?
- 2 Convert .76 miles to cm. Write your answer in scientific notation. (1 mile = 1.61 km)
- 3 Convert 1.54 kg to mg. Write your answer in scientific notation.
- 4 Convert  $0.013 \text{ m}^3$  to L. (Hint: how many  $\text{cm}^3$  are in 1 mL?)
- 5 How many cubic feet are in 8.9 cubic cm? ( $1 \text{ ft}^3 = 0.028 \text{ m}^3$ )
- 6 Convert 1257cL to L.
- 7 How many quarters will you need to have \$25.75?
- 8 Convert 55km to mm. Write your answer in scientific notation.
- 9 Convert 250Gg into kg. Write your answer in scientific notation.
- 10 How many milliseconds are in a leap year? Write your answer in scientific notation. (Hint: A leap year has 366 days.)

- 11 The speed of light is  $3.0 \times 10^8$  m/s. Convert this value into miles per hour. Write your answer in scientific notation.
- 12 The lowest possible temperature is 0 Kelvin, also known as absolute zero. Express this temperature in °F. (Hint: this is a two step process)
- 13 Calculate each of the following and round your answer appropriately.
- a.  $6.52 + 57.3 - 86.259$  \_\_\_\_\_
- b.  $0.00256 \times 0.0810$  \_\_\_\_\_
- 14 What is the difference between mass and weight?

**Period Table**

- 15 What is an isotope? What are the isotopes of Hydrogen?
- 16 Xenon is generally un-reactive. How is its low reactivity related to its position in the periodic table?
- 17 Name an element that has similar chemical properties to that of Potassium.
- 18 Name 2 halogens.
- 19 I am a good conductor of electricity. I am in group 11 on the periodic table. I have a grayish luster. What am I?

20. Complete the following table:

<i>Hyphen Notation</i>	<b>Symbol Notation</b>	<b>Atomic #</b>	<b>Mass #</b>	<b># of protons</b>	<b># of neutrons</b>	<b># of electrons</b>
Sodium-23						
Calcium-40						
		14	28			
	$^{56}_{26}\text{Fe}$					
					82	56

21. Complete the following table :

Scientist	Experiment	Contribution
John Dalton		
JJ Thompson		
Ernest Rutherford		
Niels Bohr		

### Moles

22. How many moles of oxygen make up 2,500,000 atoms of oxygen?

23. What is the mass, in grams, of  $5.0 \times 10^9$  atoms of neon?

24. What mass of silver, Ag, contains the same number of atoms as 10.0 g of Boron, B?

25. How many neutrons are present in 8.75 mol of Uranium-223?

### Properties and Changes

For each of the following, choose whether it is a PHYSICAL (P) or CHEMICAL (C) property.

26. \_\_\_\_\_ Bromine exists as a liquid at room temperature.
27. \_\_\_\_\_ Zinc reacts with hydrochloric acid to produce zinc chloride and hydrogen gas.
28. \_\_\_\_\_ Iron will combine chemically with oxygen to produce rust.
29. \_\_\_\_\_ Nitrogen and oxygen are clear, colorless, odorless gases.
30. \_\_\_\_\_ Water has a density that is exactly 1 g /mL.

State whether each of the following changes is PHYSICAL (P) or CHEMICAL (C), and **explain** why.

31. \_\_\_\_\_ An orange liquid mixture of salt crystals dissolved in water is boiling. The water evaporates and leaves behind orange crystal.
32. \_\_\_\_\_ Bread bakes in the oven.
33. \_\_\_\_\_ Steel is melted and then cooled into new shapes to use as parts for cars.
34. \_\_\_\_\_ Water is decomposed into its elements, oxygen and hydrogen, by running an electric current through water.
35. \_\_\_\_\_ An antacid tablet fizzes and releases carbon dioxide gas when it comes in contact with hydrochloric acid in the stomach.
36. \_\_\_\_\_ A bottle of wine left open turns to vinegar.
37. \_\_\_\_\_ Dry ice "evaporates" without melting.

### States of Matter

38. Which state of matter is most compressible? Why?
39. Which state of matter is present in stars and fluorescent lights?
40. Consider three 25g samples of water: one is ice, one is liquid, and one exists as vapor.
  - a. In which state of matter will water occupy the most volume?
  - b. In which state of matter will water occupy the least volume?
  - c. In which state of matter will the strength of the forces between the water molecules be the greatest?

### Electromagnetic Spectrum

41. What is the frequency of light that has a  $\lambda = 9.04 \times 10^{-4} \text{ cm}$ ?
42. Determine the energy of a photon described in the previous problem.
43. How long will it take a radio wave with frequency of  $7.25 \times 10^5 \text{ Hz}$  to travel from Mars to Earth, a distance of  $8.00 \times 10^7 \text{ km}$ ?

44. Assume that an atom has a total of five possible energy levels and that an electron can "jump" up or down between any of these energy levels. Draw a model of these energy levels and use it to predict the maximum number of spectral lines in the emission spectrum.

45. An emitted photon has an energy of  $4.9695 \times 10^{-19}$  J.

a. What is the frequency of this light?

b. What is its wavelength?

c. What is the color of the emitted light? (Find it on an electromagnetic spectrum)

### Electron Configuration

46. What is the value of "x" for an alkali metal with the electron configuration  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^x$ . What is the identity of this element?

47. Write the noble gas notation for Barium.

48. Write the electron configuration for Yttrium.

49. Write the orbital notation for Silver.

50. How many valence electrons does each of the following families of elements have?

a. Alkaline Earth Metals \_\_\_\_\_

c. Alkali Metals \_\_\_\_\_

b. Halogens \_\_\_\_\_

d. Noble Gases (except He) \_\_\_\_\_

### Periodic Trends

51. Name the alkali metal with the greatest ionization energy.

52. Of the elements that have 4 valence electrons, which has the smallest atomic radius?

53. Which has a larger radius, Al or  $Al^{+3}$ ?
54. Name the halogen with the greatest electronegativity.
55. The electrons available to be gained, lost, or shared in the formation of chemical compounds are called \_\_\_\_\_.
56. The energy required to remove an electron from an atom is called its \_\_\_\_\_, and is measured in units of \_\_\_\_\_.
57. The measure of the ability of an atom in a chemical compound to attract electrons is called \_\_\_\_\_.
58. An atom that has a + charge is called a(n) \_\_\_\_\_ while an atom with a - charge is called a(n) \_\_\_\_\_.
59. One-half the distance between the nuclei of identical atoms that are bonded together is the \_\_\_\_\_.

#### True or False - Mixed review

Mark each of the following statements true (T) or false (F). *If the statement is false, correct the underlined portion of the statement to make it true.*

60. \_\_\_\_\_ Energy and wavelength are directly proportional values.
61. \_\_\_\_\_ Hertz is a unit of measurement for wavelength.
62. \_\_\_\_\_ Atoms in the ground state emit photons.
63. \_\_\_\_\_ UV rays travel at a greater speed than infrared waves.
64. \_\_\_\_\_ White is the absence of color.
65. \_\_\_\_\_ Orange light has a greater frequency than red light.
66. \_\_\_\_\_ The d sublevel has 5 orbitals.
67. \_\_\_\_\_ Hund's rule states that no two electrons can have the same set of quantum numbers.
68. \_\_\_\_\_ Two electrons that occupy the same orbital have opposite spins.
69. \_\_\_\_\_ Electrons will fill the 3d orbital before they occupy the 4s orbital.
70. \_\_\_\_\_ It is possible to simultaneously determine both the position and the velocity of an electron.
71. \_\_\_\_\_ All atoms of the same element have the same atomic number.
72. \_\_\_\_\_ Hydrogen has 3 isotopes.
73. \_\_\_\_\_ The electron is the subatomic particle with the greatest mass.
74. \_\_\_\_\_ Avogadro's number describes the amount of particles in 1 mole.
75. \_\_\_\_\_ Rutherford's gold foil experiment proved the presence of a nucleus.
76. \_\_\_\_\_ The atomic mass is the mass of the most common isotope of a particular element.

77. Mendeleev created his periodic table by grouping elements with similar \_\_\_\_\_ together.
- Properties
  - Atomic mass
  - Atomic numbers
  - Densities
78. Within the p-block element group, the elements at the top \_\_\_\_\_ than those at the bottom.
- Have a greater atomic mass
  - Are more metallic
  - Have lower ionization energies
  - Have smaller radii
79. Within a period of elements, as the atomic number increases, the atomic radius \_\_\_\_\_.
- Generally increases
  - Generally decreases
  - Remains constant
  - Spiteri is a nerd
80. The most characteristic property of the noble gases is that they are \_\_\_\_\_.
- Metallic
  - Radioactive
  - Largely unreactive
  - Unhappy
81. The first ionization energy for an atom is \_\_\_\_\_ the second ionization energy.
- Greater than
  - Less than
  - Equal to
  - I like ice cream
82. The current periodic table arranges elements by increasing \_\_\_\_\_.
- Atomic mass
  - Atomic number
  - Atomic radius
  - Ionization Energy

### Compounds

83. The explosive TNT has the molecular formula  $C_7H_5(NO_2)_3$ .
- How many different elements make up this compound? \_\_\_\_\_
  - How many oxygen atoms are present in one molecule of TNT? \_\_\_\_\_
  - How many atoms total are present in one molecule of TNT? \_\_\_\_\_
84. Write the names for the following ions

$Zn^{+2}$  \_\_\_\_\_

$N^{-3}$  \_\_\_\_\_

$Na^{+}$  \_\_\_\_\_

$O^{-2}$  \_\_\_\_\_

$NO_2^{-}$  \_\_\_\_\_

$Cu^{+1}$  \_\_\_\_\_

$Fe^{+3}$  \_\_\_\_\_

$SO_4^{-2}$  \_\_\_\_\_

a.

**Nuclear Chemistry**

77. Write the nuclear symbol charge for each of the following:

Particle	Symbol	Charge
Alpha Particle		
Beta Particle		
Positron		
Electron		

78. In the reaction  ${}_4\text{Be}^9 + X \rightarrow {}_6\text{C}^{12} + {}_0\text{n}^1$ , the X represents \_\_\_\_\_.

- a. an alpha particle
- b. a beta particle
- c. an electron
- d. a positron

79. Control rods in nuclear reactors are commonly made of boron and cadmium because these two elements have the ability to \_\_\_\_\_.

- a. absorb neutrons
- b. emit neutrons
- c. decrease the speed of neutrons
- d. increase the speed of neutrons

80. Write the nuclear symbol for a neon isotope that has 12 neutrons.

81. Which type of particle has the most penetrating ability: alpha, beta, or gamma particles?

82. Explain how nuclear fusion is one of our sources of energy on Earth. How is nuclear fission a source of energy?

83. How many neutrons are contained in each of the following isotopes?

Isotope	# of neutrons
Carbon - 14	
Tin-134	
Hydrogen - 3	



84. Complete the following nuclear equations by filling the blank with the missing particle. Then classify each type of nuclear reaction.

<u>Equation</u>	<u>Type of Reaction</u>
a. ${}_{86}\text{Rn}^{210} \rightarrow {}_2\text{He}^4 + \underline{\hspace{2cm}}$	<hr/>
b. ${}_{53}\text{I}^{131} \rightarrow {}_{54}\text{Xe}^{131} + \underline{\hspace{2cm}}$	<hr/>
c. ${}_{57}\text{La}^{137} + {}_{-1}\text{e}^0 \rightarrow \underline{\hspace{2cm}}$	<hr/>
d. ${}_{19}\text{K}^{38} \rightarrow {}_{18}\text{Ar}^{38} + \underline{\hspace{2cm}}$	<hr/>

85. Which of the following is the most stable isotope: Carbon-12, Carbon-13, or Carbon-14? Explain why.

86. Silicon-31 has a half-life of approximately 2.5 hours. If we begin with a sample containing 1000 mg of Silicon-31, what is the approximate amount remaining after 10 hours?

87. Technetium-99 is used as a radiographic agent in bone scans. A patient must wait until 15/16 of the radioactive isotope decays before he/she is allowed to leave the doctor's office. If  ${}_{43}\text{Tc}^{99}$  has a half-life of 6.0 hours, how many days must a patient wait before leaving the doctor's office after a bone scan?

88. You are an endocrinologist (a doctor that studies human hormones), and a patient comes into your office who is overweight and lethargic. You predict that an underactive thyroid gland is the source of the problem. You decide to use a radioactive isotope to help determine whether your prediction is correct. Which radioactive element should you choose to help you diagnose the problem and why?

