

# Semester 1 Final Exam Review

Name: \_\_\_\_\_ Per: \_\_\_\_\_

## Unit 1: Intro to Chemistry and Measurements in Chemistry

1. Define hypothesis.

2. What is the difference between an observation and a conclusion?

3. What are the 6 metric prefixes you are supposed to know and what do they mean?

4. a) What are units of length?

b) What are units of mass?

c) What are units of volume?

d) What are units of temperature?

5. Metric conversions:

a) 10.0 mm = \_\_\_\_\_ m

d) 1.22 km = \_\_\_\_\_ m

b) 20. hm = \_\_\_\_\_ cm

e) 63.5 mm = \_\_\_\_\_ dam

c) 50. cm = \_\_\_\_\_ dm

f) 25 mL = \_\_\_\_\_ cm<sup>3</sup>

6. How can you find the number of significant figures after adding or subtracting?

7. How can you find the number of significant figures after multiplying or dividing?

8. How many certain digits are in the following number? 72.24 inches \_\_\_\_\_

9. How many significant digits are in the following?

a) 0.20030 \_\_\_\_\_

b) 100.0 \_\_\_\_\_

c) 220 \_\_\_\_\_

d) 0.00057 \_\_\_\_\_

e) The answer to  $0.002 \times 1.200$  \_\_\_\_\_

f) The answer to  $4.6 + 0.3502$  \_\_\_\_\_

10. Answer the following in scientific notation and significant digits:

a)  $1.2 \times 10^3 \times 3.994 \times 10^5 =$  \_\_\_\_\_

c)  $4.36 \times 10^{-3} + 2.5 \times 10^{-5} =$  \_\_\_\_\_

b)  $3.98 \times 10^4 / 7.21 \times 10^6 =$  \_\_\_\_\_

d)  $3.98 \times 10^7 - 3.994 \times 10^5 =$  \_\_\_\_\_

11. What is the formula for percent error?

12. In the lab you experimentally determine a mass to be 165 g. The theoretical value is 132 g. What is the % error?

13. What is the formula for density?

14. What is the density of a metal that has a mass of 145 g and a volume of 32 cm<sup>3</sup>?

15. Determine which of the following is a pure substance or a mixture:

a) air \_\_\_\_\_ c) iron \_\_\_\_\_ e) brass \_\_\_\_\_

b) salt \_\_\_\_\_ d) soda \_\_\_\_\_ f) milk \_\_\_\_\_

16. What is a physical property/change?

17. What is a chemical property/change?

18. Determine which of the following is a physical property/change or a chemical property/change:

a) Length \_\_\_\_\_ d) density \_\_\_\_\_ g) temperature \_\_\_\_\_

b) burning \_\_\_\_\_ e) rusting \_\_\_\_\_ h) texture \_\_\_\_\_

c) melting \_\_\_\_\_ f) dissolving \_\_\_\_\_ i) digesting \_\_\_\_\_

## Unit 2: Atomic Structure

19. What are the 3 parts of an atom and their respective charges?

20. Where is most of the mass of the atom found? Where is the majority of the space of the atom found?

21. Fill out the following chart.

Symbol	Protons	Neutrons	Electrons	Charge
	4	5		0
	47	61		0
<sup>201</sup> <sub>80</sub> Hg				
	16	17		-2
	13	15		+3
		47	35	-1
<sup>60</sup> <sub>28</sub> Ni				
<sup>80</sup> <sub>34</sub> Se <sup>-2</sup>				
<sup>16</sup> <sub>8</sub> O <sup>-2</sup>				

22. What is an isotope?

23. What is an ion?

24. What is the law of conservation of mass?



### Unit 3: Nuclear Chemistry

38. (a) List the types of nuclear radiation in order of increasing ionizing ability. \_\_\_\_\_
- (b) List the types nuclear radiation in order of increasing penetrating power. \_\_\_\_\_
39. How is fission different than fusion?
40. Which produces more energy than the other, fission or fusion? \_\_\_\_\_ Where does fusion occur? \_\_\_\_\_
41. Write the equation for a beta decay for radium-228.
42. What the equation for an alpha decay of iodine-130.
43. Zn-65 has a half life of 365 days. How much remains after 3 years if you started with 100. grams?

### Unit 4: Periodic Table

44. What is a period?
45. What is a group?
46. What is a family?
47. Name the 10 various areas of the periodic table. (Make sure you can identify them!)
48. What is ionization energy?
49. What is the major trend among the elements of the periodic table for ionization energy?
50. What is the major trend among the elements of the periodic table for metallic character?
51. What does it mean if an element has metallic character?
52. What is the major trend among the elements of the periodic table for non-metallic character?

53. What is electronegativity?

54. What is the major trend among the elements of the periodic table for electronegativity?

55. What is the major trend among the elements of the periodic table for atomic radius?

56. Order the following elements according to: Ba, Ge, O, Rh, S, Ta

a) increasing atomic radii \_\_\_\_\_

b) increasing ionization energy \_\_\_\_\_

c) decreasing metallic character \_\_\_\_\_

d) decreasing electronegativity \_\_\_\_\_

57. How can you predict the probable oxidation number of an element based on periodic table placement?

58. How can you predict properties of elements based in their placement on the periodic table?

59. What is the predicted oxidation number of Al \_\_\_\_\_ Sr \_\_\_\_\_ Br \_\_\_\_\_ Li \_\_\_\_\_

### Unit 5: Nomenclature and Bonding

60. Name the following compounds:

Write the formula for the following:

a)  $\text{FeCO}_3$  \_\_\_\_\_

f) lithium phosphate \_\_\_\_\_

b)  $\text{ZnCl}_2$  \_\_\_\_\_

g) copper I chromate \_\_\_\_\_

c)  $\text{Cr}_2\text{O}_3$  \_\_\_\_\_

h) barium sulfide \_\_\_\_\_

d)  $\text{NH}_4\text{OH}$  \_\_\_\_\_

i) disulfur pentoxide \_\_\_\_\_

e)  $\text{CCl}_4$  \_\_\_\_\_

j) cobalt III ion \_\_\_\_\_

61. What are the diatomic elements? Write them in their proper form when they are alone.

62. What is a covalent bond and how is it formed?

63. What is the difference between a covalent bond and a polar covalent bond?

64. What is an ionic bond and how is it formed?

65. What are some characteristics of ionic compounds?

66. What are some characteristics of covalent compounds?

67. Draw the Lewis dot structure for the following:

a)  $\text{CCl}_4$

b)  $\text{SO}_4^{2-}$

c)  $\text{SO}_2$

68. Without using anything besides a periodic table, would you expect a bond between H and O to be polar? Why or why not?

69. Without using anything besides a periodic table, would you expect a bond between S and F to be polar? Why or why not?

### Unit 6: Chemical Composition- The Mole

70. Determine the molar mass (formula weight) of the following. Include proper units:

a)  $\text{FeCO}_3$  \_\_\_\_\_ b)  $\text{NH}_4\text{OH}$  \_\_\_\_\_ c)  $\text{Fe}_3(\text{PO}_4)_2$  \_\_\_\_\_

71. One molecule of water has an atomic mass of \_\_\_\_\_ amu therefore one mole of water has a mass of \_\_\_\_\_ grams and contains \_\_\_\_\_ molecules.

72. Be able to do mole conversions. Show all work, box your final answer.

a) How many grams are in 0.125 moles of water?

b) How many moles are in 12.5 grams of  $\text{FeCO}_3$ ?

c) How many molecules are in 1.82 moles of  $\text{Cr}_2\text{O}_3$ ?

d) How many grams are in  $4.36 \times 10^{25}$  molecules of  $\text{ZnCl}_2$ ?

73. Find the percent composition by mass of each element in  $\text{NH}_4\text{OH}$ .

74. What is the empirical formula of  $\text{C}_6\text{H}_{12}\text{O}_6$ ? \_\_\_\_\_

75. Find the empirical formula of a compound that is composed of 4.2 g of C, 0.40 g of H, and 0.70 g of N.

76. If the molecular mass of the above compound is 212 grams, what is the molecular formula of the compound?

### Unit 7: Chemical Equations

77. What are the 5 types of reactions called?

78. Identify the type of reaction, predict the products, and balance the following reactions:

