

Honors Chemistry Mid-Term Review Sheet

****You must complete the entire review sheet to receive credit, and you must answer the questions on your own paper. Do not put your answers on this sheet! You do not need to write the questions, but you must SHOW YOUR WORK for any math problem.**

Chapter 1

1. Define Chemistry.
2. List and define the 5 areas of Chemistry.
3. What are the 5 steps of the scientific method (IN ORDER)?
4. Define independent variable, dependent variable, and control.
5. A student conducts an experiment to determine the effect on the boiling point when salt is added to water. Use the results shown below to determine the independent variable, the dependent variable, and the control.

Sample	Amount of Salt	Boiling Temperature
Sample 1	0 g	100.0°C
Sample 2	2 g	102.3°C
Sample 3	5 g	104.8°C
Sample 4	10 g	107.5°C

Chapter 2

6. Define the following: mass, volume, and matter.
7. Define pure substance. What are the two categories of pure substances?
8. What is a compound? List an example.
9. What is an element? List an example.
10. List and define the four states of matter.
11. List and define the two methods for separating mixtures.
12. What is the law of conservation of mass and how does it apply to chemical reactions?
13. What is a precipitate?
14. Classify each of the following as an element, compound, homogeneous mixture, or heterogeneous mixture.
 - a. carbon monoxide
 - b. zinc metal
 - c. mushroom pizza
 - d. tap water
15. What are the 5 signs that a chemical reaction has taken place?

Chapter 3

16. Express the following number in scientific notation:
 - a. 4380000
 - b. 0.000274
17. List the SI units for the following quantities: length, mass, temperature, time, amount of substance, luminous intensity, and electric current.
18. How many significant figures are in the following numbers:
 - a. 702000m
 - b. 40 crayons
 - c. 0.00630100g
 - d. 170.4380s
19. Convert 14.8g to micrograms.
20. Convert 3.72km to meters.
21. Convert 80.3in to centimeters. (1in = 2.54cm)
22. Convert 867,329s to hours.
23. Convert 50 km/min to mi/hr. (1mi = 1.6km)
24. Convert 329°C to Kelvin.
25. Convert 693K to Celsius.
26. The density of mercury is 13.6 g/cm³. What is the volume of 50.0g of mercury?

27. What is the mass of 180.3 cm³ of lead if the density is 11.4 g/cm³?
28. What is the density of 325g of a substance with a volume of 492mL?
29. Define accuracy and precision.
30. Complete the following calculations with the correct number of significant figures:
 - a. 1.23kg + 4.082kg
 - b. 16.04s – 5s
 - c. 0.070cm x 1.08cm
31. What is the lowest temperature on the Kelvin scale? Why can Kelvin not be negative?
32. If a student measures a volume of 63.8mL of water, but the actual volume of the water was 72.1mL, then what was the percent error of the student's measurement?
33. Using the SI prefixes between nano and mega, list the prefixes in order of largest to smallest.

Chapter 4

34. List the symbol and name for the 35 elements that you were required to memorize. (Hint: the atomic numbers are 1 – 20, 26 – 28, 30, 35, 47, 50, 53, 74, 78 – 80, 82, and 92)
35. What did the following scientists contribute to Chemistry: Democritus, J. J. Thomson, Eugen Goldstein, and James Chadwick?
36. List the charge, relative mass, and location for the following: protons, electrons, and neutrons.
37. Which subatomic particle is the most responsible for the chemical behavior of an atom?
38. Define atomic number and mass number.
39. Define isotope. Would isotopes have different atomic numbers or mass numbers?
40. ${}^7_3\text{Li}$ Which is the atomic number? Which is the mass number?
41. Calculate the number of neutrons in the following:
 - a. ${}^7_3\text{Li}$
 - b. ${}^{45}_{21}\text{Sc}$
42. Fully explain Rutherford's experiment.

Chapter 5

43. Define ground state and excited state for an electron.
44. Define the Aufbau Principle, Pauli Exclusion Principle, and Hund's Rule.
45. List the number of orbitals and maximum number of electrons that are in the following sublevels: s, p, d, f, and g.
46. What is the standard electron configuration for zinc?
47. What element has an electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^2$?
48. Draw a wave and label the crest, trough, wavelength, and amplitude.
49. Draw and label the 4 atomic models.
50. Explain how atoms emit light.
51. Draw a picture of an s sublevel, a p sublevel, and 2 types of d sublevels.
52. What is the noble gas configuration for iodine?
53. What are the possible quantum numbers for n, l, m, and s?

Chapter 6

54. Define groups and periods.
55. What are the following groups called: Group 1, 2, 3 – 12, 17, and 18?
56. List the properties of metals, nonmetals, and metalloids.
57. What does each row on the periodic table represent?
58. How did Mendeleev arrange his periodic table?
59. How is the modern periodic table arranged?
60. What determines an element's chemical properties?

61. Define cation and anion.
62. The radius of a cation is _____ than its neutral atom.
63. The radius of an anion is _____ than its neutral atom.
64. What are 2 characteristics of noble gases?
65. List the charges formed by the groups on the periodic table.
66. What charges do the following elements have when they form ions?
a. S b. Ne c. Ca d. P
67. Draw the periodic trends for atomic size, ionization energy, and electronegativity.

Chapter 7

68. Write the formula for the compound formed between the following elements:
a. lithium and sulfur
b. aluminum and oxygen
c. calcium and phosphorus
d. rubidium and chlorine
e. strontium and oxygen
69. Define electron sea model.
70. When can ionic compounds conduct electricity?
71. Define ionic bond, covalent bond, and metallic bond.
72. What is a diatomic molecule? List the 7 naturally occurring diatomic elements.
73. Metals have _____ electronegativities.
74. Nonmetals have _____ electronegativities.
75. Do metals tend to gain or lose electrons?
76. Do nonmetals tend to gain or lose electrons?
77. Which electrons are involved in bonding?

Chapter 8

78. Define nonpolar bond and polar bond.
79. Tell if the following molecules contain nonpolar, polar, or ionic bonds.
a. CH₄ b. HCl c. H₂O d. Li₃N e. F₂
80. Define dipole moment.
81. How many lone pairs of electrons are in the Lewis dot structure for H₂O?
82. Draw the Lewis dot structures for the following: CO, CO₂, N₂, and O₂.
83. Define intermolecular forces and intramolecular forces.
84. Define London dispersion forces, dipole-dipole attractions, and hydrogen bonding.
85. List the intermolecular forces in order of strongest to weakest.
86. Identify the major intermolecular forces in the following molecules: NH₃, Cl₂, and CO₂.
87. How many total valence electron pairs are in the Lewis dot structure for NO₃⁻?
88. What is the VSEPR theory and what does the acronym mean?
89. Draw the correct 3-D Lewis dot structure and list the shape for the following molecules:
CH₄, NH₃, and H₂O.
90. Draw the shapes for linear, trigonal planar, bent, tetrahedral, trigonal pyramidal, trigonal bipyramidal, see-saw, T-shaped, octahedral, square pyramidal, and square planar.

Chapter 9

91. What are the rules for naming a compound that starts with the following type of element:
a. regular metal
b. transition metal
c. nonmetal
d. hydrogen

92. Name the following compounds:

- | | |
|-------------------------------|----------------------------|
| a. Li_2CO_3 | f. Cu_2O |
| b. H_2SO_3 | g. H_3PO_4 |
| c. N_2O_4 | h. SO_3 |
| d. $\text{Mg}(\text{NO}_3)_2$ | i. FeCl_3 |
| e. HF | j. PbO_2 |

93. Write the formulas for the following compounds:

- nitric acid
- dichlorine septoxide
- zinc (II) acetate
- calcium nitride
- aluminum fluoride

Lab Safety

94. List 3 lab safety rules.

95. What items do we wear to protect the following: eyes, hands, and clothes?

96. Draw the following pieces of glassware: beaker, Florence flask, volumetric flask, and Erlenmeyer flask.