Chemistry 1 Final Fall 2006

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

1. Which field of science studies the composition and structure of matter?
2. What would a chemist be most likely to study?
3. What is pure chemistry? Give and example
4. Does studying chemistry ensure that officials make correct choices in funding technology
5. Give an example of chemistry research in the main area of energy?
6. Give an example of a current research focus in chemistry?
7. What can be observed only in a microscopic view?
8. Which step in the scientific method requires you to use your senses to obtain information?
9. How do conceptual problems differ from numeric problems?
10. A vapor is which state of matter?
11. Which state of matter has a definite volume and takes the shape of its container?
12. Which state of matter is characterized by having a definite shape and a definite volume?
13. What is a physical change? Give 2 examples
14. What is a heterogeneous mixture? Give an example.
15. What do we use for chemical symbols today?
16. What do chemical symbols and formulas represent, respectively?
17. What must be done to be certain that a chemical change has taken place?
18. What is a chemical reaction? Give an example
19. Which of the following measurements (of different masses) is the most accurate?
    a. 3.1000 g b. 3.100 00 g c. 3.122 22 g d. 3.000 000 g
20. Which of the following measurements is expressed to three significant figures?
    a. 0.007 m b. 7077 mg c. 7.30×10^{-7} km d. 0.070 mm
21. Express the sum of 1111 km and 222 km using the correct number of significant digits.
22. What is the measurement 111.009 mm rounded off to four significant digits?
23. What is the measurement 1042 L rounded off to two significant digits?
24. What is the temperature of absolute zero measured in °C?
25. What is the boiling point of water in kelvins?
26. If the temperature changes by 100 K, by how much does it change in °C?
27. What is the volume of 80.0 g of ether if the density of ether is 0.70 g/mL?

28. Who was the man who lived from 460B.C.–370B.C. and was among the first to suggest the idea of atoms?

29. The comparison of the number of atoms in a copper coin the size of a penny with the number of people on Earth is made to illustrate what?

30. Which hypothesis led to the discovery of the proton?

31. All atoms are ____.

32. Using the periodic table, determine the number of neutrons in ^{16}O.

33. How many protons, electrons, and neutrons does an atom with atomic number 50 and mass number 125 contain?

34. In which of the following is the number of neutrons correctly represented?
a. $^{19}_{9}$F has 0 neutrons. b. $^{75}_{33}$As has 108 neutrons. c. $^{24}_{12}$Mg has 24 neutrons. d. $^{238}_{92}$U has 146 neutrons.

35. Which of the following isotopes has the same number of neutrons as phosphorus-31?
a. $^{32}_{15}$P b. $^{32}_{16}$S c. $^{29}_{14}$Si d. $^{28}_{14}$Si

36. What is necessary to calculate the atomic mass of an element?

37. What is the number of electrons in the outermost energy level of an oxygen atom?

38. If three electrons are available to fill three empty 2*p* atomic orbitals, how will the electrons be distributed in the three orbitals?

39. How are the frequency and wavelength of light related?

40. The atomic emission spectra of a sodium atom on Earth and of a sodium atom in the sun would be ____.

41. What is the approximate frequency of a photon having an energy 5×10^{-24} J? ($h = 6.6 \times 10^{-34}$ J·s)

42. Which of the following quantum leaps would be associated with the greatest energy of emitted light?
a. n = 5 to n = 1 b. n = 4 to n = 5 c. n = 2 to n = 5 d. n = 5 to n = 4

43. What are quanta of light called?

44. Which scientist developed the quantum mechanical model of the atom?

45. What does the quantum mechanical model of the atom state?.

46. The atomic number of an element is the total number of which particles in the nucleus?

47. Of the elements Fe, Hg, U, and Te, which is a representative element?

48. What element in the second period has the largest atomic radius?

49. What is the element with the highest electronegativity value?

50. Which of the following elements has the smallest ionic radius?
a. Li b. K c. O d. S

51. What is the energy required to remove an electron from an atom in the gaseous state called?

52. Which factors contributes to the decrease in ionization energy within a group in the periodic table as the atomic number increases?

53. what is true about electronegativity?

54. Which of the following statements correctly compares the relative size of an ion to its neutral atom?

a. The radius of an anion is greater than the radius of its neutral atom. b. The radius of an anion is identical to the radius of its neutral atom. c. The radius of a cation is greater than the radius of its neutral atom. d. The radius of a cation is identical to the radius of its neutral atom.

55. How many valence electrons are in an atom of phosphorus?
56. What is the maximum charge an ion is likely to have?
57. What is the formula of the ion formed when tin achieves a stable electron configuration?
58. What is the formula of the ion formed when phosphorus achieves a noble-gas electron configuration?
59. What occurs in an ionic bond?
60. What is the name of the ionic compound formed from lithium and bromine?
61. Which particles are free to drift in metals?
62. What is the basis of a metallic bond?
63. What characteristic of metals makes them good electrical conductors?
64. What is shown by the structural formula of a molecule or polyatomic ion?
65. How do atoms achieve noble-gas electron configurations in single covalent bonds?
66. Which elements can form diatomic molecules joined by a single covalent bond?
67. When H^+ forms a bond with H_2O to form the hydronium ion H_3O^+, this bond is called a coordinate covalent bond because ____.
68. In which compounds is the octet expanded to include 12 electrons?
69. How many electrons can occupy a single molecular orbital?
70. What causes water molecules to have a bent shape, according to VSEPR theory?
71. What is the shape of a molecule with a triple bond?
72. What is required in order to melt a network solid?
73. What happens when Group 2A elements form ions?
74. When naming a transition metal ion that can have more than one common ionic charge, the numerical value of the charge is indicated by a ____.
75. Which set of chemical name and chemical formula for the same compound is correct?
a. iron(II) oxide, Fe_2O_3 b. aluminum fluorate, AlF_3 c. tin(IV) bromide, $SnBr_4$ d. potassium chloride, K_2Cl_2
76. List the prefixes used in naming molecular compounds with the correct number.
77. Give 3 examples of molecular compounds.
78. What is the name of H_2SO_3?
79. What is produced when a base is dissolved in water?
80. Suppose you encounter a chemical formula with H as the cation. What do you know about this compound immediately?
81. What does an *-ite* or *-ate* ending in a polyatomic ion mean?

82. What SI unit is used to measure the number of representative particles in a substance?

83. What are representative particles?

84. What is the relationship between atomic mass and moles?

85. What is the molar mass of $(NH_4)_2CO_3$?

86. A 22.4-L sample of which of the following substances, at STP, would contain 6.02×10^{23} representative particles?
a. oxygen b. gold c. cesium iodide d. sulfur

87. What is the percent composition of chromium in $BaCrO_4$?

88. Which of the following compounds have the same empirical formula?
a. CO_2 and SO_2 b. C_7H_{14} and $C_{10}H_{20}$ c. C_4H_{10} and $C_{10}H_4$ d. C_6H_{12} and C_6H_{14}

89. What is the empirical formula of a substance that is 53.5% C, 15.5% H, and 31.1% N by weight?

90. Which of the following sets of empirical formula, molar mass, and molecular formula is correct?
a. CH, 78 g, $C_{13}H_{13}$ b. CH_4N, 90 g, $C_3H_{12}N_3$ c. CaO, 56 g, Ca_2O_2 d. C_3H_8O, 120 g, $C_3H_8O_2$

91. A skeleton equation does NOT show what?

92. What happens to atoms in chemical reactions?

93. When the equation $KClO_3(s) \rightarrow KCl(s) + O_2(g)$ is balanced, the coefficient of $KClO_3$ is ____.

94. In order to predict whether or not a single-replacement reaction takes place, which chart do you need to consult?

95. What are the 5 types of chemical reactions? Give an example of each.

96. A double-replacement reaction takes place when aqueous Na_2CO_3 reacts with aqueous $Sn(NO_3)_2$. What are the products of the reaction

97. Give the correctly balanced equation for the incomplete combustion of heptene, C_7H_{14}?

98. The reaction $2Fe + 3Cl_2 \rightarrow 2FeCl_3$ is an example of which type of reaction?

99. The equation $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$ is an example of which type of reaction?

100. The equation $H_3PO_4 + 3KOH \rightarrow K_3PO_3 + 3H_2O$ is an example of which type of reaction?