Name: _____

Chemistry Fall Final Exam Review

Define:

1. solid
2. liquid
3. gas
4. chemistry
5. heterogenous mixture
6. homogeneous mixture
7. element
8. compound
9. law of conservation of mass
10. atom
11. atomic number
12. mass number
13. isotope
14. atomic mass
15. Hund's Rule
16. Heisenburg uncertainty principle
17. Pauli exclusion principle
18. photon
19. period
20. group
21. cation
22. anion
23. valence electrons
24. octet rule
25. ionic bond
26. binary molecular compound
27. What is the difference between precision and accuracy?
28. What step in the scientific method requires you to use your sensed to obtain information?
29. What field of science studies the composition and structure of matter?
30. Which of the following is a chemical property (C) or physical property (P)?
    a. Color b. hardness c. freezing point d. ability to react with oxygen
    e. melting point f. ability to rust g. mass
31. Which of the following is a physical change (P) and which is a chemical change (C)?
    a. Corrosion b. explosion c. rotting d. evaporation e. rusting
    f. fermenting g. boiling h. burning
32. Which of the following is a heterogeneous(he) mixture and which is homogeneous (ho)?
    a. Air b. salt water c. steel d. soil e. vinegar in water
    d. oil in vinegar e. milk f. beef stew g. sand in water
33. What are the five indicators that a chemical change (reaction) has taken place?
34. A substance that forms a vapor is generally in what physical state at room temperature?
35. Which state of matter expands when heated and is easy to compress?
36. Which of the following are compounds (C), homogeneous mixtures (ho) or heterogeneous mixtures (he): sucrose, baking soda, salad dressing, steel
37. Sucrose is heated and decomposes to form carbon dioxide and water: what is the reactant? What are the products?
38. In a chemical reaction, the total mass of reactants _____ the total mass of products.

39. In the reaction in which sucrose is heated and decomposes to form carbon dioxide and water, what is the reactant? What are the products?
40. Convert the following temperatures to Kelvin: -43ºC, 34ºC
41. Write the following numbers in scientific notation.
    a. 57000
    b. 0.000489
42. Determine the number of significant figures in the following numbers.
    a. 600
    b. 600.
    c. 0.001200
    d. 507
43. In the number 0.305 L, which digit is estimated?
44. Express the sum of 8.67 m and 5.2 m to the correct number of significant figures.
45. Express the product of 5.5 mm and 2.00 mm to the correct number of significant figures.
46. List the metric prefixes and their decimal equivalents. Ex: centi .01
47. Make the following conversions:
    a. 8961 m to mm
    b. 0.000245 kg to g
48. List the 7 SI base units, including the unit. Ex. Mass – kilogram, kg
49. What is the density of an object having a mass of 25g and a volume of 5 cm^3?
50. Where are the electrons and the protons in the Bohr model?
51. The principal quantum number indicates the _____ _____ of an electron.
52. What is the shape of the following orbitals: s, p
53. How are frequency and wavelength related?
54. What causes the emission of light from an atom?
55. All atoms are _____ with the number of protons _____ the number of electrons.
56. What is the energy of a photon having a frequency of 3.5×10^7 Hz?
57. Which variable is directly proportional to frequency?
58. Which subatomic particle plays the greatest part in determining the properties of an element?
59. The atomic number is the total number of which particles in the nucleus?
60. What does the number 16 in the name oxygen-16 represent?
61. Determine the number of protons and electrons in the following elements: Indium, zinc, cesium, fluorine.
62. Calculate the number of neutrons in the following: fluorine-19, arsenic-75, magnesium-24 and uranium-238.
63. Complete the following table about subatomic particles.

Particle	Location in atom	Charge	Mass
Proton			
Neutron			
Electron			

64. What does the number 18 represent in oxygen-18?
65. Complete the following table.

Element	Atomic #	Atomic mass	Mass #	# of protons	#of neutrons	#of electrons
Cu						
^{83}Br						
	82					

66. Complete the following table regarding atomic orbitals.

Principle Quantum Number (energy level)	Orbitals available	Maximum number of electrons in each orbital	Maximum number of electrons for the energy level
1			
2			8
	P	6	
3			
4			32
	F		

67. True or False: If the spin of one electron in an orbital is clockwise, then the spin of the other electron in that orbital is counterclockwise.
68. Write the electron configuration and the orbital diagram for phosphorus. How many unpaired electrons does phosphorus have?
69. Write the electron configurations for potassium, oxygen, and selenium.
70. Write the components of the electromagnetic spectrum in order of highest frequency to lowest frequency.
71. What is the frequency of ultraviolet light with a wavelength of 4.92×10^{-8}m?
72. What is the wavelength of a gamma ray with a frequency of 3.72×10^{20}Hz?
73. If three electrons are available to fill three empty 2p orbitals, how will the electrons be distributed?
74. Stable electron configurations are likely to contain _____ energy sublevels.
75. What is the next atomic orbital in the series: 1s, 2s, 2p, 3s, 3p. . . ?
76. The principal quantum number indicates the _____ _____ of an electron.
77. Who arranged the elements in order of increasing atomic mass and used the arrangement to predict properties of missing elements? He is considered the father of the periodic table.
78. What is another name for the representative elements? Transition elements?
79. Which of the following is a metalloid? Metal? Nonmetal?
80. Ca Si Cl
81. The majority of elements on the periodic table are which of the following? (circle)
82. Metal B. Nonmetal C. Metalloid
83. How would you classify an element that is a poor conductor of electricity? (circle)
84. Metal B. Nonmetal C. Metalloid
85. Which subatomic particle plays the greatest part in determining the properties of an element?
86. Chlorine has two naturally occurring isotopes, Cl-35 and Cl-37. The atomic mass of chlorine is 35.45. Which of these two isotopes of chlorine is more abundant?
87. Consider an element Z that has two naturally occurring isotopes with the following percent abundances: the isotope with a mass number of 19.0 is 40.0% abundant; the isotope with a mass number of 20.0 is 60.0% abundant. What is the average atomic mass for element Z? Record your answer to three significant figures.
88. Which group in the periodic table are the alkali metals? Alkaline earth metals? Halogens? Noble gases?
89. In terms of electron configuration, what makes an element inactive?
90. Each period in the periodic table corresponds to a _____ _____ _____.

91. Which of the following is a transition metal? Cs, Cu, Te or Sn
92. Going across a period, does atomic radius increase or decrease?
93. Going down a group, does atomic radius increase or decrease?
94. What is the energy required to remove an electron from an atom in the gaseous state called?
95. What element has the greatest electronegativity value?
96. Which of the following has the smallest atomic radius: oxygen, fluorine, sulfur of chlorine?
97. Which of these has the lowest electronegativity: lithium, carbon, bromine or fluorine?
98. Which element has the smallest first ionization energy: potassium, calcium, rubidium or strontium?
99. How many valence electrons are in the following groups? How many electrons will the elements lose or gain in order to satisfy the octet rule? Write the charge.
100. 1A
101. 2A
102. 3A
103. 4A
104. 5A
105. 6A
106. 7A
107. How does the size of a cation compare to its neutral atom?
108. How does the size of anion compare to its neutral atom?
109. What is the charge of a cation? An anion?
110. Cations form when an atom _____ _____ and anions form when an atom _____ _____.
111. Write the electron configuration for the sodium **ion**? Oxide **ion**?
112. How many electrons does strontium have to give up to achieve noble gas configuration?
113. What is the formula for the ion formed when sodium achieves noble gas electron configuration?
114. 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 _____ _____.
115. Why do atoms share electrons in covalent bonds?
116. How many electrons are in the Cs^{+} ion? The N^{3-} ion?
117. Name the following ions: N^{3-}, P^{3-}, S^{2-}
118. Write formulas for the following ions: hydroxide, sulfate, sulfite, nitrate, nitrite, cyanide, ammonium, phosphate, carbonate, and acetate.
119. Write formulas for the following:
120. Sodium sulfide
121. Potassium nitrate
122. Calcium sulfate
123. Lithium nitride
124. Sodium nitride
125. Aluminum oxide
126. Sodium sulfate
127. Dinitrogen pentoxide
128. Carbon dioxide
129. Tetraphosphorus hexasulfide
130. Phosphoric acid
131. Name the following:
132. Al_2O_3

133. LiBr
134. K_2S
135. PbO
136. N_2O_5
137. BF_3
138. CCl_4
139. $CoCl_2$
140. Describe the properties of ionic compounds.
141. What holds an ionic bond together?
142. What characteristic of metals makes them good electrical conductors?
143. List the seven diatomic molecules.
144. Molecular compounds are composed of two or more _____.
145. What is the ending for the names of all binary compounds, both ionic and molecular?
146. What kind of bond results from unequal sharing of electrons?
147. List in order the ten prefixes for binary molecular compound naming.
148. When placed between oppositely charged metal plates, what region of a water molecule is attracted to the negative plate?
149. How many electrons are shared in a
150. Single covalent bond?
151. Double covalent bond?
152. Triple covalent bond?
153. Draw Lewis structures and tell the molecular shape of the following:
154. CO_2
155. CH_4
156. H_2O
157. NH_3
158. Which of the structures has only one lone pair of electrons?
159. True or False: An ionic bond will form between a metal and a nonmetal and a covalent bond will form between nonmetals.
160. Tell if ionic or molecular: ZnO, SO_2, N_2O_4, BaI_2, magnesium and fluorine, nitrogen and sulfur