**Chemistry II Exam SG**

**Matching**

*Match each item with the correct statement below.*

|  |  |  |  |
| --- | --- | --- | --- |
| a. | monatomic ion | f. | cation |
| b. | acid | g. | binary compound |
| c. | base | h. | anion |
| d. | law of definite proportions | i. | polyatomic ion |
| e. | law of multiple proportions |

\_\_\_\_ 1. consists of a single atom with a positive or negative charge

\_\_\_\_ 2. atom or group of atoms having a negative charge

\_\_\_\_ 3. atom or group of atoms having a positive charge

\_\_\_\_ 4. tightly-bound group of atoms that behaves as a unit and carries a net charge

\_\_\_\_ 5. compound composed of two different elements

\_\_\_\_ 6. produces a hydrogen ion when dissolved in water

\_\_\_\_ 7. produces a hydroxide ion when dissolved in water

\_\_\_\_ 8. In any chemical compound, the masses of elements are always in the same proportion by mass.

\_\_\_\_ 9. when two elements form more than one compound, the masses of one element that combine with the same mass of the other element are in the ratio of small, whole numbers

*Match each item with the correct statement below.*

|  |  |  |  |
| --- | --- | --- | --- |
| a. | representative particle | d. | percent composition |
| b. | mole | e. | standard temperature and pressure |
| c. | Avogadro's number | f. | empirical formula |

\_\_\_\_ 10. the number of representative particles of a substance present in 1 mole of that substance

\_\_\_\_ 11. an atom, an ion, or a molecule, depending upon the way a substance commonly exists

\_\_\_\_ 12. the SI unit used to measure amount of substance

\_\_\_\_ 13. 0C and 1 atm



\_\_\_\_ 14. the percent by mass of each element in a compound

\_\_\_\_ 15. the smallest whole number ratio of the atoms in a compound

*Match each item with the correct statement below.*

|  |  |  |  |
| --- | --- | --- | --- |
| a. | product | d. | balanced equation |
| b. | reactant | e. | skeleton equation |
| c. | chemical equation |

\_\_\_\_ 16. a chemical equation that does not indicate relative amounts of reactants and products

\_\_\_\_ 17. a new substance formed in a chemical reaction

\_\_\_\_ 18. a starting substance in a chemical reaction

\_\_\_\_ 19. a concise representation of a chemical reaction

\_\_\_\_ 20. an equation in which each side has the same number of atoms of each element

**Multiple Choice**

*Identify the choice that best completes the statement or answers the question.*

\_\_\_\_ 21. How many valence electrons are in an atom of phosphorus?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2 | c. | 4 |
| b. | 3 | d. | 5 |

\_\_\_\_ 22. How many valence electrons are in an atom of magnesium?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2 | c. | 4 |
| b. | 3 | d. | 5 |

\_\_\_\_ 23. How many valence electrons does a helium atom have?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2 | c. | 4 |
| b. | 3 | d. | 5 |

\_\_\_\_ 24. How does calcium obey the octet rule when reacting to form compounds?

|  |  |
| --- | --- |
| a. | It gains electrons. |
| b. | It gives up electrons. |
| c. | It does not change its number of electrons. |
| d. | Calcium does not obey the octet rule. |

\_\_\_\_ 25. What is the maximum charge an ion is likely to have?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2 | c. | 4 |
| b. | 3 | d. | 5 |

\_\_\_\_ 26. How many electrons does silver have to give up in order to achieve a pseudo-noble-gas electron configuration?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 3 |
| b. | 2 | d. | 4 |

\_\_\_\_ 27. How many electrons does barium have to give up to achieve a noble-gas electron configuration?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 3 |
| b. | 2 | d. | 4 |

\_\_\_\_ 28. What is the formula of the ion formed when potassium achieves noble-gas electron configuration?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | K | c. | K |
| b. | K | d. | K |

\_\_\_\_ 29. Which of the following elements does NOT form an ion with a charge of 1?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | fluorine | c. | potassium |
| b. | hydrogen | d. | sodium |

\_\_\_\_ 30. How does oxygen obey the octet rule when reacting to form compounds?

|  |  |
| --- | --- |
| a. | It gains electrons. |
| b. | It gives up electrons. |
| c. | It does not change its number of electrons. |
| d. | Oxygen does not obey the octet rule. |

\_\_\_\_ 31. Which of the following occurs in an ionic bond?

|  |  |
| --- | --- |
| a. | Oppositely charged ions attract. |
| b. | Two atoms share two electrons. |
| c. | Two atoms share more than two electrons. |
| d. | Like-charged ions attract. |

\_\_\_\_ 32. What is the net charge of the ionic compound calcium fluoride?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2– | c. | 0 |
| b. | 1– | d. | 1 |

\_\_\_\_ 33. Which of the following is true about an ionic compound?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | It is a salt. | c. | It is composed of anions and cations. |
| b. | It is held together by ionic bonds. | d. | all of the above |

\_\_\_\_ 34. How many valence electrons are transferred from the nitrogen atom to potassium in the formation of the compound potassium nitride?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 2 |
| b. | 1 | d. | 3 |

\_\_\_\_ 35. How many valence electrons are transferred from the calcium atom to iodine in the formation of the compound calcium iodide?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 2 |
| b. | 1 | d. | 3 |

\_\_\_\_ 36. What is the formula unit of aluminum oxide?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | AlO | c. | AlO |
| b. | AlO | d. | AlO |

\_\_\_\_ 37. What is the name of the ionic compound formed from lithium and bromine?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | lithium bromine | c. | lithium bromium |
| b. | lithium bromide | d. | lithium bromate |

\_\_\_\_ 38. Which of the following pairs of elements is most likely to form an ionic compound?

|  |  |
| --- | --- |
| a. | magnesium and fluorine |
| b. | nitrogen and sulfur |
| c. | oxygen and chlorine |
| d. | sodium and aluminum |

\_\_\_\_ 39. Ionic compounds are normally in which physical state at room temperature?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | solid | c. | gas |
| b. | liquid | d. | plasma |

\_\_\_\_ 40. What does the term *coordination number* in ionic crystals refer to?

|  |  |
| --- | --- |
| a. | the total number of valence electrons in an atom |
| b. | the number of oppositely charged ions surrounding a particular ion |
| c. | the number of atoms in a particular formula unit |
| d. | the number of like-charged ions surrounding a particular ion |

\_\_\_\_ 41. Under what conditions can potassium bromide conduct electricity?

|  |  |
| --- | --- |
| a. | only when melted |
| b. | only when dissolved |
| c. | only when it is in crystal form |
| d. | only when melted or dissolved in water |

\_\_\_\_ 42. Which of the following particles are free to drift in metals?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | protons | c. | neutrons |
| b. | electrons | d. | cations |

\_\_\_\_ 43. What is the basis of a metallic bond?

|  |  |
| --- | --- |
| a. | the attraction of metal ions to mobile electrons |
| b. | the attraction between neutral metal atoms |
| c. | the neutralization of protons by electrons |
| d. | the attraction of oppositely charged ions |

\_\_\_\_ 44. What characteristic of metals makes them good electrical conductors?

|  |  |
| --- | --- |
| a. | They have mobile valence electrons. |
| b. | They have mobile protons. |
| c. | They have mobile cations. |
| d. | Their crystal structures can be rearranged easily. |

\_\_\_\_ 45. Which is a typical characteristic of an ionic compound?

|  |  |
| --- | --- |
| a. | Electron pairs are shared among atoms. |
| b. | The ionic compound has a low solubility in water. |
| c. | The ionic compound is described as a molecule. |
| d. | The ionic compound has a high melting point. |

\_\_\_\_ 46. What is shown by the structural formula of a molecule or polyatomic ion?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the arrangement of bonded atoms | c. | the number of metallic bonds |
| b. | the number of ionic bonds | d. | the shapes of molecular orbitals |

\_\_\_\_ 47. Which of these elements does not exist as a diatomic molecule?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Ne | c. | H |
| b. | F | d. | I |

\_\_\_\_ 48. How do atoms achieve noble-gas electron configurations in single covalent bonds?

|  |  |
| --- | --- |
| a. | One atom completely loses two electrons to the other atom in the bond. |
| b. | Two atoms share two pairs of electrons. |
| c. | Two atoms share two electrons. |
| d. | Two atoms share one electron. |

\_\_\_\_ 49. Which noble gas has the same electron configuration as the oxygen in a water molecule?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | helium | c. | argon |
| b. | neon | d. | xenon |

\_\_\_\_ 50. Which of the following is the name given to the pairs of valence electrons that do not participate in bonding in diatomic oxygen molecules?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | unvalenced pair | c. | inner pair |
| b. | outer pair | d. | unshared pair |

\_\_\_\_ 51. Which of the following diatomic molecules is joined by a double covalent bond?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

\_\_\_\_ 52. A molecule with a single covalent bond is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CO | c. | CO |
| b. | Cl | d. | N |

\_\_\_\_ 53. Once formed, how are coordinate covalent bonds different from other covalent bonds?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | They are stronger. | c. | They are weaker. |
| b. | They are more ionic in character. | d. | There is no difference. |

\_\_\_\_ 54. When H forms a bond with HO to form the hydronium ion HO, this bond is called a coordinate covalent bond because \_\_\_\_.



|  |  |
| --- | --- |
| a. | both bonding electrons come from the oxygen atom |
| b. | it forms an especially strong bond |
| c. | the electrons are equally shared |
| d. | the oxygen no longer has eight valence electrons |

\_\_\_\_ 55. Which of the following bonds is the least reactive?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | C—C | c. | O—H |
| b. | H—H | d. | H—Cl |

\_\_\_\_ 56. Molecular orbital theory is based upon which of the following models of the atom?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | classical mechanical model | c. | quantum mechanical model |
| b. | Bohr model | d. | Democritus’s model |

\_\_\_\_ 57. Which of the following theories provides information concerning both molecular shape and molecular bonding?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | molecular orbital theory | c. | orbital hybridization theory |
| b. | VSEPR theory | d. | Bohr atomic theory |

\_\_\_\_ 58. What type of hybrid orbital exists in the methane molecule?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *sp* | c. | *sp* |
| b. | *sp* | d. | *spd* |

\_\_\_\_ 59. Which of the following atoms acquires the most negative charge in a covalent bond with hydrogen?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | C | c. | O |
| b. | Na | d. | S |

\_\_\_\_ 60. What is thought to cause the dispersion forces?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | attraction between ions | c. | sharing of electron pairs |
| b. | motion of electrons | d. | differences in electronegativity |

\_\_\_\_ 61. Which of the forces of molecular attraction is the weakest?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | dipole interaction | c. | hydrogen bond |
| b. | dispersion | d. | single covalent bond |

\_\_\_\_ 62. What causes dipole interactions?

|  |  |
| --- | --- |
| a. | sharing of electron pairs |
| b. | attraction between polar molecules |
| c. | bonding of a covalently bonded hydrogen to an unshared electron pair |
| d. | attraction between ions |

\_\_\_\_ 63. What are the weakest attractions between molecules?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | ionic forces | c. | covalent forces |
| b. | Van der Waals forces | d. | hydrogen forces |

\_\_\_\_ 64. Which type of solid has the highest melting point?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | ionic solid | c. | metal |
| b. | network solid | d. | nonmetallic solid |

\_\_\_\_ 65. When Group 2A elements form ions, they \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | lose two protons | c. | lose two electrons |
| b. | gain two protons | d. | gain two electrons |

\_\_\_\_ 66. 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 \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | prefix | c. | Roman numeral following the name |
| b. | suffix | d. | superscript after the name |

\_\_\_\_ 67. Aluminum is a group 3A metal. Which ion does A1 typically form?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Al | c. | Al |
| b. | Al | d. | Al |

\_\_\_\_ 68. Which of the following is NOT a cation?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | iron(III) ion | c. | Ca |
| b. | sulfate | d. | mercurous ion |

\_\_\_\_ 69. Which of the following correctly provides the names and formulas of polyatomic ions?

|  |  |
| --- | --- |
| a. | carbonate: HCO; bicarbonate: CO |
| b. | nitrite: NO; nitrate: NO |
| c. | sulfite: S; sulfate: SO |
| d. | chromate: CrO; dichromate: CrO |

\_\_\_\_ 70. Which of the following compounds contains the Mn ion?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | MnS | c. | MnO |
| b. | MnBr | d. | MnO |

\_\_\_\_ 71. How are chemical formulas of binary ionic compounds generally written?

|  |  |
| --- | --- |
| a. | cation on left, anion on right |
| b. | anion on left, cation on right |
| c. | Roman numeral first, then anion, then cation |
| d. | subscripts first, then ions |

\_\_\_\_ 72. Which of the following is true about the composition of ionic compounds?

|  |  |
| --- | --- |
| a. | They are composed of anions and cations. |
| b. | They are composed of anions only. |
| c. | They are composed of cations only. |
| d. | They are formed from two or more nonmetallic elements. |

\_\_\_\_ 73. Which element, when combined with fluorine, would most likely form an ionic compound?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | lithium | c. | phosphorus |
| b. | carbon | d. | chlorine |

\_\_\_\_ 74. In which of the following are the formula of the ionic compound and the charge on the metal ion shown correctly?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | UCl, U | c. | IrS, Ir |
| b. | ThO, Th | d. | NiO, Ni |

\_\_\_\_ 75. Which set of chemical name and chemical formula for the same compound is correct?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | iron(II) oxide, FeO | c. | tin(IV) bromide, SnBr |
| b. | aluminum fluorate, AlF | d. | potassium chloride, KCl |

\_\_\_\_ 76. What is the correct formula for potassium sulfite?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | KHSO | c. | KSO |
| b. | KHSO | d. | KSO |

\_\_\_\_ 77. Sulfur hexafluoride is an example of a \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | monatomic ion | c. | binary compound |
| b. | polyatomic ion | d. | polyatomic compound |

\_\_\_\_ 78. Which of the following is a binary molecular compound?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | BeHCO | c. | AgI |
| b. | PCl | d. | MgS |

\_\_\_\_ 79. Which of the following shows both the correct formula and correct name of an acid?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | HClO, chloric acid | c. | HPO, phosphoric acid |
| b. | HNO, hydronitrous acid | d. | HI, iodic acid |

\_\_\_\_ 80. What is the formula for phosphoric acid?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | HPO | c. | HPO |
| b. | HPO | d. | HPO |

\_\_\_\_ 81. What is the formula for hydrosulfuric acid?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | HS | c. | HSO |
| b. | HSO | d. | HS |

\_\_\_\_ 82. Which of the following are produced when a base is dissolved in water?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | hydronium ions | c. | hydrogen ions |
| b. | hydroxide ions | d. | ammonium ions |

\_\_\_\_ 83. How are bases named?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | like monatomic elements | c. | like ionic compounds |
| b. | like polyatomic ions | d. | like molecular compounds |

\_\_\_\_ 84. Select the correct formula for sulfur hexafluoride.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | SF | c. | FS |
| b. | FSO | d. | SF |

\_\_\_\_ 85. What is the correct formula for barium chlorate?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Ba(ClO) | c. | Ba(ClO) |
| b. | Ba(ClO) | d. | BaCl |

\_\_\_\_ 86. What is the correct formula for calcium dihydrogen phosphate?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CaHPO | c. | Ca(HPO) |
| b. | CaHPO | d. | Ca(HHPO) |

\_\_\_\_ 87. What does an *-ite* or *-ate* ending in a polyatomic ion mean?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Oxygen is in the formula. | c. | Nitrogen is in the formula. |
| b. | Sulfur is in the formula. | d. | Bromine is in the formula. |

\_\_\_\_ 88. Which of the following elements exists as a diatomic molecule?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | neon | c. | nitrogen |
| b. | lithium | d. | sulfur |

\_\_\_\_ 89. How many moles of tungsten atoms are in 4.8 10 atoms of tungsten?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 8.0 10 moles | c. | 1.3 10 moles |
| b. | 8.0 10 moles | d. | 1.3 10 moles |

\_\_\_\_ 90. How many moles of silver atoms are in 1.8 10 atoms of silver?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3.0 10 | c. | 3.0 10 |
| b. | 3.3 10 | d. | 1.1 10 |

\_\_\_\_ 91. How many atoms are in 0.075 mol of titanium?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1.2 10-25 | c. | 6.4 10 |
| b. | 2.2 10 | d. | 4.5 10 |

\_\_\_\_ 92. How many molecules are in 2.10 mol CO?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2.53 10 molecules | c. | 3.49 10molecules |
| b. | 3.79 10 molecules | d. | 1.26 10 molecules |

\_\_\_\_ 93. The mass of a mole of NaCl is the \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | molar mass | c. | molecular mass |
| b. | atomic mass | d. | gram atomic mass |

\_\_\_\_ 94. What is the molar mass of AuCl3?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 96 g | c. | 232.5 g |
| b. | 130 g | d. | 303.6 g |

\_\_\_\_ 95. What is the mass in grams of 5.90 mol CH?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.0512 g | c. | 389 g |
| b. | 19.4 g | d. | 673 g |

\_\_\_\_ 96. What is the number of moles of beryllium atoms in 36 g of Be?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.25 mol | c. | 45.0 mol |
| b. | 4.0 mol | d. | 320 mol |

\_\_\_\_ 97. How many moles of CaBr are in 5.0 grams of CaBr?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2.5 10 mol | c. | 4.0 10 mol |
| b. | 4.2 10 mol | d. | 1.0 10 mol |

\_\_\_\_ 98. For which of the following conversions does the value of the conversion factor depend upon the formula of the substance?

|  |  |
| --- | --- |
| a. | volume of gas (STP) to moles |
| b. | density of gas (STP) to molar mass |
| c. | mass of any substance to moles |
| d. | moles of any substance to number of particles |

\_\_\_\_ 99. What is the mass of silver in 3.4 g AgNO?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.025 g | c. | 2.2 g |
| b. | 0.64 g | d. | 3.0 g |

\_\_\_\_ 100. What is the mass of oxygen in 250 g of sulfuric acid, HSO?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.65 g | c. | 16 g |
| b. | 3.9 g | d. | 160 g |

\_\_\_\_ 101. Which combination of temperature and pressure correctly describes standard temperature and pressure, STP?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0C and 101 kPa | c. | 0C and 22.4 kPa |
| b. | 1C and 0 kPa | d. | 100C and 100 kPa |

\_\_\_\_ 102. What is the volume, in liters, of 0.500 mol of CH gas at STP?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.0335 L | c. | 16.8 L |
| b. | 11.2 L | d. | 22.4 L |

\_\_\_\_ 103. What is the number of moles in 500 L of He gas at STP?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.05 mol | c. | 22 mol |
| b. | 0.2 mol | d. | 90 mol |

\_\_\_\_ 104. What is the number of moles in 9.63 L of HS gas at STP?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.104 mol | c. | 3.54 mol |
| b. | 0.430 mol | d. | 14.7 mol |

\_\_\_\_ 105. What is the density at STP of the gas sulfur hexafluoride, SF?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.153 g/L | c. | 3270 g/L |
| b. | 6.52 g/L | d. | 3.93 10 g/L |

\_\_\_\_ 106. The molar mass of a certain gas is 49 g. What is the density of the gas in g/L at STP?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3.6 10 g/L | c. | 2.2 g/L |
| b. | 0.46 g/L | d. | 71 g/L |

\_\_\_\_ 107. A 22.4-L sample of which of the following substances, at STP, would contain 6.02 10 representative particles?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | oxygen | c. | cesium iodide |
| b. | gold | d. | sulfur |

\_\_\_\_ 108. If the density of an unknown gas Z is 4.50 g/L at STP, what is the molar mass of gas Z?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0.201 g/mol | c. | 26.9 g/mol |
| b. | 5.00 g/mol | d. | 101 g/mol |

\_\_\_\_ 109. Which of the following gas samples would have the largest number of representative particles at STP?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 12.0 L He | c. | 0.10 L Xe |
| b. | 7.0 L O | d. | 0.007 L SO |

\_\_\_\_ 110. Given 1.00 mole of each of the following gases at STP, which gas would have the greatest volume?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | He | c. | SO |
| b. | O | d. | All would have the same volume. |

\_\_\_\_ 111. What information is needed to calculate the percent composition of a compound?

|  |  |
| --- | --- |
| a. | the weight of the sample to be analyzed and its density |
| b. | the weight of the sample to be analyzed and its molar volume |
| c. | the formula of the compound and the atomic mass of its elements |
| d. | the formula of the compound and its density |

\_\_\_\_ 112. What is the percent composition of chromium in BaCrO?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 4.87% | c. | 20.5% |
| b. | 9.47% | d. | 25.2% |

\_\_\_\_ 113. Which of the following compounds has the lowest percent gold content by weight?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | AuOH | c. | AuCl |
| b. | Au(OH) | d. | AuI |

\_\_\_\_ 114. Which of the following compounds has the highest oxygen content, by weight?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | NaO | c. | BaO |
| b. | CO | d. | HO |

\_\_\_\_ 115. Which of the following compounds have the same empirical formula?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CO and SO | c. | CH and CH |
| b. | CH and CH | d. | CH and CH |

\_\_\_\_ 116. Which of the following sets of empirical formula, molar mass, and molecular formula is correct?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | CH, 78 g, CH | c. | CaO, 56 g, CaO |
| b. | CHN, 90 g, CHN | d. | CHO, 120 g, CHO |

\_\_\_\_ 117. Chemical reactions \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | occur only in living organisms | c. | only occur outside living organisms |
| b. | create and destroy atoms | d. | produce new substances |

\_\_\_\_ 118. What does the symbol in a chemical equation mean?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | Heat is supplied to the reaction. | c. | yields |
| b. | A catalyst is needed. | d. | precipitate |

\_\_\_\_ 119. Chemical equations \_\_\_\_.

|  |  |
| --- | --- |
| a. | describe chemical reactions |
| b. | show how to write chemical formulas |
| c. | give directions for naming chemical compounds |
| d. | describe only biological changes |

\_\_\_\_ 120. A skeleton equation does NOT show which of the following?

|  |  |
| --- | --- |
| a. | the correct formulas of the reactants and products |
| b. | the reactants on the left, the products on the right |
| c. | an arrow connecting the reactants to the products |
| d. | the relative amounts of reactants and products |

\_\_\_\_ 121. If you rewrite the following word equation as a balanced chemical equation, what will the coefficient and symbol for fluorine be?

nitrogen trifluoride nitrogen fluorine



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 6F | c. | 6F |
| b. | F | d. | 3F |

\_\_\_\_ 122. What are the coefficients that will balance the skeleton equation below?

AlCl + NaOH Al(OH) NaCl



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1, 3, 1, 3 | c. | 1, 1, 1, 3 |
| b. | 3, 1, 3, 1 | d. | 1, 3, 3, 1 |

\_\_\_\_ 123. Chemical equations must be balanced to satisfy \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the law of definite proportions | c. | the law of conservation of mass |
| b. | the law of multiple proportions | d. | Avogadro’s principle |

\_\_\_\_ 124. What are the missing coefficients for the skeleton equation below?

Cr(*s*) Fe(NO)(*aq*) Fe(*s*) Cr(NO)(*aq*)



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 4, 6, 6, 2 | c. | 2, 3, 3, 2 |
| b. | 2, 3, 2, 3 | d. | 1, 3, 3, 1 |

\_\_\_\_ 125. What are the missing coefficients for the skeleton equation below?

Al(SO)(*aq*) KOH(*aq*)  Al(OH)(*aq*) KSO(*aq*)



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1, 3, 2, 3 | c. | 4, 6, 2, 3 |
| b. | 2, 12, 4, 6 | d. | 1, 6, 2, 3 |

\_\_\_\_ 126. In a combustion reaction, one of the reactants is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | hydrogen | c. | oxygen |
| b. | nitrogen | d. | a metal |

\_\_\_\_ 127. The products of a combustion reaction do NOT include \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | water | c. | carbon monoxide |
| b. | carbon dioxide | d. | hydrogen |

\_\_\_\_ 128. What is the formula for phosphoric acid?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | HPO | c. | HPO |
| b. | HPO | d. | HPO |

\_\_\_\_ 129. Which of the following is a property of an acid?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | sour taste | c. | strong color |
| b. | nonelectrolyte | d. | unreactive |

\_\_\_\_ 130. What is an acid according to Arrhenius?

|  |  |
| --- | --- |
| a. | a substance that ionizes to yield protons in aqueous solution |
| b. | a substance that is a hydrogen ion donor |
| c. | a substance that accepts an electron pair |
| d. | a substance that is a hydrogen ion acceptor |

\_\_\_\_ 131. Which of these is an Arrhenius base?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | LiOH | c. | HPO |
| b. | NH | d. | CHCOOH |

\_\_\_\_ 132. What is transferred between a conjugate acid-base pair?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | an electron | c. | a hydroxide ion |
| b. | a proton | d. | a hydronium ion |

\_\_\_\_ 133. What type of acid is sulfuric acid?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | monoprotic | c. | triprotic |
| b. | diprotic | d. | none of the above |

\_\_\_\_ 134. What are the acids in the following equilibrium reaction?

CN + HO HCN + OH



|  |  |  |  |
| --- | --- | --- | --- |
| a. | CN, HO | c. | CN, OH |
| b. | HO, HCN | d. | HO, OH |

\_\_\_\_ 135. Which of the following represents a Brønsted-Lowry conjugate acid-base pair?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | SO and SO | c. | HO and H |
| b. | CO and CO | d. | NH and NH |

\_\_\_\_ 136. What is the charge on the hydronium ion?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 2– | c. | 0 |
| b. | 2– | d. | 1+ |

\_\_\_\_ 137. If the hydrogen ion concentration of a solution is 10*M*, is the solution acidic, alkaline, or neutral?



|  |  |  |  |
| --- | --- | --- | --- |
| a. | acidic | c. | neutral |
| b. | alkaline | d. | The answer cannot be determined. |

\_\_\_\_ 138. In a neutral solution, the [H] is \_\_\_\_.



|  |  |  |  |
| --- | --- | --- | --- |
| a. | 10*M* | c. | 1 10*M* |
| b. | zero | d. | equal to [OH] |

\_\_\_\_ 139. What is pH?

|  |  |
| --- | --- |
| a. | the negative logarithm of the hydrogen ion concentration |
| b. | the positive logarithm of the hydrogen ion concentration |
| c. | the negative logarithm of the hydroxide ion concentration |
| d. | the positive logarithm of the hydroxide ion concentration |

\_\_\_\_ 140. Which of these solutions is the most basic?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | [H] = 1 10*M* | c. | [H] = 1 10*M* |
| b. | [OH] = 1 10*M* | d. | [OH] = 1 10*M* |

\_\_\_\_ 141. The process of adding a known amount of solution of known concentration to determine the concentration of another solution is called \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | neutralization | c. | titration |
| b. | hydrolysis | d. | buffer capacity |

**Short Answer**

142. What is the formula for the oxide ion?

143. Balance the following equation.

NaClO NaCl O



144. Complete and balance the following equation:

KPO BaCl



145. What is the hydrogen-ion concentration if the pH is 3.7?

146. What is the pH if the hydrogen-ion concentration is 6.8 10*M*?



**Numeric Response**

147. How many valence electrons are in rubidium?

148. How many valence electrons are in bromine?

149. What is the charge of a particle having 9 protons and 10 electrons?

150. How many electrons does a gallium atom give up when it becomes an ion?

151. What is the coordination number of both ions in the cesium chloride crystal?

152. How many valence electrons does an iodine atom have?

153. What is the total number of covalent bonds normally associated with a single carbon atom in a compound?

154. How many electrons are shared in a single covalent bond?

155. How many electrons does a nitrogen atom need to gain in order to attain a noble-gas electron configuration?

156. How many unshared pairs of electrons does the nitrogen atom in ammonia possess?

157. How many electrons are shared in a double covalent bond?

158. How many covalent bonds are in a covalently bonded molecule containing 1 phosphorus atom and 3 chlorine atoms?

159. What is the bond angle in a water molecule?

160. Write the charge of an chloride ion.

161. What is the charge on the cation in CuSO?



162. What is the ionic charge on the zirconium ion in the ionic compound zirconium oxide, ZrO?



163. How many iron(II) ions combine with oxygen to form iron(II) oxide?

164. Determine the subscript for ammonium in the chemical formula for ammonium dichromate.

165. If the hydrogen ion concentration is 10*M*, what is the pH of the solution?



166. If the hydroxide ion concentration is 10*M*, what is the pH of the solution?



167. If [OH] = 1 10*M*, what is the pH of the solution?



168. What is the pH of a solution with a concentration of 0.01*M* hydrochloric acid