

## Chapter 9 Study Guide

### 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. produces a hydrogen ion when dissolved in water
- \_\_\_\_\_ 2. atom or group of atoms having a positive charge
- \_\_\_\_\_ 3. tightly-bound group of atoms that behaves as a unit and carries a net charge
- \_\_\_\_\_ 4. produces a hydroxide ion when dissolved in water
- \_\_\_\_\_ 5. atom or group of atoms having a negative charge
- \_\_\_\_\_ 6. consists of a single atom with a positive or negative charge
- \_\_\_\_\_ 7. compound composed of two different elements

### Multiple Choice

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

- \_\_\_\_\_ 8. Which of the following shows correctly an ion pair and the ionic compound the two ions form?
  - a.  $\text{Sn}^{4+}$ ,  $\text{N}^{3-}$ ;  $\text{Sn}_4\text{N}_3$
  - b.  $\text{Cu}^{2+}$ ,  $\text{O}^{2-}$ ;  $\text{Cu}_2\text{O}_2$
  - c.  $\text{Cr}^{3+}$ ,  $\text{I}^-$ ;  $\text{CrI}$
  - d.  $\text{Fe}^{3+}$ ,  $\text{O}^{2-}$ ;  $\text{Fe}_2\text{O}_3$
- \_\_\_\_\_ 9. Which of the following compounds contains the  $\text{Mn}^{3+}$  ion?
  - a.  $\text{MnS}$
  - b.  $\text{MnBr}_2$
  - c.  $\text{Mn}_2\text{O}_3$
  - d.  $\text{MnO}$
- \_\_\_\_\_ 10. 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
- \_\_\_\_\_ 11. What is the correct name for the  $\text{N}^{3-}$  ion?
  - a. nitrate ion
  - b. nitrogen ion
  - c. nitride ion
  - d. nitrite ion

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

ID: B

- \_\_\_\_\_ 12. Which of the following is the correct name for  $\text{N}_2\text{O}_5$ ?
- a. nitrous oxide
  - b. dinitrogen pentoxide
  - c. nitrogen dioxide
  - d. nitrate oxide
- \_\_\_\_\_ 13. What is the name of  $\text{H}_2\text{SO}_3$ ?
- a. hyposulfuric acid
  - b. hydrosulfuric acid
  - c. sulfuric acid
  - d. sulfurous acid
- \_\_\_\_\_ 14. Which set of chemical name and chemical formula for the same compound is correct?
- a. ammonium sulfite,  $(\text{NH}_4)_2\text{S}$
  - b. iron(III) phosphate,  $\text{FePO}_4$
  - c. lithium carbonate,  $\text{LiCO}_3$
  - d. magnesium dichromate,  $\text{MgCrO}_4$
- \_\_\_\_\_ 15. 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
  - b. suffix
  - c. Roman numeral following the name
  - d. superscript after the name
- \_\_\_\_\_ 16. Which set of chemical name and chemical formula for the same compound is correct?
- a. iron(II) oxide,  $\text{Fe}_2\text{O}_3$
  - b. aluminum fluoride,  $\text{AlF}_3$
  - c. tin(IV) bromide,  $\text{SnBr}_4$
  - d. potassium chloride,  $\text{K}_2\text{Cl}_2$
- \_\_\_\_\_ 17. When Group 2A elements form ions, they \_\_\_\_.
- a. lose two protons
  - b. gain two protons
  - c. lose two electrons
  - d. gain two electrons
- \_\_\_\_\_ 18. Which of the following formulas represents a molecular compound?
- a.  $\text{ZnO}$
  - b.  $\text{Xe}$
  - c.  $\text{SO}_2$
  - d.  $\text{BeF}_2$
- \_\_\_\_\_ 19. Which element, when combined with fluorine, would most likely form an ionic compound?
- a. lithium
  - b. carbon
  - c. phosphorus
  - d. chlorine
- \_\_\_\_\_ 20. What is the formula for hydrosulfuric acid?
- a.  $\text{H}_2\text{S}_2$
  - b.  $\text{H}_2\text{SO}_2$
  - c.  $\text{HSO}_2$
  - d.  $\text{H}_2\text{S}$
- \_\_\_\_\_ 21. How are bases named?
- a. like monatomic elements
  - b. like polyatomic ions
  - c. like ionic compounds
  - d. like molecular compounds
- \_\_\_\_\_ 22. Select the correct formula for sulfur hexafluoride.
- a.  $\text{S}_2\text{F}_6$
  - b.  $\text{F}_6\text{SO}_3$
  - c.  $\text{F}_6\text{S}_2$
  - d.  $\text{SF}_6$

- \_\_\_\_\_ 23. Which of the following is true about the composition of ionic compounds?
- They are composed of anions and cations.
  - They are composed of anions only.
  - They are composed of cations only.
  - They are formed from two or more nonmetallic elements.
- \_\_\_\_\_ 24. Which of the following correctly provides the names and formulas of polyatomic ions?
- carbonate:  $\text{HCO}_3^-$ ; bicarbonate:  $\text{CO}_3^{2-}$
  - nitrite:  $\text{NO}^-$ ; nitrate:  $\text{NO}_2^-$
  - sulfite:  $\text{S}^{2-}$ ; sulfate:  $\text{SO}_3^-$
  - chromate:  $\text{CrO}_4^{2-}$ ; dichromate:  $\text{Cr}_2\text{O}_7^{2-}$
- \_\_\_\_\_ 25. What is the correct name for the compound  $\text{CoCl}_2$ ?
- cobalt(I) chlorate
  - cobalt(I) chloride
  - cobalt(II) chlorate
  - cobalt(II) chloride
- \_\_\_\_\_ 26. In which of the following are the symbol and name for the ion given correctly?
- $\text{NH}_4^+$ : ammonia;  $\text{H}^+$ : hydride
  - $\text{C}_2\text{H}_3\text{O}_2^-$ : acetate;  $\text{C}_2\text{O}_4^-$ : oxalite
  - $\text{OH}^-$ : hydroxide;  $\text{O}^{2-}$ : oxide
  - $\text{PO}_3^{3-}$ : phosphate;  $\text{PO}_4^{3-}$ : phosphite
- \_\_\_\_\_ 27. When the name of an anion that is part of an acid ends in *-ite*, the acid name includes the suffix \_\_\_\_\_.
- ous*
  - ic*
  - ate*
  - ite*
- \_\_\_\_\_ 28. Which of the following is NOT a cation?
- iron(III) ion
  - sulfate
  - $\text{Ca}^{2+}$
  - mercurous ion
- \_\_\_\_\_ 29. What is the correct formula for potassium sulfite?
- $\text{KHSO}_3$
  - $\text{KHSO}_4$
  - $\text{K}_2\text{SO}_3$
  - $\text{K}_2\text{SO}_4$
- \_\_\_\_\_ 30. What is the formula for phosphoric acid?
- $\text{H}_2\text{PO}_3$
  - $\text{H}_3\text{PO}_4$
  - $\text{HPO}_2$
  - $\text{HPO}_4$
- \_\_\_\_\_ 31. What is the correct formula for barium chlorate?
- $\text{Ba}(\text{ClO})_2$
  - $\text{Ba}(\text{ClO}_2)_2$
  - $\text{Ba}(\text{ClO}_3)_2$
  - $\text{BaCl}_2$
- \_\_\_\_\_ 32. Binary molecular compounds are made of two \_\_\_\_\_.
- metallic elements
  - nonmetallic elements
  - polyatomic ions
  - cations

- \_\_\_\_\_ 33. Aluminum is a group 3A metal. Which ion does Al typically form?
- a.  $\text{Al}^{3-}$  c.  $\text{Al}^{5-}$   
b.  $\text{Al}^{3+}$  d.  $\text{Al}^{5+}$
- \_\_\_\_\_ 34. What type of ions have names ending in *-ide*?
- a. only cations c. only metal ions  
b. only anions d. only gaseous ions
- \_\_\_\_\_ 35. Suppose you encounter a chemical formula with H as the cation. What do you know about this compound immediately?
- a. It is a polyatomic ionic compound. c. It is a base.  
b. It is an acid. d. It has a +1 charge.
- \_\_\_\_\_ 36. Which of the following correctly represents an ion pair and the ionic compound the ions form?
- a.  $\text{Ca}^{2-}$ ,  $\text{F}^-$ ;  $\text{CaF}_2$  c.  $\text{Ba}^{2+}$ ,  $\text{O}^{2-}$ ;  $\text{Ba}_2\text{O}_2$   
b.  $\text{Na}^+$ ,  $\text{Cl}^-$ ;  $\text{NaCl}_2$  d.  $\text{Pb}^{4+}$ ,  $\text{O}^{2-}$ ;  $\text{Pb}_2\text{O}_4$
- \_\_\_\_\_ 37. Which of the following formulas represents an ionic compound?
- a.  $\text{CS}_2$  c.  $\text{N}_2\text{O}_4$   
b.  $\text{BaI}_2$  d.  $\text{PCl}_3$
- \_\_\_\_\_ 38. What is the correct name for  $\text{Sn}_3(\text{PO}_4)_2$ ?
- a. tritin diphosphate c. tin(III) phosphate  
b. tin(II) phosphate d. tin(IV) phosphate
- \_\_\_\_\_ 39. What is the ending for the names of all binary compounds, both ionic and molecular?
- a. *-ide* c. *-ade*  
b. *-ite* d. *-ate*
- \_\_\_\_\_ 40. What determines that an element is a metal?
- a. the magnitude of its charge c. when it is a Group A element  
b. the molecules that it forms d. its position in the periodic table
- \_\_\_\_\_ 41. In naming a binary molecular compound, the number of atoms of each element present in the molecule is indicated by \_\_\_\_.
- a. Roman numerals c. prefixes  
b. superscripts d. suffixes
- \_\_\_\_\_ 42. Which of the following shows both the correct formula and correct name of an acid?
- a.  $\text{HClO}_2$ , chloric acid c.  $\text{H}_3\text{PO}_4$ , phosphoric acid  
b.  $\text{HNO}_2$ , hydronitrous acid d.  $\text{HI}$ , iodic acid
- \_\_\_\_\_ 43. Molecular compounds are usually \_\_\_\_.
- a. composed of two or more transition elements  
b. composed of positive and negative ions  
c. composed of two or more nonmetallic elements  
d. exceptions to the law of definite proportions

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- \_\_\_\_ 44. Which of the following is a binary molecular compound?
- a.  $\text{BeHCO}_3$
  - b.  $\text{PCl}_5$
  - c.  $\text{AgI}$
  - d.  $\text{MgS}$
- \_\_\_\_ 45. Which of the following are produced when a base is dissolved in water?
- a. hydronium ions
  - b. hydroxide ions
  - c. hydrogen ions
  - d. ammonium ions
- \_\_\_\_ 46. When dissolved in water, acids produce \_\_\_\_.
- a. negative ions
  - b. polyatomic ions
  - c. hydrogen ions
  - d. oxide ions
- \_\_\_\_ 47. What is the formula for sulfurous acid?
- a.  $\text{H}_2\text{SO}_4$
  - b.  $\text{H}_2\text{SO}_3$
  - c.  $\text{H}_2\text{SO}_2$
  - d.  $\text{H}_2\text{S}$
- \_\_\_\_ 48. When naming acids, the prefix *hydro-* is used when the name of the acid anion ends in \_\_\_\_.
- a. *-ide*
  - b. *-ite*
  - c. *-ate*
  - d. *-ic*
- \_\_\_\_ 49. Which of the following compounds contains the lead(II) ion?
- a.  $\text{PbO}$
  - b.  $\text{PbCl}_4$
  - c.  $\text{Pb}_2\text{O}$
  - d.  $\text{Pb}_2\text{S}$
- \_\_\_\_ 50. An *-ate* or *-ite* at the end of a compound name usually indicates that the compound contains \_\_\_\_.
- a. fewer electrons than protons
  - b. neutral molecules
  - c. only two elements
  - d. a polyatomic anion