Practice Problems

Name the following ionic compounds.

34. $Sn(NO_3)_2$
35. Cu_2CO_3
36. NiC_2O_4
37. Cr_2O_3

Complete solutions to the Practice Problems can be found in the Appendix at the back of the book.

PART 3 REVIEW

38. The following compounds contain ions whose charges can be predicted from the periodic table or the rules in Section 2-10. Write the formula of each compound.
    a. potassium iodide
    b. magnesium chloride
    c. calcium nitride
    d. aluminum iodide
    e. barium fluoride

PROBLEM-SOLVING STRATEGY

*By **using what you know** about the charge of the nonmetal ion, you should be able to determine the charge of the metal ion. (See Strategy, page 58.)*

39. The metals in the following compounds form ions with different charges, so the charge cannot be predicted from the periodic table. Determine the charge on the metal ion and write the name for each compound.
    a. SnO
    b. $SnBr_4$
    c. FeS
    d. $CuSO_4$
40. Write the formula for each of the following compounds.
    a. tin(IV) chloride
    b. iron(III) sulfide
    c. mercury(II) oxide
    d. cobalt(III) oxide
    e. copper(II) sulfate
41. Write the formulas for the following compounds containing polyatomic ions.
    a. calcium nitrate
    b. potassium phosphate
    c. aluminum acetate
    d. ammonium sulfate
42. Write the name of the following compounds containing polyatomic ions.
    a. $Al(OH)_3$
    b. Cu_2SO_4
    c. $NH_4C_2H_3O_2$

D. Objective: **Distinguish** *between elements and compounds on the submicroscopic level, using the atomic model.*

10. Draw pictures (or make models) to represent the submicroscopic nature of the following.
    a. a mixture of hydrogen and oxygen gas
    b. a compound of hydrogen and oxygen
    c. two oxygen atoms
11. Draw a picture to represent a single molecule of each of the following compounds.
    a. nitrogen monoxide and nitrogen dioxide (two common air pollutants)
    b. ammonia, NH_3 (a fertilizer, household cleaner, and industrial chemical)

SYMBOLS AND NAMES OF MOLECULAR COMPOUNDS

E. Objective: **Use chemical symbols** *to represent elements and formulas for compounds.*

12. Answer the questions in each set *without referring to the text.* Then check your answers. If you miss *any* item in the first set, review the material and then try the next set.

    Set I
    a. What element is represented by *K*?
    b. What is the symbol for mercury?
    c. What is the formula for a compound containing one atom of zinc and two atoms of iodine?

    Set II
    d. What element is represented by *Br*?
    e. What is the symbol for copper?
    f. What is the formula of a molecule containing one atom of phosphorus and five atoms of chlorine?

    Set III
    g. What element is represented by *Au*?
    h. What is the symbol for lead?
    i. What is the formula for a molecule containing one atom of boron and one atom of nickel?

13. Determine how many of each kind of atom is represented in each formula.
    a. H_2O_2 b. $CuSO_4$ c. $(NH_4)_2CO_3$
    d. $CH_3(CH_2)_5OH$

F. Objective: **Summarize** *information about the elements and their properties from the periodic table.*

14. Identify which elements mentioned in question 12, Sets I–III, are metals and which are nonmetals.
15. Do any of the elements mentioned in question 12, Sets I–III, appear in the same column of the periodic table? If so, which ones?
16. What characteristics distinguish metals from nonmetals?
17. What information about the metallic properties of elements can you obtain by looking at the positions in the periodic table?
18. For each of the following pairs of elements, choose the one that is more metallic in character.
    a. potassium or sulfur
    b. vanadium or iodine
    c. argon or molybdenum

G. Objective: **Identify** *the names of binary molecular compounds from their formulas.*

19. Write the name for each of the following compounds formed from two nonmetals.
    a. SiO_2 d. PCl_5
    b. BF_3 e. N_2O_5
    c. SO_2 f. NO
20. If you remember the meaning of the Greek prefixes, you should be able to write formulas for the following compounds. Try to do it without referring to Table 2-4.
    a. sulfur hexafluoride
    b. tetraphosphorus hexoxide
    c. iodine tribromide
    d. tetraphosphorous heptoxide
    e. carbon tetrachloride
    f. arsenic pentachloride

FORMULAS AND NAMES OF IONIC COMPOUNDS

H. Objective: **Predict** *the formulas of ionic compounds from ionic charge.*

21. The following compounds contain ions whose charges can be predicted from the periodic table. Use the periodic table to predict the formula of each compound.
    a. cesium bromide
    b. magnesium fluoride
    c. calcium oxide
    d. potassium iodide

22. Write formulas for the following compounds containing polyatomic ions.
    a. calcium hydrogen carbonate
    b. magnesium sulfite
    c. sodium hydroxide
    d. ammonium carbonate

I. Objective: **Identify** *the names of ionic compounds from their formulas.*

23. Name the following ionic compounds. Identify those that do not contain polyatomic ions.

a. NaI	e. $MgCO_3$	i. $CrCl_3$
b. $K_2Cr_2O_7$	f. $Na_2C_2O_4$	j. $FeSO_3$
c. $CoBr_2$	g. $CaCl_2$	k. $KHCO_3$
d. $Cu_3(PO_4)_2$	h. H_2SO_3	l. $Ca(NO_3)_2$

J. Objective: **Recognize** *the charge of an ion from a chemical formula.*

24. Write the formulas for these compounds.
    a. tin(II) chloride
    b. tin(IV) oxide
    c. iron(II) fluoride
    d. lead(II) chromate
    e. copper(II) sulfate
    f. iron(II) phosphate

25. The metals in the following compounds can form ions with different charges, so the charge cannot be predicted from the periodic table. Predict the charge on the metal ion and write the name for the compound.
    a. $FeCl_3$
    b. $CuBr_2$
    c. $NiCl_2$
    d. $Fe_2(SO_4)_3$
    e. $CuSO_4$
    f. Cu_2O

Critical Thinking

SYNTHESIS WITHIN THE CHAPTER

26. Write the name of each of the following formulas and indicate whether it represents a molecule or an ion.

a. SO_3^{2-}	c. CS_2	e. PO_4^{3-}	g. CO_3^{2-}
b. SO_3	d. P_4O_{10}	f. CO	h. NO_2

SYNTHESIS ACROSS CHAPTERS

27. Look up values for melting points, boiling points, densities, or other properties of the elements. Enter the values on a periodic table. Identify any trends in the properties as you go across or down a column of the table.

Projects

28. Many types of matter can be found as mixtures. Find out how mixtures of chemicals are separated so that valuable materials can be separated in a pure form or toxic materials can be separated and disposed of safely. If there is an industry in your community, you may be able to find out how the problem is solved in that industry. If not, you can read about it in the library.

Research and Writing

29. Pick an element and learn as much about it as you can. Write an advertising brochure for the element. Include information such as the following: Where is it found in nature? In what form is it found? How is it obtained in pure form? What commercial value does it have? What dangers are associated with its use? What are some of its properties? Become the class authority on this element and share your knowledge with your teacher and classmates.

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