23. What is the total number of atoms in $(NH_4)_2SO_4$? (1) 10 (2) 11 (3) 14 (4) 15

24. What is the total number of oxygen atoms present in one unit of $Mg(ClO_3)_2$? (1) 5 (2) 2 (3) 3 (4) 6

25. What is the total number of atoms of oxygen in the formula $Al(ClO_3)_3 \cdot 6H_2O$? (1) 6 (2) 9 (3) 10 (4) 15

26. Write the correct formulas for the following binary ionic compounds. (a) lithium fluoride (b) calcium oxide (c) aluminum nitride (d) sodium sulfide (e) magnesium bromide (f) beryllium chloride (g) potassium iodide (h) aluminum oxide (i) calcium fluoride (j) lithium oxide

27. Write the correct formulas for the following binary molecular compounds. (a) carbon monoxide (b) dinitrogen monoxide (c) phosphorus trichloride (d) boron tribromide (e) sulfur hexafluoride (f) carbon dioxide (g) carbon tetrabromide (h) nitrogen dioxide (i) sulfur dioxide (j) dichlorine monoxide

28. Write the correct formulas for the following compounds that contain polyatomic ions. (a) sodium hydroxide (b) potassium nitrate (c) potassium phosphate (d) magnesium sulfate (e) magnesium hydroxide (f) aluminum phosphate (g) aluminum nitrate (h) ammonium nitrate (i) ammonium sulfite (j) sodium carbonate

29. Name each of the following binary ionic compounds. (a) NaBr (b) MgS (c) CaO (d) AlP (e) KCl (f) $MgCl_2$ (g) AlF_3 (h) CaI_2 (i) Li_2S (j) BeO

30. Name each of the following binary molecular compounds. (a) O_2F_2 (b) SiF_4 (c) S_4N_4 (d) CF_4 (e) N_2Cl_2 (f) SF_2 (g) H_2S (h) P_4O_{10} (i) SO_3 (j) Cl_2O_7

31. Name each of the following compounds. (a) $Ca(NO_3)_2$ (b) KOH (c) $MgCO_3$ (d) $Al_2(SO_4)_3$ (e) NH_4Cl (f) Na_3PO_4 (g) $LiNO_3$ (h) $K_2Cr_2O_7$ (i) $Mg(C_2H_3O_2)_2$ (j) $(NH_4)_2SO_3$

32. Write formulas for each of the following compounds. (a) iron(II) oxide (b) tin(II) sulfide (c) copper(I) chloride (d) mercury(II) iodide (e) lead(II) nitrate (f) iron(III) oxide (g) tin(IV) oxide (h) copper(II) nitrite (i) lead(IV) oxide (j) gold(I) oxide

33. Write the names of each of the following using stock nomenclature. (a) CuCl (b) FeS (c) HgI_2 (d) $Pb(NO_3)_2$ (e) $Sn(OH)_2$ (f) $Cu(NO_3)_2$ (g) Fe_2O_3 (h) PbI_4 (i) SnO_2 (j) $FeCO_3$

34. How many metallic elements are present in the formula $NaKSO_4$?

35. When sulfur and oxygen combine to form a compound, which element should be written first? What values are considered in making this choice?

36. A student named $KClO_3$ potassium chlorine(V) oxide. Explain to her why the use of the stock system is not correct in this case, and write the correct name of the substance.

37. Vanadium has several oxidation states. Write correct formulas for vanadium(III) oxide and vanadium(V) oxide.

38. What incorrect information is given by the formula $MgOH_2$, instead of the correct formula, $Mg(OH)_2$?

Chemical Reactions and Equations

The world around us is constantly changing. Some of these changes result from substances undergoing phase changes, such as ice melting or water boiling. In these cases, the **physical changes** that have taken place have not resulted in the formation of a new substance, but rather only a change in appearance of the starting material.

Other changes are more dramatic. When a substance is burned, whether it is a piece of paper or gasoline, the substances produced are quite different from the starting materials. These changes in which the identity of the products differs from the identity of the reactants are called **chemical changes.** In this section you will learn how to use chemical symbols to form equations that represent these chemical changes. A well-defined chemical change is called a chemical reaction.

Chemical Equations

A chemical equation shows what takes place during a chemical reaction. It is similar to an algebraic equation in that what is written on one side of the equation equals what is written on the other side. An arrow is used instead of an equal sign to separate the sides of the equation. The arrow is read *produces* or *yields.*

A substance that enters into a reaction is called a **reactant** and is written to the left of the arrow. A substance that is produced by a reaction is called a **product** and is written to the right of the arrow.

The word equation for the burning of carbon is

carbon + oxygen → carbon dioxide

WRITING FORMULAS (CRISS-CROSS METHOD)

Name _____

Write the formulas of the compounds produced from the listed ions.

	Cl^-	CO_3^{-2}	OH^-	SO_4^{-2}	PO_4^{-3}	NO_3
Na^+						
NH_4^+						
K^+						
Ca^{+2}						
Mg^{+2}						
Zn^{+2}						
Fe^{+3}						
Al^{+3}						
Co^{+3}						
Fe^{+2}						
H^+						

NAMING IONIC COMPOUNDS

Name _____

Name the following compounds using the Stock Naming System.

1. $CaCO_3$ _____
2. KCl _____
3. $FeSO_4$ _____
4. $LiBr$ _____
5. $MgCl_2$ _____
6. $FeCl_3$ _____
7. $Zn_3(PO_4)_2$ _____
8. NH_4NO_3 _____
9. $Al(OH)_3$ _____
10. $CuC_2H_3O_2$ _____
11. $PbSO_3$ _____
12. $NaClO_3$ _____
13. CaC_2O_4 _____
14. Fe_2O_3 _____
15. $(NH_4)_3PO_4$ _____
16. $NaHSO_4$ _____
17. Hg_2Cl_2 _____
18. $Mg(NO_2)_2$ _____
19. $CuSO_4$ _____
20. $NaHCO_3$ _____
21. $NiBr_3$ _____
22. $Be(NO_3)_2$ _____
23. $ZnSO_4$ _____
24. $AuCl_3$ _____
25. $KMnO_4$ _____

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WRITING FORMULAS FROM NAMES

Name _____

Write the formulas of the following compounds.

1. ammonium phosphate _____
2. iron (II) oxide _____
3. iron (III) oxide _____
4. carbon monoxide _____
5. calcium chloride _____
6. potassium nitrate _____
7. magnesium hydroxide _____
8. aluminum sulfate _____
9. copper (II) sulfate _____
10. lead (IV) chromate _____
11. diphosphorus pentoxide _____
12. potassium permanganate _____
13. sodium hydrogen carbonate _____
14. zinc nitrate _____
15. aluminum sulfite _____

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