

STUDY GUIDE

Chapter 20

Formulas and Names of Compounds

Match each term in Column II with its description in Column I. Write the letter of the correct term in the space provided.

Column I

- _____ 1. prefix meaning six
- _____ 2. prefix meaning many
- _____ 3. prefix meaning two
- _____ 4. compound composed of two elements
- _____ 5. positively or negatively charged atom
- _____ 6. positively or negatively charged group of atoms
- _____ 7. compound that has water chemically attached to its ions
- _____ 8. number assigned to an element to show its combining ability in a compound
- _____ 9. without water
- _____ 10. number that tells how many atoms of an element are in a unit of the compound

Column II

- a. bi-
- b. ion
- c. binary
- d. anhydrous
- e. polyatomic ion
- f. subscript
- g. poly
- h. oxidation number
- i. hydrate
- j. hexa-

The words in each group below are related. Write a sentence, using all the words in the group, that shows how the words are related.

Example: compound, properties, elements

The properties of a compound differ from the properties of the elements making up the compound.

1. hydrate, water, ions _____

2. oxidation number, element, compound _____

3. zero, oxidation numbers, noble gases _____

4. oxidation number, Roman numeral, element _____

REINFORCEMENT**Chapter 20****Formulas and Names of Compounds**

Use the Periodic Table of Elements in your reference tables to identify the oxidation numbers of the elements in each group.

- _____ 1. any element in group 1
_____ 2. any element in group 17
_____ 3. any element in group 2
_____ 4. any element in group 18
_____ 5. any element in group 16

Answer the following questions in the spaces provided. Use the Periodic Table if you need help.

1. What is the usual oxidation number of oxygen? _____
2. What is the usual oxidation number of hydrogen? _____
3. What name is given to many of the elements that have more than one oxidation number? _____
4. What is the sum of oxidation numbers in a compound? _____
5. What is an oxidation number? _____

Write the formulas for the following compounds. Use the Periodic Table of the Elements or Oxidation Number in your reference tables for help.

1. copper(II) sulfate _____
2. calcium chloride _____
3. iron (II) oxide _____
4. copper(I) oxide _____
5. sodium sulfide _____

Complete the following table by providing the name of the compound and the total number of atoms in each formula given.

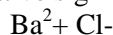
| Formula | Name | Number of atoms |
|---------------------------------------|------|-----------------|
| NH₄OH | | |
| NH₄Cl | | |
| Ag₂O | | |
| K₂SO₄ | | |
| Ca(NO₃)₂ | | |
| Na₂S | | |

ENRICHMENT**Chapter 20****Formulas and Names of Compounds***WRITING CHEMICAL FORMULAS WITH THE CRISSCROSS METHOD*

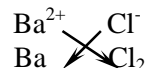
Oxidation numbers are useful for writing chemical formulas. Use your textbook or a periodic table to find oxidation numbers for elements and polyatomic ions. In the following examples, oxidation numbers and the crisscross method will be used for writing chemical formulas. Remember that subscripts in a formula give the ratio of atoms in a compound. After crisscrossing, simplify the ratio, if necessary.

Example 1. What is the formula for barium chloride?

Solution: Barium is in Group 2. Elements in this group tend to lose two electrons, so their oxidation number is 2+. Chlorine is in Group 17. Elements in this group tend to gain one electron. Chlorine has an oxidation number of 1—. Now write the symbols in the correct order. The metal ion is written first. Write the oxidation numbers as superscripts. For oxidation number of 1+ or 1—, only the positive or negative sign is written.

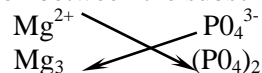


Next, crisscross the numbers only and show them as subscripts. The number 1 does not need to be written.



The correct formula for barium chloride is BaCl_2 .

Example 2. What is the formula for magnesium phosphate? Solution: Write the parts of the formula in the correct order. Assign oxidation numbers. Write the formula for the compound by crisscrossing the superscripts. Since the phosphate ion is used more than once, place it in parentheses. The parentheses prevent confusion between the subscripts.



The correct formula for magnesium phosphate is $\text{Mg}_3(\text{PO}_4)_2$.

Use the crisscross method to write the chemical formulas for the compounds described below.

- The compound ammonium selenate is used as a mothproofing agent. The selenate ion is written as SeO_4^{2-} . What is the formula for this compound?
- Titanium oxide is used as a white paint pigment. If titanium has an oxidation number of 4+ in this compound, what is this compound's formula?
- Zinc iodide is used as an antiseptic. What is its formula?
- Potassium chloride is used in fertilizer, photography, and as a salt substitute. What is its chemical formula?
- Write the correct chemical formula for a compound containing barium and oxygen. What is the name of this compound?

