ACTIVITY 28: CHEMICAL FORMULA SIMULATIONS

QUESTION

How is the ratio of elements in a chemical formula determined?

SAFETY

Use care in working with scissors, as they can be sharp. Keep them out of the reach of children.

MATERIALS

Photocopy of Atom Cutouts page (p. 239), scissors

PROCEDURE

In this activity, you will simulate the writing of chemical formulas by cutting out some shapes and putting them together to find out how many of each it takes to completely fill up all of the connectors. This is, in a way, how ions get together to form molecules in an ionic bond. Anions get together with cations to form molecules. Anions are negative ions that have gained electrons and are represented by the consonants. Cations are positive ions that have lost electrons and are represented by the vowels. Sometimes two anions will get together and share electrons (in a covalent bond), but two cations will not form a molecule. The number of electrons that an ion wants to exchange with its partner is represented by its oxidation number or charge. The two terms are similar, and in this book, I will use *oxidation number* from now on since the word itself is not nearly as important as the concept. Some elements have different oxidation numbers under different circumstances, so to simplify this activity, you will use fake elements that always have the same oxidation number.

Keep in mind that this activity is not meant to show you physically how bonds are formed; it is simply intended to show you how to determine the chemical formula when two elements combine.

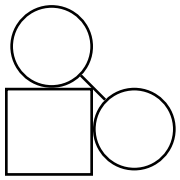
1. Roughly cut all of the pieces on page 239 (do not waste too much time trying to make them perfect).
2. Read the rules below.
3. Combine the given pieces in the combinations below and write the formula for each combination.
4. Do not throw away the pieces; you will need them again.

Here are some simple rules for combinations:

1. When combined, there should be no unused C or O in the end. (No empty slots!)
2. You may rotate, flip, and turn the pieces any way that you want. Do not cut or break them. Hint: You may need more than one of the (+) and/or (-) pieces.
3. When you write the formula, the positive one (the vowel) always goes first.
4. The number of each piece in the finished product is written as a subscript number without the oxidation number. You do not need to write "1" if there is only one of a piece. For example, two A^{+1} pieces combined with one D^{-2} piece would have the formula A_2D, not A_2D_1.
5. If you can simplify by dividing both numbers by 2, do it. For example, you would not write Mg_2O_2, you would simplify it to MgO. You would not write C_2O_4; you would simplify it to CO_2.
6. The total (+) and (-) charge in each compound will always be zero.

Problems

1. Write the formula when A and C combine.
2. Write the formula when A and D combine.
3. Write the formula when A and F combine.
4. Write the formula when A and G combine.
5. Write the formula when I and B combine.



6. Write the formula when I and D combine.
7. Write the formula when I and G combine.
8. Write the formula when U and C combine.
9. Write the formula when U and F combine.
10. Write the formula when U and G combine.

Activities 28 and 29