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## Chemical Formulas Notes

### What is a chemical formula?

A **chemical formula** is a written way to show what kind of atom(s) and how many of each type of atom(s) are bonded together to make up a substance.

Chemical formulas use chemical symbols to show what kind of atoms and **subscript** numbers (the little 2 in  $H_2O$  is a subscript number) to indicate how many of each kind of atom.

Ex. Hydrogen gas' chemical formula is  $H_2$ .

- In  $H_2$ , the capital H is the chemical symbol for Hydrogen and the small (subscript) number 2 means that there are 2 atoms of Hydrogen.

**WHEN THERE IS NO SUBSCRIPT NUMBER IT MEANS THERE IS ONE OF THAT TYPE OF ATOM!**

Ex. Water's chemical formula is  $H_2O$ .

- in  $H_2O$ , the H is the symbol for Hydrogen, and the subscript 2 means there are two of them (just like the example above.) The capital O is the symbol for oxygen. Since there is no subscript number after it, It means that there is just 1 oxygen.

Ex. Peroxide's chemical formula is  $H_2O_2$ .

- In  $H_2O_2$  there are 2 hydrogen and 2 oxygen atoms bonded together.

### What are coefficients?

A **coefficient** shows how many of each molecule there are. Coefficients are used with chemical formulas.

A coefficient is shown as a large number placed in front of a chemical formula.

Ex. If you had two water molecules you would write  $2 H_2O$

- the large 2 in front of the  $H_2O$  means that there are two  $H_2O$  molecules.

**WHEN THERE IS NO COEFFICIENT IT MEANS THERE IS ONE OF THAT MOLECULE!**

Ex. If you had one molecule of peroxide you would write  $H_2O_2$ . Not  $1 H_2O_2$ .

- If you only have one molecule of a substance you do not need to put a 1 as a coefficient.

### What's up with those parentheses?

Parentheses are sometimes used in chemical formulas to show groups of atoms which stay together even when they are part of a larger molecule. These parentheses work just like they do in Math.

Ex.  $(NH_4)_2SO_4$  is ammonium sulfate. In ammonium sulfate,  $NH_4$  is in parentheses with a subscript 2 outside the parenthesis. This means that there are 2  $NH_4$  groups attached to the  $SO_4$ .

- Overall there are  $2 \times 1$  Nitrogen atoms,  $2 \times 4$  Hydrogen atoms, 1 Sulfur atom, and 4 Oxygen atoms in ammonium sulfate.

Parentheses are used to enclose the formulas for polyatomic ions. (We'll worry about those later.)

