Name: _____ Teacher: _____ Pd. ___ Date: _____

# STAAR Science Tutorial 02
# TEK 8.5D: Chemical Formulas

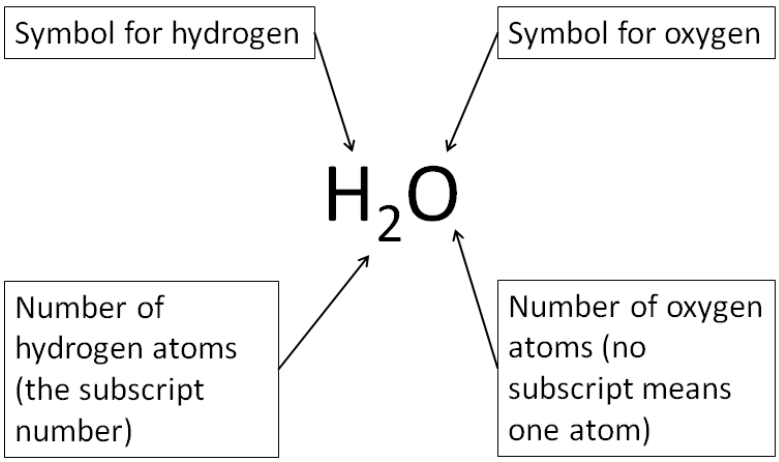
***TEK 8.5D: Recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts.***

## Chemical Formulas

- A **chemical formula** is a description of the number and kind of atoms found in a single molecule of a substance, using the symbol for each element and a subscript number to state the number of atoms of the element to the left of the subscript.

- Scientists use chemical formulas such as NaCl instead of common names (table salt) or chemical names (sodium chloride) because it is shorter, more accurate, and universally understood.

- Examples of chemical formulas include $H_2O$ (water), $CO_2$ (carbon dioxide), $HC_2H_3O_2$ (vinegar), $NaHCO_3$ (baking soda), $NH_4$ (ammonia), and $C_6H_{12}O_6$ (glucose).




- If asked how many different elements are in a chemical formula, remember that each element symbol starts with a capital letter. But be careful to not count an element twice if repeated in the formula. In $HC_2H_3O_2$, there are only three elements, carbon, hydrogen and oxygen, even though there are four capital letters. (The H symbol is repeated twice in the formula.)

- To count the total number of atoms in a formula, count each symbol without a subscript number as one atom, and then add together all of the subscript numbers. In $HC_2H_3O_2$, there are 8 atoms: four hydrogen (H), two carbon (C) and two oxygen.

- If part of the formula is enclosed in a parenthesis, with an outside subscript number to the right of the parenthesis pair, the subscript number should be multiplied by the subscript numbers for each symbol within. For example in $CO(NH_2)_2$ there are a total of 8 atoms: one carbon (C), one oxygen (O), two nitrogen (N) and four hydrogen (H).

## Practice Questions

**Write E for Element or C for Compound for each example (#1-5):**

1. _____$Fe_2O_3$ 2.____$SiO_2$ 3.____Zr 4._____Fr 5.____NaCl

6. Write an example of an element using its name and symbol: _____

7. Write an example of a compound using symbols: _____

8. How many elements are in Asbestos $H_4Mg_3Si_2O_9$: _____ and name the elements: _____

9. $Zn + 2\ HCl \rightarrow ZnCl_2 + H_2$ : How many elements are in the reaction to left (hint: only list how many different symbols you see)? _____ Name the elements: _____

**How many atoms of each element are in each formula? (#10-13)**

10. $H_2O_2$: Hydrogen ____; Oxygen _____;

11. $H_2SO_4$: Hydrogen ____; Sulfur _____; Oxygen _____;

12. $NaHCO_3$: Sodium ____; Hydrogen _____; Carbon _____; Oxygen _____;

13. $Ca_3(PO_4)_2$: Calcium ____; Phosphorus _____; Oxygen _____;

**Molecule (M), Compound(C), or Both (B)? (#14-17)**

14. $O_2$=_____ 15. $CO_2$=_____ 16. $H_2O_2$=____ 17. $Cu_4$=____