

STAAR Science Tutorial 07 **TEK 6.5C: Elements & Compounds**

TEK 6.5C: Differentiate between elements and compounds on the most basic level.

Elements & Atoms

- An **element** is a substance that cannot be separated into simpler substances by physical or chemical means. An element is already in its simplest form.
- The smallest piece of an element that still has the properties of that element is called an **atom**.
- An element is a pure substance, containing only one kind of atom. For example, the element gold is made only of gold atoms.
- Examples of elements include oxygen, potassium, carbon, hydrogen, sodium, and iron. The Periodic Table of Elements is a list of all the elements that have been discovered and named.
- Elements are represented on the Periodic Table by a one or two letter **symbol**. If it is a one letter symbol, it is always capitalized (such as S for sulfur). If it is a two letter symbol, the first letter is always capitalized and the second letter is always lowercase (such as He for helium).
- Most symbols look like abbreviations of the English element name. But some element symbols are based on the original Latin or Greek name for the element, such as gold (Au), silver (Ag), iron (Fe), sodium (Na), potassium (K) and mercury (Hg).

Compounds

- A **compound** is a substance that is made by chemically bonding two or more elements in a set ratio. For example, sodium (Na) and chlorine (Cl) in a 1:1 ratio makes the compound sodium chloride, commonly known as table salt. The symbols of the elements in a compound can be listed together to describe the "chemical formula of the compound. Sodium chloride has the chemical formula "NaCl".
- Compounds have different chemical and physical properties than the elements from which they are made.
- For example, while sodium is a reactive metal and chlorine is a poisonous gas, the resulting white powder is neither a metal nor a gas, and is non-poisonous.

- Water, a liquid at room temperature that can be used to put out fires, is made of two gases, hydrogen and oxygen, that burn when combined.

Molecules

- A **molecule** is made of two or more atoms chemically bonded together. When the atoms are of different elements, it is a molecule of a compound (the smallest piece of a compound). When the atoms are of the same element, it is a molecule of that element.
- Examples of element molecules include oxygen (O_2), hydrogen (H_2) and nitrogen (N_2).
- Examples of compound molecules include water (H_2O), salt ($NaCl$), carbon dioxide (CO_2), glucose ($C_6H_{12}O_6$), and caffeine ($C_8H_{10}N_4O_2$).

Practice Questions

1. A substance made of two or more elements chemically bonded together is a(n) _____.
2. A substance made of only one kind of atom, and that cannot be separated into any simpler substance, is a(n) _____.
3. The smallest piece of an element is a(n) _____.
4. A particle with two or more atoms bonded together is a(n) _____.
5. Molecules can either be of a _____, when they contain two or more elements, or of just one _____.
6. A single particle of a compound is a(n) _____.
7. An example of an element is _____, with the symbol _____ for a single atom of that element.
8. An example of a molecule of a single element is _____, which has two atoms of the element _____.
9. An example of a compound is _____, which has the chemical formula _____, and is made of the elements _____ and _____.
10. True or False: Compounds have the same physical and chemical properties as the elements they are made from. _____