Essential Questions

1. What are the difference among elements, compounds and mixtures?

2. How are the atoms in air, water, and oxygen the same and how are they different?

3. How can art be related to elements, compounds, and mixtures?

Molecules

Molecules form when atoms are chemically joined together, and are made up of two or more atoms. The size of a molecule depends upon the size and number of atoms that make it up. For example, the oxygen molecules we breathe are made out of only two atoms joined together and can be represented by the chemical formula O₂. On the other hand, one molecule of aspirin is made of twenty-one atoms and is represented by the chemical formula of C₉H₈O₄.

Elements

Elements are classified into two major types: elements and compounds. Remember, if a molecule is made out of only one type of atom, it is an element. Elements can have just one atom, or they can have many of the same atoms joined together. If all of the atoms in a molecule are alike, then the molecule is classified as an element. For example, the O₂ we breathe is an element, since both of the atoms are oxygen. Air also contains other elements, such as Helium (H), Nitrogen (N₂), Hydrogen (H₂), Argon (Ar) and Neon (N).

Which of these elements are molecules and which are atoms?
Compounds

Molecules that have more than one type of atom are called compounds. All molecules are made of atoms that have been joined together. However, if all of the atoms are not the same, the molecule is classified as a compound. The aspirin molecule of \( \text{C}_9\text{H}_8\text{O}_4 \) is made of three different types of atoms: carbon atoms, hydrogen atoms, and oxygen atoms. Therefore, \( \text{C}_9\text{H}_8\text{O}_4 \) is a compound. Air contains compounds such as carbon dioxide (\( \text{CO}_2 \)), methane (\( \text{CH}_4 \)), and water vapor (\( \text{H}_2\text{O} \)). Notice that all these examples have two or more different elements in them.

Mixtures

Mixtures are composed of two or more substances which each keep their original properties and do not combine chemically when put together. A salad is an example of a mixture. Each part keeps its own properties—lettuce, tomatoes, carrots, peppers all taste like themselves—but they are all combined to form a salad. The special trait of mixtures is that physical forces can still remove the basic parts. Air is considered a mixture, because it contains different elements and compounds, but each one still maintains its own properties. The oxygen in air is mixed with other elements and compounds, but it is still oxygen.

Art Connection

The Metro Nashville Arts Commission has engaged two internationally-known artists, Thornton Dial and Lonnie Holley, to create site-specific public art works for Edmondson Park in Nashville, Tennessee. This project honors William Edmondson, a native of Davidson County, a self-taught sculptor, and the first African American artist to have a solo exhibition at the New York Museum of Modern Art (1937). Thornton Dial and Lonnie Holley, like Edmondson, are self-taught artists.
Thornton Dial  
*Born 1928 in Bessemer, Alabama*

Dial worked as an industrial worker until 1981, was “discovered” in 1987 by friend, Lonnie Holley and Art Collector William Arnett. His works are largely found objects, both 2D and 3D. Dial is one of the most notable self-taught artists of the last century, exhibiting work in major museums across the US. His work is featured in numerous public and private collections such as Smithsonian American Art Museum and Whitney Museum of American Art. Thornton Dial continues to create work with the help of his son, artist Richard Dial.

Lonnie Holley  
*Born 1950 Birmingham, Alabama*

Holley is a self-taught artist, inspired to pursue art after carving tombstones for his sister’s two children who died in a house fire. Like William Edmondson, Holley believes that his work and materials are divinely inspired. Holley’s works include carved sandstone and found object assemblages. Some of the materials used in these assemblages include: orphaned shoes, plastic flowers, tattered quilts, tires, animal bones, VCR remotes, wooden ladders, an old tailor’s dummy, a broken Minolta EP 510 copy machine, a pink scooter, rusted oil drums, metal pipes, broken headstone fragments, a half-melted television set, a syringe, a white cross. Holley’s sculptures have been displayed in institutions such as The Smithsonian American Museum of Art, The American Folk Art Museum, The High Museum of Art and the White House.

**Critical Thinking: Art and Chemistry—is there a connection?**

- Thinking about some of the materials the Mr. Holley used in his artwork, please fill in the chart below, and try to list any elements, compounds, and mixtures that you can determine from the above list of materials:

<table>
<thead>
<tr>
<th>Item from the Art Work</th>
<th>Element</th>
<th>Compounds</th>
<th>Mixtures</th>
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