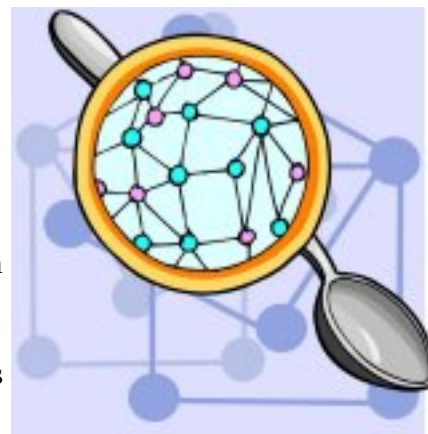


Matter, Elements, Molecules, and Compounds

By Cindy Grigg

¹ What is matter? Matter is the stuff that makes up everything in the universe. Matter has mass and takes up space. Matter is made of atoms. Solids, liquids, gases, and plasma are all matter. When all atoms that make up a substance are the same, then that substance is an element. Elements are made of only one kind of atom. Because of this, elements are called "pure" substances. An atom is the smallest piece of an element that still has the properties of that element. For example, aluminum is a lightweight, shiny metal. If we took a piece of aluminum and cut it into small pieces, it would still be aluminum. It would still be a lightweight, shiny metal. The smallest piece would be called an atom. Atoms are so small they cannot be seen even with a microscope. Atoms consist of a nucleus that has protons and neutrons surrounded by electrons outside the nucleus.



² Atoms of different elements can combine to make new substances. A molecule is formed when two or more atoms join together chemically. If atoms combine that are of two or more different elements, we call that a compound. All compounds are molecules, but not all molecules are compounds. When two hydrogen atoms combine with one oxygen atom, it becomes the compound water. The oxygen we breathe is actually two atoms of oxygen combined, so it is a molecule of oxygen. We use abbreviations for elements, molecules, and compounds. These abbreviations are called chemical symbols. The chemical symbol for an oxygen molecule is O₂.

³ The compound water has a chemical symbol of H₂O. This is like the "recipe" for water. It tells us that a water molecule is made of two atoms of hydrogen and one atom of oxygen. Oxygen is a gas that we can't see, hear, smell, taste, or feel. But it's in the air we breathe, and without it, we would die. Hydrogen, also a gas, is the lightest substance on Earth. When two atoms of hydrogen join together with one atom of oxygen, those two gases make a liquid compound we call water. Water, a liquid at room temperature, is a very different substance from the two gases that it is made of. Many different compounds can be made when different atoms combine.

⁴ There are about 92 elements that naturally occur on Earth. Different sources will say different numbers of elements occur naturally. Many elements have been made by scientists in a laboratory. With that many elements to form combinations, many millions of different molecules and compounds can be made. How is that possible? Think of our alphabet. The English alphabet has 26 letters. Those 26 letters can be combined in different ways to make millions of words. Atoms are like the letters of the alphabet and the compounds they make are like words.

⁵ Now that you have learned the language of chemistry, you are ready to learn more about elements, atoms, and the ways they combine.

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<p>1. What is matter?</p> <p><input type="radio"/> A The stuff that makes up everything in the universe</p> <p><input type="radio"/> B Has mass and takes up space</p> <p><input type="radio"/> C Is made of atoms</p> <p><input type="radio"/> D Can be solid, liquid, gas, or plasma</p> <p><input type="radio"/> E All of the above</p>	<p>2. What is an element?</p> <p><input type="radio"/> A A pure substance</p> <p><input type="radio"/> B Made of only one kind of atom</p> <p><input type="radio"/> C Both A and B</p> <p><input type="radio"/> D None of the above</p>
<p>3. What is an atom?</p> <p><input type="radio"/> A A metal</p> <p><input type="radio"/> B A gas</p> <p><input type="radio"/> C The smallest piece of an element that still has the properties of that element</p> <p><input type="radio"/> D A solid</p>	<p>4. Atoms consist of _____.</p> <p><input type="radio"/> A Solids</p> <p><input type="radio"/> B Gases</p> <p><input type="radio"/> C A nucleus that has protons and neutrons with electrons outside</p> <p><input type="radio"/> D Two or more molecules</p>
<p>5. Abbreviations for elements, molecules, and compounds are called _____.</p> <p><input type="radio"/> A Shorthand</p> <p><input type="radio"/> B Abbr.</p> <p><input type="radio"/> C Letters</p> <p><input type="radio"/> D Chemical symbols</p>	<p>6. Elements are called "pure" substances. Which synonym of "pure" best fits the original meaning of this sentence?</p> <p><input type="radio"/> A Clean</p> <p><input type="radio"/> B Complete</p> <p><input type="radio"/> C Uncontaminated</p> <p><input type="radio"/> D Unmixed</p>
<p>7. Hydrogen, also a gas, is the lightest substance on Earth. What is meant by the word "lightest"?</p> <p><input type="radio"/> A Having the most luminosity</p> <p><input type="radio"/> B Having the least amount of darkness</p> <p><input type="radio"/> C Weighing the least amount</p> <p><input type="radio"/> D Having the least amount of color</p>	<p>8. Atoms are like the letters of the alphabet and the compounds they make are like words. This sentence:</p>