

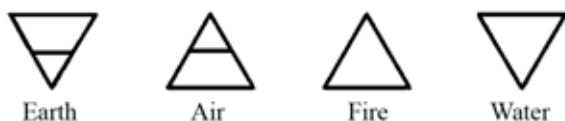
# Educational Innovations<sub>LLC</sub>

## Alchemy and the Four Elements: A Brief History

Fifth century B.C., pre-Socratic Greek philosopher Empedocles (c. 492-432 B.C.) is credited with the idea that everything is made of four fundamental elements: earth, air, fire, and water. He believed that these four elements have always existed in fixed amounts, and that there are two major forces which act upon these elements to both create and destroy, the forces of Love and Strife. He was also the first to theorize that light has a finite speed.

Plato (c. 427-347 B.C.) and Aristotle (c. 384-322 B.C.) expanded on the idea of the four elements. Plato took a mathematical approach, and stated which shapes the particles of each element are. Aristotle did not agree with Plato's approach, and instead decided that each element was some combination of either hot or cold, and wet or dry. According to him, earth was cold and dry, fire was hot and dry, air was hot and wet, and water was cold and wet. He also referred to a fifth element, which he called "quintessence", which made up things metaphysical.

It was Aristotle's approach that caught on, and prevailed throughout the Middle Ages. The four elements were said to be a part of the four humors existing in the human body. Air was matched up with the sanguine humor, fire with choleric, earth with melancholic, and water with phlegmatic. Every substance was believed to be made of a combination of the four elements in different ratios. Even as the alchemists discovered other elements, such as mercury and gold, they still believed that each element was made of a combination of the original four. This is why they believed they could make gold out of other things, like lead, simply by changing the ratio of the four basic elements within. The alchemists each had their own symbols for each element, as they saw them, which resulted in many different symbols for each. The four symbols for the four basic elements were most commonly seen as variations on the Greek letter Delta, as shown below.



In the 1700's, scientists started to discover the elements as we know them today. Finally, in 1869, Dmitry Ivanovich Mendeleev (1834-1907 A. D.) discovered that if the elements were placed in order by atomic weight (later to be changed to atomic number) then properties of the elements seemed to be repeated in a periodic way. He formed the periodic law, and the first periodic table of elements.

This tongue-in-cheek t-shirt (designed by our own Laurie Neilsen) is perfect for introducing a unit on the periodic table, or to wear to that first day of Chemistry class or to your local Renaissance Faire. We guarantee people will ask you about it! Made of 100% heavyweight, pre-shrunk cotton.



362 Main Avenue  
Norwalk, CT 06851 USA  
[www.teachersource.com](http://www.teachersource.com)

Phone (203) 229-0730  
Fax (203) 229-0740  
[info@teachersource.com](mailto:info@teachersource.com)