



# Chemist versus Alchemist

Understanding the links  
between the modern science  
and the ancient tradition

by Dr. S Sivaram

Chemistry is a very old science. References to chemical transformations and the nature of matter date all the way back to the Egyptian and Greek civilisations. In fact, modern chemistry has its roots in the ancient tradition of alchemy, which sought to transform **base metals** like lead into gold. For instance, the 'Father of Modern Chemistry', Robert Boyle (1627-91) was fascinated by alchemy, and so was Isaac Newton. So much so that Newton is believed to have written more about alchemy than physics and mathematics put together.

The written origins of alchemy can be traced back to Hellenistic Greece (323 BC-140 BC). Muslim scholars in turn translated these Greek texts into Arabic and called their study 'al-chemia'. At the same time, matter and its transformation was studied with growing interest in China and India (where its study was called 'Rasayana').

Modern chemistry began to emerge sometime between the seventeenth and eighteenth centuries, thanks to scientists like Boyle and Antoine Lavoisier. In 1661, Boyle wrote the classic chemistry text, *The Sceptical Chymist*, in which he defined the term 'element'. Two centuries later, John Dalton (1766-1844) proposed the atomic theory and Dmitri Mendeleev (1834-

1907) discovered the periodic table. Then in 1911, Ernest Rutherford (1871-1937) discovered the structure of an atom, an event so revolutionary, that chemistry was transformed beyond the wildest imagination of the alchemists.

Over the past 100 years, chemistry has grown into a precise science dealing with the composition, structure and properties of various substances that make up matter. Although chemists have not yet been able to convert base metals like copper and lead to gold as the alchemists dreamt of doing, they have **synthesised** quartz from silicon and diamonds from carbon and created new elements like plutonium and nobelium through **transmutation**.

But where do the alchemists fit into all of this? Were they really pioneers of chemistry? And did they practice science or magic? In recent years, there has been a resurgence of interest in the work of early alchemists. Their closely guarded secrets have been uncovered, providing a rich source of information to historians of chemistry.

We now know that alchemists were the first to practice experimental chemistry. They created laboratories, designed apparatus made of glass, metal and wood and invented

techniques like **distillation**, **titration**, **precipitation** and **crystallisation** — processes that modern chemists use even today. The alchemist's obsession with fantastic ideas like the **Philosopher's Stone**, **Phlogiston** and **Ether** that supposedly had the power to transform matter, later led to the discovery of the elements, atoms, oxygen and so on.

Instead of thinking of alchemists as crooks, we now see them as seekers of knowledge who worked with well-constructed, but wrong theories. It was their desire to seek

experimental verification for their theories that led to the evolution of chemistry as a science. The alchemists remind us that all theories need to be treated cautiously, and that rigorous experimentation holds the key to the scientist's quest for truth. Today, chemistry is seen as the quintessential experimental science, and for this, we need to thank the ancient alchemists. ●

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Artwork: Somesh Kumar