

# Chemistry



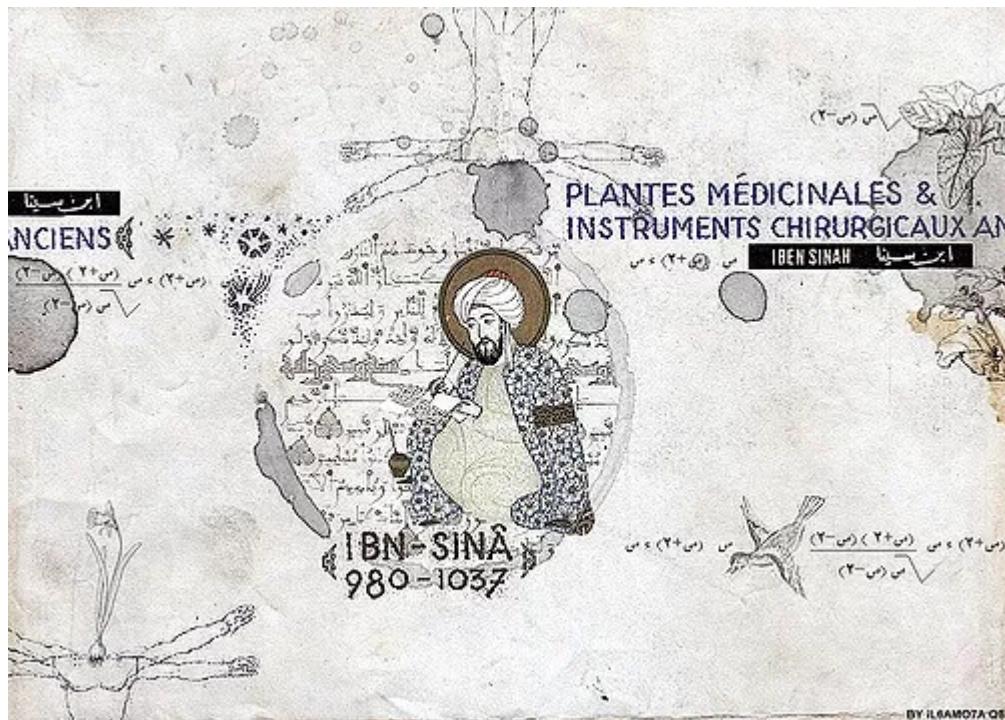
## Chemistry

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From the 10th century to the present time, the origin of alchemy, the true authorship of the latin and Arabic alchemecal writings, were attributed deleted a letter to Al-Jabr Ibn Hayyan. He (Geber), who flourished in Kufa about 776 A.D., is known as the father of modern chemistry and along with Zakariya Razi, stands as the greatest names in the annals of chemical science during medieval times. He received his education from Omayyad Prince Khalid Ibn Yazid Ibn Muawiyah and the celebrated Imam Jafar al-Sadiq. He worked on the assumption that metals, such as lead, tin and iron, could be transformed into gold by mixing certain chemical substances. It is said that he manufactured a large quantity of gold with the help of that mysterious substance and two centuries later, when a street was rebuilt in Kufa, a large piece of gold was unearthed from his laboratory. This is from a paragraph below. It seemed to fit better here.

### Islamic Era Illustration Laboratory

Al-Jabr Ibn Hayyan (d. 815) regarded as the father of chemistry, said "all matters can be traced to a simple, basic particle composed of a lightning-like charge and fire, which serves as the smallest indivisible unit of matter." He discovered as many as 19 elements and is credited with correct measurements of specific weights. He perfected chemical processes such as distillation, crystallization and sublimation. He was also the first to distill vinegar into acetic acid, to introduce the relative solubility or insolubility of substance in solutions, and the first to use glass tubes, tubes and bottles on a large scale. He mastered the use of chemical purification processes: distillation, sublimation and precipitation. Alcohol and extracts of herbs were used in surgery. Al-Jabr, and Zakiriyah Razi were regarded as the founders of chemistry as an exact science.



It is said that he manufactured a large quantity of gold with the help of that mysterious substance and two centuries later, when a street was rebuilt in Kufa a large piece of gold was unearthed from his laboratory. He laid great emphasis on the importance of experimentation in his research and hence he made great headway in chemical science, Western writers credit him with the discovery of several chemical compounds, which are not mentioned in his twenty-two extensive Arabic works. According to Max Meyerhof,

"His influence may be traced throughout the whole historic course of European alchemy and chemistry."

Al-Jabr is credited, with the writing of 100 chemical works. "Nevertheless, the works to which his name was attached" says Hitti, "was after the 14th century, the most influential chemical treatises in both Europe and Asia." "He explained scientifically the two principal operations of chemistry, calcination and reduction, and registered a marked improvement in the methods of evaporation, sublimation, filtration, distillation and crystallization."

#### Islamic Era Laboratory Potries

He also modified and corrected the Aristotelian theory of the constituents of metal, which remained unchanged until the beginning of modern chemistry in the 18th century. He has explained in his works the preparation of many chemical substances including "Cinnabar" (sulfide of mercury) and arsenic oxide. It has been established through historical research that he knew how to obtain nearly pure vitrilos, alums, alkalis and how to produce "the so-called liver" and milk of sulfur by heating sulfur with alkali.

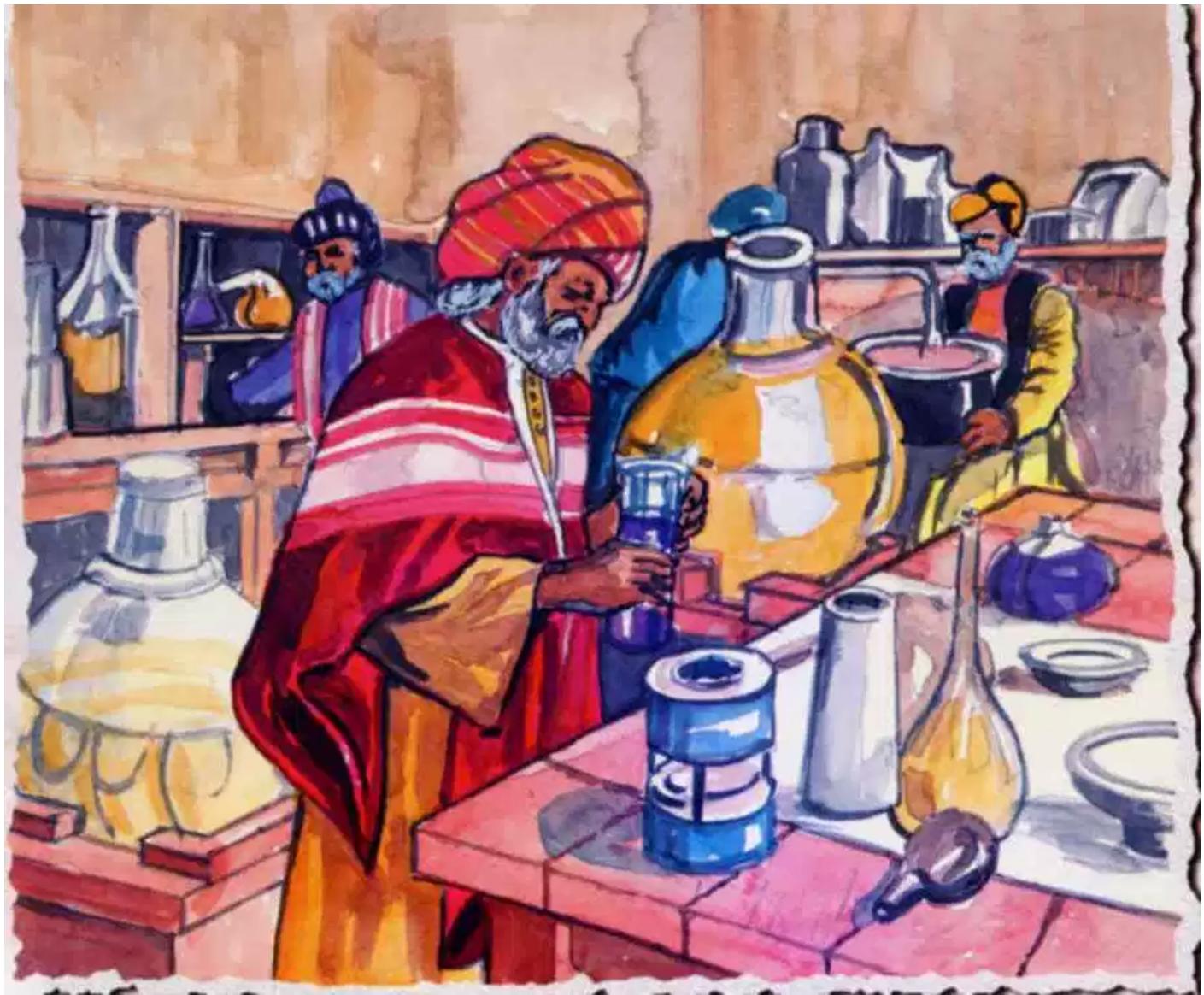
He prepared mercury oxide and was fully conversant with the preparation of crude sulfuric and nitric acids. He knew the method of the solution of gold and silver with this acid. His chemical treatises on such subjects have been translated into several European languages including Latin and several technical scientific terms invented by al-Jabr have been adopted in modern chemistry. A real estimate of his achievements was only possible when his enormous chemical work, including the Book of Seventy, was published.

Richard Russell (1678, A.D.) an English translator ascribes a book entitled Sun of Perfection to al-Jabr. A number of his chemical works have been published by Berthelot. His books translated into English are the Book of Kingdom, Book of Balances and Book of Eastern Mercury.

#### Al-Razi

Al-Jabr also advanced a theory on the geologic formation of metals and dealt with many useful practical applications of chemistry such as refinement of metals, preparation of steel and dyeing of cloth and leather, varnishing of waterproof cloth and use of manganese dioxide to color glass.

Al-Jabr was recognized as the master by the later chemists including al-Tughrai and Abu al-Qasim al-Iraqi who flourished in the 12th and 13th centuries respectively. These Muslim chemists made



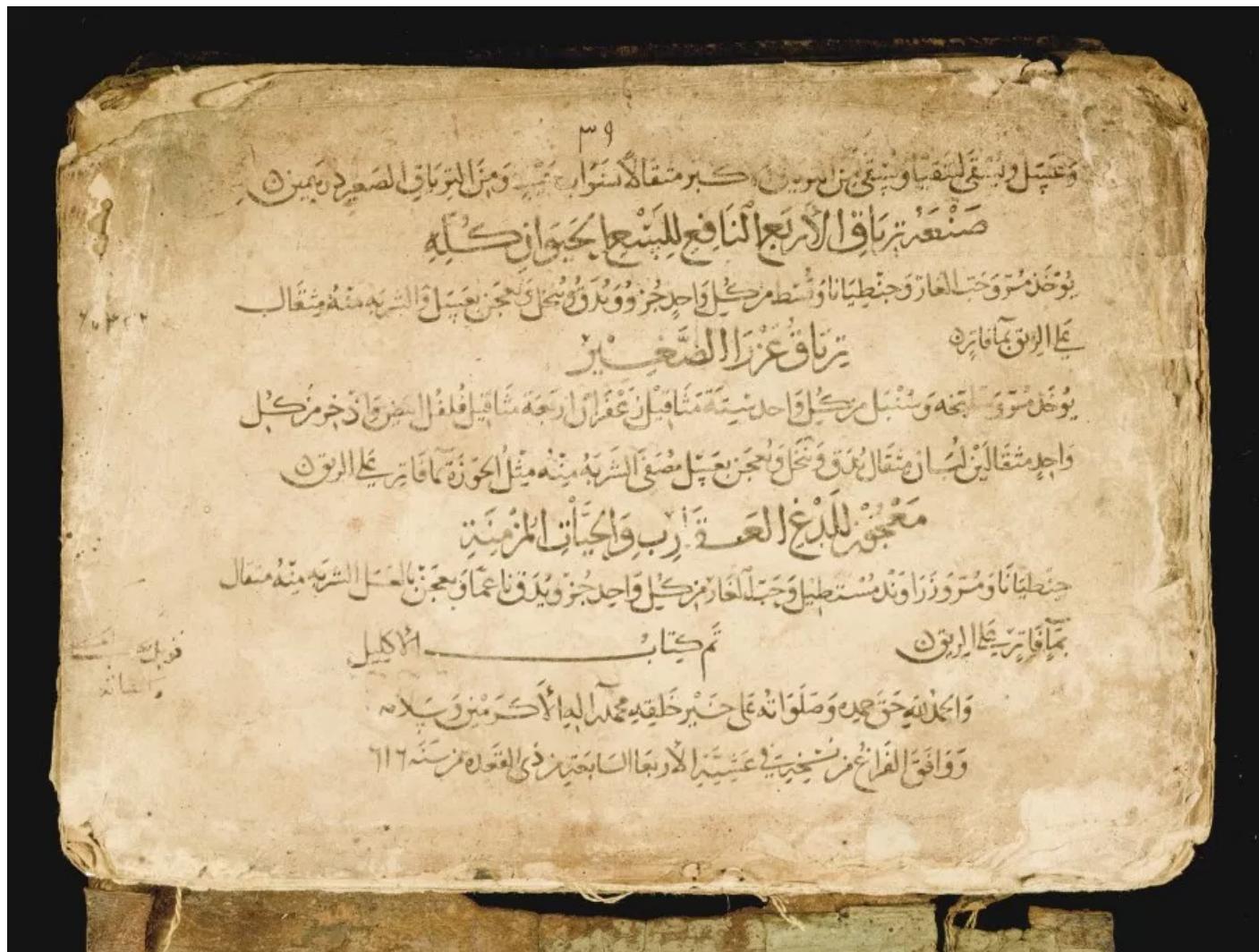
little improvement on the methods of Al-Jabr. They confined themselves to the quest of the legendary elixir which they could never find.

Zakariya Razi known as Rhazas in Latin is the second great name in medieval chemical science. Born in 850 A.D. at Rayy, he is known as one of the greatest physicians of all times. He wrote *Kitab al Asrar* in chemistry dealing with the preparation of chemical substances and their application. His great work of the art of alchemy was recently found in the library of an Indian prince.

Razi has proved himself to be a greater expert than all his predecessors, including al-Jabr, in the exact classification of substances. His description of chemical experiments as well as their apparatus, are distinguished for their clarity which were not visible in the writings of his predecessors.

Al-Jabr and other Arabian chemists divided mineral substances into bodies (gold, silver etc.), souls (sulfur, arsenic, etc.) and spirits (mercury and sal-ammoniac) while Razi classified his mineral substances as vegetable, animal and mineral. The mineral substances were also classified by al-Jabr. Abu Mansur Muwaffaq also contributed to the method of the preparation and properties of mineral substances.

Abul Qasim who was a renowned chemist prepared drugs by sublimation and distillation. High class sugar and glass were manufactured in Islamic countries. The Arabs were also experts in the manufacture of ink, lacquers, solders, cements and imitation pearls. The famed physician, ar-Razi, d. 925 was also a chemist.



He wrote a book, *Sir al-Asrar, the Secret of Secrets* which reveals much of the properties, colors and types of minerals and mineralogy discovered by all civilizations. This book was the first example of a chemistry lab manual. The chemicals he experimented with included nitric and sulfuric acid. His laboratory included burners, water baths, a hearth, a kiln, bellows, filters, ceramic dishes, flasks, and vials. All these devices are part of today's labs.

This, a 13th century book, was translated four centuries later by Roger Bacon. It was then entitled in Latin, *Seretum Secretorum*.

**Dr. A. Hakim Murad says:**

**“The influence of Ibn Haitham on Roger Bacon is clearly visible in his works.”**

In his writing, "The Making of Humanity," Briffault stated,

It was under their successors at the Oxford School that Roger Bacon learned Arabic and Arabic science. Neither Roger Bacon nor his later namesake has any title to be credited with having introduced the experimental method. Roger Bacon was no more than one of the apostles of Muslim science and method to Christian Europe. Discussions as to who was the originator of the experimental method are part of the colossal misrepresentation of the origins of European civilization.

Chemistry as a science is unquestionably the invention of the Muslims. It is one of the sciences in which Muslims have made the greatest contribution and developed it to such a high degree of perfection that they were considered authorities in this science until the end of the 17th century. A. D. al-Jabr and Zakariya Razi have the distinction of being the greatest chemists the medieval



times produced.

Writing in his illuminating History of the Arabs, Philip K. Hitti acknowledges the greatness of Arabs in this branch of science when he says,

After *materia medica*, astronomy and mathematics, the Arabs made their greatest scientific contribution in chemistry. In the study of chemistry and other physical sciences, the Arabs introduced the objective experiment, a decided improvement over the hazy speculation of Greeks. Accurate in the observation of phenomena and diligent in the accumulation of facts, the Arabs nevertheless found it difficult to project proper hypotheses.

**What is Taught:** The concept of the finite nature of matter was first introduced by Antoine Lavoisier during the 18th century. He discovered that, although matter may change its form or shape, its mass always remains the same. Thus, for instance, if water is heated to steam, if salt is dissolved in water or if a piece of wood is burned to ashes, the total mass remains unchanged.

**What Should be Taught:** The principles of this discovery were elaborated centuries before by Islamic Persia's great scholar, al-Biruni (d. 1050). Lavoisier was a disciple of the Muslim chemists and physicists and referred to their books frequently.