

JABIR IBN HAYYAN, THE GREAT ARAB ALCHEMIST

Abu Musa Jabir ibn Hayyan, an eighth century genius, is considered to be the greatest of the early Arab Chemists and an important contributor to world science. Jabir worked during a pivotal time for human civilization. The civilizations that began some six-thousand years ago on the banks of three mighty rivers – Syria's Euphrates, Iraq's Tigris, and Egypt's Nile – had spread to Greece, culminating there and resulting in masterpieces of science and culture. This Greek civilization, however, deteriorated as the Roman Empire rose to dominate the world. Rome's downfall, by foreign invasion from the outside and by intellectual stagnation from within, would have resulted in the total loss of the scientific knowledge of that era had not the miracle of Arab ascendancy then occurred. The expansion of the Islamic empire resulted in bringing to Baghdad a huge collection of books, treatises, documents, and miscellaneous papers from all over the known world; in Baghdad, they were preserved, translated into Arabic, and then modified and developed. Jabir was a central figure in this modification and development.

Arab chemists had already integrated and expanded much of the knowledge that had been acquired from the Greeks. For example they had developed the chemical processes of crystallization, precipitation, distillation, and sublimation, processes that Arab alchemists used to obtain some of the known precious metals in a pure state. Jabir was to develop this work even more.

Jabir's contributions in many cases had a practical outlook. He dealt with applications of chemistry such as the refinement of metals, the preparation of steel, the development of varnishes to protect iron, and the distillation of vinegar to concentrate acetic acid.

Jabir was highly appreciated by early Western scientists and a glowing portrait of him is still kept by a famous Italian family in their library. Most of his writings were translated into Latin, Italian, French, and English. He was famous for his reliance on experimentation and observations. He used to execute his experiments scientifically by following some general

rules he, himself, has developed. His method was based on the use of the balance; he was determined to understand the correct proportions of the constituents of a compound. He described his sulfur-mercury theory of the constitution of minerals as follows:

“... the metals are all, in essence, composed of mercury and coagulated with sulfur... they differ from one another only because of the difference of their accidental qualities, which is due to the difference of their varieties of sulfur ... when mercury and sulfur combine to form one single substance, it is thought that they have changed essentially and that a new substance has been formed. The facts are otherwise, however. Both the mercury and the sulfur retain their own natures; all that has happened is that their parts have become attenuated, and placed in close approximation to one another, so that to the eye the product appears uniform...” (3).

This quotation of one of Jabir's own writings demonstrates the insight he acquired about chemical reactions. The way in which he is describing this chemical fact is very similar to the modern theory of Dalton which says that chemical compounds are obtained when their atoms approach each other and thus bonded together.

Jabir was both a Shi'ite and Sufi. He was a faithful disciple of the Imam Ja'far al Sadiq. He was spokesman for his master's doctrines and he had adopted the method of symbolic interpretation of things which was common among Shia. Hayyan, Jabir's father, was a member of Al-Azd tribe who settled at Kufa in Iraq. Hayyan was sent by the Abbasids to Persia where he took his pregnant wife with him. Jabir ibn Hayyan was born in Tus, Khorasan, probably in the year A.D. 721. His father was killed in Persia and Jabir was sent back to Kufa. He went to Baghdad and served in the Abbasids' Court. Records suggest that he died about the year A.D. 817. The great amount of work bearing the name of Jabir has cast some doubt about the authenticity of some of them. It is possible,

though, that, a group of people used his name for some of their writings and thus the name Jabir or Geber (which is the Western rendering of Arabic Jabir) is a symbolic representation of most of the alchemical work that had been performed by many different and now unknown Arab alchemists. Whether this is true or not, there is convincing evidence that Jabir existed as a real person and made outstanding personal contributions to Arab science, it should not discredit him or the value of his work because he was real and he was a great thinker.

REFERENCES

- [1] M. Abdur Khan, *Muslim Contribution to Science and Culture*. Lahore, Pakistan: Sh. M. Ashraf Bazar, 1969.
- [2] G. Sarton, *Introduction to the History of Science*. Baltimore: Williams and Williams, 1947, Vol.1, p. 532.
- [3] Seyyed Hosseim Nasr, *Science and Civilization in Islam*. Cambridge: Harvard University Press, 1968.
- [4] E. J. Holmyard, *Markers of Chemistry*. London: Oxford University Press, 1962, pp 49-63.

Brief historical perspectives of significant Arab scientists are planned as a regular feature of the ARABIAN JOURNAL FOR SCIENCE AND ENGINEERING. The staff wishes to acknowledge gratefully the assistance of Dr. Khaled Y. Khalaf, Chairman of the Department of Chemistry at the University of Petroleum and Minerals, for providing this commentary on Jabir Ibn Hayyan.