

Islamic Alchemy and the Birth of Chemistry

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ALCHEMY is at once a science of the cosmos, or cosmology, a sacred science of the soul, or psychology, a science of materials and a complement to certain branches of traditional medicine. It is not a proto-chemistry although it deals with physical materials from a particular point of view; nor is it the origin of the modern scientific method—although alchemy has been concerned in the profoundest sense with experiment and experience, that inner experiment which alone leads to certitude and of which all external experience is but a pale shadow.¹ The traditional alchemist serves as the window through which the light of the spiritual world shines upon the natural domain and the revivifying air—or more precisely ether—of the empyrean penetrates the arteries of nature. His aim is not to work with sheer material substances from a purely physical point of view, this being the work of charcoal burners. Rather, he aims to transform nature in order to return nature to that primordial perfection, that paradisaic beatitude which nature is in reality, although this face of nature remains veiled and hidden from the view of modern man. Through the transmutation, based upon a sacred science of things, of the soul of the beholder to pure gold, alchemy permits the solar element or the supernal Apollo to shine upon the world of the gross elements and their compounds.

These general remarks on alchemy pertain as much to Islamic alchemy as to the Alexandrian or Latin schools, for all schools of traditional alchemy share ultimately the same world view and even the same symbolic language; although each of course possesses certain distinct characteristics. Islamic alchemy inherited at once Alexandrian and Chinese alchemy and created that immense synthesis. The translation of some of their fruits into Latin in the form of such texts as the *Turba Philosophorum* and *Picatrix*² brought Latin alchemy into being.

Islamic alchemy has managed to preserve over the centuries and even to our own day an integral spiritual alchemy wed to Sufism and other esoteric schools, such as that of the Shaykhīs in Persia, and a symbolic science of ma-

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1. On the alchemical tradition and its spiritual significance see T. Burckhardt, *Alchemy: Science of the Cosmos, Science of the Soul*, trans. W. Stoddart (Baltimore, 1971), and E. Zolla, *Le meraviglie della natura - Introduzione all'alchimia* (Milan, 1975).

2. On Islamic alchemy see S. H. Nasr, *Islamic Science - An Illustrated Study* (London, 1976), pp. 193 ff.; and S. H. Nasr, *Science and Civilization in Islam* (New York, 1970), pp. 242 ff.

terials wed to the crafts and guilds.³ Yet, it was also in Islam that the first seeds of a science of chemistry were sown, although the symbolic view of nature predominated and never allowed a secularized view of material substances to become dominant, for it is not possible to have a chemistry until the living body of nature has become converted into a cadaver and until nature has become deprived, for him who has lost the symbolist spirit, of the sacred presence which nevertheless continues to glow within all things.

The appearance of chemistry is related to the birth of a school of philosophy at the margin of Islamic intellectual life, and is bound to a change in intellectual perspective which corresponds directly to the profound difference between the world views of alchemy and chemistry. Moreover, the creation of this peripheral philosophical school and the birth of chemistry belong to the early period of Islamic history and concern two of the most famous figures of Islamic science, namely, Jābir ibn Ḥayyān, the Latin Geber (d. 3rd/9th century), and Muḥammad ibn Zakariyyā' Rāzī, the Latin Rhazes (d. 4th/10th century).

No two figures are better known in the annals of Islamic alchemy than these two men of many-sided genius. Both men were celebrated masters of alchemy. Both are believed to have belonged to the same school by later generations of alchemists in the Islamic and Western world.⁴ Yet a study made of the writings of both men clearly reveals that although Rāzī employed the languages of Jābirian alchemy, he was in reality dealing not with alchemy but with chemistry. One might even say that Rāzī transformed alchemy into chemistry, even though alchemy endured long after him and chemistry continued to be cultivated in the Islamic world within the bosom of alchemy. Thus the chemistry of Rāzī was by no means independent of alchemy,⁵ and in fact the two never parted ways completely in Islamic civilization as was to happen in the West after Robert Boyle.

Before discussing the philosophical and religious divergences between Jābir and Rāzī which led also to the separation of chemistry from alchemy, it is worthwhile to note the similarities and differences in the alchemical views of the two authors. Or rather, a comparison must be made between the Jābirian corpus, of which certainly much was written by Jābir himself and some of the treatises added later by Ismā'īlī authors, and the writings of Rāzī. Scholars studying these writings differ as to how closely Rāzī followed Jābirian alchemy⁶

3. See H. Corbin, *En Islam iranien*, vol. IV, (Paris, 1978), pp. 205 ff.

4. *Rubat al-ḥakīm* considers Rāzī to be a disciple of the school of Jābir, while in almost all Latin alchemical texts the names of both men appear as unquestionable masters of alchemy.

5. See G. Heym, "Al-Rāzī and alchemy", *Ambix*, 1 (1938), 184-191; and J. R. Partington, "The Chemistry of Rāzī", *Ambix*, 1 (1938), 192-196.

6. For example, P. Kraus in his *Jābir ibn Ḥayyān*, vol. II, pp. 3 ff., does not believe that there is any direct and close relation between them, while N. E. Stapleton in "Chemistry in 'Iraq and Persia in the Tenth Century A.D.", written with R. F. Azo and M. Hidayat Husain, *Memoires of the Asiatic Society of Bengal*, 1927, pp. 317-415, considers Rāzī as a direct disciple of Jābir.

And in fact, there is both similarity and difference when their alchemical and chemical ideas are compared.

Jābir believed that the elixir contained animal and plant substances as well as minerals, while Rāzī limited it to minerals and only casually mentioned animal and plant substances.⁷ Rāzī divided metals into seven species including *khārṣinī* just like Jābir in his *Kitāb al-khamsīn*. However, contrary to Jābir, Rāzī showed no interest in the numerical symbolism connected with this division. Jābir sought to discover the ultimate causes of things, while Rāzī, following the views of the Peripatetics among the physicians, denies openly that such a possibility exists.⁸ Rāzī in his *al-Madkhal* and *al-Asrār* did not follow the Jābirian view that minerals are composed of sulphur and mercury but believed that they are constituted of body (*jasad*), spirit (*rūḥ*) and soul (*nafs*).⁹ However, the Jābirian belief that there are five principles – the first substance, matter, form, time and space – certainly bears close resemblance to the famous five eternal principles of Rāzī.¹⁰

Rāzī also closely followed the terminology of Jābirian alchemy. He adopted not only technical names from Jābir but also titles of books. A large number of Rāzī's writings in this field bear the same titles as those of Jābir, while some are simply modifications of names of works belonging to the Jābirian corpus.¹¹ This is particularly significant in the case of such an independent philosopher as Rāzī. Even in the classification of simples (*ʿaqāqir*), which is among the most important scientific achievements of Rāzī in the field of chemistry, he followed the example of Jābir's *al-Ustuqus al-uss al-awwal*.

One may then ask why Rāzī's works have been called the first books of chemistry in the history of science.¹² We have several extant alchemical works of Rāzī, such as *al-Madkhal al-taʿlimī* which served as a basis for the section on alchemy of *Mafātīḥ al-ʿulūm*,¹³ and most important of all, the *Sirr al-asrār*, well-known to the Western world as *Liber Secretorum Bubacaris*.¹⁴

7. Kraus, *op. cit.*, p. 3.

8. Kraus, *op. cit.*, p. 95, cites from Rāzī's *Kitāb al-khawāṣṣ* to this effect.

9. Stapleton, *op. cit.*, pp. 320 ff.

10. Kraus, *op. cit.*, p. 137. Regarding the five eternal principles of Rāzī and his general philosophical views, see R. Walzer, *Greek into Arabic*, pp. 15-17.

11. Stapleton, *op. cit.*, pp. 336-337, where he cites fifteen works of Rāzī which have either identical or modified titles of works of Jābir and seem to deal with the same subject.

12. Stapleton, *op. cit.*, p. 320.

13. The text of this work has been translated with commentary by Stapleton in the above-mentioned articles.

14. This work, whose title may have also been *Kitāb al-sirr* as cited by Ibn al-Nadīm, is the most basic work of Rāzī on chemistry, one in which the transformation of alchemy into chemistry may be clearly discerned. It was well-known during the later centuries in the Islamic world not only in its original Arabic version, but also in a Persian recension, and it was also influential in the West. But everywhere it was considered an alchemical work rather than a chemical one because, in the medieval

Throughout these works, there is a description and classification of mineral substances, chemical processes, apparatuses, and so forth, so that these works could be easily translated into modern chemical languages. There is no interest in the symbolic aspect of alchemy, in the discussion of metals and their transformations as symbols of the transformation of the soul. The correspondence between the natural and spiritual worlds which underlies the whole worldview of alchemy¹⁵ has disappeared, and we are left with a science dealing with natural substances considered only in their external reality, albeit the language of alchemy and some of its ideas are still preserved.

The reason for Rāzī's departure from the alchemical view must be sought in the peculiar philosophical position which he held. As we know from many later sources including Bīrūnī, who was scientifically sympathetic with him, Rāzī wrote several works against prophetic religion and even denied prophecy as such.¹⁶ He thus rejected a central theme of Islamic philosophy which in fact is "prophetic philosophy". Moreover, Rāzī was particularly opposed to Ismāʿīlism and carried out a series of highly philosophical debates with one of the leading figures of Ismāʿīlism, Abū Ḥatīm Rāzī.¹⁷ When the religious and philosophical attitudes implied by Rāzī's position are analyzed, it becomes clear why he transformed Jābirian alchemy into chemistry.

According to Islamic esotericism in general and Shiʿism – of which Ismāʿīlism is a branch – in particular, the sciences of nature are related to the science of revelation. Revelation possesses an exoteric (*ẓāhir*) and an esoteric (*bāṭin*) aspect and the process of spiritual realization implies beginning from the exoteric and reaching ultimately the esoteric. This process is called *taʿwīl* or hermeneutic interpretation, which is applied by the Shiʿah, and also in Sufism, to the Holy Quran, in order to discover its inner meaning. Only prophecy and revelation can enable man to make this journey from the exterior to the interior, to perform this *taʿwīl* which also means a personal transformation from the exterior man to the inner one.¹⁸

world view, there was no completely secularized domain of nature to which a totally "non-symbolic" science could apply. Therefore, although much chemistry was contained in the medieval alchemical tradition, especially in the case of Rāzī, it was never totally divorced from alchemy.

The *Sirr al-asrār* was translated and thoroughly studied by J. Ruska, *Al-Razi's Buch Geheimnis der Geheimnisse* (Berlin, 1937).

15. Concerning this correspondence see T. Burckhardt, *op. cit.*

16. One of Rāzī's famous works on this subject is the *Refutation of Prophecy*, (*al-Radd ʿala'l-nubuwwah*). See Bīrūnī, *Epître de Beruni contenant le repertoire des ouvrages de Muhammad b. Zakariya al-Razi*, trans. et ed. P. Kraus, (Paris, 1936).

17. See P. Kraus, "Raziana", *Orientalia*, 4 (1935), 300-334; 5 (1936), 35-56, 358-378. The complete debate between the two Rāzī's, which centers mostly around the question of prophecy, runs throughout the many chapters of *Aʿlām al-nubuwwah* (*Peaks of Prophecy*), ed. by S. al-Sawy and Gh. Aavani, (Tehran, 1977) Later Ismāʿīlī authors such as Ḥamīd al-Dīn Kirmanī in his *al-Aqwāl al-dhahabīyyah* and Nāṣir-i Khusraw in his *Jāmiʿ al-ḥikmatayn* were to continue this debate.

18. This theme has been thoroughly studied in the many writings of H. Corbin. As far as it concerns

Applied to nature, *ta'wil* means penetrating the phenomena of nature to discover the noumena which they veil. It means a transformation of fact into symbol and a vision of nature, not as that which veils the spiritual world, but as that which reveals it.

Alchemy is precisely such a science, one based on the appearances of nature, particularly the mineral kingdom, not as facts in themselves but as symbols of higher levels of existence. It is not accidental that Jābir was both a Sufi and also a Shi'ite and that in fact the Jābirian corpus later became closely associated with Ismā'īlism which added certain treatises to the original body of Jābir's works.

Jābir, while also interested in natural occurrences, never divorced the facts of the natural world from their symbolic and spiritual content. His famous Balance (*mizān*) was not an attempt to quantify the study of nature in the modern sense but "to measure the tendency of the World Soul". His preoccupation with numerical and alphabetical symbolism, with the study of natural phenomena as determinations of the World Soul, with specifically alchemical symbols, all indicated that Jābir was applying the process of *ta'wil* to nature in order to understand its inner meaning.

Rāzī, by rejecting prophecy and the process of *ta'wil* which depends upon it, also rejected the application of this method to the study of nature. In so doing, he transformed the alchemy of Jābir into chemistry. That is not to say that he stopped using alchemical terminology or ideas, but in his perspective, there was no longer any Balance to measure the tendency of the World Soul, nor any symbols to serve as a bridge between the phenomenal and noumenal worlds. The facts of nature were studied as before, but as facts, not symbols. Alchemy was studied, not as real alchemy, but as an embryonic chemistry. The religious and philosophical attitude of Rāzī was therefore directly connected to his scientific views and was responsible for this transformation. In fact, his case marks one of the clearest examples of how philosophical and religious questions have played a role in many significant developments of science and in the history of science in general, displaying the intimate relation between man's view toward the sciences of nature and his vision of Reality as such.

Islamic civilization however rejected the philosophical views of Rāzī and his like and remained faithful to its own ethos and the burden which the hands of Providence had placed upon it, namely to bear the Divine Message of the Qur'ān for mankind to the end of the world. This truth has allowed Islam to preserve to this day, despite all the vicissitudes of time, the knowledge and practice of an inner alchemy which makes possible the cultivation of

Rāzī and his rejection of the alchemical view, see Corbin (with the collaboration of S. H. Nasr and O. Yahya), *Histoire de la philosophie islamique* (Paris, 1964), pp. 194-201. On the alchemy of Jābir see Corbin, "Le 'Livre du Glorieux' de Jābir ibn Ḥayyān (alchimie et archétypes)", *Eranos-Jahrbuch* (Zurich, 1950).

gold which is the goal of human life and which allows man to play the role for which he is destined, to act as the bridge between heaven and earth, as the eye through which God views His creation, as the channel through which the grace of heaven penetrates the earth and fecundates it. Through this inner alchemy, to which all other aspects of alchemy are subservient, man comes to see nature not as the chaos of coagulated matter but as the theophany which reveals the paradise which is here and now and which man must rediscover through the attainment of the gold which resides at the heart of all beings and which remains to be extracted by means which tradition offers to those who are willing to surrender themselves to it. Although Rāzī sowed the seeds of what was to become known later as the science of chemistry, Islam continued to harbor that spiritual alchemy which refuses to see nature as deprived of life, which aims at transmuting the inner being of man and attempts to bring about, through his transmutation, the spiritual revival of nature.