



ESSSAT-News

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by the Center for Ethics & Values in the Sciences.

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What about the Philosophy of Chemistry?

On the side of the natural sciences the dialogue between science and religion often engages physicists and biologists, but less often chemists. How many of you did know that there is an International Journal for the Philosophy of Chemistry called *Hyle*? Below, the editor of this journal, Dr. Joachim Schummer of the Institute of Philosophy, University of Karlsruhe, Germany, gives some glimpses of recent issues of *Hyle*.

Voluntaristic Theology and Alchemy

Interrelations between Experimental Method, Religion, Technology and Ethics

Unlike the 19th century historiography of science, it is now widely accepted that a real understanding of the history of modern western science requires the comprehension of both the religious feelings of their main contributors and the various theological trends and conflicts since the Reformation. Not only were the astronomic visions of Kepler and Newton based on personal religious world-views, also the corpuscularian mechanical philosophy of nature, with its strong opposition against the Aristotelian-Thomist *scala naturae*, owed much to the anti-hierarchical view of the Reformation movement. Moreover, the major epistemological approaches, like empiricism, rationalism, and constructivism, reflect different theological positions since medieval times, relating each of their own human and divine capacities to one another. Such as theological intellectualism paved the way to

rationalistic, mathematical, and deterministic approaches towards nature, its counterpart, theological voluntarism, always implied a much more modest account of human epistemic abilities. While the former was best exemplified in mathematical astronomy, the latter had its strongest impact on the experimental science of matter and material changes, i.e. on chemistry or experimental alchemy. Since chemistry/alchemy did not only aim at an understanding of nature as it is but also at changing nature according to human purposes, theological voluntarism had two intricately related consequences, one being methodological, the other ethical.

Since the earliest reception of Greek philosophy of nature in the Islamic world (*Tarīkh al-filosophīyah*), cosmology and cosmogony were related to human activity in such a way that understanding the divine creation process enables the making of any material species. However, human creativity was from the very beginning combined with the strong Islamic voluntarism, which later found its European correspondence in the Augustinian and Scotian tradition. The voluntaristic view that God can intervene into material processes at will did substantially hinder the modern view of experimental method. If the outcome of experiments is basically a gift of God (*donum dei*), as alchemists continued to claim until the 18th century, then experiments cannot be regarded as reproducible behaviours under controlled material conditions. Moreover, if the experimental outcome depends on the spiritual conditions of the individual experimenter, as all 'true' alchemists claimed too, then experiments cannot have any objective epistemic value in the modern sense.

On the other hand, by putting spiritual constraints on the success of an experiment, experimental method was bound to moral standards. It was the aims and the moral attitude of the experimenter that should basically contribute to experimental success. And since 'experimental success' did not and could not simply mean verification of a value-free hypothesis for the given reasons, success had to be understood in terms of human values. That is to say that, in the view of the 'true' alchemists, the success of an experiment

strongly depends on the goals of the experiments; i.e. only morally good experiments can be successful.

Experimental method in the alchemical tradition had a rather technological meaning that is completely different from what philosophers of science have taught us. Rather than being instances of epistemic verification, 'true' alchemists considered experimental success as instances of moral verification. Moreover, since only morally good experiments can be successful, the underlying idea of technology is far from bearing the modern notion of ambivalence of technological means. However, it is exactly that tradition from which our modern, science based technology, from chemical engineering to genetic engineering, developed with chemistry as its central support. After giving up theological voluntarism, the two interrelated consequences vanished too. Experimental method became an objective epistemic means for ambivalent technology.



Today we are only at the beginning to understand the cultural development with its intricate mutual dependencies between science, religion, technology, and ethics. Much has been neglected in previous times due to one-sided emphasis on selective stories of physics. In recent issues of *Hyle-An International Journal for the Philosophy of Chemistry* [<http://www.uni-karlsruhe.de/~philosophie/hyle.html>] two papers develop complementary views with emphasis on the history of chemistry/alchemy, as outlined above. Italian chemist and philosopher GIUSEPPE DEL RE explores in 'Technology and the Spirit of Alchemy' (Hyle, vol. 3, pp. 51-63) the ethical aspect. Czech chemist and historian of alchemy VLADIMÍR KARPENKO examines in 'Alchemy as *donum dei*' (Hyle, vol. 4, pp. 63-80) the methodological implications of theological voluntarism.

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