

Concept of Chemical Science in Vedic Literature

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ABSTRACT

The whole Sanskrit Literature is enriched with different sources of knowledge from the beginning itself. Moreover the Vedic literature is something different from the classical literature which stands to prove the origin and development of science and technology of the then period. In this paper an effort has made to highlight the concept of Chemical science as reflected in Vedic literature.

KEYWORDS: Chemical Science, Satva, Rajas, Tamas, Pritirupa, Apritirupa, Vi?adarupa, Padartha, Anu, Paramanu, Bhautika Parivartana, Rasayanika Parivartana, Rajata, Tamra, Lauha, Bhasma, Yajurveda, Atharvaveda, Ayurveda, Rasaka, Lohavedha, Dehavedha, Kayakalpa, Rasaratna Samucaya

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INTRODUCTION

India is considered as the soil of Intellects. Through the intellectual power and ability of the intellects, she touches the highest peak. The culture, tradition, belief, faith and devotion are the sources of knowledge to make her great. The knowledge is not at all restricted to the spiritual, religious and social dimensions, but it also extends its approach in the realm of the Sciences i.e. Physical Science, Medical Science, Engineering and Mathematics and is undoubtedly the greatest presentation to the new generation. Apart from this, the concept of Chemical Science in particular, plays a vital role in the case of invention and application. In ancient days, Indians were more familiar with the Chemical excellence of cast iron production. India was the leader of Chemical and Pharmaceutical industries including Dying, Lemming, Soap making, Glass and Ceramics, Cement and Metallurgy. Here in this research paper, an attempt has made to highlight the Chemical Science and its operation in the Vedic period through the help of textual evidences.

Science is well thought out as knowledge for excellence to find out the ultimate truth of a particular object. The quest or finding out is not having its limitations. That to why it is completely endless. How much deeper we go we will get new approach on the specific object time to time. Therefore it may be rightly said that science and human life is the two sides of a coin, where without science, human life is impossible and human life without science is meaningless. From the day of evolution or civilization it has been transferred from generation to generation as a gift to the mankind.

The present science believes that the whole universe stands with three different elements such as Proton, Electron and Neutron. To understand these three elements we may have their definition as such. The first element Proton is the collection of the force to attract (*Ākaraṣaṇa*) all near to it. The second element Electron is the force of repulsion (*Apakaraṣaṇa*) and the third element Neutron is completely absence of these two natures. In other word, it is said that it neither attracts nor repulses. By combining all, the whole universe forms.

In connection to these, Indian philosophy understands the whole universe is the cause of three different qualities (*Guṇa*) such as *Satva*, *Rajas* and *Tamas*. By getting transformation within these qualities (*Guṇa*) the universe takes its shape. To correlate the philosophical thoughts with present modern science an eminent Scholar Kapila (Vaidikākalina Rasāyana Vijnāna - Dr.Vishnu Dutta Sarma) explains the significance of these three qualities (*Guṇa*). The first one *Satva* is the representative of agreeable (*Pritirupa*) which attracts others toward its own. The second is *Rajas* stands for disagreeable (*Apritirupa*) which keeps away from others. The last one *Tamas* stands for dejection (*Viṣādarupa*) which is neither in the state of agreeable (*Pritirupa*) nor the state of disagreeable (*Apritirupa*). From the above said discussion we may clearly understand how far these two parts (Modern science and Indian thought) stand unique on their own significance. All these three elements (Proton, Electron and Neutron as equal with *Rajas*, *Tamas* and *Satva*) are the cause of the formation of a substance (*Padārtha*) in respect to their number of particles (*Mātrā* or *Samkhyā*) in

same way the age of the world or creation (*Yuga*) forms with the less or more number of qualities (*Guṇa*).

In the first part of the 6th century the so called famous Indian Scientist Ṛṣi Kanāda has given an understanding about *Anu* (Molecules) and *Paramānu* (Atom). He said that the substance (*Padārtha*) is the formation of the very small particles which cannot be made into smaller particles again and the same may be again named as Atom (*Paramānu*). Therefore it is said that the smallest particles of a substance (in gross form or in chemical form) which cannot be made into smaller particles by which Molecules (*Anu*) form are called Atom (*Paramānu*). Ṛṣi Kanāda says this Atom (*Paramānu*) is imperishable (*Avināsi*) and it cannot be made into small pieces.

A nature (*Tatva*) of the particular substance turns into another nature is called transmutation (*Utparivartana*) in scientific term. A study on the Changes (*Parivartana*) and analysis (*Visleṣaṇa*) of the substance because of its origin and qualities is called Chemical Science of the particular substance. The Change is of two kinds such as 1) Physical Change (*Bhautika Parivartana*) 2) Chemical Change (*Rāsāyanika Parivartana*). In first type of Change i.e. the Physical Change, the nature of the substance for the time being changes and after sometime it turn back to its previous position. For example, a piece of Iron forms into magnet after a deep friction (*Gharṣaṇa*) on the magnet for the time being but due to physical change it turns into iron after sometime. In same manner, water turns into ice at the stage of high cooling (*Himānka*) after melting the same it turns into water again.

In second type of Change i.e. Chemical Change where the nature of the substance once changes cannot be brought back to the previous position. This Change is called Chemical Change. For example, Milk turns into curd, and iron turns into rust etc. To know and the study of this particular branches of learning is called Chemical Science. Different types of substances and their qualities are included in this study.

In connection to the Chemical Change, our Ancient scholars of Vedic age have proved their skill in several technologies involving melting, smelting, casting, calcinations, sublimation, steaming, fixation and fermentation. An eminent scholar Kanāda, the profinder of *Vaiśeṣikadarśana* has explained *Dravya* (Substance) as

“पृथिव्यग्नेजोवाय्वाकाशकालदिगात्ममनांसि” - इति द्रव्याणि V.S.D.1.1.5.

Here he says *Prthivi*(Earth), *Jala*(Water), *Agni*(Fire), *Vāyu*(Air), *Ākāśa*(Space), *Kāla*(Time), *Dik*(Directon), *Jivātmā*(Soul), *Paramātmā*(Supreme Soul) and *Mana*(Mind) are the substances.

To recognize the quality of the individual substance it is said by Visvanatha Panchanana Bhattacharya his text *Pāribhāṣika Padārtha Samgraha* as

वायोर्नवैकादश तेजसो गुणाः जलक्षितिप्राणभूतां चतुर्दश।

दिक्कालयोः पञ्च षडेव चाम्बरे महेश्वरेऽष्टौ मनसस्तथैव च॥

Bhasāparichheda

It says that *Vāyu* possesses nine qualities, *Agni* possesses eleven, *Jala*, *Prthivi* and *Jivātmā* each posses fourteen, *Dik* and *Kāla* each possesses five, *Ākāśa* possesses six,

Paramātmā and *Mana* individually possesses eight qualities. Apart from this, the qualities are also clearly described such *Rupa*, *Rasa*, *Gandha*, *Sparsa*, *Samkhyā*, *Parimāṇa*, *Prthakatva*, *Samyoga*, *Viyoga*, *Paratva*, *Aparatva*, *Dravatva*, *Gurutva*, *Sneha*, *Sabda*, *Buddhi*, *Sukha*, *Duḥkha*, *Ichhā*, *Dveṣa*, *Prayatna*, *Dharma*, *Adharma*, *Samskāra* (*Vaiśeṣikadarsana* -- 1.1.6)

It is also observed that the Chemical Science and its application are highly described during the Vedic period by using for the purpose of the medicine. Knowledge of *Svarṇa*, *Rajata*, *Tāmra* and *Lauha* etc. which are the prominent components of Medicine to the Vedic Physicians. They were also named as *Kṛṣṇāyasa* for *Lauha*, *Lohitāyasa* for *Tāmra*, *Haritāyasa* for *Svarṇa* and *Svetāyasa* for *Rajata*. In this context we may have many references from *Yajurveda* (18.13) and *Atharvaveda* (11.3.7). In *Āyurveda* it is said -

नव प्राणान्नवभिः सं मिमीते दीर्घायुत्वाय शतशारदाय ।

हरति त्रीणि रजते त्रीणि अयसि त्रीणि तपसाविष्ठितानि ॥ Āyurveda 5.28

Again in Vedic age, scholars were very much familiar to make powder (*Bhasma*) from the particular metal. In the process of making *Bhasma* they used to keep red hot metal into butter milk, sour, gruel, Seeds of *Tila* or in cow urine to make cooling within.

The Science of Vedic age was so strong where Vedic Scientists have explored the quality of the metal. In *Atharvaveda* it is said that the metal of gold (*Svarṇa*) is considered as energizer of life, booster of health, extender of force and energy. The mantra is as follows -

आयुषेत्वा वर्चसे त्वौजसे च बलाय च ।

यथा हरिण्यतेजसा विभासासि जनौ अनु ॥ Āyurveda 19.26.3

Apart from the Gold, silver is also played a prominent role by curing the disease like Leprosy, Hair-fall, Wrinkles, Powerlessness in ancient age which is clearly mentioned in the text of *Rasedra Cintāmaṇi*.

The food, drink and clothing of Vedic Scholars also represent their knowledge in the field of Chemistry. Approximately 610 Mantras of ninth *Maṇḍala* of *Rgveda* says that they were preparing drinks like *Soma* (*Rgveda*-1.116.7& 10.119.3) by the process of fermentation and the same was used in several religions ceremonies and social gatherings. As it is also noticed that -

स्वादिष्टया मदीष्टया पवस्व सोम धारया ।

इन्द्राय पातवे सूतः..... दशोत्तराणि।

ऋचांश्चैव पावमामी शतानिषद् - Rgveda - 9

Scholar like Dr. Prasun Kumar Mishra in his opinion says the word 'Alcohol' is derived from the Sanskrit word *Kohala* an alcoholic preparation in the Ayurvedic Medicine. Later on the article 'al' (the) of Arabs suffixes to this and finally become an accepted term.

Moreover Indian Chemists have made a tremendous contribution to the field of Cosmetics and Scented Perfumes rightly from the Vedic period onwards. In this context *Śrīsūkta* of *Rgveda* says -

गन्धद्वारां दुराधर्षां नित्यपुष्टां करीषिणीम्।

ईश्वरीं सर्वभूतानां तामिहोपह्वयोश्रियाम्॥ - Śrīsūkta

Indian Alchemists have known the properties of Sulphur as the killer of metals (Copper). It was used in laboratory to kill the metals and was named as *Śulvāri*. A prominent text *Rasārṇava* says –

लोहानां मारणं वक्ष्ये समाहितमनः शृणु।

नास्ति तल्लोहमातङ्गो यन्नगन्धक केशरी।। *Rasārṇava* 7.138-142

There were two prominent functions of Sulphur as mentioned in *Rasārṇava*. First one is *Lohavedhaḥ* i.e. to transform base metals into noble metals and the second one is *Dehavedhaḥ* or *Kāyākalpa* i.e. to maintain in a fresh and healthy state just like a youth.

Further the Calamine (*Rasakaḥ*) (one of the zinc ores) gets converted into gold when roasted with copper (*Śulva*) three times. Really it was highly miracle to understand how it was happening. On this particular concept the present science is completely silent because such invention was made in India. Nāgārjuna, an eminent Buddhist scholar, who has expertised in this field to make gold from Calamine (*Rasakaḥ*) through his Chemical experiments. It is written in his text of *Ratnākara* as –

किमत्र चित्रं रसको रसेन, क्रमेण कृत्वाम्बुधरेण रञ्जितः करोति शुल्वं
त्रिपुटेन काञ्चनम्

Ratnākara – 3

Through the archaeological excavation at Mohenjodaro and Harrappa, it is clearly understood that the people of Indus Valley Civilization (2500-1800 BC) were expertised in preparation of Pottery, Glass and Enamels and extracted metals from natural ores for making utensils, instruments and weapons. The above said materials were also used by Vedic Scientists prior to Indus Civilization. The reference of *Kṛṣṇayajurveda* is highly noted here to understand. The Mantra goes –

अश्मा च मे, मृत्तिका च मे, गिरयश्च मे, पर्वताश्च मे, सिकताश्च मे,
वनस्पतयश्च मे, हिरण्यश्च मेऽयश्च मे सीसं च मे, त्रपुश्च मे, श्यामं च मे,
लोहं च मे.....

Kṛṣṇayajurveda 4-7-5

It says “I want stone, clay, hills, mountains, sands, trees, gold, silver, copper, lead, tin and iron.

The use of the Laboratory (*Rasasālā*) was also familiar to the Indian scholars for experiments, readings and reactions. To give a brief description to a Laboratory (*Rasasālā*) *Rasaratna Samucaya* explains as –

रसशाला प्रकुर्वीत सर्वबाधा विवर्जिते सर्वौषधीमये देशे रम्ये
कूपसमन्विते।

यक्षत्र्यक्षसहस्रादिग्विभागे सुशोभने नानोपकरणोपेतां प्राकारेण
सुशोभिताम्।।

Rasaratna Samucaya

“A laboratory is to be established in such a place which abounds in medical plants and well (water) and free from all interferences and disturbances. The building should be well protected with high boundary walls and again it should be furnished with different kinds of equipments and kept in the right direction.

Again the same text also gives a clear picture of apparatus which are used in a Laboratory. It says there are 32 units of apparatus technically known as *Yantra*, used for Chemical and pharmaceutical investigations. Further a detailed qualification for a staff who is working in the Laboratory also described in *Rasaratna Samucaya*.

Conclusion:

From the above said it may conclude that the Concept of Chemical Science was highly exposed during the Vedic period. In the light of Medicine as well as Metallurgy Chemical Science took stand to highlight its application and use. No doubt the contribution of our Vedic Sages who have made effort to understand and explore the concept of Chemical Science was highly remarkable. If a deep vigil could have put to enhance the knowledge of present on the foundation of past definitely we may construct an excellent bridge between the past and present on the issue of Chemical Science which will take India one step ahead

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