

Quotations From Scriptures:

Selections From Acharya Umasvati's TATTVAARTH SUTRA¹

Introduction

Acharya Umasvati's TATTVAARTH SUTRA presents a systematic and comprehensive view of the seven aspects of reality, relating to the basic principles of Jainism. The seven aspects of reality (TATTVAS) are: souls (JEEV), inanimate entities (AJEEV), influx of karmic matter towards soul (AASHRAV), bondage of karmic matter to soul (BANDH), stoppage of influx of karmic matter (SAMVAR), shedding of karmic matter (NIRJARA) and liberation of soul from karmic bondage (MOKSHA).

The fifth chapter of the TATTVAARTH SUTRA describes the inanimate entities (DRAVYAS) of the universe that include matter (including energy, PUDGAL), principle of motion (DHARM), principle of rest (ADHARM), space (AAKAASH) and time (KAAL). Certain concepts regarding soul that relate to the inanimate entities have also been presented in this chapter. It should be pointed out that some facts about matter delineated in this chapter correspond to modern scientific concepts.

Chapter 5

Continued from January 2008 issue:

Definition of matter:

SPARSHARASAGANDHAVARNAVANTAH PUDGALAAH [5-23]

Matter (including energy, PUDGAL) possesses the attributes of touch, taste, smell and color.

¹ Based on the following commentaries on TATTVAARTH SUTRA:

TATTVAARTH SUTRA by Acharya Umasvati, commentary by Pandit Sukh Lal Sanghvi, English translation by K. K. Dixit, published by L. D. Institute of Indology, Ahmedabad, 1974.

TATTVAARTH SUTRA by Acharya Umasvati, commentary by Pandit Phool Chandra Siddhantacharya, published by Varni Granthmala, Varanasi, 1949.

TATTVAARTH SUTRA by Acharya Umasvati, commentary by Pandit Mohan Lal Shastri, published by Saral Jain Granth Bhandar, Jabalpur, 1983.

Reality, English translation of Acharya Pujya Pad's SARVAARTHASIDDHI by S. A. Jain, published by Vir Sasana Sangha, Calcutta, 1960.

'That Which Is', a commentary on TATTVAARTH SUTRA by Dr Nath Mal Tatia, published by Harper Collins, 1994.

Cosmology: Old and New by Prof. G. R. Jain, published by Bharatiya Jnanapith, New Delhi, first edition, 1975.

Matter is said to have form, which is aggregation of touch, taste, smell and color. All matter possesses the attributes of touch, taste, smell and color. Touch is of eight kinds: smooth, rough, soft, hard, hot, cold, light and heavy. There are five kinds of taste: sweet, sour, bitter, astringent and acidic. Two kinds of smell are pleasant and unpleasant. There are five kinds of color: black, red, yellow, white and blue.

In certain pieces of matter, some attributes are tangible (evident) while others are intangible (obscure). However, a thing that exhibits even one of the above attributes has the other three attributes as well. In certain instances, we may not be able to detect some of the attributes with our senses. For example, infrared rays, which are essentially heat rays, are invisible to human eyes but owls and cats can see with the help of these rays. Further, photographs can be taken with infrared rays. Similarly, we cannot detect the smell of fire but it can be detected with a tele-olfactory cell. This device is more sensitive than our nose and can detect fire from a distance of 100 yards. It is also employed to transmit fragrance over long distances and in automatic fire control. These examples illustrate that some of the attributes of matter may be obscure to our senses but they do exist.

Jain scriptures describe only five colors while there are seven colors in the solar spectrum. Further, there are a variety of natural and pigmentary colors. This apparent paradox can be addressed by pointing out that in this context, color does not refer to the solar spectrum. It refers to a fundamental attribute of matter that produces the impression of colors such as black, blue and yellow on the retina of our eyes and the resulting sensation in our brain.

The concept of five kinds of color can be explained on the basis of the following scientific fact. When the temperature of an object is raised gradually, at first, it emits mostly infrared (dark) heat rays. Then as the temperature rises, it emits mostly red rays and then yellow rays. At higher temperatures, its radiation turns white and then blue. This is known as the blackbody spectrum. Professors M. N. Saha and B. N. Shrivastava write,² "Some of the stars shine with a bluish-white light, which indicates that their temperatures must be very high." This concept indicates that the five colors are the natural attributes of matter that are emitted by any piece of matter at different temperatures. Jain thinkers have also mentioned that colors are infinite in number, which correspond to the infinite wavelengths in the blackbody

² Treatise On Heat, page 341.

spectrum. These facts represent an aspect of agreement between Jainism and modern science.

Forms of matter:

SHABDABANDHASAUKSHMYASTHAULYASAMSTHAANABHEDA
TAMASHCHHAAAYAATAPODYOTAVANTASHCHA [5-24]

Sound, combination (formation of aggregates), subtlety, grossness, shape, breakup, shadows, images, heat and light involve transformations (forms or modifications) of matter.

The Jain theory of sound asserts that sound is produced by modifications of material media. According to modern science as well, sound is produced by vibrations of the particles of a medium such as air or water or musical instruments. In Jain literature, sound has been classified as follows:³

Linguistic (BHAASHAATMAK) and non-linguistic (ABHAASHAATMAK). Linguistic sound has been further divided into articulate (AKSHARAATMAK) and inarticulate (ANAKSHARAATMAK). Similarly, non-linguistic sound has been classified as natural (VAISRASIK) such as the sound of thunder, and operative (PRAAYOGIK), the sound made by effort, such as the sound produced by musical instruments. The sound produced by musical instruments has been classified into the following four categories:⁴

1. Sound produced by vibrations of membranes (TAT) such as drums.
2. Sound produced by vibrations of strings (VITAT) such as piano and violin.
3. Sound produced by reed instruments (GHAN) such as harmonium and xylophone. This category also includes sounds produced by bells and plates.
4. Sound produced by vibrations of air columns (SAUSHIR) such as organ pipes or a conch.

Combination is of two kinds, spontaneous and induced. Formation of clouds, thunder and lightning, rainbow, fire and the like involve

³ SHABDO DWEDHA BHAASHAALAKSHANAVIPAREETATVAAT |
BHAASHAATMAK UBHAYATHA AKSHAREEKRITETAR VIKALPAT |
ABHAASHAATMAKO DWEDHA PRAYOG VISRASAANIMITTATVAAT |
TATTRAVAISRASIKO BALAAHAKAADIPRABHAVAH |
PRAYOGASHCHATURDHA TAT VITAT DHANASAUSHIRABHEDAAT |

Swami Aklankadev in TATTVAARTH RAAJVAARTIK

⁴ CHARMATANANANIITTAH-PUSHKARABHEREEDARDURAADIPRABHAVASTATAH |
TANTREEKRITAVEENAASUGHOSHAADISAMUDBHAVO VITATAH |
TAALAGHANTALAALANAADYABHIGHAATAJO GHANAH |
VANSHASHANKHAADINIMITTAH SAUSHIRAH |

Acharya Pujapad in SARVAARTH SIDDHI

spontaneous combination. Induced combinations are of two kinds, those involving inanimate entities only and those involving animate as well as inanimate entities. Combination of mortar and cement is an example of the former, while association of karmas and pseudo-karmas with worldly souls is an example of the latter.

Subtlety and grossness are relative. The density of ice is less than that of water. Thus the same basic substance can be lighter in one state (solid) than in the other state (liquid). Relative subtlety and grossness can also be stated between different materials. For example, iron is denser than wood.

Shape can be regular like round, triangular and rectilinear or irregular like a cloud and hill. Shapes of aggregates of matter can be changed. Breakup implies processes such as milling wheat and corn, sawing wood, splitting legumes and separating layers of rocks.

Shadows are formed by obstruction of light by opaque objects. In general, a shadow is considered to be absence of light. However, invisible infrared radiation can exist in shadows. Thus shadows are forms of matter and energy (PUDGAL).

Jainism considers that energy is a modification (form) of matter.⁵ All kinds of radiation are produced due to transformations of matter. The Jain philosophers have classified radiation into two categories: heat (AATAP) - the radiation emitted by hot objects such as fire and sun, and light (UDYOT) - the cool radiation emitted by fireflies and the moon.⁶ In the former, much of the energy is emitted in the form of heat rays, and, in the latter, most of the energy is emitted in the form of light. This classification shows the incisive discernment of ancient thinkers.

Classification of matter:

ANAVAH SKANDHAASHCHA [5-25]

The two classes of matter are ultimate particles (PARAMANUS) and aggregates (SKANDHS).

The Jain scriptures present the following concepts regarding the structure of matter:

1. All matter is made up of ultimate particles, which are the elementary units of matter.

⁵ Please see 'Quotations From Scriptures', Jain Study Circular, January 2008 issue posted on jainstudy.org, page 3.

⁶ AATAP AADITYAADI NIMITTA USHNAPRAKAASHALAKSHNAH |
UDYOTASHCHANDRAMANIKHADYOTAADIPRABHAVAH PRAKAASHAH |
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2. An ultimate particle is eternal, indestructible and extremely tiny. It is indivisible and cannot be seen by us.
3. An ultimate particle has one taste, one smell, one color and two kinds of touch (either smooth or rough, and either hot or cold).
4. The existence of an ultimate particle can be ascertained by its aggregates (SKANDH) - pieces of matter.

It should be pointed out that the elementary particles of modern science do not conform to the definition of the ultimate particle (PARAMAANU) of Jain literature.

In general, aggregates of matter have four kinds of touch: smooth or rough, hot or cold, hard or soft, and light or heavy. The questions of hard or soft and of light or heavy do not arise in the case of an ultimate particle. Thus it has only two kinds of touch, smooth or rough and hot or cold as stated above.

Formation of aggregates:

BHEDASANGHAATEVYAH UTPADYANTE [5-26]

Ultimate particles and aggregates are formed by breakup, by combination and by the conjoined processes of breakup and combination.

The processes of breakup and combination occur on account of smooth and rough attributes of matter. According to Jainism, aggregates are formed through three processes: breakup (BHED), combination (SANGHAAT) and breakup-cum-combination (BHED-SANGHAAT). Breakup can be interpreted as certain particles leaving one aggregate and combining with another aggregate. Combination can be considered to be a sharing of some particles between two aggregates. The third process involves partial transfer of some particles from one aggregate to another aggregate followed by sharing of the transferred particles between the two. In each case, a new aggregate is formed. These processes are similar to the process of chemical bonding.

In chemistry, there are three kinds of bonds for the formation of molecules from atoms: ionic, covalent and coordinate covalent. In ionic bond, some electrons from the outermost orbital shell of one atom are transferred to the outermost orbital shell of another atom. Thus a molecule is formed. In a covalent bond, electrons from the outermost shell of one kind of atom combine with the electrons of the outermost shell of another atom. Thus the outer electronic shells of all atoms assume the configuration of inert gases. In a coordinate covalent bond,

electrons from the outermost shell of one atom are transferred. These electrons are shared by both atoms in the formation of the bond.⁷

Breakup (BHED) has one more aspect - the breakup of aggregates. Jain scriptures state:⁸ BHED entails breakup of aggregates on account of intrinsic or extrinsic causes. This fact can be compared to the phenomenon of radioactivity, which is related to the internal structure of atom and thus is intrinsic. The emission of alpha particles from a nucleus of uranium and other elements is an appropriate illustration of BHED.

The Jain scriptures define PUDGAL (matter including energy) as the entity that undergoes the processes of disintegration (breakup GALAN) and combination (POORAN).⁹ The processes of breakup and combination occur on account of smooth and rough attributes of matter. This fact implies that one aggregate can combine with another aggregate due to the smooth and rough attributes and a new aggregate is formed. This process is POORAN. On the other hand, a small section of a larger aggregate can part with it. This process is called GALAN. In the past, scientists believed that one element couldn't be transformed into another element. However, it has been observed that in the phenomenon of radioactivity, when three alpha particles are emitted from a nucleus of uranium, it turns into a nucleus of radium, and when a nucleus of radium emits five alpha particles, it turns into a nucleus of lead. These are instances of the process of GALAN. When an alpha particle enters the nucleus of nitrogen, a nucleus of oxygen is formed. This is an example of the process of POORAN. Similar processes occur in lithium and beryllium as well.

Formation of ultimate particle:

BHEDAADANU [5-27]

The ultimate particle is formed by breakup only.

Evidently, the ultimate particle, being the smallest indivisible unit of matter, is formed only through the process of breakup of an aggregate.

⁷ For details, please see 'Matter And Energy According To The Jain Scriptures' by Duli Chandra Jain, Jain Study Circular, July 2007 (posted on jainstudy.org).

⁸ SANGHAATAANAAM DWITAYA NIMITTAVASHAADDVIDAARA NAM BHEDAH |
Acharya Pujapad in SARVAARTH SIDDHI

⁹ POORAYANTI GALANTI ITI PUDGALAAH |
POORANAGALANAANVARTHA SAMJNAYATVAATA PUDGALAAH |
Swami Aklankadev in TATTVAARTH RAAJVAARTIK
CHHABIH SANTHAANAM BAHUBIH DEHEHIM POORADI GALADITTI POGGALO |
DHAVALA

As stated above, an ultimate particle has one taste, one smell, one color and two kinds of touch. It occupies just one iota of space. An ultimate particle cannot be detected by our senses.

Formation of visible aggregates:

BHEDASANGHAATAABHYAAM CHAAKSHUSHAH [5-28]

Visible (perceptible) aggregates are formed through conjoined processes of combination and breakup.

Some aggregates of matter are visible (perceptible) while others are invisible (imperceptible). Invisible aggregates are changed into visible ones through the conjoined processes of breakup and combination. Obviously, an invisible aggregate cannot become visible by breakup. Further, an invisible aggregate cannot be turned into a visible aggregate by combining with another aggregate in each and every instance. For example, two invisible aggregates cannot become visible through combination. However, when an invisible aggregate breaks up into two or more pieces and one of its pieces combines with another aggregate, the resulting aggregate is visible in every instance.

- To be continued

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All Matter Is Essentially Similar In Nature

(From 'Matter And Energy According To The Jain Scriptures', Jain Study Circular, July 2007)

Acharya Umasvati, who lived around the first century A.D., has stated in TATVAARTH SUTRA that all aggregates of matter are formed through the breakup of larger aggregates or through a combination of smaller aggregates, and that these processes occur because of the smooth and rough attributes. This means that all substances in the universe, such as lead, gold and sulfur, which we see or detect through our senses, are made up of particles possessing smooth and rough attributes. Further, their constituent particles are similar and therefore all matter is identical in nature. Prior to the advent of the theory of electronic structure, scientists believed that different elements were made up of different kinds of matter. However, the theory of electronic structure has led to the conclusion that atoms of all elements are made up of protons, neutrons and electrons. Thus all matter is similar in nature. This principle agrees with the Jain concept of matter.