PHYSICS AND CHEMISTRY

Section 4. Chemical phenomena

Point I. Matter
(42:3.1) In all universes except the central one, matter is identical. The physical properties of matter depend on the speed of rotation of its constituent elements, on the number and size of the rotating elements, on their distance from the nuclear body or on the spatial content of matter, as well as on the presence of certain forces, as yet undiscovered on Urantia.

Point A. General Classification

Point 1. Ten basic types of matter.
(42:3.2) In the various suns, planets, and cosmic bodies are represented ten principal kinds of matter:
(42:3.3) **1.** Ultimatonic matter - the original physical units of material being, the particles of energy from which electrons are formed.
(42:3.4) **2.** Sub-electronic matter - the stage of the solar super-gases, which is characterized by explosive and repulsive action.
(42:3.5) **3.** Electronic matter - the electrical stage of differentiation of matter: electrons, protons and various other particles participating in the diverse construction of electron groups.
(42:3.6) **4.** Sub-atomic matter - matter widespread in the bowels of hot suns.
(42:3.7) **5.** Deformed atoms - found in cooling suns and throughout space.
(42:3.8) **6.** Ionized matter - individual atoms deprived of their outer [or chemically active] electrons as a result of electrical, thermal or X-ray activity, as well as under the influence of solvents.
(42:3.9) **7.** Atomic matter - a chemical stage of organization of the elements, the constituent particles of molecular, or visible, matter.
(42:3.10) **8.** Molecular stage of matter - matter as it exists on Urantia in a state of relatively stable materialization under ordinary conditions.
(42:3.11) **9.** Radioactive matter - the destructive property and activity of heavier elements under conditions of moderate heating and weakened gravitational pressure.
(42:3.12) **10.** Ruined Matter - The relatively unchanged matter of cooled or dead luminaries. In reality, matter of this kind is not immutable; a certain ultimatonic - and even electronic - activity is detected in it, but these particles are located very close to each other, and the speed of their rotation is extremely slowed down.

Point B. Ultimatons, Electrons and Atoms

Point 1. Space charge is uniform and undifferentiated, and matter consists of particles of definite weight.
(42:6.1) While the space charge of the universal force is uniform and undifferentiated, the organization of energy manifested in matter is related to the concentration of energy into discrete masses of finite size and stable weight-an exact response to gravity.

Point 2. Gravity operates in full force at the appearance of the atomic organization of matter.
(42:6.2) Local, or linear, gravitation begins to operate in full with the appearance of the atomic organization of matter. Subatomic matter shows a weak response to gravity when activated by X-rays and other analogous energies, but free, unattached and uncharged particles of electronic energy or free ultimatons are not subject to the measurable effects of linear gravity.

Point 3. Ultimatons only respond to Heaven's gravity.
(42:6.3) The ultimatons function by mutual attraction, responding only to the circular gravitational pull of Heaven. Having no response to linear gravity, they are thus held in the universal spatial drift. Ultimatons are capable of increasing spin speed to the point of partial anti-gravity properties, but they cannot, without the help of force organizers or energy controllers, reach a critical speed of de-individuation, a return to the force energy stage. Under natural conditions, ultimatons are released from the status of physical existence only when they participate in the final destruction of a cold and dying sun.

Point 4. Movements of the Ultimatons.
(42:6.4) Passing through many stages of physical activity, the ultimatons, unknown to Urantia, slow down their motion until they attain such rotational energy as is necessary for the formation of electrons. Ultimatons have three types of movement:
1. Cosmic force mutual resistance

2. Individual rotation with potential anti-gravity action capability
3. Intra-electronic inter-positional displacements of a hundred interconnected ultimatons

Point 5. No more and no less than one hundred ultimatons are always present in a typical electron.
(42:6.5) Mutual attraction holds a hundred ultimatons in the composition of the electron; and no more and no less than a hundred ultimatons are always present in the typical electron. The loss of one or more ultimatons does not destroy the typical electron integrity, giving rise to one of the ten altered forms of the electron.

Point 6. The size and type of the electron is determined by the behavior of the ultimatons.
(42:6.6) The ultimatons do not describe orbits and do not revolve in circles within the confines of electrons, but spread out or accumulate in accordance with their axial velocities of rotation, which determines the various sizes of electrons. In addition, this same electronic axial rotation rate causes negative or positive responses of several types of electronic units. In general, the separation or joining of electronic matter, just like the electrical differentiation of the negatively and positively charged bodies of energy-matter, takes place as a result of the various functions that effect the interconnection of the ultimatons that form this matter.

Point 7. Dimensions of atoms and electrons.
(42:6.7) Each atom is a little more than four millionths of a millimeter in diameter, while an electron weighs a little more than two thousandths of the smallest atom, the hydrogen atom. Although the positively charged proton characteristic of the atomic nucleus may not be greater in charge than the negatively charged electrons, its weight exceeds the weight of the electron by almost 2,000 times.

Point 8. Comparison of mass and volume of electrons and protons.
(42:6.8) If the mass of matter be increased so that the mass of an electron is equal to one-tenth of an ounce [2.84 grams], then with a corresponding increase in size the volume of such an electron will be equal to the volume of the earth. If the volume of the proton - which is eighteen hundred times heavier than the electron - was increased to the size of the head of a pin, the head of a pin would, by comparison, reach a diameter equal to the orbit of the Earth around the Sun.

Point C. Atomic matter

Point 1. The structure of all matter is analogous to the structure of the solar system.
(42:7.1) The construction of all matter is analogous to the construction of the solar system. At the center of every smallest energy of the universe is a relatively stable, relatively unchanging nuclear part of material being. This central particle is endowed with the threefold possibility of manifestation. Around the energy center in infinite abundance, but in unstable orbits, energy particles, vaguely reminiscent of planets, which - like your solar system - surround the sun of some star group.

Point 2. In an atom, electrons revolve around a central proton.
(42:7.2) Inside the atom, the electrons revolve around a central proton, having as much free space as the planets revolve around the sun in the space of the solar system. Equally, compared to actual dimensions, a relative distance separates the atomic nucleus from the inner electron orbit, like the distance between the inner planet Mercury and your Sun.

Point 3. Rotational speeds around the atomic nucleus are enormous.
(42:7.3) Both the axial rotation of the electrons and the orbital velocities of rotation around the atomic nucleus lie beyond the limits of human imagination, to say nothing of the velocities of their constituent ultimatons. Positively charged radium particles fly into space at a speed of 1,600 kilometers per second, while negatively charged particles reach speeds close to the speed of light.

Point 4. Local universes are decimal - there are 100 types of atoms.
(42:7.4) The local universes have a decimal construction. There are exactly one hundred distinct atomic materializations of spatial energy in a dual universe, corresponding to the maximum possible organization of matter in Nebadon. These hundred forms of matter form a regular order where from one to a hundred electrons revolve around a central and relatively compact nucleus. It is at the expense of these orderly and reliable associations of the various energies that matter is formed.

Point 5. Not all one hundred known elements can be on the surface.
(42:7.5) Not on every world can a hundred recognizable elements be found on the surface, but somewhere they are, have been, or are in the process of evolution. The conditions of origin and subsequent evolution of the planet

determine how many of the hundred atomic types will be observable. On many worlds, heavier atoms are absent from the surface. Even on Urantia the known heavy elements show a tendency to decay, as demonstrated by the behavior of radium.

Point 6. Stability of the atom.
(42:7.6) The stability of the atom depends on the number of electrically passive neutrons in the central body. The chemical properties depend entirely on the activity of the free-spinning electrons.

Point 7. With more than 100 electrons, an atom is destroyed and energy is released.
(42:7.7) In Orvonton it has never been possible to collect under natural conditions more than one hundred orbital electrons in one atomic system. When one hundred and one electrons were artificially introduced into the orbital field, the result invariably was the practically instantaneous destruction of the central proton with rapid dissipation of the electrons and other released energies.

Point 8. Only the outer 10 electrons rotate in discrete orbits.
(42:7.8) Although atoms may contain from one to a hundred orbital electrons, only the outer ten electrons of the largest atoms revolve around the central nucleus in the form of distinct and discrete bodies which retain their integrity and compactly revolve in strict certain orbits. The thirty electrons closest to the center are difficult to observe or detect as separate and organized bodies. Such a comparative dependence of the electronic properties on the proximity to the nucleus corresponds to all atoms regardless of the number of electrons contained in them. The closer the nucleus, the weaker the individuality of the electron. The wave-like energy spread of the electron can be so wide that it captures all the lower atomic orbitals; this is especially true of the electrons closest to the atomic nucleus.

Point 9. Characteristics of the four zones of electron organization in the atom.
(42:7.9) The 30 orbital electrons within the very depths of the atom possess individual character, but their energy systems tend to interpenetrate, extending from one electron to another and virtually from one orbit to another. The next 30 electrons form the second family or energy zone and possess a more developed individuality, representing actually physical bodies having greater control over their energy systems. The next 30 electrons - the third energy zone - are even more individualized and revolve in more obvious and defined orbits. The last 10 electrons, present only in the ten heaviest elements, have the dignity of independence, and by virtue of this are able with greater or less ease to break free from the control of the parent nucleus. With minimal fluctuations in temperature and pressure, the members of this fourth and outermost group are freed from the power of the central nucleus, which is confirmed by the spontaneous destruction of uranium and its related elements.

Point 10. The unpredictability of electrons is explained by many factors.
(42:7.10) The first twenty-seven atoms containing one of the twenty-seven orbital electrons are easier to understand than the rest. From the twenty-eighth and up we are confronted with an increasing unpredictability of the supposed presence of the Unconditioned Absolute. But in part this unpredictability of the electrons is explained by the different spin rates of the ultimatons about their axis and the unexplained tendency of the ultimatons to "bunch up". The different properties of electrons are also explained by the action of other factors: physical, electrical, magnetic and gravitational. Therefore, as far as predictability is concerned, atoms are similar to beings. Statistics can proclaim laws governing large numbers of atoms or beings, but not for each individual atom or being.

Point D. Atomic Cohesion

Point 1. The integrity of the atomic system determines gravity and unknown energy.
(42:8.1) Although gravity is one of several factors determining the integrity of the smallest atomic energy system, there is a mighty and unknown energy within and between the elementary physical particles, the secret of their elementary structure and outward behavior-the force which ever yet to be discovered on Urantia. This universal influence permeates all space locked within the confines of the microscopic energy structure.

Point 2. The inter-electron space of the atom is not empty. The behavior of the atom is related to a spatial-force manifestation of the Unconditioned Absolute.
(42:8.2) The inter-electron space of the atom is not empty. Throughout the atom, this inter-electron space activates with wave-like manifestations that are perfectly synchronized with the electronic velocities and spins of the ultimatons. This force obeys not only the well-known laws of mutual attraction of positive and negative particles; therefore her behavior is sometimes unpredictable. This unnamed influence appears to be a space-force manifestation of the Unconditioned Absolute.

Point 3. Size and role of the meson.
(42:8.3) The charged protons and uncharged neutrons of the atomic nucleus are held together by the interaction of the meson, the particle of matter which is 180 times heavier than the electron. Without this arrangement, the electrical charge of protons would prove destructive to atomic nuclei.

Point 4. Role of the meson in the nuclear stability of the atom.
(42:8.4) The structure of atoms is such that neither electrical nor gravitational forces could hold the nucleus. The integrity of the nucleus is maintained by the two-way binding function of the meson, which is able to bind charged and uncharged particles together thanks to superior mass-energy capability, and also by another function of its own, which causes protons and neutrons to constantly switch roles. The meson causes the electrical charge of the nuclear particles to continuously shift from protons to neutrons. During one infinitesimal fraction of a second, the given nuclear particle is a charged proton, during the next - an uncharged neutron. And these alternations of energy state take place so incredibly rapidly that the electric charge is deprived of any possibility of acting as an "energy carrier" particle, which greatly aids the nuclear stability of the atom.

Point 5. Meson disintegration.
(42:8.5) The presence and function of the meson explains another mystery of the atom. When atoms become radioactive, they emit much more energy than might be expected. This excess radiation is formed when the meson "energy carrier" breaks down, which then becomes an ordinary electron. Meson decay is also accompanied by the emission of some small uncharged particles.

Point 6. The meson has nothing to do with proton binding - there is an almighty force.
(42:8.6) The meson explains the binding properties of the atomic nucleus, but has nothing to do with proton-to-proton coupling or neutron-to-neutron attraction. The paradoxical and powerful force locked in the cohesive wholeness of the atom is a type of energy as yet undiscovered on Urantia.
(42:8.7) These mesons are abundantly present in the cosmic rays which so persistently affect your planet.

Point D. Classification of elements

Point 1. The number 7 characterizes the spiritual world, the number 10 – the material creation.
(42:9.2) The number 7 is fundamental to the central universe and spiritual system of innate transmission of distinctive properties, but the number 10, the decimal system, is to energy, matter, and material creation. However, the atomic world does show some periodic signs, repeating themselves in groups of seven, which is the birthmark of the material world, indicating its distant spiritual source.

Point 2. The sevenfoldness of the periodic table shows the weekly origin of the material world.
(42:9.3) In the realm of chemistry, the constancy with which sevenfoldness manifests itself in the structure of created matter is demonstrated in the segmented cyclic repetition of similar physical and chemical properties in groups of seven elements in the arrangement of the basic elements in order of increasing their atomic weight. If the chemical elements of Urantia are thus arranged in order, then any given quality or property tends to repeat itself through each of the seven elements. This periodicity of change through seven elements resumes and variably declines throughout the periodic table, where it is seen most clearly in the first, or lighter, groups of atoms. Starting with an element, some of its properties will change over the course of the six subsequent elements, but by reaching the eighth it tends to resume - in other words, the eighth chemically active element resembles the first, the ninth resembles the second, and so on. Such a fact of the physical world unmistakably shows the sevenfold construction of the energy preceding it and testifies to the fundamental reality of the sevenfold diversity of space-time creations. It should also be pointed out to man that the natural spectrum contains seven colors.

Point 3. Spectral phenomena change under the influence of different types of energy.
(41:6.1) In deciphering spectral phenomena it should be remembered that space is not empty; that in passing through space, light is sometimes slightly modified by the action of the various types of energy and matter circulating throughout organized space. Some of the lines that appear in the spectrum of your sun, indicating unknown matter, are explained by the transmutation of well-known elements floating in space in a destroyed form - atomic victims of violent collisions occurring in elemental solar battles. Space is saturated with such wandering debris, especially sodium and calcium.

Point E. Calcium

Point 1. Reason for the prevalence of calcium in the universe.

(41:6.2) Indeed, throughout Orvonton calcium is the primary space-penetrating element. Our entire super-universe is littered with the tiniest particles of "pulverized rock." Stone is literally the basic building material of the planets and spatial spheres. The cosmic cloud, the vast covering of space, consists mainly of modified calcium atoms. The calcium atom is one of the most abundant and stable elements. It not only withstands solar ionization - decomposition, but also preserves its associative identity even after the test of destructive X-rays and scattering under the influence of high solar temperature. Calcium has an individuality and durability that surpasses all the most common forms of matter.

Point 2. Release of calcium from the sun.
(41:6.3) As your physicists suggest, the deformed remnants of calcium from the sun are moved to various distances literally with the rays of the sun, which unusually facilitates their wide distribution in space. The sodium atom, after some modifications, is also capable of moving with the help of light and energy. The agility of calcium is all the more amazing because the mass of this element is almost twice that of sodium. The local penetration of calcium into space is explained by the fact that it, in a modified form, is torn out of the sun's photosphere, literally "riding" the sun's rays rushing outward. Of all the elements of the sun, calcium, regardless of its relatively large mass - there are as many as twenty spinning electrons in its atom, is most successfully released from the bowels of the sun, heading for the spheres of space. This explains the presence of the sun on a layer of calcium - a gaseous stone surface with a thickness of 9,600 kilometers. And this regardless of the fact that under it there are nineteen lighter elements and many heavier ones.

Point 3. Method for releasing calcium from the sun - loss of the 20th and mobility of the 19th electron.
(41:6.4) At solar temperatures, calcium is an active and unstable element. The atom of the stone has two mobile and weakly bound electrons in two outer orbits that are very close to each other. At the very beginning of the atomic battles, calcium loses its outer electron; then he begins to masterfully juggle the nineteen electrons, transferring them from the nineteenth to the twentieth orbit and back again. By transferring this nineteenth electron between its own orbit and that of its lost companion more than 25,000 times per second, a deformed atom of the stone is able to partially resist the action of gravity and thus successfully navigate the emerging streams of light and energy-the solar rays, striving for freedom and adventure. This calcium atom moves forward in alternating leaps, catching and releasing the sun's beam about 25,000 times every second. This is precisely why stone is an essential component of the spatial worlds. Calcium is the most experienced escapee from the solar prison.

Point 4. Phenomenal mobility of the 19th electron from the calcium atom.
(41:6.5) The mobility of this acrobatic electron of calcium is demonstrated by the fact that, being transferred by the influence of solar forces-temperatures and X-ray radiation-to a higher orbit, it remains there only for about one millionth of a second; but until the electro-gravitational force of the atomic nucleus pulls it into its former orbit, it manages to complete a million revolutions around the atomic center.

Point 5. Your sun has used up a huge chunk of its calcium. A significant part is in the outer crust of the sun.
(41:6.6) Your sun has used up a great deal of its calcium, losing it in vast quantities in the convulsive eruptions of the formation process of the solar system. A significant portion of its calcium is now found in the sun's outer crust.

Point G. Other chemical phenomena

Point 1. Factors influencing the origin of cosmic rays.
(58:3.1) In the initial stages of materialization of the universe, vast hydrogen clouds-such accumulations of cosmic dust as characterize many regions of distant space today-were scattered throughout space. Much of the organized matter, broken up and dissipated by blazing suns in the form of radiant energy, first accumulated in these ancient hydrogen clouds of space. In the presence of some unusual conditions, atomic decay is also observed in the nuclei of large hydrogen masses. And all these processes of construction and destruction of atoms, similar to those that take place in highly heated nebulae, are accompanied by the release of streams of short-wave space rays carrying radiant energy. These various radiations are accompanied by a type of spatial energy unknown to Urantia.

Point 2. The relationship of the hydrogen clouds and the various cosmic energies to form an environment necessary for the establishment of life.
(58:3.4) The vast hydrogen clouds are the veritable chemical laboratories of the cosmos, uniting all phases of evolving energy and changing matter. Powerful energetic processes take place in the marginal gases of the huge binary stars, which so often overlap and, as a result, are widely mixed with each other. But none of these colossal and large-scale energy activities of space have the slightest effect on the phenomenon of organized life - the germplasm of living nature and living beings. Such energetic conditions of space are inherent in the environment necessary for the establishment of life, but - unlike some longer rays carrying radiant energy - they do not affect the

subsequent modifications of the hereditary factors of the germplasm. Life implanted by Life Carriers is immune to this amazing flow of short space rays of cosmic energy.

Point 3. There are over 1,000,000 basic chemical formulas forming variants of the manifestations of life.
(36:2.14) There are over 1,000,000 basic or cosmic chemical formulas which form the parent prototypes as well as the numerous principle functional variations of the manifestations of life. The number one satellite of the life planning sphere is the world of universal physicists and electrochemists who serve as technical assistants to the Life Carriers in their work of capturing, organizing and manipulating the basic units of energy used in the construction of the material envelope for transmission of life - the so-called germplasm.

Point 4. Over 15,000,000 chemical reactions can take place in human blood.
(65:6.6) Yet many apparently mysterious adaptations of living organisms are purely chemical, wholly physical in character. At any given time, over 15,000,000 chemical reactions between the hormones secreted by a dozen endocrine glands may be taking place in each person's bloodstream.