

THE 6 LAWS BIOCHEMISTRY OF LIVING MATTER

● In document F1a 2014, F1b, F1c and finally F1d www.uitewijkwinkel.eu the author derived that all matter started from an equivalent number of protons and electrons that results in pure hydrogen. For energetically reasons and speed of atoms in the universe the nuclear fusion starting with just hydrogen always universe widely results in the same atoms in accordance with the elements / isotopes of the *periodic table* as found on Earth. In universe all atoms are conform the periodic table!

Throughout the universe for energetically reasons as well all elements of the periodic table qualitatively have exact the same system of 12 fundamental physically and chemically forces as found on planet Earth:

● With those elements of the *periodic table* all over the universe the exact same total amount of about 1 – 2 billion different mono- and polymer molecules can be constructed:

● In the universe as on Earth these molecules result in the same varied system of chemically, physically-chemically and biochemically reactions. In principle all biochemically forms of living matter are possible on Earth. All forms of living matter could have been developed on Earth:

● The biochemistry of all living matter on Earth however is exclusively based at the carbon chemistry and at the biochemical patterns and schemes of *Biochemical Pathways* by Gerhard Michal at al. In the chapters 1 – 6 of document B1.1 the author presented the top – down analyses of Biochemical Pathways. So he derived and formulated the central biochemical fundamentals of living matter on Earth.

● It is however still the question that all living matter in the universe is based on the carbon chemistry and Biochemical Pathways. Are other biochemically systems possible for living matter or not?:

● In this document and chapters 7 – 13 of document B1.2 the author presents a *systematic bottom-up deduction* of all possible biochemical basic principles and thus the six Laws of biochemistry of living matter in the universe:

● That *bottom up deduction* points out that this total amount of 1 – 2 billion different mono- an poly-molecules permits *only one biochemical basic system* for living matter. The central part of this biochemical system on Earth has been represented in Gerhard Michal's et al. See schema's of *Biochemical Pathways* (BP) and Recon 2 model:

● In chapter 7 - 13 is *bottom up proven* why all the biochemistry of all living matter in the universe is based on exactly the same biochemistry and Laws of biochemistry as found in living matter on Earth.

● Because the periodic table allows only *one biochemical system* (Biochemical Pathways) living matter can arise and develop *spontaneously* everywhere in the universe on 'earthlike' planets with enough land and water (20 – 80% covering) and a rather low atmospheric 'air' pressure at sea level of about 0.8 – 1.2 bar.

● Every galaxy contains at least about hundred to thousand planets with spontaneous developed living matter like at planet Earth. Living matter is rather rare per galaxy but abundant all over the universe.

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7.0 INTRODUCTION:

In **Chapters 1- 6**, the author *top down* derived the biochemical principles of living matter on Earth and in the universe assuming that:

- a) Everywhere in the universe all matter is buildup from atoms starting with hydrogen. All atoms are arranged conform the *periodic table* as found on Earth with have the same accompanying physically / chemically forces and construction. (See **document F1d** www.uiterwijkwinkel.eu),
- b) Everywhere in universe the same theoretically number of 1 – 2 billion molecules are possible and
- c) These molecules contain anyhow one biochemically system for living matter on Earth presented by the biochemical diagrams and schemes of living matter of **Biochemical Pathways (BP)** by **Gerhard Michal** and his team and later worked out in the **Recon2 model**. For biochemical reactions water is essential.
- d) The author is aware that these biochemical schemes can be represented mathematically.

Still remain the following questions:

- 1) Does the periodic table theoretically permits other biochemically systems for living matter for instance centrally based around Si, amphoteric metals, S etc.?
- 2) Are reaction media possible other than water?

-) Deduction principles of biochemistry living matter in universe with 26 sieve steps:

The universal biochemical conditions of all living matter are systematically derived in this **chapter 7** by a *bottom-up deduction* which consists of *26 sieve steps*. This deduction is based on the same all universe widely possible 1 – 2 billion molecules of the periodic table / system. That number is estimated at about 1 - 2 million (10^6) mono-molecules and 1 – 2 billion (10^9) polymer molecules. These huge number of molecules apply to the biochemistry of every imaginable form of living matter in the universe!

This *bottom-up deduction* in **chapter 7** is opposed to the *top-down analysis* of **chapter 6**.

Now in **chapter 7** is derived:

- I) All biochemical systems that are *theoretically* possible within these 1 – 2 billion molecules,
- II) That these systems are not different from the earth known *Biochemical Pathways* and *Recon2 model*.
- III) All living in universe is based at exactly the same biochemistry as found in living matter on Earth!

7.1 BOTTOM-UP CONCLUDE FRAMEWORK CONDITIONS FOR THE BIOCHEMISTRY OF LIVING MATTER:

In **Chapter 7**, all physical, chemical and biochemical possibilities or impossibilities are considered for:

-) the development of '*immaterial*' forms of life in matter at the basis of elements of the *periodic table* and all possible molecules,
-) the development of '*material*' forms of life at both elements / molecules and in terms of reaction medium,
-) the *driving force* required for the maintenance of any form of 'immaterial life' as well 'physical forms of life and living matter'.

Scheme 7-1: Structure of the *bottom-up* deduction:

A) Matter less absolutely nothing;

- 1) Massless, matter-free and energy-less vacuum,
 - 1.1 Gravitational waves, which travels at speeds \gg speed of light c ,

B) All forms of radiation *without the characteristics of matter*: *1*)

- 2) These forms of radiation have only the characteristic of mass, charge, and magnetic spin but not measurable:
 - 2.1 Neutrinos, majorana particles that move at the speed of light c ; See **document F1b**,
 - 2.2 Photons, majorana particles which also move with up to the speed of light c ; see **document F1b**,
 - 2.3 The incomplete particles: quarks and proto-proton and proto-electrons; see **document F1c**.

C) All forms of radiation *with characteristics of matter*: *1*)

- 3) These forms of radiation have the characteristic of a quantity: *mass, electric charge, magnetic spin and matter* that is measurable. (In matter $E = \frac{1}{2}mc^2$ rotation speed / energy is added to constructions with mass, charge and spin).
 - 3.1 Particles entire matter: the 'fast' proton / anti-proton, the electron / anti-electron, alpha particles, as the proton radiation and the neutron; see **document F1c**.

D) Protons and electrons result in the elements of the *periodic table* starting with hydrogen; see **document F1d**):

- 4) The universe with only 'slow' protons and electrons; not in the stage of radiation,
- 5) Matter as ordinary atoms, black hole atoms and anti-atoms; see **documents F1e and C4**,
- 6) All matter is made up of the universe from the approximately 90 stable elements of the *periodic table*,
- 7) With these 90 elements approximately 1 - 2 billion (10^9) different molecules, isomers and stereo-isomers can be constructed, especially around the elements C, H, N, O, S and (P),
- 8) The biochemistry of living matter is possible at all planets in the universe similar to the Earth with land, sufficient water and a low pressure atmosphere. They all have the potential to form all conceivable molecules. (**Supplements 9 and 13** will be presented in **document B 1.3**)

1) The **documents F1a 2014, F1b and F1c majoranas** www.uitewijkwinkel.eu the author worked out these forms of radiation and the structure and physical characteristics of: a) mass, b) charge, and c) magnetic spin. In matter $E = \frac{1}{2}mc^2$ rotation speed /energy is added to constructions with mass, charge and spin which transfers mass into matter or antimatter.

Explanation Scheme 7-1:

1) In **chapter 7** the author derives the biochemical bases for all forms of 'living' matter in universe as formulated in the *six Laws biochemistry of living matter* or the *Six Laws of biochemistry in the universe*.

2) Throughout the universe all atoms only are exclusively constructed out of ordinary protons and electrons (**document F1c**). At first only hydrogen atoms / molecules can be constructed and no construction with neutrons.

3) During nuclear fusion in stars and during supernovas starting with hydrogen all matter in the universe is arranged in larger atoms all in accordance with the elements of the *periodic table* as we know on Earth. (**document F1d, or step 16 of document G7; cycle of the universe**).

All atoms are built with *only* a) protons, b) 'core'-electrons and c) 'shell'-electrons. The atomic nucleus contains no neutrons! See **especially the figures in F1d** where atomic nuclei without neutrons are shown!

4) The with the *periodic table* associated system of physical and chemical forces and bonds also applies universe wide (**document D1**).

5) For ordinary matter are all forces on the atom (from hydrogen) derived systematically in **document F1d**. For black hole matter / atoms (starting from the element beryllium (Be)) all the forces are derived in **document F1e** and the forces antimatter / atoms (only anti-H / H₂) in **document C4**.

7.1.1 WHAT ARE THE RESULTS OF THIS BOTTOM-UP DEDUCTION?

Chapter 7 is tricky and difficult. For the fidgety among you in advance the outcome.

Through 26 (*sieve*) steps of the deduction is derived outline which:

- 1) Living matter is not possible on a basis of:
 - a) the absolute mass less, matter less and energy-less nothing,
 - b) mass but matter-less forms of radiation such as neutrinos and photons,
 - c) radiation of incomplete matter such Higgs particles, photons and quarks,
 - d) radiation of complete matter such as electrons / protons, alpha particles and neutrons,
 - 2) Living matter is not possible on the basis of black hole matter or antimatter,
 - 3) Living matter is *only possible* only on the basis of ordinary matter; the about 90 stable elements of the *periodic table* and their isotopes. From these elements approximately 0.5 – 1 million (10^6) mono-molecules can be constructed and 1 - 2 billion (10^9) monomer and polymeric molecules everywhere in the universe at earthlike planets with water,
 - 4) There are two different chemical bonds:
 - a) the fixed *chemical covalent radical reactions* and compounds are unsuitable in the biochemistry of living matter.
 - b) only *chemical covalent charge bonds* with flexible electrons-pairs *2* are suitable for mono-molecules and to form polymeric molecules which are useful both fit into the biochemistry of 'living matter' as by polymerization as a building material in living cells / organisms,
 - 5) These *chemical covalent charge bonds* (moveable electron-pairs) are only present between the elements C, H, O, N, S, and (P),
 - 6), Therefore, of the *periodic table*, only the elements C, H, O, N, S, and (P) can be used as basic building blocks of the mono-molecules supplemented with some trace elements, Ca, Mg, Fe, Zn, Co, Se, Si, V, K, Na, etc.
 - 7) On the basis of Si, NH₃, H₂O₂, H₂S a biochemistry for living matter similar to the carbon-chemistry as found on Earth isn't possible. In the universe all living matter is based at the exactly the same biochemistry as found in living matter on Earth,
 - 8) The conversion of *covalent charge binding energy in heat (photons)*, in fact forms the only *driving* force of biochemical processes of all living matter,
 - 9) To settle the *biochemistry* of living matter is only possible by through mono molecules dissolves in the reaction medium water,
 - 10) These molecules of the *periodic table* do not permit other chemical or biochemical systems than the biochemistry indicated in the schema's **Biochemical Pathways, BP etc. and Recon2**,
 - 11) Because only one biochemical system like BP is possible the biochemistry of living matter develops *spontaneously* on all 'earthlike' planets in the universe with sufficient water and ice on the poles. Estimated at hundred to thousand planets with living matter in every galaxy!
 - 12) The biochemistry of living matter in the earth (BP etc.) in itself is unique, but also is the standard for biochemistry of *all* lifeforms on many billions / trillions of other sites / planets in the universe.
- *2*) All chemical reactions occurring by the shifting one whole *electron pair* are to be regarded as biochemical reactions!

7.2 BOTTOM-UP DEDUCTION: SCREENING METHODS COMPRISING 26 STEPS:

Living matter consists of a complex of biochemical processes accompanied with physically / chemically reactions. This complex consist of a system of completely logically and predictable steps because each fulfills the *min / max1 principle* as worked out in **document F1e**.

Each step is characterized by one physical, chemical and energetic change. That complex of biochemical reactions manifests as 'life'. The biochemistry of the 'living' matter can't be summarized in one concept. The biochemistry of 'life', however, is strictly logically and founded on a systematic basis. This biochemistry takes place within clearly defined conditions and *degrees of freedom*.

In **chapters 7 - 9** the author expresses these constraints / degrees of freedom as the *six Laws of biochemistry of living matter in universe or simply the Six Laws of biochemistry*.

-) Methodology of *exclusion and negative sieve approach*:

The author has chosen the bottom up deduction for exceptional methodology. By (screen) step will be appointed when the (bio) chemistry of living matter *is not possible* for the physical, energetic and chemical conditions / reasons and forms of matter that is considered in that particular step.

Therefore each step in this deduction process acts as a *filter / sieve layer* through which the degrees of freedom still further curtailed. By going through these **26 steps** is increasingly clear which degree of freedom disappear and what degrees of freedom remain for the (bio) chemistry of 'living' matter to develop and which the (bio) chemistry of living matter itself *universe wide needs to settle*. The essences of the biochemistry of the living matter be reduced to physical, chemical and energetic constraints / degrees of freedom represented in the six Laws biochemistry living matter.

For curtailing the freedoms and determine which conditions the author follows in **Scheme 7-2** indicated intent with 26 steps of containment that are completed one after another as much as possible.

Scheme 7 - 2: 26 STEPS IN THE LIMITATION BIOCHEMISTRY LIVING MATTER :

Living matter is *not possible* on the basis of:

Step 1: absolute massless, matter less and energy gap; absolutely nothing,

Step 2: apparently 'massless' forms of physical radiation of neutrinos and photons,

Step 3: radiation of *incomplete matter*: neutrinos, quarks,

Step 4: radiation of *complete matter*: electrons, protons, alpha particles, neutrons and anti-forms,

Step 5a: loose (anti) protons and loose (anti) electron, (no radiation)

Step 5b: antimatter atoms,

Step 5c: the atoms in the state of black hole matter,

Step 5d: all matter outside black holes is sorted according to the elements *periodic table*,

Step 6: loose and unbound atoms with *only* physical changes,

Step 7: the atoms / molecules which cannot move freely, as in solids and in pasty liquids in the form of molten solids,

Step 8: 'slow' mono molecules which can *only* undergo *physical* changes,

Step 9: loose 'slow' mono molecules which can *only purely chemical* reactions undergo; the radical chemical reactions,

Step 10: only chemical equilibrium reactions cargo bonds (+ Lb); then no falls development driving force,

Step 11a: only proton reactions;

Step 11b: only half radical reactions,

Step 11c: only responses to load covalent bonds (L2cb) (With only these three reactions is possible together biochemistry),

Step 12: with noble gases, metals, amphoteric metals and halogens because in mutual no covalent bonds bonds charge (+ L2cb) are able to form (Only the elements C, H, O, N, S, Si, P are suitable),

Step 13: in the absence of a driving force,

Step 14: the lack of physically suitable reaction conditions,

Step 15: gas / supercritical as reaction conditions,

Step 16: viscous liquids as a reaction medium, (all non-Newtonian fluids)

Step 17: Newtonian liquids with the exception of water,

Step 18: typing mono-molecules that may not always have the three physical occupy positions of:

=) dissolved (+ W2Db), gas like (+ W2gf), uncharged (-Lf) and no radical (-Rcf),

=) dissolved (+ W2Db), not gaseous (-W2gf), charged (+Lf) and no radical (-Rcf),

=) dissolved (+ W2Db), not gaseous (-W2gf), uncharged (-Lf) and no radical (-Rcf).

=) and also where no semi-radical and / or proton reactions can occur,

Step 19: in fluids as reaction medium both physically and chemically in a lower energy level than water,

Step 20: in a central role for the Si element; only the elements C, H, O, N, S, and P fit,

Step 21: chemical systems other than carbon chemistry,

Step 22: the single use of the atoms C, H, O, N, S and P need for recycling,

Step 23: no additional clockwise biochemical system; only Biochemical Pathways remains,

Step 24: chemical polymers formed from gaseous mono-dissolved in water molecules, and ions; polymerization only from non-gaseous and non-loaded 'nopression' molecules.

Step 25: spaces that are not enclosed by a semi-permeable cell wall,

Step 26: cells without sexual or asexual reproduction.

All cells have a finite life and are by definition mortal and life requires a transferable to the progeny of system information (via RNA / DNA).

7.2.1 STEP 1: LIVE ISN'T POSSIBLE ON THE LEVEL OF THE ABSOLUTELY NOTHING:

Absolute nothingness is defined as space of itself that does not contain any form of mass, matter nor any form of (kinetic) energy. Absolute nothingness doesn't contain any form of mass, matter nor even 'vacuum energy'. The absolute nothing cannot generate by itself any form of physical or chemical effect nor changes. In universe, all forces are always 100% related to mass, matter and kinetic energy. In absolute nothingness is no form of life possible.

Even 'immaterial form life' as a remnant of living matter cannot manifest in this absolute nothing. The absolute nothing lacks any capacity for the spontaneous creation of: 1) mass / matter, 2) energy, or 3) radiation.

Step 1a restriction: The absolute matter less space accommodates:

-) No form of mass, matter and / or any form of energy,
-) No form of 'immaterial' life nor any 'physically, chemically and energetically' forms of life '

Impossible is then:

-) Generation by itself any form of radiation, mass, matter, force or energy,
-) And to induce any physical or chemical change on radiation, mass and matter.

Step 1b restriction: In this massless, matter-less and energy gap in the absolute nothing in the universe all forms of radiation are starting from ordinary matter, black hole matter or anti-matter. This radiation in origin always be reduced to a form of particles with mass / matter. *3*)

This results in the following constraint:

Precondition 1): Living matter and any random expression of 'immaterial' life are only possible on the basis of:

1a) emitted by matter forms of apparently 'massless' forms of radiation such as neutrino's and photons
4)

1b) by matter emitted radiation in the form of particles incomplete 'matter' such as Higgs particles / strings quarks,

1c) by matter emitted radiation in the form of particles complete 'matter': protons (p), electrons (e), alpha particles (4 protons + 2 'core' electrons) and neutrons (1 proton + 1 electron) and their anti-forms,

1d) complete 'matter' which is not in the form of radiation.

3) Gravity (**E3**) and time (**G1**) are the only forms of 'radiation' not based on particles and vibration.

4) Neutrinos and photons are majorana particles (document **F1b**) build up from two super-symmetrically Higgs particles (**F1a 2014**) of the (anti)proton and those two Higgs particles of the (anti) electron (**F1c**).

At the outside these majorana particles / radiation have *virtually no measurable* amount of mass and charge. Photons have a magnetic spin and have a certain amount of kinetic energy / vibration. These particles move as radiation and substantially rectilinearly, with the speed of light through the universe. In universe they only move through the relatively thin with hydrogen and helium filled universe-spherical-shell (**G9**). Because of the extreme small deviations by hydrogen and helium gasses all neutrino's and photons stay 100% inside this universe-sphere-shell. That is why the universe is a 100% fully closed system for all particles with mass, matter and energy such as neutrino's and photons.

For the construction of neutrinos and photons see **document F1b + figures**. The speed of light is valid for all these particles with *mass*, such as the Higgs particles, neutrino's, photons, quarks, the proton / electron, the neutron and alpha particle.

(Gravity and the universe-clock-time are the only forms of 'radiation' without mass and kinetic energy. Therefore gravity and time move with infinite speed through the universe! 'Radiation' of gravity and time leave the universe the same moment they are generated. See **documents E3, E3-1 and G1**).

Through the standard present, but often not measurable, charge and magnetic spin all forms of electromagnetic radiation (and based on real particles) respond to the present electrical and electromagnetic fields in the universe. In the universe-spherical-shell extremely low concentrations of hydrogen are present. Within the galaxies next to hydrogen also helium is present.

All electromagnetic radiation (particles) thereby get a deviation in their orbits through this universe-sphere-shell in the order of only about 1 degree per 10 - 40 thousand (light) years. This deviation keeps all kind of radiation and so all radiation and their connected mass / matter and energy moving within this universe-sphere-shell. Therefore the universe is a completely 100% closed system for all mass, all matter and all forms of energy! Technical seen this extremely slight deviation of radiation is not likely to be measured or poorly.

The massless, matter-less and energy gap or the absolute nothing cannot realize any change from *itself* to any form of electromagnetic radiation or that of gravitation.

7.2.2 STEP 2: ad 1a) NO LIFE AT THE LEVEL OF NEUTRINO'S AND PHOTONS:

Radiation of neutrinos and photons based on majorana particles (See **document F1b**). They are real particles but without any measurable mass and charge. Both type of particles are still incompletely matter. These types of radiation moves through relatively straight lines through the universe-spherical-shell but are so deflected in thus way by hydrogen and helium that they continue move within this universe-sphere-shell and cannot escape from there. That results in 100% closed universe for mass, matter an energy.

In **document F1c** www.uitewijkwinkel.eu and **Figures 1 - 15** is shown that in the universe from these neutrinos and photons again only protons and electrons can be constructed and nothing else! This constructing process and adding of sufficient rotational energy takes place within the universe-sphere-shell over a period of approx. 14 – 18 billion (10^9) years. During this period all neutrino's and all photons are transformed into larger structures and finally in exclusively normal proto-protons and proto-electrons. Therefore the event horizon from Earth in the universe is about 14 – 18 billion year. Thus the universe is much older!

In the meantime the rotational speed of these proto-protons and proto-electrons will also be increased to the speed of light c . Than $E = \frac{1}{2}mc^2$ kinetic energy is added to these proto-proton and proto-electron constructions. *With that added amount of kinetic rotation energy particles with only 'mass' turns into real protons and real electrons and thus in particles with mass +phenomena of matter.*

'Within a period of 14 – 18 billion years all by stars and supernova's emitted radiation is transformed back into protons, electrons and finally hydrogen again. All emitted radiation will actually be recycled back into protons and electrons and thus into the building blocks of the atom. This recycle step of neutrino's and photons is necessary in order to obtain a closed universe with an energy-neutral and never ending cycle in terms of both mass, charge, magnetic spin and kinetic / gravitational energy.

Through nuclear fusion in stars that hydrogen again transformed into all elements of the periodic table and for energetically reasons exclusively into atoms of the periodic table and isotopes. See **document F1d + figures**.

This inevitable transformation of all forms of electromagnetic radiation in the end only protons, electrons and hydrogen means that the level of neutrinos and photons no other independent form of 'physical' life or even 'immaterial' life is possible! Even human's 'souls' are objected to this regenerating process!

Step 2 restriction: Based on the matter-less forms of radiation (neutrinos and photons) no form of 'material' or 'immaterial' life is possible. So, precondition 1a) falls off.

Precondition 2): Living matter and any other expression of 'life' is only possible on the basis of matter:
1b) as radiation of incomplete particulate matter,
1c) as radiation of complete particle matter,
1d) as well as complete matter that is not in the phase of radiation.

7.2.3 STEP 3: ad 1b) NO LIFE POSSIBLE THROUGH RADIATION OF PARTICLES INCOMPLETE MATTER:

In **document F1a 2014** the author describes that all matter in universe is 100% based on only *four most basic elementary Higgs particles*. This is the Standard Higgs Model by **Uiterwijk Winkel**. These four elementary particles are:

- a) two supersymmetric Higgs particles of the proton as well
- b) two supersymmetric and about 2,000 times smaller Higgs particles of the electron.

Kinetic energy and angular speeds around the three axis generates on these Higgs particles *simultaneously*: 1) a elementary mass or anti-mass, 2) a positive or negative electric charge, 3) a parallel or antiparallel magnetic spin and 4) a volume and space.

(In particle accelerators during collisions kinetic energy destroys this before in protons and atoms present supersymmetry completely. Reconstruction after these collisions results into the 17 particles of the nowadays Standard Model instead of only four elementary Higgs particles!)

On the basis of these four most basically Higgs in **document F1b** are derived the structures of the majorana particles such as neutrinos and photons.

In **document F1c** is worked out how, from which majoranas, only protons and electrons can be reconstructed. In first instance universe widely this exclusively results in the formation of hydrogen.

Document F1d describes that for energetically reasons universe wide the identical structure of all elements of the periodic table starting at nuclear fusion of hydrogen. In this document are also derived the elementary forces of protons and electrons and secondary two physical and two chemical forces of these atoms caused by speed / kinetic energy of these atoms in universe (within the universe-spherical-shell).

The smallest elementary particles incomplete 'matter' and radiation belong successively increasing size: a) Higgs particles, b) neutrinos, c) photons and d) quarks.

With quarks is to form exclusively complete matter such as protons (p) and electrons (e) and nothing else. All free particles of electromagnetic radiation and particle radiation incomplete matter have the feature that they move with great speed and usually with at the maximum speed of light. In the state of radiation, they cannot stay in one place. Kinetic energy force them to move with the speed of light within the universe-spherical-shell. Out of a system of with the speed of light moving radiation living matter is not possible.

Step 3 restriction: The phenomenon of 'life' is not possible on the basis of:

-) *fast-moving particles and radiation of incomplete matter (Higgs, neutrinos, photons, quarks, proto-protons and proto-electrons)*

Precondition 3) For living matter only restraining:

-) *radiation of complete matter or*

-) *matter not in the state of radiation:*

The interaction between elementary particles incomplete matter and kinetic energy ultimately results in the build-up and construction of either the proton or the electron (**F1c + figures**). By adding $E = \frac{1}{2} mc^2$ rotational energy mass proto-protons and proto-electrons transforms into mass + 'matter'! Protons and electrons are the smallest and only two possible stable particles complete matter. (Under special circumstances, the anti-proton and anti-electron (positron) can be formed in particle accelerators)

At the subatomic level, no other *creative processes* of stable particles are present that allow for the presence of 'material' or 'immaterial' forms of life other than the formation of exclusively protons and electrons.

7.2.4 STEP 4: ad 1c) NO LIFE POSSIBLE THROUGH RADIATION OF PARTICLES COMPLETE MATTER:

The proton / anti-proton and electron / anti-electron are the smallest particles *complete matter* (= mass + $E = \frac{1}{2} mc^2$ angular kinetic energy). These particles can move up to maximal the speed of light. With protons and electrons are to build again other types of radiation:

- 1) α radiation; helium nuclei (4 protons + 2 'core'-electrons),
- 2) β radiation (loose electrons),
- 3) γ radiation (neutrons constructed by 1 proton + 1 electron),
- 4) radiation of loose protons and
- 5) loose nuclei of atoms.

On the basis of just these forms of *radiation* of particles *complete matter*: (anti)proton / (anti)electron, the (anti) alpha particle and the (anti) neutron no physical forms of 'life' can be build.

Step 4 restriction: 'Life' phenomenon is not possible on the basis of:

fast moving particles complete matter as radiation in the form of:

-) *fast proton / anti-proton,*
-) *fast electron / anti-electron,*
-) *fast neutrons / anti-neutrons,*
-) *alpha particles,*
-) *atom nuclei.*

Precondition 1c) of 7.2.1 is also to be excluded as a possibility for 'physical' and 'immaterial' forms of life.

Precondition 4): Remainder of 'living matter' only whole matter not in the phase of radiation:

7.2.5 STEP 5: ad 1d) COMPLETE MATTER NOT IN THE PHASE OF RADIATION:

If the (anti) proton and the (anti) electron are not in the phase of radiation. They are the smallest stable pieces for construction complete matter in the form of atoms and parts of atoms. Such atoms normally don't occur as radiation! With such 'slow' non-radiation protons / electrons initially only hydrogen can be constructed and build.

By nuclear fusion of hydrogen during supernova explosions, all elements / isotopes of the *periodic table* are constructed and build up with only protons and electrons. (The atom nucleus doesn't contain neutrons! See **document F1d + figures with nucleus without neutrons**).

All billions of galaxies started some 20 – 25 billion year ago at the same moment with their own Big Bang. Those Big Bangs were much more intensive than the nowadays found supernova explosions. All in the meantime all released neutrino's and photons are transferred within 14 – 18 billion years into protons, electrons, hydrogen and finally into new stars.

During these Big Bang explosions in the center a part of the newly formed atoms \geq Be collapse further into black hole atoms (**document F1e + figures**). The electron shells of these black hole atoms repulse each other but gravity keep them together and captured in the giant central black hole of the galaxy. Only atoms \geq Be can be transferred into blackhole atoms. The electron-shells of the elements H, He and Li cannot collapse towards the nucleus. These lightest elements are not accepted by black holes.

Complete matter according precondition 1d) from 7.2.1 can be:

1 d1) loose protons / electrons or loose antiprotons / anti-electrons,

1 d2) atoms built up in the state of matter from anti-protons and anti-electrons.

1 d3) atoms into a black hole state in accordance with the periodic table of black hole elements isotopes (\geq Be); All black hole atoms originate of collapsed ordinary atoms and exist solely of protons and electrons,

1 d4) all ordinary atoms are made of protons and electrons, and in accordance with the elements / isotopes of the periodic system (\geq H) and are made up of ordinary protons and electrons.

7.2.5.1 Step 5a: ad 1 d1): NO LIFE BASED ON THE LOOSE PROTON / ELECTRON AND THEIR ANTI PARTICLES:

'Slow' protons and electrons and their anti-structures without characteristic of radiation don't provide any opportunity for 'immaterial' and 'physical' forms of life.

Step 5a restriction: The phenomenon of 'life' is not possible on the basis of single slow protons / antiprotons and slow electrons / anti-electrons,

Precondition 5a): Remainder of 'living matter' is only possible with whole matter in the form of atoms: 1) anti-matter, 2) black hole matter and 3) ordinary matter.

7.2.5.2 STEP 5b: CONSTRAINTS ad 1 d2): NO LIFE BASED ON ANTI-MATTER:

The start of this universe will, according to the author via the Little Bang (G6) some 40 – 45 billion (10^9) years ago. By the loss of gravitation, all black hole atoms in the Little Bang black hole became unstable and then all present black hole atoms fall apart in an equal number of ordinary protons and ordinary electrons. All those ordinary protons / electrons were already present in the prior universe. This super cold **Little Bang (0 kelvin)** is described in **document G6**.

During this *Little Bang* no anti-protons or anti-electrons can be formed. In particle accelerators such anti-protons and anti-electrons can be formed through manipulation. By radioactive decay of certain isotopes of sodium are such anti-electrons also free. However, in the universe *anti-protons / electrons* or anti-matter / anti-atoms are completely absent. *In the universe no form of anti-matter is structurally present. Therefore no 'life' is present based on anti-matter.*

7.2.5.3 Step 5c: CONSTRAINTS ad 1 d3): NO LIFE POSSIBLE ON THE BASIS OF BLACK HOLE MATTER / ATOMS:

In the universe are black holes present. They contain and are based on black hole matter / atoms. In **document F1e** www.uiterwijkwinkel.eu the author describes the collapse of ordinary atoms into black hole atoms. This collapse takes place under simultaneous action:

- a) an extremely high pressure and temperature at the outside of the atom,
- b) extremely high (rotational) velocities, thereby increasing cumulative *Van der Waals / London force* and
- c) eventually forming the inside of the atom of *Van der Waals / London bonds* between the electron pairs within the electron shells of all present atoms \geq Be.

Those *Van der Waals/ London bonds* are formed both inside the electron shells of atoms themselves as well between these electron shells. Because of these *Van der Waals bonds* the electron shells of the atom collapse from *inside* until directly around the atomic nucleus. The structure of the atom continues to sustain, but the structure is 'shriveled' complete. See **document F1e and figures 18a - 18n**.

The forming of these *Van der Waals/ London bonds* and from inside collapse of the atom only take place when the atom possesses at least two electron pairs! So only from the element beryllium (\geq Be) black hole atoms can be formed.

The atoms *H, He and Li* have no or only one pair of electrons. Therefore these lightest atoms cannot collapse and they cannot transform into black hole atoms! These lightest atoms H, He and Li stay outside a black hole waiting for nuclear fusion which transform them to beryllium and higher and so finally to black hole atoms.

As a result of the collapse of the electron-shell of these atom the vibration energy of the atomic nucleus is transferred on the 'shell'-electrons. The angular velocity of these 'shell'-electrons increases to the speed of light through which all electrons-pairs falls apart into single 'shell' electrons again. Then the Van der Waals / London forces / bonds of black hole atoms disappears again.

This has the following effects (See **document F1e + figures**):

- 1) During the collapse of the electron shells all ordinary atoms \geq Be transform into *loose*, totally uncharged black hole atoms. The electrons are still ongoing in the same number of electron shells and contain the same number of free electrons but now situated almost directly in orbits around the atomic nucleus.
- 2) The electron shells than fully grasp the nucleus which the nucleus is no longer capable to vibrate. All black hole atoms be standard *on / near* the absolute zero of 0 kelvin; (2.7 K).
- 3) That the speed of light moving 'shell' electrons can no longer jump to other orbits and cannot emit or absorb light or other radiation.
- 4) Those high energy 'shell' electrons cannot form any physical or chemical bond anymore. Black hole atoms are therefore become both physically and chemically totally inert!
- 5) In black hole matter it isn't possible to generate a driving force that is required for 'living' matter.

This completely inert super cold black hole atoms / matter is not to achieve some form of 'living' matter.

Step 5b and 5c containment: Living matter is not possible on the basis of:

-) *Antimatter (as yet only the anti-atom H / anti H₂molecule) and*
-) *The uncharged atoms inert in the state of black hole matter (from beryllium)*

A precondition 5b) and 5c): 'Living' matter is only possible on the basis of complete matter in the form of ordinary atoms. For energetically reasons, universe wide, these atoms are arranged in accordance with the elements of the periodic table starting with hydrogen as found on Earth.

7.2.5.4 Step 5d: ad 1 d4) OUTSIDE BLACK HOLES ALL MATTER IS GROUPED COMPLIANCE WITH ELEMENTS OF THE PERIODIC TABLE:

In **document F1d + figures** the author derives that during the hydrogen supernovas / fusion of about 20 to 25 billion (10^9) years ago, for energetic reasons from that, than present, hydrogen plasma with exclusively protons and electrons exclusively atoms can be formed in accordance with the elements of the *periodic table*.

This *periodic table* goes mandatory universe wide for all the arrangements of protons and electrons in atoms. Thus in universe all elementary and speed related physically and chemically forces on atoms are the same as on Earth!

All stable elements / isotopes of the periodic system exclusively comprise:

- a) established a nucleus of protons and only 'core' electrons. In the nucleus, every 'core'-electron is always bound to two or is hanging between three protons. This 'core'-electron is never bound to only one proton (that should be a neutron). So the nucleus of atoms of the periodic table cannot contain neutrons as building blocks. See **document F1d + Figures 19 - 23**.
- b) 'moderately fast' moving 'shell' electrons ($\pm 1,600$ km / sec) in the different K, L, M, N, O, P electron shells around the atom nucleus. In ordinary atoms all individual electrons (1) are arranged in the electron shells as much as possible as *electron pairs* and groups and as tetrahedron of *four electron pairs* (2).

These elements of the *periodic table* generate universe widely the same associated system of physical and chemical forces. See **document F1d**.

Each group of elements varies the number of forces to be generated. The *group of metalloids* which includes the elements C, O, N, S and P generates two physical forces and two chemical forces. Only these elements of the periodic table generate the so called (*bio*)*chemical charge force* (+ *L2cf*) that results in biochemical reactions always with shifting and moving of one complete *electron-pair*. This chemical force and bonds form the basis of all biochemical reactions!

For that reason biochemical reactions with *electron-pairs* are only possible with molecules which are built up from the elements C, O, N, S, P and with the hydrogen atoms as energy rich 'fill atom' in organic molecules. In **document F1d** the system of all possible physical and chemical forces are spelled out. See **document D1** for the structure of physical and chemical bonds relative to the speeds of the atom in the universe.

7.2.6 Step 6: NO FORM OF LIFE POSSIBLE BASED ON LOOSE UNTIED ATOMS:

The **steps 1 to 5** limits the opportunities for all forms of 'material' and 'immaterial' life in ordinary complete matter and in the elements of the *periodic table*. That *matter* has no characteristics of radiation and has a broad range of 12 basic and fundamental physical and chemical forces. See **document F1d**.

At this stage of the deduction is only question of *loose* ordinary atoms / elements / radicals of the *periodic table*, and forming these atoms are *not present as molecules*. Such individual atoms can occupy about 10 - 20 different physical states of the 64 theoretically possible physical (phy) states. For details see **document F1f**.

In the universe *loose* individual atoms are in the universe naturally only present as:

- a) noble gasses,
- b) elements that evaporate at very high temperature to separate uncharged or charged atoms (Cd, Hg, metalloids),
- c) loose individual radical atoms, such as: H, F, Cl, Br and I,
- d) dissolved as atom or as a cation / anion in a liquid. (Ions are water-soluble only).

-) These individual atoms can undergo only *physically* changes:

In a system with *single atoms* they only occupy about 20 possible physical positions / states. Each separate atom can simultaneously possess only one of those limited set of *theoretical 64* physical positions / states. See **document F1f**. In practice there are possible around 10 positions. These *single atoms* can only physically switch back and forth between these different physical states as solid, liquid, gas, absorbed, adsorbed and dissolved etc.

These physical changes in individual atoms / ions are always reversible. Never, there is a *one-sided descending* and thus irreversible reaction that could serve as a basis for the development of a *driving force* that is required is to be an issue of 'living matter'. A system with exclusive chemical unbound atoms / isotopes of the *periodic table* doesn't allow for the formation of something like 'living' matter.

Step 6 restriction: Living matter is not possible on the basis of an exclusively physical changes at the level of chemically-unbound atoms / elements.

Precondition 6): living matter requires:

- a) *the use of both multiple elements of the periodic table as well chemical forces / bonds to form mono-molecules and*
- b) *chemical one-sided moving reactions to generate a driving force for the phenomena living matter.*

7.2.7 Step 7: LIVING MATTER ISN'T POSSIBLE IF THE ATOMS / MOLECULES CANNOT MOVE:

On all the planets in the universe all 90 atoms / elements of the periodic table and forces are to be expected as on Earth. After the Big Bangs and supernovas these atoms were formed from basically hydrogen. By chemically radical reactions these atoms are chemically linked with each other to a wide variety of:

- a) organic and inorganic mono-molecules,
- b) organic polymers, and
- c) inorganic polymeric molecules in the form of various minerals.

Depending on the size of the molecule and the locally present temperature are those molecules encountered in the physical form of 1) a gas / plasma, 2) as a true liquid (= condensed gas), 3) as a pasty liquid (= a molten solid), 4) dissolved in a liquid, or 5) as a solid and 6) absorbed onto a solid.

-) Both in solid as well as in a paste-like liquid may atoms / molecules are not free to move:

In *solid substances* are all molecules and polymeric molecules are fixed in place and this applies in fact all of the molecules present in a pasty liquid. Within both a solid and a paste-like liquid may be individual atoms and mono-molecules, and not really solve these particles cannot move freely relative to each other. In those positions atoms and mono-molecules cannot physically bumping into one another and give chemically reaction with each other.

However, all kinds of physical changes may occur such as evaporation, melting or solidification.

In a physical system to solve with solid / paste-like fluid are not freely movable mono-molecules. In result pasty liquids cannot unilaterally endothermic reactions are settled which match the (bio) chemistry of living matter.

Containment Step 7: 'Living matter' is not possible on a basis of molecules present in a solid or in a pasty liquid. The bedding atoms, mono-polymeric molecules and molecules in fact are fixed relative to each other. They cannot react with one another chemically.

Precondition 7): 'Living matter' requires deployment of motile mono-molecules that can react (bio) chemically with each other. Mono-molecules are only mobile and chemically reactive in the form of:

- a) *a gas,*
- b) *a true liquid (= condensed gas) and / or*
- c) *a dissolved atoms / molecules in a liquid.*

The physically requirements have been worked out to the reaction medium in the **steps 14 - 17**.

7.2.8 Step 8: LOOSE UNTIED AND MOBILE MONO-MOLECULES:

When all the atoms in a molecule pursuit of the electrons in the electron shells to the attainment of the lowest energy level. That state is at those atoms achieved with an ideal occupancy in the outer electron shell with one electron pair (K shell), or in a subshells with a) a single electron b) one electron pairs or c) four electron pairs or tetrahedron. For *energetically reasons* L, M, N, O-shells of atoms are constructed as much as possible out of these tetrahedrons of four electron-pairs.

The noble gases naturally possess such an ideal filling. As a result thereof these elements are chemically totally inert. Noble gasses are substantially completely unusable for living matter.

All other elements ranges, the electron shells, pursued this energetically lowest state by the inclusion of one or more 'shell' electrons in the outer electron shell. These atoms share one or more 'shell' electrons. The atom thereby becomes positively or negatively charged, and can thereby form chemical and physical bonds.

In all mono-molecules there are structures between two or more identical or different elements of the periodic table interconnected via at least one, two or up to three *chemical bond* (s) which consist of commonly shared (covalent) electron pairs(2).

The *physical exterior* is characterized by all of the molecules by the presence of:

- a) physical forces (f),
- b) physical bonds (b).

7.2.8.1 MONO-MOLECULAR LEVEL WITH ONLY PHYSICAL CHANGES; PHYSICALLY EQUILIBRIUM REACTIONS:

Suppose a place in the universe with all types of mobile mono-molecules are gathered: a) gases, b) real fluids (= condensed gas) and c) any form of dissolved mono-molecules. The ultimate 'primordial soup' so.

On the basis of the elements of the *periodic table*, and the two types of chemical bonds (a) the chemical radical bond (**R1cb**) and b) the chemical charge bond as pairs of electrons (**L2cb**) approximately 0.5 to 1 million different mono-molecules can be formed, including their stereo-isomers.

The author considers now only the *physical exteriors* of those mono-molecules with four physical forces (f), and their physical bonds (b). At this stage of containment the two possible chemical forces (cf) and their compounds are assumed to be *inactive*.

In **document F1f + figures** it appears that with these four different physical forces and bonds 64 theoretically possible bonds that are likely to be only around 10 - 20 physical bonds are really possible, and can prevent or approximately 15% of all theoretically possible bonds.

At any given time each of these approximately 0.5 to 1 million possible mono-molecules can be only in one of the approximately 10 to 20, possible physical positions. These molecules occupy the condition of: 1) a solid, 2) a true liquid, 3) of gas / supercritical, 4) adsorbed on solids, 5) absorbed to a solid, 6) dissolved in a liquid, and 7) *adsorbed* to solid in a liquid, 8) charges or 9) uncharged in bond with the two chemical forces etc.

In particular, small mono-molecules may occupy a large portion of these approximately 10 - 20 physically possible states. The physical states of larger mono-molecules are more limited because less physical properties are present. For example these larger molecules cannot be present as gas or dissolve as a gas in a liquid, etc.

All physical change within that 64 theoretical and in practice 10 - 20 possible phases / states. These physically possible phases have the general characteristics that all physical changes / reactions are reversible. And so can be undone. None of these physical processes results in a *one-sided irreversible reaction* and thus in an irreversible driving force!

Within a system with *only physical changes* on mono-molecules it is not possible to generate a one-sided descending and irreversible process which is needed for processes and driving force in 'living' matter!

Based only on purely physical processes on single molecules 'living matter' is not possible. The required one sided descending and irreversible changes can only occur at chemical reactions.

Step 8 containment: living matter is not possible on the basis of a system of movable 'slow' mono-molecules, which can only undergo physical changes.

Precondition 8: 'living' matter requires:

- a) the use of chemical reactions with one side endothermic reactions,
- b) molecules, which are mobile and can physically collide against each other,

Motility of mono-molecules however is only possible as these mono-molecules in the physical state of a) a gas or b) dissolved in a liquid!

7.2.9 Step 9: MONO-MOLECULAR LEVEL WITH ONLY CHEMICAL CHANGES:

Except for the noble gases about 0.5 to 1 million monomeric molecules can be formed. Each molecule can undergo multiple chemical reactions involving other molecules are formed. Upon analysis of the chemical bonds of molecules all of which are five distinct types of chemical bonds:

Scheme 7-3: TYPES OF CHEMICAL BONDS:

a) The chemical covalent radical bond (+ R1cb):

At the conclusion of the chemical covalent bonds each atom provides both sides of the binding his own 'shell'-electron and originated in principle two radicals. That results in the formation of one chemical bond consisting of

one pair of 'shell'-electrons. During these chemical radical-reactions *no physical changes* on the molecules occur. These are *purely chemical reactions*!

b) The semi-radical reaction / binding (+ R1cb)

Elements with an electron surplus, such as metals, metalloids can be stabilized by repelling one to three electrons from the outer electron shell and sometimes even more. If this reaction is carried out *in water* this results in a *charged atom / ion* and a free electron (e^-). This electron in fact is a *radical*. Overall therefore this is a *semi-radical reaction*! Other elements are just more inclined to take electrons to complete their outer electron shell to a maximum of four electron pairs. As a tetrahedron of four electron pairs then the 'sub'-shell is reaching the state of lowest energy.

Definition: All reactions in water with the repelling / attachment of a free *electron* (e^-), the author defines as a *half-radical reaction*. These reactions always go along with physical changes! This in contrast to the real radical reactions!

c) The chemical covalent bond charge (+ L2cb):

In practice these chemically charge covalent bonds are only found between the metalloids C, O, N and S with each other. These chemical charge bonds (+ L2cb) always consist of one to three common *shared electron pairs* provided by *one* of the two atoms (C, O, N, and S) on both sides of the binding.

Chemical reactions with the formation or breaking of a chemical bond covalent charge (+L2cb) is always accompanied by the shifting of one whole electron pair. This reaction is always accompanied with a *physically change* on the molecule(s). These reactions consist least out of two different physically and chemically phases. In case between two atoms of *two or three chemical bonds* than at least one of those bonds is a covalent charge bond (+ L2cb).

Of the approximately 0.5 to 1 million possible mono-molecules approximately 99% are covalent charge bonds (+ L2cb) which are found especially in organic molecules.

c1) Proton bonds (+ L2cb)

With some of these covalent charge bonds (+L2cb) such as COOH, COH, H₂S, -NH₂ and NH₃ is to separate a H atom / proton. This results in a negatively charged organic ion ($^-$), and a positive charged proton (H⁺). In water this immediately reacts with a single water molecule (H₂O) to the H₃O⁺ ion.

Definition: All reaction with the repelling / attachment of a single proton in water (H₃O⁺) are defined as a *proton reaction*. These reactions always involve a physical change!

d) The charge / load binding (+ Lb):

Many thousands of molecules consist of dissolved yet undissipated salts which are made up of two oppositely charged ions, which are held together via a full physical-chemical charge bond (+ Lb).

This binding is based on the opposite physical electrically load and *not* on a common shared chemical covalent electron pair. The undissipated molecule is thereby physically much larger than it actually is chemically. Such molecules are less soluble. Both the forms such as the splitting of salts, such undissipated always accompanied by physical changes.

On the basis of the elements of the periodic table approximately 0.5 to 1 million mono-molecules are possible. The chemical bonds in these molecules consist of approximately 1 - 4% from radical covalent bonds (+ **R1cb**). The rest of all chemically bonds are covalent charge bonds (+ **L2cb**) mainly occur in organic molecules.

Explanation Scheme 7 - 3:

- 1) Only in the chemical *covalent radical reactions* any physical changes occur. They are purely chemical reactions!
- 2) All other types of chemical and physical / chemical reactions are accompanied by one or more steps with a physically change on the atom / molecule!
- 3) Normally these physical changes only occur in the presence of a reaction medium.

The requirements to the reaction medium is explained in steps 14-17.

7.2.9.1 LIVING MATTER ISN'T BASED ON COVALENT RADICAL REACTIONS:

Radical reactions consisting of:

- a) Two radicals that together form a radical covalent bond or
 - b) From one radical bond which is broken in two radicals.
- Both atoms / molecules then have at least one unpaired electron.

Radical reactions proceed immediately and directly in one step without the intervention of enzymes and / or catalysts. They occur under the influence of: a) high speed of the molecule, b) high temperatures, or c) high-energy radiation (such as UV radiation). During these radical reactions *no* physical changes occur.

Because of energetic reasons all atomic and molecular radicals having one unpaired electron are in an aggressive way in search of an atom / molecule thereby to form a pair of electrons. If necessary, they displace a different atom from an existing weaker bond. These radical reactions are only controlled by the release of chemical binding energy and amount of heat released. Biochemically seen these radical reactions are not to get controllable.

-) Radical reactions are important in the 'phase' without living matter;

Radical reactions are however very important for the development of living matter! All the planets in the universe with water but without living matter originated in the early stages through anaerobic radical reactions all kinds of new and ultimately almost every conceivable compounds and organic molecules from which the biochemistry of anaerobic living matter can develop. Radical reactions are one-sided descending and in principle irreversible. They provide potentially a driving force.

-) Radical reactions are harmful to all forms of existing life:

However, for already 'living matter' these radical reactions not to imply controllable or manageable. Because of the random nature of radical reactions are also all kinds of mismatched and may not degradable and formed therewith, in fact toxic reaction products. On the basis of radical reactions no (bio)-chemistry is possible which leads to orderly 'living matter.'

By radioactive decay and cosmic rays, such radicals are continuously formed. Living organisms have developed different methods to make such radicals as soon as possible a (bio)-chemical appropriately harmless. Covalent radical reactions are not acceptable for 'living matter'.

Step 9 containment: 'Living matter' is not possible on the basis of radical reactions, and thus on the basis of purely chemical reactions without any physical changes on the molecules.

*Precondition 9): Structural may the chemical reactions in 'living matter' is no mention of full-radical reactions. For 'living' matter remains only the possibility of chemical reactions together with physical changes on the molecules *5*):*

- 1) a) covalent bonds charge (+ L2cb),
 - b) proton reactions (+ L2cb)
 - c) semi-radical reactions (+ R1cb) and
 - d) cleaving undissipated salts into ions (+ Lb).

- 2) A driving force is to be generated in the form of one-sided ending chemical reaction(s).

5) In living matter only fit chemical reactions and physical-chemical reactions which standard occur with physical changes on those molecules. For this physically changes on molecules a reaction medium is required. See steps 14 – 17 and Law biochemistry IIa), IIIa) and IIIb).

7.2.10 CHEMICAL REACTIONS TO MONO-MOLECULES TOGETHER WITH PHYSICAL CHANGES:

Conform *precondition 9* four response options remain under discussion in a different order of containment:

- 9-d), the physical-chemical reactions with charge binding (+ Lb) of dissolved undissipated salts,
- 9-b), the proton reactions yielding a negatively charged ions and a positively charged proton,
- 9-c), the half-radical reactions resulting in a positive (metal) ion and an electron (an electron⁻ = a radical),
- 9-a) reactions with formation / breaking a covalent charge bond (+ L2cb).

7.2.10.1 STEP 10: ad 9-d) NO LIVING MATTER IS POSSIBLE WITH MOLECULES AND ONLY CHARGE BONDS (+ Lb); CHEMICAL EQUILIBRIUM REACTIONS:

Molecules with an electric charge bindings (+ Lb) are dissolved salts with the corresponding chemical equilibrium reactions. These inorganic and organic salts are included in dissociation reactions in water wholly or partially split into two charged ions. That fall apart into ions is only possible dissolved in water or in the presence of water. This also applies to all sorts of organic salts and compounds.

Chemical equilibrium reactions consist of two one-sided going chemical reactions which are in equilibrium with each other. Such equilibrium reactions result in ions and are accompanied by physical changes. All equilibrium reactions are reversible and never irreversible or one side descending.

Through such equilibrium reactions sec is not possible to generate a driving force essential for the (bio) chemistry of living matter. Based on single molecules with *only* charge bonds 'living matter' cannot be realized. Charge bonds (+Lb) are, however, acceptable in biochemical systems of living matter in particular as regards organic ions. These reactions play a role through buffering.

Step 10 containment: Living matter is not possible based solely on chemical equilibrium reactions charge bonds (+Lb) because these reactions cannot develop the needed driving force.

Precondition 10): The driving force within the (bio) chemistry of living matter can only be generated by converting chemical binding energy into heat. This formation of covalent bonds always occurs in conjunction with physical changes in the molecule.

7.2.11. THE DRIVING FORCE IN BIOCHEMISTRY:

Within the biochemistry of living matter the driving force can be only generate through the conversion of *covalent binding energy* into heat (infrared photons). During each step of the chemical reaction the present binding energy transfers to an energetic lower level. This difference in energy level is then irreversibly converted into emitted (bindings) heat.

This irreversible release in heat is the essential *driving force in living matter*. The release of heat is also evidence that there is a one-sided reaction that is irreversible settled in time. That is the main reason why living matter principally cannot go back in time. These reactions and transformations are always in conjunction with physical changes in the molecule(s).

Universe widely these one-sided irreversible reactions are the only possible driving force for the biochemistry of living matter! (**Act IIa), IIb) and IIc) of biochemistry**). This requisite driving force is developed in **7.2.13**.

7.2.11.1 STEP 11a: ad-9b) NO LIVING MATTER WITH ONLY PROTON REACTIONS:

A number of organic compounds can dissociate in which a proton is released, or a proton is taken up:

$-\text{COOH} \leftrightarrow -\text{COO}^- + \text{H}^+$ and $-\text{C}-\text{NH}_2 \leftrightarrow -\text{C}-\text{NH}^+ + \text{H}^+$. This release or absorption of a proton is defined as a proton reaction. These (bio) chemical proton reactions can only be settled in water (**step 17**) where this proton is present as H_3O^+ ion. Proton reactions occur in the dissociation of water itself, but are also associated to the dissociation of weak acids in water, such as the carboxylic acid group COOH, the NH_2 , the SH group, and to a lesser extent at the OH group.

These proton reactions form essential steps when going through the citric acid cycle and of the fatty acid cycle. Thanks to such proton reactions, the various reaction steps can be smoothly unwound one after the other. The proton reactions in the COOH and NH_2 groups are influenced and 'controllable' by the pH.

These *proton reactions* are in principle reversible, and thus is *not directly* generate with a driving force. *Proton reactions* play a vital ancillary role in the biochemistry of living matter.

Step 11a containment: 'Living matter' is not possible on the basis of only proton reactions. Proton reactions fit in many places it within the biochemistry of living matter.

7.2.11.2 STEP 11b: ad-9c) NO LIVING MATTER WITH MOLECULES WITH ONLY HALF RADICAL REACTIONS:

By *half-radical reactions*, an electron (e^-) is released. With that free electron oxidation reactions are performed. These half-radical reactions can be realized as individual reaction steps in the biochemistry. With these half-radical reactions no chains of successive one-sided running reactions can be realized.

These half-radical reactions play an essential function in the photosynthesis and in the oxidation / reduction reactions of organic material. Therefore they are essential for the functioning of the (bio) chemistry in living matter. These half-radical reactions are important as driving force in the biochemistry of autotrophic organisms.

Step 11b containment: 'Living matter' is not possible on the basis of only half-radical reactions. Half radical reactions however do fit well with include the photosynthesis and autotrophic organisms.

7.2.11.3 STEP 11c: ad-9a) NO LIVING MATTER WITH ONLY RESPONSES COVALENT CHARGE BONDS (+ L2cb)

In the biochemistry of living matter the remaining charge covalent bond (+ L2cb) is the only chemical bond of electron-pair(s) in the molecules that structural generates the required one-sided descendant reactions. Just molecules with these bonds generate the driving force behind all possible biochemical systems of living matter. These covalent bonds charge (+ L2cb) are characterized by the transport of one or more complete electron pair(s) between two atoms. These chemical bonds are only possible with molecules built up from the elements C, H, O, N, and S. These group of organic molecules fit within the carbon chemistry.

In (bio) chemical reactions on this covalent charge bonds standard bonding heat (infrared photons) is released. This process in principle is irreversible! These chemical reactions provide the for living matter required driving force. (These biochemical reactions can only be settled in water).

These reactions are all settled through the use of enzymes and co-enzymes. These reactions also always accompanied by physically changes in the molecule. These enzymes ensure that the molecule keeps the correct spatial structure in order to undergo the acquired next reaction step. For that reason for almost all chemical steps in the biochemistry of 'living matter' a specific enzyme is required. In the biochemistry of living matter several thousand enzymes and co-enzymes are known.

Through the intervention of these specific enzymes all bio-chemical reactions can be unwound step by step and fully predictable conform the *min / max 1 principle*. See **document F1f**. Therefore all (bio)-chemical reactions proceeds as a whole fully programmed and are thereby completely 'manageable' for the cell.

-) Each bio-chemical reaction step requires one specific enzyme:

A complex of biochemical reactions, however, is to unwind only in a structured and controllable manner unwinding when for each chemical reaction step one and no more than one suitable and specific enzyme is present. Within the collection of approximately 0.5 to 1 million mono-molecules are now present approximately 4 to 5 thousand specific enzymes / coenzymes. All enzymes are in water-soluble with a mono-molecule structure. In case of a standard reaction of the same enzyme can be used in several places. For the working of enzymes, see **Appendix 8**.

Those thousands of enzymes ensure all reaction steps in the biochemistry of living matter in exactly the right order and still be settled through the exact same predictable paths. Through these thousands of enzymes / coenzymes all biochemical reactions are completely 'controllable' and 'controllable' within a complex as living matter and on without any intervention from outside. Only molecules constructed from covalent charge bonds (+ L2cb) can be used as the basis for the biochemistry of 'living' matter, and for generating the required driving force.

-) Series of successive reactions aren't possible with only covalent charge bonds (+ L2cb):

However, biochemical reactions with *only* covalent bonds (+ L2cb) don't result in series of successive reaction steps despite the developed driving force. For series of those reaction steps alternately also *proton reactions* and *half radical reactions* are necessary, as well reactions stapes which results intermediate and at the end into small gaseous (inorganic) molecules (H_2O , CO_2 , NH_3 , H_2S , NO_2 , N_2 , CH_4 , urea etc.).

Step 11c containment: Living matter is not possible on the basis of reactions with only covalent charge bonds:

Chains of biochemical reactions as in the citric acid cycle and fatty acid cycle can only be conducted with the use of *all the comments* associated with physical changes: a) covalent charge bonds (+ L2cb), b) proton reactions, c) semi-radical reactions while complementing d) chemical equilibrium reactions are also acceptable.

Precondition 11) overall: The biochemistry of living matter based on compelling:

a) A base of mono-molecules constructed with load covalent bonds (+ L2cb), which may also react as semi-radical reactions and as proton reactions. Physical-chemical reactions also apply. All chemical and physical / chemical reaction steps will consistently be associated with physical changes on the molecule.

(See Law IIa) and IIIa) of Biochemistry)

b) The chemical reaction steps take place through the use of enzymes. Each chemical step is preceded by one / two purely physical change (s) and is closed again with one / two physical change(s) by shedding the old enzyme and attaching a new enzyme for the next step. For each chemical reaction step is in principle one specific enzyme required and must be available.

c) The driving force is to be generated only through one-sided descendent chemical reactions involving chemical charge binding energy (+ L2cb) is irreversibly converted into heat (photons).

Then the following questions have to be answered:

-) Which elements these molecules must be built of,

-) What physical reaction conditions are required.

For the role of enzymes see **Appendix 8**.

7.2.12 STEP 12: WHAT TYPES OF ELEMENTS SYSTEM RESULTS IN COVALENT CHARGE BONDS (+ L2cb)

During the supernova explosions and nuclear fusion from the merging hydrogen for energetic reasons *only* the elements / isotopes of the periodic table can be formed. Universe wide all elements have the same construction the same as the elements as found on earth. See **document F1d + figures**. For purely energetic reasons other bonds or different filling of the electron shells are not possible! All matter in the universe is therefore imperative arranged in accordance with the elements of the *periodic table*. In **document F1d** the author also deduced all physically and chemically forces of the atom and the origin of gravity (**E3** and **E3-1**).

In accordance with **precondition 11** for the biochemistry of living matter are only suitable mono-molecules which are constructed of atoms and / or elements of the periodic table that are:

-a) interconnected by covalent chemical charge bonds or electron-pairs (+ L2cb),

-b) which provide the opportunity for: 1) proton reactions, 2) semi-radical reactions and for 3) dissociation reactions.

Standard all these reactions are accompanied by physically changes on the molecules.

Now we specifically examines the groups of elements which such covalent charge bonds (+ L2cb) can be formed. The *periodic table* of the elements can be divided into the following main groups. Each element can be attributed in principle to a single group:

Scheme 7 - 4: ELEMENTS PERIODIC CLASSIFICATION SYSTEM:

=) **Real metals (+m+):** these elements can give up only one electron and cation forms,

=) **Amphoteric metals (+m-):** these elements can relinquish both cation, electrons and anions,

=), **Metalloids (-m+):** with these elements C and H, O, N, S, P can be both cations and anions formed;

-) With H, C, O, N and S are able to form different anions,

-) The only cations with H, C, O, N and are NH_4^+ and H_3O^+ (H_3S^+ ?)

=) **The halogens (-m-):** with these elements are, in fact, to form only anions,

=) **The noble gases (+m o):** normally these elements cannot undergo chemical reactions *6*)

6) Under extreme conditions noble gas atoms respond as a metal (+m+).

Eventually remain only four main groups.

Explanation Scheme 7-4:

1) With these four main groups of chemically active atoms / elements are to form $4 + 3 + 2 + 1 = 10$ different molecular bonds that are elaborated in **Scheme 2** of **Appendix 5**.

2) **Scheme 3** of **Appendix 5** shows that chemical covalent charge bonds (+ L2cb) are only possible with molecules constructed from the elements C, H, O, N and S. Proton reactions are just possible with these molecules in water. Only between two metalloids of the elements C, H, O, N and S are mutually the chemical bonds to make or break through the shifting of *one pair of electrons*. Only on molecules constructed out of C, H, O, N and S are to form these double bonds.

3) When the molecules are built from the metalloids C, H, O, N, S, it appears that:

-) From H₂O, OH, SH, NH₂ and COOH is to release a proton (= proton reaction),
-) From a number of metalloids (such as O) an electron is to release (a half radical reaction),
Such an electron is also released in the (further) oxidation of an amphoteric metal ion,
-) H⁺, H₃O⁺ and NH₄⁺ cations, are the only possible one of these metalloids,
-) The H atom can react with the metalloids to represent a covalent charge bonds (+L2cb),
-) This small H atom is ideal as energetic atom inside organic molecules,
-), The C-H and the N-H bonds have a large energy content in case of oxidation of these compounds to H₂O, CO, CO₂, NO, NO₂. This energy results in a lot of energy / heat and therefore in a driving force,
-) (Bio) chemical transformations are already possible at relatively low temperatures (0 - 40° C),
-) The O-H bond has the lowest possible energy content of all chemical covalent charge bonds.

4) Between the metalloids and metals, and the halogens are only single covalent bonds with each other as possible which are equivalent to *covalent radical bonds*. These bonds with halogens don't fit in the biochemistry of living matter.

Only between the metalloids C, N, O and S are mutually 1 – 3 *covalent charge bonds* /electron-pairs possible.

5) On the basis of C in bonds with H, O, N and S is to form an enormous number of approximately 1 - 2 million mono-molecules and 1 – 2 billion polymer molecules. In chemical respect the metalloids C, H, O, N and S are, the only suitable basic building block of the molecules in the central biochemistry of living matter.

6) Si is chemically partly be regarded as metalloid. Silica in bonds with other metalloids, however, is solid and isn't a gas like is the case with carbon! Molecules with Si manifest themselves as a solid or as dissolved 'nopression' molecule (molecules without physically characteristics of gas and electric charge).

Molecules with Si cannot be removed as a gas from the reaction medium as is possible with CO₂ in comparable molecules!

For purely *physical* reasons Si unfit within the central biochemistry of the living matter. The properties of Si are more like a metal than a metalloid.

7) The halogens can only form one chemical bond to C, N, O, S and P while two bonds are required. Because of this only single chemical bond these halogenated bonds are very difficult to bring in the position of a *covalent charge bond* (-L2cb). So they are biochemical practically and extremely slowly degradable. This makes molecules with halogens also unsuitable in the biochemistry of living organisms and make them toxic.

8) Unlike the covalent H-C, H-N bonds these covalent bonds between metalloid ↔ halogen (C-Cl, C-F, etc.), contain a rather low energy content. That complicates the biochemical degradation of halogenated compounds as well. The degradation of these halogenated compounds can be carried out with strong acids / bases, but substantially not by these mild biochemical reactions. Biochemically this breakdown process is possible but extremely slowly.

9) C, H, O, N, S, and (P) are the only elements of the periodic table suitable as basis for the biochemistry of living matter. With molecules buildup from the metalloid elements C, H, O, N, S, and (P) is to generate the appropriate driving force for living matter through the conversion of chemical binding energy into heat (photons). All types of chemical reactions are associated with stapes with physical changes such as half radical reactions and proton reactions.

Step 12 containment: For biochemistry essential covalent charge bonds (+ L2cb) are not possible in molecules build up from: noble gases, metals, amphoteric metals and halogens.

Precondition 12):

a) Covalent charge bonds (+ L2cb) are only possible between the metalloid ↔ metalloid elements: C, H, O, N, S, and (P).

- b) Universe wide the biochemistry of living matter is anyhow based on molecules build up with covalent charge bonds between the metalloids C, H, O, N, S.*
- c) The element P has specific functions for the transfer of energy (ADP ↔ ATP) and hereditary characteristics in protecting DNA against hydrolyses. (Law Vb, Vc of biochemistry)*

7.2.13 STEP 13: THE DRIVING FORCE IN THE CHEMISTRY OF LIFE PROCESSES:

The common driving force in living matter are the one-sided descending chemical reactions where chemical covalent bond energy irreversibly is converted into heat (photons). The electrons needed for oxidation are also available from oxygen but also from uncharged metals or via the increase of the degree of oxidation of metals such as occurs in the autotrophic organisms.

Seen in time these reaction are irreversible. In biochemistry all chemical reaction steps are therefore one-sided descending in time! Consequences: living organisms cannot go back in time! The electrons needed for oxidation are also available from oxygen but also from uncharged metals or via the increase of the degree of oxidation of metals such as occurs in the autotrophic organisms.

The biochemistry of living matter drives every cell and all living organisms (including humans) absolutely irreversible forwards in time / in the universe clock time! 'Living matter' cannot go back into the universe clock time or prejudge that time. Time is inextricably linked to the cycle the universe follows as a whole. See the documents **G2** (Space and time), **G7** (text cycle of the universe) and **G8** (figures).

Step 13 containment: The driving force for (bio)chemistry of living matter cannot be based on any: a) physical driving force, b) chemical equilibrium reaction, or c) a radical reaction.

Precondition 13) the driving force behind living matter is only to generate through:

- 1) reactions of covalent charge bonds between the elements C, H, O, N, S, (and P for the transfer of energy / protection DNA against spontaneous hydrolyses),*
 - 2) half-radical reactions and / or the release of an electron from an amphoteric metal, or the increase in the degree of oxidation of amphoteric metal atoms,*
 - 3) oxidation reactions of protons to water*
- (Law IIa), IIb) and IIc) of Biochemistry)**

All of the foregoing steps result in the appropriate elements (C, H, O, N, S and P) for the biochemistry of living matter and the nature of chemical bonds (covalent *not* radically bonds) from which molecules of universe which is widely expected to be built up!

The following steps examines the *physical conditions* by which (bio) chemical reaction (s) may or may not occur, and especially attention to the reaction medium.

7.2.14 Step 14: PHYSICAL REACTION CONDITIONS; SOLIDS ARE NOT SUITABLE AS REACTION MEDIUM:

In 'living matter' the necessary driving force is only to generate when molecules able to react chemically with other molecules and thereby as chemical binding energy is converted into *heat*, and this heat is released. That chemically reaction is only possible if these molecules may collide against each other physically. For this anyhow one of the two molecules has to be mobile!

In solids are all mono molecules stuck motionless. This also applies to molecules absorbed on solids. In such a fixed state sec mono-molecules cannot react chemically.

Step 14 containment: Solids are unsuitable as reaction medium for living matter.

Precondition 14): The reaction medium for the settlement of chemistry of living matter must consist of either a gas or a liquid.

7.2.15 Step 15: GASES ARE NOT SUITABLE AS REACTION MEDIUM:

As a gas, super critical gas or as a plasma reactant molecules have a maximum mobility and speed of tens to some hundreds of meters per second. Gases, however, have a low heat capacity. During chemical reactions in

gases the heat released in the gas results in a quickly rising temperature. Gaseous molecules thus often react explosively with phenomena of plasma and fire.

In a gaseous environment, the required catalysts like enzymes cannot be present. The reaction is often settled by the formation of radicals and chemical radical reactions. These reactions are unsuitable for the biochemistry of living matter! Like solids gases are also unsuitable as reaction medium for the biochemistry of 'living' matter.

Step 15 containment:

a) Gases are physically unfit as a reaction medium for the settlement of the (bio) chemistry of living matter.

Precondition 15): The reaction medium for the settlement of the (bio) chemistry of living matter must consist of a liquid. This can be a real liquid or pasty liquid.

7.2.16 Step 16: WHICH TYPE OF LIQUID IS SUITABLE AS REACTION-MEDIUM:

The majority of the solids to melt only at a high temperatures and then transfer physically into a viscous pasty liquid. In those hot liquids organic mono-molecules are not to solve. So they cannot react chemically with each other. Because of the high temperatures, organic molecules fall apart again into small gaseous molecules. Molten solids / viscous liquids do not fit as reaction medium for the chemistry of living matter.

Step 16 containment:

a) In pasty liquids mono-molecules cannot really solve. Pasty liquids physically unfit as a reaction medium for the (bio) chemistry of 'living' matter.

Precondition 16: now only remain the real fluids (= condensed gas) as reaction medium suitable for (bio) chemical reactions.

Upon dissolution of mono-molecules in a true fluid to move these relatively low speeds molecules within the liquid. These mono-molecules react in a much quieter way chemically than they were in the state of a gas.

Such real liquids also act as a cooling medium that absorbs the released reaction heat. During these (bio) chemical reactions the temperature in the liquid is moderate and is not becoming too high.

This also reduces the probability of the occurrence of radicals and radical reactions significant. In a real fluid the reaction conditions are much more manageable.

7.2.17 Step 17: WHICH REAL LIQUIDS ARE SUITABLE AS REACTION-MEDIUM:

Real Newtonian fluids always occur through *condensation* of a gas. These gas atoms / molecules repelling each other by the Van der Waals / London force. On the moment of condensation this force is transferred into flexible *van der Waals- / London bonds* (+W2flb). Upon further cooling, these fluids always transfer into fixed *solids* (+W2fib) except helium.

Real liquids mixed together these fluids can mutually dissolve into each other at the molecular level (+W2Db). In all liquids the present molecules form flexible van der Waals bonds. So all liquids are in fact *physical polymers!* From themselves such large physical polymers don't have enough speed to react with another molecule. These physical polymers are (bio) chemically to be regarded as a virtually chemically inactive.

Only the gas / vapor form and dissolved mono-molecules of these liquids have enough speed and can be involved into a (bio) chemical reaction! This also applies to the other mono-molecules that are dissolved in such liquids. Only these motile mono-molecules possess sufficient velocity to start chemical and (bio) chemical reactions.

The physical polymeric molecules of the liquid themselves are *not suitable* for structures of living matter but they are very suitable to act as a *reaction medium* and as a *cooling medium*. Question is now which of the real fluids are suitable as a reaction medium for the settlement of (bio) chemical reactions?

7.2.17.1 LIMITED SOLUBILITY OF MOLECULES IN LIQUIDS THAN WATER; ONLY WATER IS SUITABLE AS REACTION MEDIUM:

In all 100% *pure* Newtonian liquids (= condensed gasses) can dissolve:

a. *gasses:*

This relates primarily to the own mono-molecular gaseous molecule from which the liquid has been formed. That flexible solute molecule may escape as a gas to the liquid. All other gases can dissolve in principle in all the other real fluids until the maximum vapor pressure is reached. All dissolved gases are in *flexibly bonds* to the liquid atoms / molecules.

b. *'Nopression' molecules (physical properties: no gas, no ion)*

This includes the group of mono-molecules with the physical characteristics of: 1) non-gaseous (-W2gk) and 2) not charged and no ion (-L). These so-called '*nopression*' molecules can also dissolve in almost any imaginable real fluids. That dissolving goes until the maximum solubility is reached. These soluble '*nopression*' molecules cannot escape as a gas. They *fixed* bound to the liquid.

c. *Charged particles / ions:*

Except water in all other 100% *pure* liquids *charged particles cannot be solved*. Water is the only molecule to dissociate into the ions H_3O^+ and OH^- . That makes water so particular.

-) The reaction medium water; solubility of charged particles:

Only in the liquid water the slow physical polymeric water molecule reacts with his own 'high-speed' dissolved gaseous H_2O under the formation of an H_3O^+ ion. By these collisions at the end of that polymeric water molecule a H^+ atom / proton is picked to form the H_3O^+ ion. The remaining polymeric water molecule stabilizes itself by the separation of an OH^- ion. This process is known as the dissociation of water.

This reaction might be possible in a much lesser extent in 100% pure H_2S . The mono H_2S molecule however is much larger and heavier than the H_2O molecule, and will therefore have less speed. The dissociation in pure H_2S is substantially much less and is not measurable. Pure hydrogen peroxide H_2O_2 is not to split into two ions.

This necessary dissociation reaction only occurs in water and so in water the ions H_3O^+ and OH^- ions are always present. By these ions only water generates a 'charge space' for dissolving and acceptance of other charged particles / ions! Dissolved in water these charged particles are always surrounded by water molecules (= hydration).

By dissolving of charged particle / ion water provides an unique position relative to all other conceivable real Newtonian fluids (= condensed gasses).

-) Only in water can solve together:

- a) all gases until vapor pressure is reached,
- b) all types of non-gaseous and non-charged molecules (the '*nopression*' molecules),
- c) all types of charged and non-gaseous particles in the form of ions.

Water offers as reaction medium the most comprehensive, also *maximum possible*, range of physical-solving capabilities and thus the most extensive possibilities for the settlement of physical, chemical and (bio) chemical reactions!

Earlier in this chapter we have seen that the mono-molecules for the biochemistry of living matter should fully comprise the metalloids C, H, O, N, S, and (P). Inside this molecules the atoms must be connected to each other elements via chemical covalent bonds charge (+ L2cb).

(Bio)-chemical reactions to such molecules go hand in hand with the standard *loaded locally* hitting of the molecules by means of a charge transfer within the molecule. This results in a plus / minus charge places on the molecule. Because of that charge / charge distribution all mono-molecules, anyway, can be temporary an 'ion'.

In all pure other liquids than water such charged molecules cannot solve not even very temporary. That inability blocks the settling of all biochemical reaction steps as a whole completely. Charged particles / ions are only soluble in water!

Therefore water is the only suitable reaction medium for the settlement of the (bio) chemistry of living matter! All other pure liquids are completely unsuitable as central reaction medium for the settlement of the biochemistry of the living matter.

Universe widely the biochemistry of living matter can only be settled in water as reaction medium. Water is also the only starting point for the formation of organic polymers from mono-molecules.

Step 17) containment: *Of all the pure Newtonian liquids only water is able to dissociate into H_3O^+ and OH^- and thus into dissolve charged particles.*

Precondition 17): *Water is universe widely the only suitable reaction medium for the completion of chemical reactions with covalent charge bonds (+L2cb). Water is the only suitable reaction medium for the settlement of biochemical reactions in living matter.*

Only in the reaction medium water the biochemistry of living matter can be settled (**Act IV**) of **Biochemistry**)

7.2.18 Step 18: PHYSICAL TYPES OF MOLECULES BEFORE AND AFTER CHEMICAL REACTIONS:

Within all chemical and (bio) chemical reactions with *chemical covalent charge bonds* force standard, temporary, physical changes occur in the status of the molecules. During every step in the reaction the medium demands the molecules to be dissolved as: 1) gas, 2) ion or as 3) noproression molecule. If that is not possible the *reaction medium* conscious blocks this reaction step and thus the whole reaction! For the physical and chemical states of atoms / molecules the author refers to the **document F1f (min / max 1 principle)**.

Chains and cycles of biochemical reactions can only be settled at molecules that during and after the reaction, remains in one of the three maximum possible physical positions of *dissolved state*: a) gas, b) ion or c) noproression as mentioned in **containment 18**. Water is the only liquid in which these *three* different types of molecules can solve physically next to each other.

Step 18 containment: *Chains of (bio)-chemical reactions can only be settled if the mono molecules are dissolved in the reaction medium water. These molecules must always able to be in one of three physical positions of dissolved state:*

- =) Gas (+ W2gk), not charged (-L) and no radical (-Rck) → gas
- =) Non gaseous (-W2gk), charged (+ Lk) and no radical (-Rck) → ion
- =) Non gaseous (-W2gk), non charged (-I) and no radical (-Rck) → noproression *7*)
- =) One and the other in conjunction with proton reactions (H^+) and half radical reactions (e^-).

7) Molecules dissolved *in water* cannot possess at the same time the physical characteristics of a gas (+W2gk) and being charged (+Lk). This combination is impossible

Universe widely water is the only liquid with the required *three physical properties / spaces*. Dissolved in water molecules possess a sufficient speed and kinetic energy to start biochemical reactions using enzymes and co-enzymes. For the *digital reaction mechanisms* with enzymes see **Appendix 8**.

In all biochemical reaction steps, the molecules are constantly switching between these three above-mentioned physical (non-radical) phases. This physically switching is only possible with mono-molecules composed of the elements C, H, O, N, S and P, dissolved in the reaction medium water. Prior to any chemical reaction step the molecules always are in one of three possible physical states! During the reaction always physical changes occur on these molecules. After the reaction the molecule itself must be again in one of those three physical states. These physical changes are only possible with the following reactions:

Precondition 18): *All the biochemical reaction steps must take place in water within the framework of the three maximum possible physical phases / states. The biochemistry of living matter can therefore only be based on reactions that take place in the reaction medium water:*

- a) *mono-molecules which are completely built up with only covalent bonds charge (+ L2cb) between the metalloid elements C, H, O, N, S, and (P),*
- b) *chains of chemical steps, interspersed with physical changes in the molecule, (annealing and uncoupling of the enzymes),*
- c) *in conjunction with semi-radical (e^-) reactions and proton reactions (H^+),*
- d) *dissociation reactions of molecules made up of C, H, O, N, S, and (P).*

The three above mentioned physical states are a fundamental precondition for the completion of the biochemistry of living matter. This is stated in the **Law IV of biochemistry**.

7.2.19 STEP 19: THE REACTION MEDIUM ENERGY REQUIREMENTS PRESCRIBED:

For the unwinding of biochemical reactions is a *chemical driving force* required wherein, in time binding energy is irreversibly converted into heat (photons of infrared or light). In connection therewith two specific energetic requirements for the reaction medium are formulated:

1) The molecular bonds of the *reaction medium* of living matter must chemically to possess the lowest conceivable level of covalent binding energy of all the molecules.
(Only the O-H bond of water satisfies this chemically energy requirement!)

2) The reaction medium also *physically seen* must have the lowest possible energy level (heat of condensation, etc.) in comparison to all other liquids. In physical terms water must possess the lowest possible energy level.
(Only water satisfies this physically energy requirement as well!)

Only if the reaction medium can satisfy both requirements, no other molecule in terms of *chemical binding energy* can fall below the energy level of the O-H bond or *physical* drops under the physical energy level of the reaction medium water.

Thus the reaction medium water prevents that molecules are intended to be chemically and / or physically outside the range of the biochemistry in living matter! (Energetic enclosure of molecules)

Step 19 containment: No, from a gas condensed liquid may physically or chemically have a lower energy content than the O-H bond and water.

Precondition 19): Only liquid water fulfills both the lowest physically and chemically energy content of all possible Newtonian fluids.

(Law IVb of Biochemistry)

Universe widely water is the only liquid suitable as a reaction medium for the biochemistry of living matter. This is stipulated in the **Law IV c** of biochemistry.

7.2.20 STEP 20a: RELATIONSHIP METALLOIDS ↔ REACTION MEDIUM WATER; THE ELEMENT Si UNFIT IN CENTRAL BIOCHEMISTRY OF LIVING MATTER:

The 'life' elements of periodic table up to the present consist of the elements C, H, O, N, S, and Si with P as a doubt case. Biochemistry takes place built using mono-molecules from these elements and interconnected via covalent charge bonds (+ L2cb). Water was found to be the only suitable reaction medium for biochemical reactions. It is essential that these three physical types of dissolved mono molecules always can be formed during the chain of biochemical steps:

- 1) dissolved gas (+W2gk) and uncharged (-L)
- 2) not dissolved gas (-W2gk) and loaded (+Lk)
- 3) not dissolved gas (-W2gk) and not charged (-L) (= the state noproression)

In water mono-molecules constructed from the elements C, H, O, N and S can always take these three above-mentioned physical positions.

However SiO₂ dissolved in water is *not a gas* but a dissolved '*noproression*' bound molecule. SiO₂ is bound *completely fixed* to water instead being in the phase of a dissolved *gas* that is *flexible bound* in water such as CO₂, CH₄ and H₂S. These molecules can escape from water as a gas.

That is not the case with SiO₂ with far reaching consequences! This physical restriction of SiO₂ blocks all biochemical reactions of mono-molecules in which one Si atom is incorporated. This physical blockade makes Si universe wide incapable of performing a central role in the biochemistry of living matter. Only the element carbon can fulfill that central role!

In living matter silica is used as a building material in diatoms. Further Si plays a supporting role in a number of biochemical reactions. On physical grounds no basic biochemistry of living matter can be shaped.

Step 20a containment: *In mutual bonds with other metalloids with Si no gasses are to form soluble in water. For physically reasons the element Si is yet inappropriate playing a central role in the biochemistry of living matter. Si plays only a supporting role as construction material.*

Boundary condition 20a: *Universe widely the central biochemistry of living matter can only be settled around the main elements C, H, O, N, S, and (P).*

7.2.20.1 STEP 20b: RELATIONSHIP METALLOIDS ↔ REACTION MEDIUM WATER; PHOSPHORUS ONLY SUITABLE FOR ESSENTIAL SUPPORTING ROLES:

Just like Si the element phosphorus in water cannot occur as a *dissolved gas* as well. As a result *phosphorus*, in fact, is pushed entirely outside the central biochemistry of living matter! But contraire to Si the element phosphorus plays an extremely essential functions in biology of living matter:

- a) via the molecules ATP / ADP in energy management supply and transport,
- b) in the structure of the RNA / DNA molecule The presence of P in the RNA / DNA molecule protects these molecules against the spontaneous hydrolysis and thus the spontaneous degradation of this genetic material within the cell. and
- c) as calcium phosphate as construction material in bones and teeth.

Step 20b) containment: *P in bonds with other metalloids doesn't results in a in water soluble gas. Thus P cannot play a central role in the biochemistry of living matter. P is extremely important for the energy supply (ATP), and protection of the RNA / DNA and in bones / teeth.*

Precondition 20b: *Universe widely the central biochemistry of living matter can only be organized and settled around the elements C, H, O, N, S. with water as the only suitable reaction medium for the settlement of the (bio) chemistry of living matter. Parallel P performs a more important supporting roles in the energy, genetic material and bones.*

See Law IVa) der biochemistry.

7.2.21 STEP 21: UNIVERSE WIDE ALL LIFE IS BASED ON THE CARBON CHEMISTRY:

Through the scheme of logical deduction is derived / 'proved' that:

- 1) Universe widely the biochemistry of all 'living' matter at the mono-molecular level is fully unwinds around mono-molecules made up of the metalloid elements C, H, O, N, and S (P).
- 2) Water is the only suitable reaction medium for the biochemical reactions.

These two conditions apply universe wide for the biochemistry of all forms of living matter.

Now the question remains if that living matter can be based on a biochemistry different as we find on earth of not.

-) One or more biochemical systems?:

Of the elements C, H, O, N, S, and (P) only be the element C in *uncharged* state can form four chemical bonds (electron-pairs) with the other metalloids. Metalloids as N and P can form four bonds too, but then these elements are always in a *charged* state of an ion. Only around the element C long *uncharged*, chains can be build and so larger organic molecules.

With C and the metalloids H and O is also to construct:

-), Only one basic form of alcohol / carbohydrate (H-C-OH), *8*)
-), Only one basic form of the fatty acid – COOH, *8*)
-), Only one basic form of aldehyde, hemiacetal, and acetal bonds. *8*).

With the metalloids C and H, O and N can be constructed:

-), Only one basic form of the amino acid (H₂N-C-C-COOH) and in total about 15 different types, *9*)
-) With a few amino acids is also a sulfur atom is included in the molecule. *8*).

8) In these basic forms of multiple molecules mono-stereo-isomers / isomers are possible.

This spatial structure now still results in the possibility of a primary 'left-handed' or a 'right-handed' system.

Would both systems next to each other they mutually interfere with each other during the construction of the biochemistry of living matter. In that situation, the development of living matter would have been impossible. So the system is either 'left-handed' or 'right-handed'.

Step 21) containment: On the basis of the elements C, H, O, N, S and P is to form:

-), **Only one basic form of carbohydrate $(HC-OH)_n$, *9*)**
 -), **Only one basic form of fatty acid $-COOH$, *9*) and**
 -), **Only one basic form of amino acid $(H_2N-C-C-COOH)$, *9*)**
- *9*) And a plurality of stereo-isomers.

Precondition 21):

-) **The biochemistry of living matter must be based on either a left-handed system either on a right-handed system. See step 23.**

7.2.22 STEP 22: NEED OF RECYCLING C, H, O, N, S, and P:

Sooner or later on all planets all present elements C, H, O, N, S and P are in their lowest energy level because of (bio)-chemical reactions and are in the phase of inorganic gases: CO_2 , H_2O , NO_x , SO_2 or in their ion form or as salts dissolved in water. From the viewpoint of biochemistry than all driving force has disappeared.

On all planets in the universe with plenty of water and with *living matter* within the biochemistry almost directly from the beginning is developed a system for upgrading *inorganic molecules* towards *organic mono-molecules* with a higher chemical energy content. This upgrading in principle can only be realized in the form of a mono-saccharide $(H-C-OH)_n$ and by photosynthesis. With this photosynthesis the level of the driving force on these planets is kept up to standard levels for both chemical reactions and for bio-chemical reactions.

Only physical forms of energy in the form of photons of *light* contain enough energy and are suitable for that purpose. That light has to be produced by the star where the planet orbits around. That necessary energy is coming always from outside the planet.

On earth, we only know a) the aerobic photosynthesis (with the formation of O_2), and b) the anaerobic photosynthesis (without O_2 formation). Other forms of photosynthesis are not known. At photosynthesis with the aid of light, chlorophyll and ADP / ATP molecule dissolved CO_2 and H_2O molecules is transformed into only the *left-handed* glucose molecule $(H-C-OH)_6$. Photosynthesis only results in the formation of the *levorotatory* mono-saccharide glucose. This anaerobic photosynthesis was already active tenth of millions of years before the existence of 'living' matter. Photosynthesis resulting eventually in vegetable organisms (algae) with chlorophyll.

Step 22 curtailment: To start living matter, long before the system starts with photosynthesis to upgrade inorganic molecules of C, H, O, N, S and P to organic molecules and most important generating left handed glucose.

Universe widely this anaerobic and aerobic photosynthesis system applies not only on earth but is on all planets rotating around a star. Everywhere this photosynthesis is the same and is possible on all planets with water.

Precondition 22):

- 1) **According to the atoms C, H, O, N, S and P must be at least one, in water-soluble, mono-molecule that is able to capture in the radiation energy from light to thereby via a semi-radical reaction, an 'energetic' electron to release.**

Universe widely that is minimal the *chlorophyll* molecule that has this property by absorption of certain light frequencies. In the center of the chlorophyll molecule is present a *physically bonded amphoteric metal ion* (Co, Fe, Zn, etc.) that generates this high-energy electron by semi-radical reactions.

- 2) **At least one water-soluble, mono-molecular must be available in order to convert the chlorophyll via the freed electron and from this collected light energy in chemically bound energy. This molecule is at least in the form of a polyphosphate in the form of ATP (Adenine-Tri-Phosphate).**

That requires the presence of at least the ADP / ATP molecule where the chemical energy collected light is captured and is stored in the form of a water-soluble polyphosphate energy-rich molecule.

- 3) **Using ATP then the captured energy is transferred on the CO_2 and H_2O molecule to be converted in the form of a levorotatory glucose molecule $C_6H_{12}O_6$.**

These three steps together in short form the photosynthesis. On Earth only one basic form of anaerobic and aerobic photosynthesis is found in the combination of chlorophyll with ADP / ATP and photon of light. The photosynthesis requires the formation of C, H, O, N, S, P, and of a minimum of the chlorophyll molecule and of at least the ADP / ATP molecule and / or its equivalent mono-molecules. (**Law Va and Vb of the biochemistry**)

7/2/23 STEP 23: UNIVERSE WIDELY THE BIOCHEMISTRY OF LIVING MATTER IS BASED ON THE LEFT HANDED CARBON CHEMISTRY:

Step 23) containment: Living matter is only possible yields as photosynthesis offers only one basic form of mono-saccharide!

-) 'Left-handed' or 'right handed' molecules?:

Photosynthesis on Earth results only into 'left-handed' glucose! No other mono-saccharide or dextrorotatory glucose is formed. All organic molecules in living matter are in fact based on this 'left-handed' glucose. For that reason the whole biochemistry of living matter on earth rests only on 'left-handed' molecules and no 'right-handed' molecules. This also applies to all other places in the universe with living matter. Universe widely all living matter starts with the same left-handed glucose as on earth!

Suppose that photosynthesis next 'left-handed' glucose also had resulted in 'right-handed' glucose. This would have resulted in its own 'right-handed' biochemical system with the corresponding system of enzymes / coenzymes. Within all living cells that situation would have resulted at the same time in two different parallel but comparative biochemical systems!

On the mono-molecular level both completely different systems would run right through one another constantly disturbing each other. In that case the biochemistry in the cells of 'living matter' would have been impossible! The biochemistry of living matter is only possible if the *periodic table* permits either a fully 'left-handed' or 'right-handed' system of photosynthesis. As we see on Earth there is only the left-handed system!

At the basis of C, H, O, N, S and P, and left-handed glucose universe widely only to form the same left handed isomers as known on Earth:

-) *Left-handed stereo isomers of the carbohydrate: H-C-OH,*
-) *Left-handed stereo isomers of the fatty acid: C -COOH,*
-) *Left handed stereo isomers of the amino acid: H₂-N-C-COOH,*
-) *Spatial forms of enzymes / coenzymes.*

On the basis of the above mentioned metalloids and photosynthesis universe widely no other chemical and / or biochemical systems than *Biochemical Pathways (BP)* are possible. This Biochemical Pathways represents the carbon chemistry as known on planet Earth. Universe widely the biochemical composition and decomposition processes of living matter applies the same sequential reaction steps and the same corresponding enzymes and co-enzymes.

Precondition 23):

a) *The biochemistry of all forms of living matter in the universe is somehow based on a carbon chemistry. That is because of photosynthesis results universe widely in left handed glucose and this results in the same kind of 'left-handed' mono-saccharides, fatty acids, amino acids and poly-alcohols.*

b) *The biochemistry of all forms of living matter in the universe is therefore based on exactly the same carbon chemistry as known on planet Earth.*

See **Law III)** and the **Laws VI a), VI b), and VI c).**

-) Biochemical Pathways cannot die:

Biochemical Pathways shows the mono-molecular bio-chip and the biochemically engine of living matter. Photosynthesis and glucose are the fuel and driving force. BP is the only available biochemical system within the 1 - 2 billion molecules to form on the basis of *periodic table*. There aren't two or more systems possible like BP! Biochemical Pathways, however, isn't '*living matter*'. BP is no more than a mono-molecular system of biochemical reactions. The biochemical schemes BP as such are immortal and cannot die! Only 'living' cell die. These cells are always constructed with the aid of organic polymers.

7.2.24 STEP 24: FORMATION OF POLYMERS BY COVALENT CHARGE BONDS:

In living matter the reaction medium is a fluid that has to be kept together and protected against draining, evaporation and mixing with precipitation. To prevent these threats the content of living cells has to be surrounded through a cell wall made up of undissolved organic or inorganic polymers. Within such cell wall the cell nucleus is able to have complete control over the whole variety of (bio)-chemical reactions which occur within the cell wall. For this control a cell wall is absolutely necessary for all cells. This applies to the cells of all forms of living matter in the universe.

The cell wall and filling of the cell is created through polymerization of a variety of mono-molecules of C, H, O, N and S, such as mono-saccharides, mono-fatty acids, amino acids and multiple alcohols. In addition, single and therefore rather flexible covalent charge bonds (L2flb) are formed by reactions between OH and COOH groups or between COOH and NH₂ groups. In both cases, thereby mono H₂O is formed.

By hydrolyses these polymers can be split into the mono-molecules from which the polymer is built up. This mono-molecules are of use for the production of new cellular material or energy (endogenous consumption). By polymerization of mono-molecules living matter eliminates the (temporary) excess of dissolved mono-molecules within the cell. If necessary these undissolved polymers can be transferred in dissolved mono-molecules again. By these processes the cell succeeds to keep the concentration of *dissolved* mono-molecules at a fairly constant level within the cell.

The polymers in the cell wall have the feature that they are flexible and that they cannot be separated directly by water as a true precipitate. Because of the many water charged sites the nucleus accepts the presence of such undissolved organic polymers in physical respect. In all forms of living matter the cell material is made up of polymers with covalent charge bonds all of which are hydrolysable again in principle. In some cases in the cell wall inorganic silica is incorporated (diatoms).

By polymerization of dissolved 'noprocession' (= no gas, no ion) mono-molecules all types of polymeric molecules are to form which are necessary for the build-up of the cell and the cell wall. They all are constructed by polymerizing water dissolved 'noprocession' mono-molecules such as mono-saccharides, mono-fatty acids, poly-alcohols and amino acids. These organic polymers cannot directly be constructed from dissolved gases and neither from ions.

Step 24 restrictions:

- a) *The polymers in living matter cannot be based on polymerizations of dissolved gases, or by polymerization of real ions.*
- b) *The chemical bonds between the molecules from which the mono-polymer molecule is built up must be split able again, in principle, through hydrolysis in their mono-molecules.
This is not possible in cases of radical covalent bonds!*

Precondition 24)

- a) *Polymers in living matter can only be based on originally 'noprocession' mono-molecules which are dissolved in water and which, at the time of the polymerization, however, a temporary get in a charged state (+ L2k).*
- b) *All connections should exist between the mono-molecules of the polymer of covalent charge bonds (+ L2cb) because only those bonds are cleavable in water and thus hydrolysable.*

The build-up of polymers in a complex of living matter can be in terms of chemical reaction possibilities universe wide, only be provided on the basis of 'noprocession' mono-molecules buildup of the elements C, H, O, N, S (and P).

7.2.25 STEP 25: THE NEED CONSTRUCTION OF CELLS:

On the mono-molecular level living matter is indicated as:

- a) molecules dissolved in the reaction medium water and
- b) from series of biochemical reactions which are fully settled in accordance with the diagrams in Biochemical Pathways.

This reaction medium water must be held together and be protected from evaporation and dehydration. This is only possible if the reaction medium is enclosed by a cell wall and the biochemistry is unwound in the relatively small area of the cell.

The cell wall and cell content is built up by the polymerization of mono-dissolved in water molecules (saccharides, fatty acids, amino acids, alcohols multiple) to insoluble polymers. This results in a large number of flexible and stable structures with the general characteristic which polymers are biochemical biodegradable into their mono-molecules by hydrolyses.

Step 25 curtailment: *The reaction medium water is only held together when this water is surrounded by a semi-permeable cell wall consisting of organic polymers.*

Precondition 25):

a) The structure of living matter (including the cell wall) can only develop on the basis of monomeric molecules such as saccharides, fatty acids, amino acids and complex alcohols that can polymerize into undissolved polymers.

b) All bonds in these polymers should consist of covalent charge bonds (+ L2cb). These bonds are to break down by hydrolysis.

c) The semi-permeable cell wall must be able to allow the selectively entrance of all the nutrients necessary for the cell and to excrete all kinds of waste out of the cell.

The cell is the basis for all forms of living matter in the universe. Author observe the formation of the cell as one of the most essential characteristics of living matter. See **Law I a) of biochemistry.**

7.2.26 STEP 26: THE REPRODUCIBLE TRAINING SYSTEMS / CELLS:

In all living cells, there is a structure consisting of organic polymers. The biochemistry of all living cells wraps itself at the mono-molecular conform *Biochemical Pathways* and the *Recon2* model and around mono-molecules buildup from the elements C, H, O, N, S and P. Water is the only suitable reaction medium.

The cell wall of such cells must be able to allow selectively building materials or nutrients, and can transport and eliminate waste towards outside the cell. That process never succeed 100%. As a result, an internal pollution of the cell occurs and accumulate harmful and / or toxic compounds in the cell.

In addition the cell is damaged by cosmic radiation which results in a variety of radicals. Most of the pollution, damage by radiation and radical often can be repaired for the most part but never for the full 100%. Every living cell with an active biochemistry has therefore *by definition a finite lifespan*. All living cells therefore die sooner or later away to disintegrate again.

Above steps 1-25 showed that *Biochemical Pathways* is inherent in the *periodic table*. In contrast to all living cells BP cannot die as such! Only living matter in the form of cells die and over time by definition.

This dying is the basic and essential difference between living matter 'and not living matter. All living cells / organisms have by definition a finite life. Therefore all living cells without exception are mortal. That mortality is expressed through **Law I b) of biochemistry.**

To maintain all cells / organisms should be able to reproduce these cells / organisms asexually or sexually. On Earth this is realized via the RNA / DNA. Both of these molecules must be constructed from the elements C, H, O, N, S and P.

On the basis of the elements C, H, O, N, S and P it is impossible to create structures as the double helixes of DNA that are completely different from the now well-known RNA / DNA structures. Such an alternative double helix have to be actually based also on the same *physical 'hydrogen' bonds / bridges*. This DNA should also be suitable as template for the *synthesis of amino acids and proteins*.

If on the basis of C, H, O, N, S, P, and such an alternative system for DNA RNA would have been possible this system undoubtedly have been found anywhere in living matter on Earth. That is not the case!

According to the author only RNA / DNA offer the possibility for the recording of the structure and of the biochemical functioning of the living cell / the organism in the form of a genetic blueprint. This RNA / DNA is suitable for both the asexual and sexual reproduction, and for the formation of proteins in the cell. So RNA / DNA universe widely is the sole system for the inheritance of information of living cells / organisms on to the

next-generation(s). In case two or more such (competitive) genetic systems had coexist then living matter would not have developed either.

Step 26 containment: All forms of life are forced to cells. Without exception by definition all cells are mortal and have a finite period of life.

Precondition 26):

- a) **The mortality of living matter is only offset by a system of sexual and / or asexual reproduction.**
- b) **All forms of living matter in universe are based at the same reproductive system as found in forms of life on Earth: the RNA / DNA.**
- c) **RNA / DNA contains the complete chemical blueprint of the biochemical structure and function of the cell / organism which information is inherited to the next generation.**

Author principle of inheritance expresses through the RNA / DNA in **Law 1c**).

7.3 EVALUATION: THE TOP DOWN AND BOTTOM UP ANALYSIS DEDUCTION HAVE A COMMON CUTTING EDGE:

These 26 restrictions and conditions of the *bottom-up deduction* also results exclusively in the carbon chemistry conform Biochemical Pathways as found in living matter on planet Earth. Entirely independent of each other all living matter in the universe is based at exactly the same biochemical principles as known on Earth. The elements of the *periodic table* leaves no biochemically alternative for living matter elsewhere in the universe!

The **top-down analysis of chapter 6** and the **bottom-up deduction of chapter 7** so intersect each other.

In **chapter 9** the author formulates that common interface as the **6 Laws of biochemistry of living matter** or *6 Laws of biochemistry*.

7.3.1 DIGITAL EVIDENCE AND BIOCHEMICAL PATHWAYS AND BP etc.:

On the basis of the elements periodic table are to form roughly about 1 - 2 million mono-molecules and their isotopes and about 1 – 2 billion (10^9) various molecules including all stereo-isomers, and their physical and chemical states. On the long term all possible molecules and there spatial structure are to translate in a digital form.

This results in a digital framework that includes all possible molecules, and all possible approximately 4 – 5 thousand molecules that serve as usable enzyme and co-enzyme. By digitizing all the molecules it is possible to present all theoretically possible (bio)-chemical reactions and following these reactions by computer.

From this total digital collection of approximately 1 - 2 billion molecules via computer analysis are to derive all the *theoretical conceivable chemical and biochemical reactions*. On this basis, to derive all *theoretically possible* digital biochemical cycles and biochemical chains like we see in Biochemical Pathways.

Based on the *min / max 1 principle* and *min / max 1 principle* of physically and chemically *changes (F1f)* every step in the chain and cycles can be followed. Every step consists from one physically or one chemically change compared to its preceding stage. This also applies to every step. So this results in a mathematically physics and (bio)chemistry.

-) In any case Biochemical Pathways:

That theoretical computer analysis results in any case in all previously known chains and cycles that are already found in the biochemistry on Earth. This results and leads us at least to *Biochemical Pathways* and *BP etc.* with all 4 – 5 thousand enzymes / coenzymes.

We are especially interested in possible theoretically biochemically alternative cycles for:

-) The citric acid cycle and fatty acid cycle (not found in living matter on earth) and
-) The photosynthesis and the formation of left-handed glucose.

At this moment to make five remarks:

1) This computer exercise delivers all chains and all cycles to be theoretically possible but up till now are *not or not yet* been found on Earth in living matter. Then first you have to examine their presence in existing living matter on earth.

In all probability this computer analysis results just in the 3 cycles, which are currently already known and are found in BP. These 3 cycles are to settle in both forward as well in the reverse direction: 1) the citric acid cycle, 2) the fatty acid cycle and 3) the amino acid synthesis.

2) If within that set of all digitized 1 – 2 billion molecules more biochemically chips are possible than the *above three mentioned cycles* and would prove further that these new biochemical cycles are not found in the biochemistry of living matter on Earth then in other locations in the universe there might be a much broader biochemistry possible than Biochemical Pathways and BP etc.! This biochemistry would still relies entirely on the carbon chemistry and water as only permitted reaction medium!

For the author the likelihood of such alternate cycles are minimal and virtually zero. At all life suitable planets like Earth in the 'primordial soup' phase all these possible molecules were present. Such theoretically possible alternative cycles had existed on Earth and then have been able to develop within the biochemistry of living matter. Nor is it likely that in the past such cycles are lost through extinction of species.

3) From photosynthesis of all mono-molecules based on the elements C, H, O, N, S and P only be formed the 'left-handed' glucose. From glucose only one basic type of left-handed fatty acid (-COOH); one basic type of mono-saccharide (H-C-OH)_n and also only one basic type left-handed amino acid (-NH₂-COOH) are to be constructed. Life forms on Earth are completely based on these mono-molecules.

Alternatives to the fatty acid cycle and citric acid cycle aren't to be expected or not possible.

4) Till nowadays no alternative photosynthesis with chlorophyll and ADP / ATP has been found on Earth that results in the formation of a mono-saccharide other than the left-handed glucose, or in the formation of the right-handed glucose.

5) Based on computer analysis, which will also be apparent that organic molecules with *biochemical chip constructions* are possible which can serve as a *biochemical processors* in computers!

7.3.2 OVERALL RESULT:

1) All mass in universe is based on two super symmetrical proton Higgs and two super symmetrical electron Higgs with their: a) elementary mass, b) electric charge, c) magnetic spin, 4) volume and 5) kinetic energy. See **document F1a 2014**. With these four Higgs only protons (matter) and electrons (matter) are to construct and hydrogen as simplest atom . See **document F1c**.

In universe all atoms are formed during nuclear fusion of hydrogen. So all atoms are based on protons and electrons. All atoms are structured conform the periodic table as found on Earth. The *periodic table* of elements goes universe widely and so the system of **elementary and secondary atom and speed related physically and chemically forces**. See **document F1d**.

For the basic structure of bonds see **document D1**.

2) Based on a) **top-down analysis in chapter 6**, b) **the bottom-up deduction in chapter 7** and c) **photosynthesis** the author derived that all forms of living matter in the universe are based at the exact same biochemical systematics and basic principles as found in lifeforms on earth.

The biochemistry of the various forms of living matter on earth is standard for the biochemistry of all other life forms elsewhere in the universe!

3) *Biochemical Pathways*, the three central cycles and the hundreds of enzymes is decided as the only possible system in which the complete collection of 1 - 2 billion (10⁹) molecules. This *periodic table* shows universe widely only one biochemical system as BP! This can be proven by mathematically modelling all 1 – 2 billion molecules.

4) Biochemical Pathways (BP) is completely restricted to the binding capabilities of electron-pairs via the covalent charge bonds (+ L2cb) which only occur between the elements C, H, O, N, S and P. Water is the only reaction medium for biochemical reactions.

5) The biochemistry of living matter evolves quite spontaneously on all planets with an low-pressure' atmosphere (only 0.8 – 1.2 bar at sea level), a land- and water covering between (20 - 80%) as well ice in the polar caps. Universe widely there will be at least a hundred – thousand planets per galaxy with living matter.

In universe there will be many billions of planets with living matter. All living matter is based on exactly the same biochemistry as those found on Earth in living matter.

6) The development of the biochemistry of the phenomenon of 'living matter' from 'dead' matter is a completely spontaneous process created by photosynthesis and there generated left handed glucose. Living matter has nothing to do with supernatural forces. See **Appendix 13**.

***8) UNIVERSAL CROSS COMPLIANCE STRUCTURE BIOCHEMISTRY LIVING MATTER:**

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8.1 SETTLEMENT IN BIOCHEMISTRY LIVING MATTER IS PRIMARILY TO PLACE THE MONO-MOLECULAR LEVEL:

-) For the biochemistry of living matter only molecules are usable if built up from the elements C, H, O, N, S, and P:

Chains and cycles of biochemical reactions are only to settle as the mono-molecules are released during the construction of these chains and cycles, and these mono-molecules are in a dissolved state. These mono-molecule are always at least one of the following three *physical states* they can occupy:

- dissolved (+W2Df) + gas (+W2gf) and not charged (-L),
- dissolved (+W2Df) + non-gaseous (-W2gf) and charged (+L)
- dissolved (+W2Df) + non-gaseous (-W2gf) and not charged (-L)

These three maximum possible physical positions for dissolved mono-molecules are only possible in *water* and only if these *molecules are constructed* out of the elements C, H, O, N, S (and to a lesser extent, with P).

These mono-molecules are normally completely constructed by covalent charge bonds (+ L2cb) between the atoms. These molecules may contain no *real* chemical covalent radical bonds (-R1cb). Because of *physical and chemical reasons* the carbon chemistry and biochemistry of living matter is structured around mono-molecules buildup from the elements: C, H, O, N, S and (P).

-) Only water is suitable as dissolution medium and as reaction medium for biochemical reactions:

Water is the only pure liquid that spontaneously dissociate into the ions H_3O^+ and OH^- thereby creating a fluid in which charged particles or *ions* can solve. Water is the only pure liquid in which these three physical properties / conditions can dissolve next to each other. Only water is suitable for biochemical reactions. This reaction medium water carries food and nutrients to cells and the discharge of dissolved waste from cells.

Water possesses both physically and chemically the lowest thinkable energy-level. Water is an excellent cooling medium for the storage and the removal of the heat of the reactions.

The cell wall is required to hold together, the reaction medium water and to protect the cell content against evaporation and against dilution with surrounding water. The cell wall must be a semi-permeable in order to make possible both the supply of nutrients to the cell and the discharge of waste products therefrom. The cell and its cell wall is the basics of all living matter in universe.

8.2 NEED FOR A ONE-SIDED IRREVERSIBLE DRIVING FORCE:

A driving force is necessary for the functioning of living matter. That driving force will be generated through biochemical reactions involving chemical binding energy *irreversibly* is converted into heat (photons of light and infrared). In practically all biochemical reactions, the chemical reaction steps are *preceded* by one or two physical steps and also *followed* by one or two physical steps. During these physical steps *no bonding energy* is released in the form of heat. Those physical steps are almost always composed the coupling / decoupling of an enzyme.

Each *chemical reaction step* has to generate sufficient driving force for the bridging those two intermediate following physical reaction steps with enzymes. Both are associated with the decrease of the energy level!

In **chapter 7** is shown that such a generated driving force behind the biochemistry of living matter is not possible with:

- a) one of the physical phase changes,
- b) conversion of gravitational energy into kinetic energy,
- c) conversion of kinetic and / or gravitational energy into electricity,
- d) chemical equilibrium reactions with a physically charge bond,
- e) chemical equilibrium reactions with covalent charge bonds,
- f) by chemical radical reactions, which take place without a physical steps,
- g) physical forms of matter-free and matter-containing forms of radiation, etc.

If unilateral irreversible driving force in living matter is eligible only chemical bond energy that in time, *irreversibly* converted into heat / photons. Only *three types of reactions* are acceptable!:

1) The conversion of covalent charge binding energy into heat (non-autotrophic organisms)

These reactions are (almost) always occur through the intermediary of enzymes together with the physical changes and through two intermediate physically steps. The reactions with covalent charge bonds (+L2cb) always occur through the shifting of one whole electron pair;

2) Half radical reactions and one electron (e) is released or one electron (e) is included:

Electrons are released for example by oxidation of the metals to metal oxides (the autotrophic organisms) and in the further oxidation of metal ions in a higher oxidation value. The sulfur and oxygen atom may also provide such an electron.

In half-radical reactions per step always only one electron is released with this oxidation. At reduction one electron is absorbed. Both these oxidation and reduction always include physically changes at the molecule.

3) Proton reactions in which a proton H^+ (H_3O^+) is released or precisely one proton H^+ is used:

Proton reactions take place in various places inside *Biochemical Pathways* (BP). These reactions also be accompanied by physical changes in the molecule.

The total generally involve one-sided developing reaction steps. At the end of several biochemical reactions simple and gaseous inorganic mono-molecules are released such as CO_2 , N_2 , H_2O , CH_4 , NH_3 , NO_2 , H_2S , and urea.

Within BP can be traced that all reaction steps are one or these three types of reactions. All reaction steps are associated with physical changes at the molecule.

8.2.1 DRIVING FORCE, GO BACK IN TIME AND MORTALITY:

As said before life processes required driving force consists of the irreversible conversion of chemical binding energy into heat (photons). All biochemical reactions are therefore *one side endothermic reactions in time*. All forms of living matter by their biochemistry are *irreversibly* driven through time. For biochemical reasons, living matter cannot go back in time by definition. (The theory of relativity holds that option open, incidentally! See **document G5**)

For living matter this conversion of *chemical binding energy into heat* requires a regular supply of energy and nutrients to their cells. Correspondingly all living cells have to discharge their waste from that cell. This leads anyway to:

- a) an internal pollution of the cell,
- b) damage in the control (RNA / DNA, etc.) of the cell as well
- c) damage of RNA / DNA by cosmic radiation.

For all living cells this results in a *finite lifetime* and sooner or later in the death of every living cell and all living organisms. That death is an autonomous and irreversible event and is also one of the most basic features of living matter.

To compensate that dying all living matter / organisms have the possibility to reproduce asexually or sexually. The cell, dying and reproduction are the foundations of the *first Law of biochemistry*.

8.3 MAIN BIOCHEMISTRY:

Living matter biochemical acts broadly on the basis of:

= 1) A biochemistry which must be based on the series of one-sided sloping reaction steps wherein every chemical step standard is interspersed by two physical steps. Those physical steps consist of the coupling for the reaction and the reaction again after the uncoupling of the specific enzyme which was required for that reaction step and then the coupling of the specific enzyme needed for being able to go through the following chemical reaction step.

= 2) All the *mono molecules* in all chemical and physical steps in physical respect, must be able to manifest themselves in water as a solvable: a) *a dissolved gas*, b) *an ion*, or c) as a *non-gaseous and non-ionic* ('*nopression*') molecule.

Only *mono-molecules* constructed from the 'life' elements C, H, O, N, S, and (P) complying with these physical requirements.

= 3) Of all *conceivable liquids* (= condensed gas) only water provides these three physical dissolution opportunities. Water poses the biggest condensation heat and solidification heat also. Physically speaking, the

lowest energy level. Water is both in terms of solubility and in energetically respect, the only suitable reaction medium for the settlement of biochemical reactions.

= 4) Excluded within the biochemistry of living matter:

- a) All the organic molecules with a *metal / amphoteric metal* in a covalent bond. These molecules with metals cannot be transferred into a water-soluble gas.
- b) *Free metals*. Metals that quite easily manifest as gas (Cd and Hg) on the other hand extremely poorly soluble as mono molecule.
- c) At all molecules containing a *halogen ↔ metalloid bond binding* exists this bond exists from one rigid chemical covalent radical bond (+R1cb). That bond doesn't allow a second chemical (charge) or electron pair bond. Therefore real radical covalent bonds (only one electron pair) cannot react biochemically. The halogen ↔ metalloid bonds are biochemically hardly degradable and thus more or less toxic.
- d) *Silica* oxide is solid, and no gas such as CO₂. That's why Si just plays a minor role in living matter.

= 5) Thereby the biochemistry of living matter is compelling based on mono-molecules built up with covalent charge bonds (+ L2cb) from the metalloids: C, H, O, N, S, and the 'life element' P which performs some specific energetic functions within *ATP* and protection role within the *RNA / DNA* against spontaneous hydrolyses.

= 6) The decomposition of organic compounds into simple inorganic molecules always ends with molecules such as: CO₂, H₂O, CH₄, NO₂, NH₃, N₂, CO, urea, etc. The chemical bond energy is the lowest in the O-H bond, at the C-O, and in the form of the H₂O and the CO₂ molecule.

= 7) In the universe all imaginable systems with living matter should develop a methodology to regenerate these molecules H₂O and CO₂ back towards at least a H-C-OH bond (= a mono-saccharide). This is done with the aid of physical forms of energy (photons of light).

On Earth, we only know the aerobic and anaerobic photosynthesis through the use of chlorophyll and ADP / ATP. This photosynthesis process goes universe wide. Both path of photosynthesis results in the formation of the 'left-handed glucose'.

= 8) From this 'left-handed' glucose can be constructed:

- a) one basic type mono-sugar (= the citric acid cycle),
- b) one basic type of mono-fatty acid (= fatty acid cycle)
- c) only one basic type of mono-amino-acid (= the amino-acid synthesis).

Those from left hand glucose derived mono-molecules are universe widely the only basic building blocks for the biochemistry of living matter. These molecules are found in all forms of life.

= 9) A number of mono-molecules composed of C, H, O, N, S and P must be able to polymerizing to insoluble polymers and to the de-polymerization by hydrolysis back to soluble mono-molecules. All basic types of molecules referred to in = 8) are able to do so.

= 10) The cell material of living matter based on polymers arising from organic monomeric molecules built up from the elements C, H, O, N, S and P. It is a variety of poly-saccharides (sugars), poly-fatty acids and poly-amino acids (proteins) and other polymers of mono-molecules. These polymers result among others in the cell walls and in all other non-liquid parts within the cell.

= 11) In the active living cells the cell wall is always comprising a certain volume of water which is essential for the settlement of biochemical reactions.

8.4 MIN / MAX 1 PRINCIPLE AS BASIC STRUCTURE OF BIOCHIPS:

The entire basic structure of Biochemical Pathways (BP), and BP, etc. is already established naturally in:

- a) the arrangement of the elements of the periodic table,
- b) the specific system of *forces* and *bonds* of the 'life'-elements C, H, O, N, S, and (P),
- c) the buildup of mono-molecules and physical properties of these molecules,
- d) the settlement of all kinds of reactions in accordance with the min / max 1 principle (See **document F1f**) and
- e) water as the only physical and energetic suitable reaction medium.

-) In primordial soups on Earthlike planets only Biochemical Pathways is / was possible:

In **Appendix 13** the author outlines the author how the development of the biochemistry of living matter in the distant past may have occurred *on land* at concentration points with 'primordial soup'. In this 'primordial soup' in principle all conceivable 1 – 2 billion mono-molecules were present that could be usable in the biochemistry of living matter. Living matter could evolve on Earth because in that primordial soup with 1 - 2 billion of molecules only one system as Biochemical Pathways was possible.

The left-handed glucose formed during photosynthesis provided the chemical energy and forms the continuous driving force behind the development from 'dead' matter to 'living' matter. Universe widely that process of creation of living matter develops in the same way on all planets with sufficient land and water!

The biochemical control and protein formation from amino-acids takes place universe widely from the polymer level in the form of the RNA / DNA with its double helix as a basis for the control of the biochemistry of the cell and also usable for reproduction.

8.5 OTHER POSSIBILITIES THAN BIOCHEMICAL PATHWAYS?:

In universe all living matter is made up of the atoms / elements C, H, O, N, S, and (P). With the elements C, H, O, N, S, and (P) can be constructed:

- = 1) only one basic form of chlorophyll and aerobic and anaerobic photosynthesis in the bond of chlorophyll with ADP / ATP. Universe widely this photosynthesis results in forming only the left-handed glucose. This is the basis for the left-handed setup of Biochemical Pathways.
- = 2) only one basic type left-handed fatty acid COOH. The fatty acid cycle forms a central part of Biochemical Pathways. With poly-alcohols these fatty acids can polymerize.
- = 3) only one basic type left handed mono sugar (H-C-OH). These mono-sugars form the central part of BP via the citric acid cycle. These mono-sugars can polymerize.
- = 4), only one basic type of left handed amino acid (NH₂ + COOH group on one mono-molecule). These amino acids can polymerize towards proteins. They are coupled to BP via the amino acid synthesis.
Of all mono-molecules only amino-acids have the possibility of polymerizing on both sides under the formation of proteins.

= 5) water is the only liquid that is suitable as a reaction medium, because of:

-) The maximum dissolving power to the three physically types of mono molecules,
-) Reactions with proton H⁺ (the proton reactions) and with electrons e⁻ (the half-radical reactions),
-), Both physically and chemically the lowest energy level.

The periodic system and the elements C, H, O, N, S and P, and photosynthesis only results in the well-known mono saccharides / sugars, mono fatty acids and amino acids with the same left handed spatial structures.

Universe widely no space is available for other essential biochemical systems than Biochemical Pathways as basis for the biochemistry of living matter.

-) Right handed system ?:

The only conceivable aberrant possibility is a biochemical structure based on Biochemical Pathways but completely based on *right-handed* stereoisomers. This is only possible if there exists is a *photosynthesis* that is structurally based on the formation of right-handed *glucose*. On earth, we nowhere find such right-handed system. Nonetheless, the left-handed structure of Biochemical Pathways structure has yet to be proven by a digital approach.

8.6 IN THE UNIVERSE ALL LIVING MATTER IS BASED ON BIOCHEMICAL PATHWAYS (BP):

On earth only one basic chip is known for living matter: Biochemical Pathways (BP) with associated enzymes and with only one central control by RNA / DNA. Based on the deduction in **Chapter 7 Biochemical Pathways** universe widely is the only biochemical processor for the biochemistry of living matter.

BP underlying biochemistry: all single-celled organisms such as bacteria, fungi, algae, multicellular plant and animal organisms, etc. The biochemical system of living matter on earth is standard for all kind of living matter in the universe on planets with sufficient water and an atmosphere with a relative low air pressure (p) between 0.8 and 1.2 bar. A higher air pressure results into a too high greenhouse effect of the present CO₂ and CH₄ gasses.

*** 9) THE SIX LAWS OF BIOCHEMISTRY:**

9.1 LAWS OF BIOCHEMISTRY GROUPED AROUND THEMES AND BASIC REQUIREMENTS BIOCHEMISTRY OF LIVING MATTER:

The top-down analysis in **chapter 6** and bottom-up deduction in **chapter 7** intersect more or less halfway. The author compresses the cutting edge of the six conditions imposed on the biochemistry of all living matter in universe. This results in the **six Laws of biochemistry** which are arranged as follows:

Law I):

-) The requirement that the biochemistry of all living matter occurs in water and particularly in small with water filled spaces in the form of *cells*. All cells are surrounded by a semi-permeable cell wall.
-) As a result of: a) internal contamination of the cell, b) damage as a result of the biochemical reactions and c) cosmic radiation all living cells are *mortal* in time.
-) To compensate for this inevitably mortality, all living cells / organisms have to reproduce themselves asexually or sexually.

Law II):

-) The requirements for the *type of driving force* behind the biochemistry of living matter.

Law III):

-) The physical requirements are imposed on the *molecules* in the chains and in the biochemical cycles in respect of:
 - The nature of the chemical bonds and thereby
 - The *elements* from which molecules must be built up.

Law IV):

-) The requirements to be met by the *reaction medium* in which the biochemical reactions take place.

Law V):

-) The requirements to be met by the cyclic reuse of matter.

Law VI):

-) The requirement that the *control of the biochemistry* of living cells / matter from one place central processor which is also useful in the reproduction.

9.1. FIRST LAW OF BIOCHEMISTRY; GENERAL CHARACTERISTICS LIVING MATTER:

The first Law appoints the basic characteristics of living matter:

Law I a): Biochemical reactions of living matter can only be settled in the reaction medium *water* which will be held together within the structure of a cell. Standard all cells are surrounded by a semi-permeable cell wall.

Law I b): All living cells have by definition a finite lifespan. Without exception all forms of living matter are mortal.

Act I c) To compensate the mortality possess all living cells and organisms the ability sexually and / or to reproduce asexually.

Remarks Act I a) of biochemistry:

1) Life includes a complex of biochemical reactions which on mono-molecular level can be carried out in water exclusively arranged. Only in water can be present next to each other: a) gases, b) ions, and c) non-gaseous and not charged 'nopression' molecules (mono-saccharides, undissipated fatty acids and amino acids).

Biochemical reactions of living matter are, therefore, to settle only in water. All living cells with an *active* biochemistry are small in size and mainly filled with water.

2) The reaction medium is water alone hold together and protect against evaporation or dilution if this is surrounded by a semi-permeable cell wall. This cell wall is made up of organic flexible polymers that cannot dissolve in water, nor can evaporate as gas.

3) All active living cells on Earth as well in the universe without exception enveloped by a semi-permeable cell wall which receive usable (food) substances from outside the cell and controls the removal from the cell of all substances that are no longer useful for the cell. All active living cells find themselves in a continuous interaction with their mostly liquid environment.

4) Due to the reaction medium is water living matter universe wide coercive structured around loose on self-contained cells, or around a conglomerates of live and interacting cells that form a multicellular organism.

Remarks Law I b) of Biochemistry

1) All living cells in the universe become fouled by the incorporation of solutes from the outside by the cell and by degradation products as a result of the biochemical reactions inside the cell. Radioactive rays, and cosmic rays from the universe form radicals within the cell followed by radical reactions. That results in degradation of both the cell as contamination thereof.

2) The cell partially correct and repair the consequents of this type of pollution and damage to the complex control of the cell (RNA / DNA), but *never* completely. Despite all the efforts and adjustments of the cell this damage and pollution results sooner or later to the death of the conscious cell. All living single cells or complexes of interacting cells are characterized by a finite lifetime and are invariably mortal.

3) All forms of life with active biochemistry have a limited lifespan ranging from hours / days to a maximum of about 3 millennia with a number of trees. Seeds and spores have a lifespan of tens of thousands of years sometimes their germination retain for a longer period. In such an inactive state all cells and seeds are eventually mortal, without exception. In the long term by definition all cells, spores and seeds are mortal to.

4) This dying of all living matter is such a basic characteristic of living matter that has been named in **Law I b) of biochemistry**

Remarks Law I c) of biochemistry:

1) To prevent the extinction of species / cells all living matter should renew itself constantly through an asexual or sexual reproduction. For this reason, all living cells / organisms possess a system to reproduce.

2) On the basis of the periodic table there should be a system with a complete molecular chemical blueprint containing all information about: a) the complete structure of the cell, b) the biochemical function of that cell / that organism, and c) its reproduction.

3) This information was recorded from the RNA / DNA and is organized into genes and in chromosomes. By sexual and / or asexual propagation the complete information of the cell / organism is passed on to the next generation.

9.1.2 SECOND LAW OF BIOCHEMISTRY; REQUIREMENT OF IRREVERSIBLE DRIVING FORCE:

The **second law of biochemistry** names:

- 1) the nature of the driving force that is required for the functioning of the biochemistry of living matter,
- 2) the direction of the driving force in the biochemistry of living matter and
- 3) the relationship between the driving force in living matter and time / universe clock time in **document G2:**

Law II A): The driving force in the biochemistry of living matter only arises from the biochemical reactions with the irreversible transformation of *chemical bond energy* from chemical covalent charge bonds (+ L2cb) into *heat* supplemented by half radical reactions (e^-) and proton reactions (H^+).

Law II b): The direction of this driving force is only forwards and is irreversible in time. This pushes living matter constant unilateral and irreversible forwards in time and in the universe clock time.

Law II c): The driving force in living matter cannot *directly* be derived from any other form of energy:

a) Physical: light, electricity, radiation, kinetic energy or gravitational energy,

b) physical or chemical charge bonds (+ Lb),

c) covalent radical bonds (+ R1cb).

-) Remarks Act II a) of biochemistry:

1) All the forms of life are biochemically characterized by one-sided descending phenomena. These reactions are *in time irreversible* because of the irreversible conversion of chemical binding energy (L2cb) in heat (photons). This release of heat is proof of that this driving force is / was active.

2) This phenomena of living matter comes to expression in the following types of reactions:

-a) in case of non-autotrophic organisms: the reduction of chemical covalent bonding energy into heat and the oxidation of hydrogen bonded to H₂O, of carbon to CO₂, of nitrogen to NO₂/ NO₃, from sulfur to SO₂/ SO₃. Such chemical covalent bonds cargo (+ L2cb) only found in chemical bonds between the elements C, H, O, N, S.

-b) at the autotrophic organisms: the oxidation of a metal / amphoteric metal by increasing the degree of oxidation of a metal / amphoteric metal by releasing an electron (a half radical reaction) or the reduction of a metal ion,

-c) the oxidation of H⁺ atom / ion to H₂O (= proton reaction) or the reduction of H₂O → H⁺ / OH⁻.

ad -a) All aerobically or anaerobically living cells without exception have the ability of conversion of chemical binding energy into heat as driving force in their cell metabolism or for bridging between the two physical steps in their biochemical reactions.

ad -b) Autotrophic organisms can retrieve the required energy from the oxidation of metals or amphoteric metals, and the release of an electron through the increase of the degree of oxidation. That liberated electron (e⁻) is used for the oxidation of organic material and so transferred into heat (photons). For this oxidation, their cell metabolism and cell structure these autotrophic organisms need *external* organic material.

ad -c) The non-autotrophic organisms get their energy from the oxidation of organic material C-H bonds that almost always originates and can be traced back to plants / algae and glucose formed during photosynthesis.

3) The driving force in both aerobic, anaerobic and autotrophic organisms is achieved through irreversible reactions involving converting chemical bond energy into heat.

4) All reactions within Biochemical Pathways consist of these three under point 1) announced types of reactions with conversion of chemically bond energy into heat / photons. With this energy the molecule can bridge the two physical steps which are present in between two successive chemical reaction steps each other.

These two physical steps always concern:

a) the disconnection of the former enzyme, and then

b) the coupling of a new enzyme for the timing of the following chemical reaction step.

By using enzymes, the molecule is physically and chemically tightly guided though the biochemical reaction chains of Biochemical Pathways (BP) and energetically driven though this chain by releasing heat (photons) at each chemically reaction step. BP as a whole is tightly programmed. BP can be considered as a true biochemical biochip. Biochemical Pathways is the biochemical visualization of the creation of living matter by God. The single tangible of this Biochemical Pathway chip are the enzymes and co-enzymes.

5) In all types of living organisms on the earth, and all living matter universe widely this driving force is exclusively generated during biochemical reactions on the mono-molecular level and through the lowering of the level of binding energy on mono-molecules by releasing photons.

At the end of the reaction chain *simple gaseous and / or uncharged compounds* are formed such as CO₂, CO, CH₄, H₂O, NH₃, NO / NO₂, N₂, N₂O, H₂S, SO₂, urea etc.

6) In the cell, the amount, for the biochemistry available, chemical binding energy decreases with time and becomes eventually zero. This loss of covalent binding energy is added in the form of:

- energy from light fixed by a photosynthesis and conversion into glucose; (For all organisms with chlorophyll),
- organic materials; (the non-autotrophic aerobic and anaerobic organisms) and
- metals and organic materials (in the autotrophic organisms).

Remarks Act II b) of biochemistry:

1) All biochemical reactions are ultimately based on the conversion of binding energy into heat / photons. This complex of one-sided sloping reactions is also one-sided descending in time and therefore irreversible in (universe clock) time.

2) The physical phenomenon of time does not in itself. Time is directly linked to the development of the universe cycle and space and time of that universe. Everywhere in the universe the *universe clock time* is constantly exactly the same. See **document G2**.

3) The biochemistry of living matter cannot go back in time / universe clock time. Time cannot be delayed or accelerated in its developments.

Remarks Act II c) of biochemistry:

1) No single organism can obtain its energy requirements and driving force *directly* in one reaction step from light or to kinetic and / or gravitational energy or compatible.

2) Light / photons can / cannot *directly* be used as an energy source for the living cell. That is only possible indirectly through absorption of photons of light to *chlorophyll and photosynthesis*. With this process chlorophyll containing organisms transfer light energy into energetic fully ATP. With this energy only CO₂ and H₂O can be converted into the *left handed glucose*.

For their energy input plant organisms are normally 100% dependent on sunlight and binding of photons through photosynthesis.

3) The formed glucose is used in the cell structure of plants and as an energy source. The power source of all *plant organisms* (with chlorophyll and ATP) and all other organisms is always ultimately originate the glucose formed during photosynthesis. This applies as well for all autotrophic organisms.

4) This required driving force required is only generated by irreversible (bio) chemical degradation reactions. This driving force can never be derived from physical reactions and / or obtained by physical or chemical equilibrium reactions.

9.1.3 THIRT LAW OF BIOCHEMISTRY; REQUIREMENTS TO MONO MOLECULES:

The third law of biochemistry formulates the requirements to be fulfilled by single molecules in chains and biochemical cycles in living matter:

Law III a): All chemical bonds of the molecules that are involved in the unwinding of the biochemistry of living matter are to be the *chemically covalent charge bonds* (+L2cb). Half radical (e⁻) and proton reactions (H⁺) are also acceptable and accepted.

Within the biochemistry molecules with real chemically radical covalent bond(s) (+ R1cb) these bonds are not biochemically biodegradable and by that persistent and unacceptable for living cells.

Law III b): Biochemical cycles and chains can only occur on mono-molecular level. These cycles and chains are only possible when these molecules are dissolved and in physical respect always can take one of the three physical states:

- 1) gaseous and not charged (as dissolved gas)
- 2) non-gaseous and charged (as dissolved ions), and
- 3) non-gaseous and not charged (as dissolved 'nopression' molecules).

Law III c): Biochemical cycles and chains of reactions are both physically and chemically only to settle with mono-molecules which are standardly constructed with covalent charge bonds (+L2cb) between the elements C, H, O, N, S (and P)

Remarks Act IIIa):

1) Between two atoms *two* totally different chemical covalent bonds are to distinguish both of which comprising at least one common shared electron pair:

a) the chemical covalent radical binding (+ R1cb)

Within Biochemical Pathways (BP) there aren't any full-radical reactions. Radical reactions occur directly between *two* radicals without the intervention of enzymes. Thus there are *no physical changes* on the molecule. The absence of enzymes and physical changes expired radical reactions very random and unstructured. Radical reactions cannot be obtained consistent within the biochemistry of living matter and are, therefore, not acceptable.

The only exception is the *half-radical reactions* involving the release of a single electron (e^- = a radical) in water in connection with the formation of an ion.

b) The chemical covalent charge bond (+ L2cb)

The forming or breaking up of the chemical charge bonds (+ L2cb) always goes through the shifting of *a whole electron pair* and never through breaking of the chemical bond in two real radicals (two atoms / molecules each with one unpaired electron). In almost all (bio) chemical reaction steps within Biochemical Pathways reactions are done by shifting one whole electron pair. Those reactions are never settled in one step but always proceed in 3 – 5 steps because of the necessary intervention of enzymes / co-enzymes. These reactions always involve *physical changes* on these organic molecules.

In biochemical reactions is any chemical reaction step framed between at least one but mostly two physical changes on the molecule consisting of the disengagement of the old enzyme and the attachment of a next specific enzyme. Biochemical reactions consist of alternating two physical changes and one chemical reaction step. These enzymes and associated physical intermediate steps organize all biochemical reactions in such way that they follow entirely predictable paths. For the cell these reactions with enzymes can be regarded as entirely 'controllable'.

*** c) Semi-radical and proton reactions:**

Inside Biochemical Pathways are two special, common, reaction steps in which *the electron* and *the proton* are involved.

*** c1) Half-radical reactions are all reactions in which one electron e^- attaches itself to or disconnect itself from an atom or molecule:**

These are (bio) chemical reaction steps that temporary one electron (e^-) released or wherein one free electron (e^-) is used and is connected to an atom / molecule. Such an electron can also originate from a *physically bonded* amphoteric metal within an organic molecule. Such half-radical reactions take place at chlorophyll, hemoglobin, and in / near autotrophic organisms. These semi-radical reactions are always accompanied by physical changes. These are *not pure radical reactions* but only half-radical reactions!

*** c2) Proton reactions are all reactions with the attachment or detachment of a proton H^+ :**

These are the (bio) chemical reactions in which one proton (H^+) is released or wherein one proton is utilized or is bound to an atom / molecule. Such proton reactions are also always accompanied by physical changes and are therefore not to be regarded as a form of 'radical' response. Proton reactions always occur in water wherein said proton exists as an H_3O^+ ion and not as a free proton (H^+ atom).

In a living cell, the chemical reactions thus based entirely on chemical covalent charge bonds (+ L2cb) and based on 2 - 1, and 1 - 2 reaction steps.*9*) They are based on the shifting of one whole electron pair and supplemented by half-radical reactions and proton reactions. This set of standard (bio)chemical reactions is always in association with physical changes. They results in completely predictable reaction products and reaction pathways.

9) See the fundamental *min/max 1 principle* by Uiterwijk Winkel in Document F1f.

2) Because of lack of physically changes *radical reactions* on covalent bonds (+R1cb) expired in one step and thus quite arbitrary and virtually uncontrolled. For a living cell real radical reactions are fully uncontrollable in any way. All reactions involving two real radicals threaten the proper functioning of the biochemistry in a living cell.

3) Biochemical chains and cycles are to make nor with molecules built up with elements of the periodic system which are mutually may form *just one and no more than one chemical covalent charge bond (electron-pair)*.

Then this is always a covalent radical bond. Such radical covalent bonds always occur at metalloids in bond with a *halogen, a metal, or an amphoteric metal*:

-), The *covalent halogen bond* in molecules of C, H, O, N, S and P biochemically are very difficult to break into a halogen-ion soluble in water,

-), This is also true for *covalent bonds with metals, and amphoteric metals* which also react as radical covalent bonds.

Organic molecules with a halogen, a metal, and amphoteric metals manifest itself in dissolved form as a biochemical poorly degradable and are therefore almost always be regarded as more or less toxic.

4) The above excludes halogens, metals, and amphoteric metals, as basic elements in the molecules suitable for the biochemical cycles in living matter. Fortunately for humanity certain groups of soil bacteria however can break down halogenated organic compounds very slowly. During this breakdown the halogen is converted into a soluble inorganic ion. The rest of the organic molecule is then used by these bacteria for the energy supply.

Remarks Act IIIb of biochemistry:

1) Biochemical reactions are combined with enzymes / coenzymes rather than as series of dissociation reactions and association reactions. These reactions are only to settle as to form the particles (electron, H^+ , atom, molecule) consistently always be able to have one of the three *physical states* of being dissolved:

- a) *gas and not charged*,

- b) *charged and non-gaseous* and

- c) *not charged and non-gaseous* (noproression).

2) With the halogens in conjunction with the elements C, H, O, N, S, and (P), these three physical states are also possible. Physically seen, halogenated organic compounds fit reasonably well in living matter. Solubility which leads to halogenated compounds in the cell as soon as they are present in the environment of the cell.

3) Halogenated molecules with that single chemical bonds are in reality chemical covalent radical bonds (+R1cb). These bonds are not the required chemical covalent charge bonds (-L2cb). This causes that halogenated molecules biochemically (*extremely*) *poor degradable*. These substances are often accumulate inside the cell giving a toxic effect. So halogenated organic compounds are not usable within Biochemical Pathways!

4) Biochemical chains and cycles are not to settle with molecules composed of the elements of the periodic table which only generate 2 of the 3 required different physical types of being dissolved. Molecules containing a covalently bonded metal and / or amphoteric metals results at the end of the reaction not in a dissolvable gas as is normally the case in biochemical reactions. All molecules with a metal or metalloid in a pure *chemical* covalent (radical) bond are therefore excluded in the central part of the biochemistry of living matter!

5) The silicon element is biochemically also unusable because SiO_2 is a solid. Dissolved in water it is a 'noproression' molecule. SiO_2 is not present as a gas or as a soluble gas such with CO_2 is the case!

This also applies to metals, and amphoteric metals. Metals, amphoteric metals and Si are thus excluded from central part of biochemical systems with the characteristics of living matter.

6) Some metals play a secondary role and are suitable for the formation of bone (Ca-phosphate), silicic skeletons (Si), and find application in semi-radical reactions within ring-shaped molecules (Fe, Co, Se, Zn), or are preferred in connection with the turgor in the cell (K).

7) Essential metals like Fe present in the center of the chlorophyll and hemoglobin within Biochemical Pathways are always *physically bound* as ion dissolved in water and never as a *chemically bound* metal!

Remarks Act III c of biochemistry:

1) The three required physical conditions for the settlement of biochemical reactions only occur with the mono-molecules constructed from the elements C, H, O, N and S. Molecules in other bonds of elements of the *periodic table* may:

-) not occur in the gas form: the molecules with metals, amphoteric metals, Si and P,

-) not occur in a charged state as ion: the noble gases,

-) not respond via the shifting of one electron pair: the molecules with a metal, amphoteric metal or a halogen.

2) For primarily physical reasons the three different physical states (**Law III b**) all conceivable biochemical systems in the universe are coercive structured around molecules of the elements C, H, O, N, and S. In Biochemical Pathways there are only molecules *chemically* built up out of these elements C, H, O, N and S.

3) P cannot form a gas. For that reason P is standing almost entirely outside Biochemical Pathways. P fulfils only a limited but highly essential role in a) the ATP energy capture, b) in RNA / DNA and c) in bone material. The presence of P in the RNA / DNA prevents this molecule against spontaneous hydrolysis and thus protects the RNA / DNA in the cell against a spontaneous degradation. The elements C, H, O, N, S, and (P) are the only universe widely 'life elements' of periodic table. Around these elements a great amount of molecules are to construct. Within these molecules is to form and develop the biochemistry of Biochemical Pathways. This applies to all forms of living matter in the universe.

4) The mono-molecules within Biochemical Pathways mostly consist of covalent charge bonds (+L2cb) between C, H, O, N and S (with the exception in P) and are readily soluble in water. In water, these molecules react biochemically monitored via the intermediacy of enzymes.

Within BP take the molecules remains one of the three required physical conditions in:

- a) gas and not loaded,
- b) no gas and charged particle / ion or
- c) not as gas and not charged molecule!

All forms of life in the universe are in biochemically binding based on molecules consisting solely of *covalent charge bonds (+L2cb) between the elements C, H, O, N, S, and (P)*, with one, two, or three covalent charge bonds in between two atoms.

5) The covalent charge bonds between the elements C, H, O, N, S and P results many millions of molecules, but only:

- *) One type of monosaccharide, (glucose, fructose, mannose, lactose, etc.)
- *) One type of fatty acid (organic compounds having a COOH group),
- *) One type of amino acid (at least a chain of 2 C atoms and having an NH₂ group and a COOH group);
- *) One type of protein binding,
- *) One type of NAD,
- *) One type of ADP / ATP,
- *) One type of molecule for the absorption of light: the chlorophyll in types a, b, c and d,
- *) One type of RNA / DNA,
- *) The same types of 4 -5 thousand enzymes and co-enzymes,
- *) The same types of vitamins,
- *) One citric acid cycle, one fatty acid cycle, and one amino acid synthesis.

6) Use the 'life elements' is H, O, N, S and P are only dealing with longer carbon chains. All mono larger organic molecules are primarily based on carbon chains.

Bio-organic polymers based on a poly-saccharide, an acetal, hemiacetal or a linkage to a protein which are all hydrolysable.

Bonds C, H, O and N in addition to chains also lead to various cyclic rings of 5 and 6 atoms C and N . Bonds between the other elements of the *periodic table* cannot result in similar ring structures and molecules having similar characteristics and operation, such as which are possible around carbon and nitrogen.

9.1.4 FOURTH LAW OF BIOCHEMISTRY; WATER ONLY SUITABLE MEDIA REACTION:

In almost all biochemical reactions the use of an enzyme is required. As solid matter enzymes cannot move and not react. As solids enzymes are unsuitable to serve in the biochemistry of living matter.

Enzymes are too large to be present as a gas / vapor. Therefore biochemical reactions cannot occur in a gas or in a mixture of gases.

For biochemical reactions remaining the *only* possibility are enzymes as mono-molecules which *are dissolved* in a liquid reaction medium. That liquid is emerged through the condensation of a gas. Biochemical reactions only occur between loose, relatively small, molecules which are dissolved in a true liquid / condensed gas.

In the *fourth Law of biochemistry* be formulated the requirements of the *reaction medium* for unwinding biochemical reactions:

Law IV a): The reaction should allow the dissolving of three physical types of molecules next to each other.

a) gaseous and not charged molecules,

b) non-gaseous and charged molecules, including the (temporary free) electron (e^-) and proton H^+ ,

c) non-gaseous and not charged ('noproression') molecules.

As a 100% pure liquid only water satisfies these requirements.

Wet IV b): The chemical and physical bonds of the reaction medium must poses both physically and chemically the lowest energy content of all other conceivable chemical and physical bonds possible within the periodic table.

Of all the molecules of only water also conforms to this requirement.

Act IV c) Water is universe widely the only liquid that both physically, chemically and energetically universe fits as reaction medium for the settlement of the biochemical reactions in living matter.

Remarks to LAW IVa) of biochemistry:

1) All real fluids arise via the condensation of a gas. In all 100% pure fluids can solve: a) gases and c) 'noproression' molecules. Thus, only two of the three for biochemical reactions required physical states!

2) Water is the only exception! In water, the small dissolved gaseous mono- and molecular H_2O has a relatively high speed. That dissolved gaseous H_2O molecule collides in water always against the end of physical polymerized H_2O molecules. In that collision this gaseous H_2O molecule cuts off a proton (H^+) from that polymeric water with the formation of an H_3O^+ molecule / ion and thereby transformed into a *non-gaseous and charged ion*.

The polymeric water molecule then emits an OH^- molecular down to get uncharged again. Finally its then bounds another new gaseous H_2O molecule to get back its original structure.

3) Only water can be divided in this way in a very small but measurable amount of dissolved and charged H_3O^+ and OH^- ions. Water accepts these ions because they are surrounded by a shell of water molecules (= hydration).

4) In this way water surrounds other *positively or negatively* charged atoms / molecules with such a shell of water molecules. As a result only in water these charged particles can really dissolve as ions. Of all liquids only water provides this possibility of dissolution charged particles / ions.

5) All the other thinkable and 100% pure liquids such as ammonia, hydrogen sulfide, carboxylic acids, alcohols, halogens may themselves *not, or insufficiently split* into ions. That would have resulted in two oppositely charged ions, respectively: (NH_4^+ and NH_2^-) and (H_3S^+ and HS^-). On the basis of their structural formulas 100% *pure* liquids that consist of H-halogens molecules (HF, HCl, HBr, HI) are not to split into ions!

6) All other liquids than water lack the ability to be able to dissociate from within itself in ions. It is confusing that a number of fluids which may or dissociate in the presence of water but not from within itself! Therefore it seems as if they have the same dissolving characteristics as water.

7) Salts can dissolve in all *pure liquids*. However, these salts cannot be further dissociate into two or charged particles to ions. That is only possible in the presence of water.

Water is the only liquid able at the same time and next to each other to solve: a) gases, b) ions and c) non-gaseous and not loaded ('noproression') mono-molecules.

8) Water is the only liquid that meets LAW IV a.

Remarks LAW IV b of biochemistry:

1) Both physically and chemically, the reaction medium must have the lowest possible energy level of the atoms / molecules that can be constructed on the basis of the elements of the periodic table. From physically and / or chemically energetic point of view no single molecule may become in a lower energetic position than the physical and chemical bonds of the reaction medium (H_2O) itself.

2) The covalent charge binding of O-H of the reaction medium water must have the lowest energy level in comparison with all other possible *covalent bonds* between the elements of the periodic table.

3) In physical respect water has the lowest energy level in comparison with all other physical bonds. Water has the highest condensation heat and solidification heat.

The reaction medium water can thereby act as a most efficient cooling liquid for adaptation, buffering and the dissipation of the heat which is released during biochemical reactions.

4) Water released as the only liquid in both physically and chemically the lowest energy level.

5) *Water is the only liquid that satisfies Act IV b) in energetic terms*

Remarks LAW IV c)

1) Of all the fluids only water has the right properties both physically and chemically.

2) All enzymes used in biochemical reactions enzymes are soluble in water. Biochemical reactions are only to settle in the reaction medium water. Water is universe widely the only appropriate base medium for the settlement of biochemical reactions in all conceivable forms of living matter.

9.1.5 FIFTH LAW OF BIOCHEMISTRY: REUSE OF CYCLIC C, H, O, N, S, and P:

Through (bio)-chemical reactions all organic molecules in a planet get sooner or later in their chemical lowest energy level of CO₂, H₂O, NO₂, NO₃, SO₂, etc. All chemical and biochemical reactions end up and with it all the activities of living matter. On a longer term a system of living matter on planets are running out of chemical energy unless there is any energetic '*upgrade*' of these chemical bonds. This is especially true for the '*upgrade*' of the molecules with the *lowest* chemical energy content CO₂ and H₂O.

In practice this upgrading of both molecules can only occur by creating a more energy-rich H-C-OH construction in the form of a mono-sugar (glucose). That '*upgrade*' of the chemical bonds of C-O to C-H and C-OH can only be done by *physical forms* of radiant energy coming from outside the planet. This is energy in the form of light / light photons coming from the nuclear fusion process in the star around which the planet orbits.

On the planet these physical radiation energy of light photons must be absorbed in any way. Many substances are able to do so, including chlorophyll. In chlorophyll absorption of photons separates an energetic particle (an free electron e⁻).

The energy of this electron should then carried and fixed in a different energy-bearing molecule. The transferred on that molecule energy ultimately is to be converted into chemical forms of energy such as in the H-O-CH bindings of glucose.

On Earth, there the aerobic and anaerobic photosynthesis of chlorophyll in co-operation with ADP / ATP is done by chlorophyll. This bond in water leads exclusively to the formation of the left-handed glucose and is in the aerobic photosynthesis accompanied by the release of free oxygen O₂. On Earth, this aerobic and anaerobic photosynthesis are the only known forms of photosynthesis.

If molecules had resulted in an alternative photosynthesis than such alternative forms of photosynthesis undoubtedly should have developed during the '*primordial soup*' phase. That is not the case. In biochemical terms, we only know this aerobic and anaerobic photosynthesis.

The recycling of CO₂ and H₂O to glucose lawful proposes the following requirements:

Law V a): Out of the 'life elements' C, H, O, N, S and P, must formed least one, soluble in water, mono-molecule that external physical radiation energy, both under anaerobic as under aerobic conditions. That molecule can absorb light photons and results in a half radical reaction and to release an energetic electron (e⁻).

(Universe widely this is in any case possible by the chlorophyll molecule and sub types a, b, c, and d)

Law V b): From the 'life elements' C, H, O, N, S and P, must be formed at least one water-soluble mono-molecule which the energy of this liberated electron can transform into a high-energy chemical bond being a polyphosphate.

(Universe Wide is in any event possible through the ADP / ATP molecule)

Law V c): Under both aerobic and under anaerobic conditions, universe widely photosynthesis consists of a least of chlorophyll and ADP / ATP and the construction of left handed glucose.

Remarks Act V a) Vb) and V c) of biochemistry:

- 1) In the biochemistry of living matter overall chemical binding energy is irreversibly converted into heat. That is the driving force. (See **Law II a** and **Law II b**). These molecules must be energetically recharged.
 - 2) Structurally this 'recharge' cannot be realized from other forms of covalent chemical bond-energy. That would offer no solution in the long term. On the basis of **Law II b** the total energy content of covalent bonds on the planet would further and further decrease.
 - 3) Structurally this energetically 'charge' of the covalent bonds can only be realized through an energy source outside the system / planet and only through one of the physical forms of energy. In practice, this shall only happen through the absorption by chlorophyll molecule of radiation energy in the form of light / photons coming from the star where the planet orbits around it.
 - 4) By using photosynthesis energy is added to the O-H and C-O bonds transforming them back into energy-rich C-H and C-OH bonds. Universe widely this process at least is done by the chlorophyll photosynthesis + the ADP / ATP molecule. This process ends in the formation of the left handed *mono-saccharide glucose*.
 - 5) Without the presence of living matter / cells this photosynthesis is already spontaneously active under anaerobic and later photosynthesis under aerobic conditions!
 - 6) At all planets in the universe with sufficient water and land the development of living matter starts with the unfolding of photosynthesis and the formation of left handed glucose as energy source and as driving force.
 - 7) Till now on earth no other process with photosynthesis has been observed that produces a different mono-saccharide or the right handed (dextrorotatory) glucose. If on the basis of C, H, N, O, S and P that possibility theoretically exists then this alternative form of photosynthesis must also be found somewhere in living matter in the earth!
 - 8) Given the history of the earth and thereby 'primordial soup' phase it seems (almost) impossible that elsewhere in universe a system of photosynthesis could develop resulting in other mono-saccharides than the left-handed glucose.
 - 9) The binding of light energy is present in two different ways:
 - a) the bond to the chlorophyll molecule (chlorophyll a, b, c, d,) under separation of one temporarily free electron (*the oxygenic photosynthesis*). This process passes via NADP in ATP which is added as an energy to the chemically reaction of $6 \text{CO}_2 + 6 \text{H}_2\text{O} \rightarrow (\text{H-C-OH})_6$ (= left handed glucose) + 6O_2 . All hereby involved molecules are soluble in water.
 - b) The photosynthesis by purple bacteria include:
The released electrons are transferred directly to an acceptor against the thermodynamic decay which $\text{ADP} + \text{P} + \text{H}_2\text{O} \rightarrow \text{ATP} + \text{H}^+ + \text{OH}^-$. However, this also results in the formation of left handed glucose without the formation of O_2 .
- On earth, we only know these two ways of oxidative and anoxic forms of photosynthesis with the binding of light energy through the chlorophyll molecule and to the final transmission to the ADP / ATP. Both pathways result in the formation of water in the left handed / levorotatory glucose.
- 10) Photosynthesis is the charging of chemical bonds by photons of light.
 - 11) Photosynthesis is universe widely in any case at least realized by chlorophyll and the ADP / ATP molecule.

-) Reproduction of living matter:

All forms of living matter are mortal and will eventually die. For this reason, all living matter must be able to reproduce at least asexually. See **Law I c**. The information about the overall structure and the full functioning of the cell / organism must therefore be inherited. **Law I c**) is further specified in **Law V d**):

Law V d): Out of the elements C, H, O, N, S and P is intended to form at least one type of polymer molecule that captures:

-), **The whole information (blueprint) of the structure and biochemical functioning of the cell,**
-) **This information is to transfer to the next generation in an asexual or sexual way.**
(*Universe widely this is anyway possible via RNA / DNA, genes and chromosomes*)

Remarks Law V d) of biochemistry:

- 1) All forms of life on earth have in their nucleus the RNA / DNA molecule. This molecule contains all of the information of the cell / organism, and it constitutes a blueprint for: a) the biochemical function of the cell, b) the construction of the cell, and c) its reproduction.
- 2) This RNA / DNA is a surprisingly simple *dual polymer helix* molecule built up from the elements C, H, O, N, and P which is composed of two helical strands of polymer which are interconnected via physical charge bonds in the form of hydrogen bonds / bridges and which possess just the right strength ***10***).
- 3) The presence of the element P protects the RNA / DNA molecule against spontaneous decomposition / hydrolysis within the cell!
- 4) The hydrogen bonds / bridges of the *double helix* are temporarily only to split for the sexual and asexual reproduction and then recombine as a 'zip fastener'. This system is also used during the formation of proteins from amino acids. The RNA / DNA in the nucleus organize themselves universe widely in the form of genes and chromosomes.
- 5) It is extremely unlikely that, on the basis of the 'life' elements, C, H, N, O, S and P, alternatives are to create with the same structure in the form a double helix with hydrogen bridges and having the same similar properties and information transfer if the RNA / DNA.
- 6) If this possibility consists theoretically than this different method of reproduction must be found somewhere in living matter on earth. However on Earth currently no alternative is found for the RNA / DNA. Universe widely the RNA / DNA underlies the biochemistry of living matter and the sexual and asexual reproduction.
- 7) Because of their mortality all life on other planets in the universe living matter should be minimal based at an RNA / DNA configuration that contains the blueprint for the whole function of plant- and animal cells / organisms. This ensures the complete transfer of all information during the asexual and sexual reproduction of the phenomenon of living matter to future generations.

10) The strength of this, *non-elementary, physically hydrogen bridges*, is however dependent on the speed of the earth / an object in space with respect to the **center C** of the universe and relative to the **center R1** of the galaxy.

The speed of living organism in a spaceship should therefore not deviate too much from the current speed of the earth in the universe! For reason of stability of the DNA the speed of humans in universe cannot exceed about 300 km/s relative to Earth. Crossing one light year takes about millennium!

Crossing the universe by 'worm holes' is absolutely deadly. So we are 100% trapped and captured within our solar system. (Relative to the universe our planet Earth is compatible with the Alcatraz prison!) The function of DNA imposes stringent speed restrictions to living organisms when traveling in the universe. See **paragraph 13** discussion in **Chapter 11**.

9.1.6 THE SIXTH LAW OF BIOCHEMISTRY: ALL LIFE IN THE UNIVERSE IS BASED ON SAME BIOCHEMISTRY:

The **sixth Law of biochemistry** requires all forms of living matter in the universe is based on the basis of Biochemical Pathways (BP) and is exactly the same as on planet Earth.

Law VI a): The periodic table of elements and their molecules contains only one basic biochemical system of living matter that is set out in Biochemical Pathways. BP is structured with in the center a) the citric acid cycle, b) the fatty acid cycle, and c) the amino acid synthesis. In conjunction with water this results in the only one possible bio-processor BP for all living matter in the universe.

Law VI b): All living matter in the universe is compelling based on exactly the same biochemically principles as found in life forms on Earth.

Wet VI c): Universe widely Biochemical Pathways is based on de elements C, H, O, N, S and P of the periodic table with its 12 fundamental forces of which in any case 7 forces are involved in the biochemistry of living matter:

- 1a / 2a), the elementary charge power / spin strength of the proton: (+ Lek p +) / (+ Mesk p +),
- 1b / 2b), the elementary charge power / spin strength of the electron: (+ Lek e-1) / (Mesk + e-),
- 3), the van der Waals / London force (+ W2k),
- 3a) the dissolving force (+ W2Dk),
- 3b) the absorption force (+ W2Ak)
- 3c) the gas force (+ W2gk)
- 4) the charge force (+ Lk)
- 5) the chemical covalent charge power (+ L2ck)
- 6) the light force of photons (+ Q1k) (connected with electrons) and
- 7) the infrared force of photons (+ Qirk).(connected with protons).

See **documents F1a 2014, F1b and F1c for the elementary forces under 1) and 2)**,

See document F1d for the other physically and chemically forces.

In biochemistry the mechanical forces are *only indirectly involved*: a) the centripetal force of the electron, b) the centrifugal force of the atomic nucleus, c) acceleration / deceleration force of the atomic nucleus, d) the gravitational force and e) the covalent radical force. See **document F1d**.

Law VI d) Any system with one speed related force more or less than the above mentioned seven of the 12 naturally forces (F1d) fully blocks:

- a) the settlement of BP and therefore the biochemistry of living matter and**
- b) the spontaneous creation of Biochemical Pathways and thus the biochemistry of living matter and thus live.**

Explanation Law VI a) of biochemistry:

1) During the hydrogen supernovas of about 20 - 25 billion (10^9) years ago from hydrogen all matter and all atoms in the universe are structured according to the about ninety stable elements of the periodic table and their isotopes. Those elements show a total of 12 fundamental forces. See **document F1d** www.uiterwijkwinkel.eu . The forces of all atoms in the periodic table are universe widely the same as on Earth.

2) Only the elements C, H, O, N and S results in molecules that can change in the 3 necessary physical conditions /states. For these purely physically reasons, all other elements of the periodic table are excluded to play a central role in Biochemical Pathways and in the biochemistry of living matter. Some amphoteric metals perform an important supporting role in BP as a donor / acceptor of electrons in half-radical reactions (Fe, Ca, Co, Se, and some other metals), and as a construction material (Ca, Mg) and K among other things, for the turgor.

3) The diagrams of Biochemical Pathways may develop exactly within a very select part of the elements of the periodic table (C, H, O, N, S and P with some additional metal elements) in conjunction with the associated system of *twelve* different physically and chemically forces which are present on the outside of these elements. (These twelve forces are listed in **document F1d and in Law VI c)**.

4) Within the perfectly *rational containment* of the periodic table to this 6 'life elements' with their forces / bonds, and water as a reaction medium only fits *one biochemical system* as Biochemical Pathways.

5) The biochemistry of living matter, such as shown in the diagrams of Biochemical Pathways can be explained both physically and chemically quite rational. The BP schemas are completely explainable and have nothing to do with any form of mysticism or goddess intervention. Contrary BP can only operate under conditions of fully absence of any supernatural power / force.

6) Universe widely the periodic table allows only one biochemical system as Biochemical Pathways. This complex system BP thereby developing its selves completely *autonomously and spontaneously* around the two / three central biochemical cycles and real biochemical basis chips of living matter.

These are: a) the citric acid cycle, b) the fatty acid cycle supplemented with c), the synthesis / degradation of amino acids, and d) the photosynthetic with the thus formed left handed glucose. This glucose is the energetic driving force of biochemistry. Photosynthesis and glucose ensures a continuous driving force during the construction of the system of 'lifeless' → 'living matter' and sustaining that living matter.

7) The citric acid cycle (mono-sugars) and the fatty acid cycle (mono-carboxylic acids) constitute two central biochemical processors with the unique ability which are to settle down these cycles biochemically both clockwise and anticlockwise. Both of these cycles are therefore suited to both the degradation of mono-molecules as in the construction of mono-molecules and thereby act as a two-sided settle biochemical chips and processors.

See the diagrams Biochemical Pathways 1993 **Gerhard Michal et al**, editor, **Boehringer Mannheim**.

8) The **6th Law of biochemistry** can only be proved if all approximately 1 - 2 billion (10^9) possible molecules are transferred digitally. See the **Appendix 3a, 3b, 4**. Via selections from that collection all conceivable chains are to derive and all conceivable cycles and bio-processors which are theoretically possible at the periodic table.

9) On the basis of the deduction in **Chapter 7** applies to the author 'proven' that the periodic table allows only one biochemical system like Biochemical Pathways and BP etc. and any other compatible system is impossible. The biochemistry as found in living matter on earth is the only standard for the biochemistry of all living matter on other planets elsewhere in the universe.

Remarks Law VI b):

1) The **Chapters 6 and 7** showed that the periodic table allows only one system like Biochemical Pathways (BP). That excludes other cycles which are comparable with the citric acid cycle, fatty acid cycle and / or the amino acid synthesis.

2) In the universal basic-chip of living matter Biochemical Pathways is to couple a large variety of possible one-sided bio-chips and biochemical reaction chains which is reflected in the different biochemical varieties of living matter in the earth.

The total number of all the earth existing aerobic and anaerobic Biochemical Pathways and cycles is defined as BP, etc.

3) Universe widely the evolving of the biochemistry of living matter forms, both broadly and in detail exactly similar biochemistry as found in life forms on Earth. The biochemistry of life on Earth is unique but also standard for all life forms of living matter in the universe.

4) This formation and buildup of the biochemistry of living matter starts already very soon after cooling of the planet / earth, and the condensation of water vapor to water and creation of natural waters, lakes and seas.

Via lightning discharges, and radical reactions molecules like chlorophyll and ADP / ATP are formed. See **Appendix 13**.

5) On dry land portions of 'life potential' planets this chlorophyll and ADP / ATP molecule are brought together. These molecules accumulate on land and in lakes. Through evaporation the concentration arises starting first the anaerobic photosynthesis which results exclusively in left-handed glucose. This glucose is the basic raw material, from which subsequently a variety of other organic molecules are formed.

This continuous forming of glucose is initiating the driving force and the further expansion of Biochemical Pathways and the energetic maintenance of the biochemistry of BP.

6) A spontaneous evolution of living matter is to be expected at one hundred to thousand planets per galaxy. Throughout the universe-spherical-shell this concerns many trillions of planets within the 'life zone of their star with:

- a) Sufficient water (oceans 1 - 4 km deep). A part of that water is fixed as ice at the poles of the planet,
- b) 20 - 80% of the surface of the planet is present in the form of land / water
- c) An atmosphere with a 'pressure' between 0.8 to 1.2 bar which primarily consists out of atomic nitrogen (N_2) with low concentrations of CO_2 and CH_4 ,
- d) A magnetic field around the planet for the protection and reduction of the intensity of cosmic radiation.

See **Appendix 9**.

7) The development of the life process starts under complete anaerobic conditions with a mix of anaerobic and aerobic photosynthesis which results in glucose and fatty acids. The later initiated aerobic photosynthesis results in a planet with a low concentration of oxygen. Through lightning discharges and *radical formation* that glucose results in millions of compounds / molecules which are hardly or not broken down because the oxygen concentration in this initial phase is relatively low. See **Appendix 13**.

Remarks Law VI c) of biochemistry:

1) The function of Biochemical Pathways is only possible on the basis of

a) the existing periodic table with b) are fundamental forces 12, see **Document F1d** and the 7 of 12 forces involved in the biochemistry of living matter. These forces results in physically or chemically bonds. The other five forces of the twelve fundamental forces do not play a direct role in biochemistry of living matter.

2) Within this system with 12-forces and with molecules built up from the elements C, H, O, N, S and P only the biochemical processor Biochemical Pathways is possible build up around the citric acid cycle, the fatty acid cycle, and the amino acid synthesis. All reactions and physically changes within BP are settled in a totally predictable manner like a biochemically bio-processor.

3) Suppose the elements C, H, O, N, S and P had generated one physically or chemically force *more or less* than the settlement of BP would either chemically or physically disabled:

- 1) *One physical force more* disrupts the tight physical control between two chemical reaction steps within \ BP. All steps derails than in physically respect after virtually all chemical reaction steps.

-2) *One chemical force more* derails BP chemically. With the periodic table then many more molecules are possible than the current estimated 1 - 2 billion (10^9) pieces. To all probability *two or more* biochemical systems like BP are possible.

Those two or more biochemical systems are present at the mono-molecular biochemically level. They transverse and combat to each other. In that case, there will be no final 'winning' system. The biochemistry of 'living matter' is no longer possible nor on the basis of BP nor on the basis of the other system(s).

-3) At *one physically force less* a good physical settlement of Biochemical Pathways is blocked.

-4) At *one chemically force less* that collection of required minimum of 1 - 2 billion molecules isn't possible anymore. Then Biochemical Pathways is no longer possible as well.

In all four cases the biochemical processing of the phenomenon of living matter is completely disrupted. The phenomenon of the biochemistry of living matter, and thus the phenomenon of living matter is no longer possible.

Remarks Law VI d) of biochemistry:

1) Any arbitrary force more or less is anyhow blocking Biochemical Pathways completely and thus the phenomenon of living matter.

2) The presence of any additional mystical (= supernatural) force, provided that it is demonstrably qualitatively and quantitatively measurable, would block the settlement of Biochemical Pathways completely as well. All supernatural phenomena are incompatible with the biochemistry of the phenomenon of living matter. Living matter is only possible in complete absence of god .

9.2 CONCLUSION: ABSOLUTE PLANNING AND LACK OF CHAOS:

All the physical and chemical changes in Biochemical Pathways (BP) based on the min / max 1 principle. See **document F1f**. That *min / max 1 principle* applies universally for all types of:

- a) physical changes,
- b) all types of chemical reactions,
- c) all types of nuclear fission and nuclear fusion reactions, and
- d) also applies to all the physical and chemical reactions of elementary particles on the level of neutrinos, photons and quarks.

The *min / max 1 principle* allows for the absolute ordering in both matter itself and on all physical / chemical changes which take place in, on or near to matter. Min / max 1 results at all levels in the absolute absence of any form of *chaos*!

The settlement of Biochemical Pathways occurs on the basis of an absolute physical and chemical organization at the molecular level, which is absolutely incompatible with the occurrence of any form of physical or chemical *chaos* whatsoever. The biochemistry of living matter is therefore incompatible with the concept of chaos.

You live through biochemical regulation in your body and the absolute lack of any form of chaos in the atomic or mono-molecular level.

*** 10) SUMMARY:**

-1) Universe based on four stable super symmetrically basic building blocks of mass:

The author distinguishes in our universe only four stable Higgs, strings, snares particles:

-) two super symmetrically Higgs, strings, snares related to the proton and

-) two super symmetrically Higgs, strings, snares related to the electron; (See **Document F1a 2014**).

In particle accelerators kinetic energy destroys all super-symmetrically properties

-2) Only protons and electrons to construct:

With these four Higgs particles only to construct neutrinos and photons; (**F1b**). Out of these neutrinos and photons only to build two stable basic building blocks of atoms: 1) the ordinary proton and 2) ordinary electron; (**F1c**). These particles with mass and matter are generated by adding $E = \frac{1}{2} mc^2$ of rotation energy to constructions of photons and neutrino's. These only two stable building blocks of atoms / matter possess as basic characteristics only:

1) mass and matter,

2) the *elementary charge* (force),

3) the *elementary magnetic spin* (force),

4) a volume.

These two basic building blocks of atoms are represented in terms of spatial composition and structure in **Figures 1 - 15 Document F1c**. With protons and electrons only hydrogen to construct.

-3) With protons / electrons and hydrogen only elements of the periodic table to construct:

For energetic reasons nuclear fusion of hydrogens just results in the elements of the periodic table. See **document F1d**. These atoms results in a new set of physically and chemically forces in nature caused by speed of the atom in universe. All other non-elementary forces (inclusive gravity) are solely generated by *atoms and speed of these atoms in the universe!* These non-elementary forces don't play any role at the level of loose protons / electrons. See the **documents F1c and F1d**. For the origin of gravitation see **documents E3, E3-1 and E4**.

-4) The structure of matter at the level of the atom during the cycle of the universe:

In the universe are all ordinary atoms, all the atoms into a black hole state solely composed of $+\epsilon$ and ϵ charged protons and electrons. Both have an equal magnetic spin of $+\frac{1}{2}$. During the universe cycle (**G7 + G8**) the universe started directly with an equal number of loose *ordinary protons* and *ordinary electrons*. See **document G6** with the *super cold Little Bang at 0 kelvin*

After 5 – 10 billion (10^9) years of expansion without atoms and without gravity and gravitational energy these single protons and electrons at first exclusively to construct hydrogen atoms and molecules. This atom results in the phenomena of gravity and gravitational energy (= dark energy).

Cooling of hydrogen under the point of condensation and gravity finally results in the forming of billions very large and hot pure hydrogens spheres all ending in a supernovae explosion. All galaxies started with their own supernovae. These hydrogen supernovae occurred within the universe cycle approximately 15 – 20 billion year after the Little Bang and about 20 - 25 billion years ago. The universe is now estimated 40 – 45 billion of year old.

By nuclear fusion of hydrogen for energetic reasons universe widely exclusively the elements and their isotopes of the periodic table can be constructed. After stabilization universe widely remain exactly the same stable elements and their isotopes as those found on Earth and same set of physically and chemically forces. See **document F1d**.

The atomic nuclei don't contain neutrons. The neutron consists of one proton and one neutron. In the nucleus, each 'core' electron of these neutrons, however, subject to a minimum of two and up to three bonds with protons (He) and not just only one bond with one proton. (That should have been a neutron in the nucleus!).

All normal and black hole atoms so constructed with only a) 'core' protons, b) 'core' electrons and c) 'shell' electrons. See **document F1d and figures**.

-5) Forces on matter / the atom:

The 90 different stable elements of the periodic table generate a total of 12 basic forces especially at the metalloids C, O, N, S and P. This system of forces applies universe wide. See **document F1d**. For the forces on black hole atoms see **document F1e**.

The elements C, O, N, S, and (P) with their forces and bonds are the base of the carbon chemistry in conjunction with the H atom as small and energy-rich molecular filler.

-6) Universe widely the same finite set of molecules:

On the basis of the 90 stable elements / isotopes of the periodic system, in principle, a *finite collection* of approximately 1- 2 million mono-molecules and 100 – 200 million polymer molecules are to build.

Each molecule can be in an average of about 10 physical (fy) and chemical (che) states. This results in a total collection of approximately 1 - 2 billion molecules in *all* imaginable physical and chemical states of those molecules!

That total and maximal collection of 1 – 2 billion different molecules is possible on Earth. That same collection goes universe widely for *all the planets* with water and an atmosphere in which lightning discharges occur.

Through anaerobic and finally aerobic photosynthesis all those billions of planets will form glucose and finally free oxygen.

On earth that total collection of molecules resulting in the formation of only one biochemical basic system shown in biochemical schemas of *Biochemical Pathways*, **Gerhard Michal at all** which previously with his team still deserves one of the highest scientific prizes!

-7) No living matter if two or more systems like Biochemical Pathways are possible:

Suppose the collection at the mono-molecular level of 1 – 2 million mono-molecules, leaving the possibility for two or more different bio processors comparable with *Biochemical Pathways (BP)*. In that case, these mono-molecular systems always run straight through together during the period of tenth of millions of years needed for the development of 'living' matter out of 'dead' matter.

On this extremely long path from dead material to 'living' matter these two or more biochemically systems become mutually disturbed all time and impeded each other. *11*) Such a situation never leads to a 'winning' system, nor results in two or more biochemical basic form (s) of life in accordance with *BP* because these systems start alongside and mixed through one another. When two or more systems like *BP* adjacent to the biochemistry of living matter cannot develop.

11) Like the paralyzing civil war between the Democrats and the Republicans in USA!

-8) Biochemistry of living matter can only function with only one biochemical system like BP:

The biochemistry of living matter can only develop and to come about under the strict precondition that the periodic table of elements and their related 12 fundamental forces will result in *only one*, and *not more than one*, bio processors as *Biochemical Pathways* with just a) one citric acid cycle, b) one fatty acid cycle as central biochips, and c) only one amino acid synthesis!

Only in a monopoly position *BP* living matter can *spontaneously and unhindered* develop over a period of tenth of millions of years. This process is started und is energetically constantly pushed forwards by the left-handed glucose which is formed by photosynthesis, from inorganic matter CO_2 and H_2O .

The same development process takes place on the many billions of planets all over the universe that are similar to the earth. These not too big 'Earth-like' planets have sufficient water for oceans (20 – 80%) and 'dry land' (80 – 20%) where an atmosphere is present with relatively low 'air pressure' of approximately 0.8 - 1.2 bar which consists mainly of nitrogen gas!

-9) Driving force in origin only from photosynthesis producing left handed glucose:

The driving force for this development lies in the first instance by lightning discharges in the atmosphere in which all kinds of organic molecules are formed by chemically *radical reactions*. This produces eventually both chlorophyll as well the ADP / ATP molecule. With these molecules present photosynthesis starts spontaneously. The anaerobic and aerobic photosynthesis, results in the formation of left handed glucose and in time the formation of free oxygen. From the very start forming glucose and oxygen are the basic driving forces behind the development of all living matter on earth. This applies universe wide on all earth-like planets.

Next come part of *BP* templates to development until finally somewhere on one of the points in lakes *on land* the entire template of *BP* and which is realized from the RNA / DNA. Dry land is indispensable in this process!

The total development process of mono-*BP* on the molecular level goes parallel with the development of polymers with the formation of, among other things poly sugars, fatty acids, proteins and RNA / DNA ultimately to *cells* with characteristics of living matter.

-10) Transition from dead to living matter takes tens of millions of years:

Considering the deduction in **Chapter 7** the periodic table allows only one biochemical system: Biochemical Pathways (BP). For this simple reason, the development of the biochemistry of living matter can be realized out from totally 'dead' matter. This development of living matter takes place automatically and in a totally autonomous manner. From that 1 – 2 million possible mono-molecules only one biochemically system is possible. In biochemical respect the development of the biochemistry of living matter cannot be disturbed because other parallel biochemical systems like BP are not possible.

The development of Biochemical Pathways is continuously driven by glucose supplied from the (an)aerobic photosynthesis. The biochemistry of living matter develops completely autonomously and automatically. This has far reaching consequences for our religious view on the origin of life! This constantly by glucose driven development ultimately results in living matter which itself controls by RNA / DNA and that can reproduce themselves through asexual and sexual reproduction through genes and chromosomes.

That overall development of BP and of living matter in the form of living cells that can reproduce asexually and sexually, takes universe widely the same way. This development estimated a period of only one – two hundred millions of years. All suitable planets in the universe with sufficient water and 'contiguous land' follow this same biochemical building process that results in exactly the same end system of *Biochemical Pathways* and BP etc. Universe widely the same types of cells and biochemistry as known in living matter on Earth.

The biochemistry of life on Earth is unique but also universe standard for the biochemistry of all life forms occurring there.

The structure of *Biochemical Pathways* is entirely based on the carbon chemistry. The structure of BP can be explained by an analysis entirely rational (see **Chapter 6**).

On the other hand BP can be inferred the periodic table by the deduction (**Chapter 7**) and on the basis of all 1 – 2 billion possible molecules and the 12 fundamental forces specifically present on the elements C, H, O, N, S, and (P), and molecules thereby to construct.

-11) Development living matter goes everywhere wide universe spontaneously and according to the same pattern:

Everywhere in the universe will develop spontaneously living matter itself from dead matter. See **Appendix 13**. This process occurs in the same way and all the planets in the universe:

-) Sufficient liquid water and land with a minimum for both of them of about 20 - 80% of the surface.

-) An air pressure at sea level between only about 0.8 and 1.2 bar, which atmosphere is mainly composed of N₂ gas. Many billions of planets in the universe comply. On those planets with water first photosynthesis, ADP /ATP and production of glucose will develop. This is followed by some templates of *Biochemical Pathways* until finally somewhere *on land* the whole BP is realized. Which in a period of tens of millions of years ultimately results in living matter. This development process takes place completely spontaneously, is irreversible, and results anywhere in the development of living matter.

The development of BP requires tens of *millions of years*. In that period still higher levels of organic compounds are reached. That process only occur if the planet has sufficient land. On relatively dry concentration points anaerobic and later aerobic photosynthesis starts. This process continuous produces glucose and thus the chemical energy in the accelerated development of BP. Much later aerobic photosynthesis results in the formation of glucose and simultaneously oxygen. All planets ends hitherto aerobic. This results in the formation of all kinds of molecules, such as alcohols, aldehydes, fatty acids and amino acids.

-12) At one force more or less this fixed pattern of Biochemical Pathways is no longer possible:

In case the elements of the system had resulted in a force system other than the in **document F1d** said 12 fundamental forces than Biochemical Pathways (BP) would not be possible. With one force *more or less* the individual reaction steps in the central cycles of BP can no longer occur step by step conform the min / max 1 principle as now is the case. For this principle see **document F1f**.

-13) Creation of the biochemistry of living is based on a purely coincidence:

Only the current system of forces on the atom or elements of the periodic system results in the fixed and rigid templates of Biochemical Pathways and BP, etc. The biochemistry of living matter sorted according *Biochemical Pathways* in physical, chemical and biochemical terms appears to be a 100% *pure coincidence*. That biochemical system is entirely rationally be explained by the:

- a) properties of the elements in the periodic table,
- b) the system of physical and chemical forces caused by speed in the universe,
- c) and especially the chemically covalent charge force only generated by the elements C, H, O, N, S and P.

-14) The 6 Laws of biochemistry apply wide universe:

The top-down analysis in **chapter 6** and the bottom up deduction in **chapter 7** both be settled within the elements of the periodic table. Both methodologies overlap each other and intersect each other mutually over the full width.

This point of intersection the author expresses as the universal basic principles of the biochemistry of living matter in the form of the 6 Laws of biochemistry as set out in **Chapter 9**. The Laws of biochemistry apply universe widely for the biochemistry of all thinkable forms of life.

*** 11) DISCUSSION:**

-1) Scientific irrefutable evidence not yet been delivered:

The author has shown:

- a) that the periodic table is universe widely the same and
- b) these elements contain only one biochemical system like Biochemical Pathways as found on Earth.

The biochemistry of living matter on earth is standard universe widely for all forms of 'life / living matter'. See **Laws VI a –VI d of biochemistry**. This document proves the uniqueness of *Biochemical Pathways* to a great extent but still *not definitely mathematically* proven.

Technical that irrefutable scientific evidence is only possible if all imaginable 1 - 2 million (10^6) mono-molecules and their spatial structure is molded in *digital* models. That digitization will take about a decade to perform. With these system the uniqueness of BP can be mathematically proven.

-2) Life on Mars and on the ice moons of Jupiter?:

Within our solar system living matter can have been evolved on planet Mars in the period when there was enough *water*. This may also have occurred on the moons in the solar system that are completely covered with ice. Now under this ice cap water is expected. Being on Mars living matter, or their fossil remains, can be discovered because in the past photosynthesis was possible. On the ice moons in the solar system however photosynthesis is rather impossible and so the presence of living matter!

According to **Uiterwijk Winkel** all forms of live are biochemically fully consistent with *Biochemical Pathways* and the biochemistry of life forms on earth!

-3) Stability of DNA is dependent on the speed in the universe:

For its reproduction all living matter depends on DNA. Both helix are universe wide held together in the double helix of the DNA by physically relatively weak so-called 'hydrogen bonds'. The strength and stability of those hydrogen bonds is based on a physical charge bonds! The strength of these hydrogen bonds however is dependent on the speed of a planet or a spacecraft in space with respect to the **center C of the universe** and the **center R1 of the central black hole of our galaxy**. The speed of DNA within the universe-spherical-shell is decisive for the strength of these hydrogen bonds.

(The universe itself is a fairly thin universe-spherical-shell which is occupied with about 4 - 20 million facet areas each filled with 1 – 2 thousand galaxies, each with its own central black hole. See **G7** and **G8**)

For proper function in DNA and protein synthesis and in procreation these hydrogen bonds cannot be too strong neither become too weak. For DNA the Earth is now moving in the universe within acceptable speed limits! That good functioning of the hydrogen bridges in our DNA puts stringent limits on the rate of living matter through the universe and velocity relative to the Earth and **center C of the universe and center R1 of the Milky Way galaxy**.

This applies to all living plant and animal matter all traveling from Earth as well from other places in the universe. These restrictions also apply to all 'cultures' of planets moving to Earth.

-4) In universe both too high speeds or too low speeds are deadly for living matter:

In case this velocity increases both helix of the DNA are more difficult or even not to separate. The working of DNA and hence the protein synthesis are hindered in ever increasing extent, and ultimately totally blocked. If *speed in the universe* decreases the strength of the hydrogen bonds will correspondingly declining as well. The double helix spirals will separating easier and even too easy from each other. Ultimate these helices fail to recombine at the cell division or too troublesome to form new well function DNA. In a still further decrease of the speed this DNA even spontaneously separate from each other. Than the function of the RNA / DNA is blocked with all its consequences for protein synthesis and the live in the cell itself!

Both the *increase* and the *decrease* of velocity in the universe first result in discomfort when the cell division and the synthesis of proteins and leads to a further increase / decrease eventually to a complete blockade of the DNA and same for the RNA. Both inevitably result in the spontaneous biochemical death of all cells in plants and animals. (If wormholes exist traveling through wormholes is 100% deadly)

-5) Living matter can travel in the universe with only 1 ‰ of the speed of light relative to the Earth or planet of departure:

The moving of living matter / cells in universe is only possible within a certain, fairly narrow, speed limits *relative to Earth or planet of departure*. Violation if this speed limit results in the shortening of the life and leads finally to spontaneously dead and end of all living cells.

Given the fragility of the RNA / DNA, all forms of living matter in the universe bounded to speeds not faster or slower moving *relative to the earth / planet of origin* than about 300 km/s. The speeds of living organisms in universe are limited to *only 1 ‰* to the speed of light relative to their planet of origin. This is **Berry's** maximum speed limit of living matter in the universe. Traveling with higher or slower speeds becomes deadly!

This speed limits the crossing of one light year in universe towards about *one millennium* to bridge.

For human standards this limitation of speed to **1 ‰** results in endlessly long travelling times in universe.

Technically it is impossible for living beings travelling to the planets of even the nearest stars because:

1. required travel time of some to many millennia,
2. available space in the spacecraft,
3. damage to living cells by the (intense) cosmic radiation,
4. harmful effects due to the lack of *gravity* and thereby eventually osteoporosis.

Author considers it absolutely inconceivable that humanity can achieve habitable planets outside our solar system. **Humanity is 100% trapped within our solar system and specifically trapped on Earth.**

-6) Aliens may not reach planet Earth as well:

This limitation of speeds to only 1 ‰ of the speed of light goes universe wide for *all* living (intelligent) beings on billions other planets with living matter in the universe. Through this physical speed limit imposed from the DNA and protein formation, it is impossible that humanity can reach planets around other stars in the Milky Way.

This speed limitation of **1 ‰ of the speed of light** is exactly the same for all aliens in universe. This limitation to **1 ‰** in fact is the seventh Law of biochemistry. The earth cannot be reached by spacecraft(s) from other potentially habitable planets in the Milky Way or outside. The author expects at least about hundred to thousand planets with different levels of living matter in de Milky Way!

-7) Earth is the only available place to stay for mankind in the universe:

Humanity is now and the next centuries and millennia 100% captured on planet Earth as *only possible abode in the universe*. Mankind is ultimately fully dependent on the present ecosystems on earth.

In relation to durability the present humanity of about 7 billion (10^9) people is already an approximately 20 - 30 x excessive burden for these various mutually coordinated ecosystems on Earth. This overload from humanity finally leads to the irreversible collapse of these eco-systems and ultimately results in the almost total destruction of these systems. That leads to an inevitable destabilization of the world and that eventually results in the complete destruction of humanity itself.

-8) Mankind will destroys the stability of all ecosystems and human live on planet earth completely:

Mankind must realize and be aware their dependence of these ecosystems both personally and at the level of the world politics. Humanity destroys Earth completely under the guise of 'economic progress' and 'personal wealth'. **Humanity runs to a dead end.**

*** 12) CONCLUSIONS:**

A) All ordinary matter universe is according the elements of periodic table:

- 1) Out of the four 'low energetically' super symmetrically Higgs, string, snare particles exclusively can be constructed protons and electrons. (**F1a 2014, F1b and F1c**). In universe this protons (p) and electrons (e) first results in the formation of exclusively hydrogen atoms / molecules.
- 2) In universe for energetic reasons nuclear fusion starting with hydrogen plasma results exclusively in the construction of the elements of the periodic table! (**F1d**) All ordinary atoms in the universe are exclusively constructed out of protons and electrons with their *elementary forces* of electric charge and magnetic spin; the proton: (L+1, M+1/2) and the electron: (L-1, M+1/2). At supernovae and the nuclear fusion of hydrogen no neutrons are formed in the nucleus of atoms. (All electrons of those neutrons are bound with two protons and not to one proton (**F1d + figures**)).
- 3) The stabilizing elements formed during supernovae themselves through nuclear fission and emit alpha particle ($4 p^+ + 2 e^-$), beta particles (e^-) and neutrons ($1 p^+ + 1 e^-$). After stabilization those elements universe wide are ranked according to the approximate 90 stable elements / isotopes of the periodic table. These stable elements generate a total of 12 fundamental forces with the chemical covalent charge force of the electron pair (+ L2cf). In the biochemistry of living matter seven of those 12 forces are directly involved. Only the elements C, H, O, N, S (P) and therefrom to form molecules generate this system of seven obliged forces that are required for the biochemistry of 'living matter'.
- 4) With the stable elements and specially the elements C, H, O, N, S and P in principle can be constructed a *finite set* of some 1 - 2 billion (10^9) different molecules in all their possible physical and chemical states and spatial forms. That collection of molecules is present on earth and led there to only one biochemical basic system *Biochemical Pathways* and resulted there in the formation of 'living matter.'
The same set of 1 - 2 million mono-molecules and 1 - 2 billion polymer-molecules can be expected on all planets in the universe which is present a moderate atmosphere (0.8 - 1.2 bar at sea level), plenty of water and enough land (both at least about 20 %) ***11***
11) Estimated one hundred to some thousands of such planets per galaxy

B) Limited number of atoms arranged in biochemistry of living matter:

- 5) The settlement of the biochemistry of living matter can only occur through *via covalent chemical charge bonds* (+L2cb). These reactions always consist of the *shift* of one whole electron pair. Such covalent charge bonds are in fact only found in molecules built up from the metalloid 'life' elements C, O, N, S and P in bonds with the H atom in the position of a small and energy-rich 'filling' element.
This 'life' elements are complemented with some secondary usable ordinary metals such as Ca, Mg, K and Na, as well as with a number of amphoteric metal which only occur in the biochemistry as spore elements. These include the use of amphoteric elements Zn, Co, Fe, Se, Si, V, etc.

C) Principles for the biochemistry of living matter:

- 6) Biochemical reactions *cannot* occur in:
 -) Solids as single molecules fixed it down and unable to move.
This molecules can be included in (bio) chemically speaking, do not react with each other,
 -) Gases as all mono-molecules and their reaction products, therefore, again have to be a gas.
Biochemical reactions can only take place in the form of *mono-molecules* which are dissolved in a *liquid*. Which liquid is always formed by the condensation of a gas.
- 7) Of *all the pure liquids*, only in water can dissolve: a) gases, b) charged ions and c) non-gaseous and not loaded ('nopression') molecules.
Water also holds both a) the lowest energy level of all chemical bonds as well b) all forms of physical bonds.
For these physically and energetically reasons, universe widely water is the only liquid suitable as a reaction medium for the settlement of *all* biochemical and chemical reactions.
- 8) During biochemical reactions only with molecules built up from the elements C, H, O, N, and S are to form new molecules in the state of either: a) a dissolved gas, b) a dissolved charged ion or 3) a dissolved not gaseous and not loaded ('nopression') molecule.

9) All forms of biochemically active 'living matter' in the universe, therefore, in essence are based exclusively on a biochemistry consisting of mono-molecules, and polymer molecules that are standard constructed from the elements C, H, O, N, S, and (P) and based on the carbon chemistry.

This biochemical system operates in conjunction with a number of metals (Ca, Mg) for among others, the bone formation, K for the ion balance in the cell and a number of trace elements (including Zn, Co, Fe, Se, Si, etc.) in physical bonds in bond. Water is the only suitable reaction medium.

10) All forms of life are characterized by a verifiable driving force consisting of:

- a) the conversion of covalently charge binding energy into heat (all non-autotrophic organisms),
- b) oxidation of the metal by means of a *semi-radical reaction* (the autotrophic organisms) and
- c) the oxidation of a proton via reaction of an H bond to a water molecule.

The origin of that energy still is traced to photosynthesis and thus formed left handed mono-saccharide glucose.

D) Photosynthesis and glucose as the driving force:

11) Both on earth as in the whole universe the anaerobic and aerobic photosynthesis forms the sole mechanism for the enhancement of CO₂ and H₂O to *left handed glucose*. The aerobic photosynthesis results in the formation of free oxygen.

From the very beginning that *left handed glucose* is the only driving force that is constantly pushing behind the spontaneous development of the biochemistry of living matter. That left handed glucose still is the primary source of energy as driving force in living matter.

E) Biochemical Pathways (BP):

12) The periodic table and the 1 - 2 million (10⁶) possible mono-molecules and 1 – 2 billion polymer molecules result from the bottom up deduction in Biochemical Pathways (BP) as the *only* possible biochemically system for living matter. The schemes of *Biochemical Pathways* distracted himself perfectly rational from the periodic table of elements with the associated system of seven forces of a total of 12 fundamental forces (**document F1d**).

13) All living matter in the universe is based on the biochemical system as shown in *Biochemical Pathways* (BP) prepared by **Gerhard Michal et al.**

14) The biochemistry of living matter as shown in *Biochemical Pathways* appears to be a *pure coincidence* out of the elements of the periodic table and 12 / 7 forces. Biochemical Pathways and basis of live however is completely rationally to explain under the strictly exclusion of all mystical (= inexplicable) forces whatsoever.

15) Central to BP shows the lefthanded and the righthanded developable *citric acid cycle* and *fatty acid cycle*, and the *amino acid synthesis*. These three cycles are to be regarded as the central biochips universe widely of living matter.

For every biochemical step a specific enzyme is needed. There are several thousand enzymes / coenzymes known each for any biochemical reaction step.

Both these biochips as a whole BP consists entirely on in water soluble mono-molecules built up from the elements C, H, O, N, S and P together with a number of physically bound amphoteric metals (Fe, Co, etc.) and other elements such as Ca, Mg, K, Na.

The elements C, H, O, N, S are mutually exclusively chemically connected via a covalent charge bond (+L2cb). The optionally present metal exclusively via a *physical* bound cargo binding and not through any kind of chemical bond.

16) Within BP no true *molecular*-bonds are found in the form of chemical *covalent radical bonds* or one electron pair (+R1cb).

F) With one force more or less all possible biochemical systems for living matter fail for the full 100%

17) Having either a force more either one force less the individual reaction steps in the three central cycles of the citric acid cycle and fatty acid cycle not to wrap off more precisely structured one behind the other in accordance with the fixed templates as currently displayed in *Biochemical Pathways*. The presence of any goddess force will block the biochemistry of living matter completely. Life' is not possible anymore!

18) The completion of *Biochemical Pathways* and thus the biochemistry of the phenomenon of 'living' matter is blocked in case of:

- a) Presence of any *additional* physical or chemical force than the 12 / 7 mentioned fundamental forces,
-) The *absence* of any physical or chemical power of these 12 / 7 fundamental forces,

19) The elements of the periodic table, in particular the elements C, H, O, N and S, or had resulted in a variety of physical, chemical reactions but the system would not have resulted in the schemes of *Biochemical Pathways*. The biochemistry of living matter would have been blocked completely.

G) The six laws biochemistry of living matter or six Laws of biochemistry:

20) The top-down analysis of *Biochemical Pathways* coupled with the bottom-up deduction results in the six universe widely applicable Laws of the biochemistry of living matter or the Six Laws of biochemistry (**chapter 9**).

These 6 Laws show the key issues on which the biochemistry of the phenomenon of living matter is based. These 6 Laws supplies universe wide for all kinds of living matter.

21) In universe all forms of active 'living matter' are based on the exact same biochemical principles as in *Biochemical Pathways* and Recon2 model which are found on planet earth. The biochemistry and structure of living matter on earth is both unique as well universe widely standard for all forms of living matter.

H) The biochemistry is structured in the form of cells in all forms of living matter:

22) For the settlement of biochemistry is a reaction medium necessary. Only water is suitable. This reaction medium is only to hold together and protect against evaporation / draining as this is surrounded by a semi-permeable wall which permits the supply of nutrients and the removal of waste.

For that reason all forms of life are structured in the form of one cell or system of multiple cells. All cells are surrounded by a semi-permeable cell wall.

23) As a result of internal contamination and damage caused by cosmic rays all active living cells have a finite lifespan. All living cells / organisms are mortal and die sooner or later.

24) To keep the phenomenon of life-sustaining, all living cells and organisms forced the ability to reproduce sexually and / or asexually.

I) Control biochemistry from RNA / DNA:

25) The life activities in the form of biochemical reactions in the reaction medium is liquid water be completely controlled from polymer level from among other things, the RNA / DNA which contains the complete blueprint of the operation of the cell. This RNA / DNA is the only system universe widely useful also for the sexual / asexual reproduction, and as template for the formation of proteins.

J) Life in the Universe:

26) Living matter is evolving universe wide spontaneously at many billions of planets with sufficient water, an atmosphere (0.8 - 1.2 bar) at sea level with mainly N₂. Through lightning and cosmic rays molecules are formed compromising the development of photosynthesis. This photosynthesis resulting universe widely in the formation of left handed glucose. This eventually leads to amino acids, fatty acids and finally to 'living matter' with a biochemistry based on *Biochemical Pathways*. All living matter is biochemically seen fully comparable to that in living matter on Earth!

27) In the universe many *hundreds of billions (10⁹) of smaller earthlike planets* around stars are present with:

- a) the size of the earth and in the life zone of the star,
- b) with both sufficient water and land (each 20% - 80% covering)
- c) equivalent energy photon radiation of the stars and
- d) with an atmospheric pressure 0.8 - 1.2 bar where living matter can develop.

All forms of life are based on the carbon chemistry, cells, with water as a central reaction medium and based on the biochemically schemas of *Biochemical Pathways* (BP).

K) The RNA / DNA puts stringent speed restrictions when traveling on living beings in the universe:

28) The fragility of the hydrogen bonds in the RNA / DNA reduces the maximum *net* speed of movement of living matter in the universe. That maximum speed of living matter is restricted to only about 1 ‰ of the speed of light with respect to *the center C of the universe and the center R1 of the galaxy.*

This **Berry speed limitation** applies to living matter in the universe!

29) The bridging a distance of one light year requires all 'living organisms' in the universe a period of about one millennium! Because of this speed limit, all the other stars and their Earth-like planets are in practice unattainable. This applies both to humans and to all aliens and 'cultures'.

Colonization of the universe by mankind or by other living beings is to exclude completely.

30) Mankind will have to make concern with earth and all the aliens on their own planet.

L) Overload ecosystems on Earth by mankind:

31) Mankind puts a heavy strain on the ecosystems of the planet earth. Anno 2017 by a factor of approximately at least 20 – 30 times more than those ecosystems on planet Earth can handle. These ecosystems impoverish both in species and in terms of biomass. All ecosystems will eventually collapse and end up under the human load / pressure will die and perish.

32) This destruction of ecosystems on planet Earth will perish humanity. No one will escape this disaster.

***13) COPYRIGHT:**

This document and the various ancillary documents based on author by author proprietary insights regarding the power systems on matter or the elements of the systems, the biochemistry of living matter. The author from 1985 to the present (2017) worked more than thirty years and spend at least about 30 - 35 thousand hours on:

-1) various documents www.uitervijkwinkel.eu ,

-2) hundreds of figures,

-3) translation of these documents and figures.

For copyright, see **document A6** .

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This version dated June 2017 replaces all previous versions.



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This document with Bottom – Up deduction of all living matter in universe: chapters 7 – 13.

- *7) BOTTOM-UP DEDUCTION BASIC PRINCIPLES BIOCHEMISTRY LIVING MATTER:**
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- 7.3.1 IN 2006 THE AUTHOR DEDUCED ALL FORCES ON THE ATOM:
- 7.3.2 **STEP 5:** NO LIFE ON THE LEVEL OF LOOSE UNBOUND ATOMS OF THE PERIODIC TABLE (at speeds < ca. 3,000 km/sec):

- 7.4 **STEP 6:** NO LIFE POSSIBLE IF ATOMS/ MOLECULES CANNOT MOVE:
- 7.5 THE LEVEL OF LOOSE UNBOUND MONO MOLECULES:
- 7.5.1 PHYSICAL/ CHEMICAL (phy/che) EXTERIORS OF ATOMS/ MOLECULES:
- 7.5.2 THE PHYSICAL MINIMAL AND MAXIMAL ONE PRINCIPLE:
- 7.5.3 **STEP 7:** MONO MOLECULAR LEVEL WITH ONLY PHYSICAL CHANGES and/or PHYSICAL EQUILIBRIUM REACTIONS:
- 7.6 MONO MOLECULAR LEVEL WITH ONLY CHEMICAL CHANGES:
- 7.6.1 C, H, O, N FAVOURITE; AS ARE COVALENT CHEMICAL CHARGE BONDS:
- 7.6.2 THE PURELY CHEMICAL REACTIONS: ONLY THE REAL RADICAL REACTIONS:
- 7.6.3 **STEP 8:** NO LIVING MATTER ON THE BASIS OF PURELY OR PARTLY CHEMICALLY COVALENT RADICAL REACTIONS:
- 7.7 THE CHEMICAL REACTIONS ON MONO MOLECULES IN BOND WITH PHYSICAL CHANGES ON THOSE MOLECULES:
- 7.7.1 **STEP 9:** sub e) NO LIVING MATTER ON MOLECULES WITH ONLY COMPLETE CHARGE BONDS (+Lb) AND CHEMICAL EQUILIBRIUM REACTIONS:
- 7.7.2 **STEP 10a:** sub b) NO LIVING MATTER ON MOLECULES WITH ONLY PROTON REACTIONS:
- 7.7.3 **STEP 10b:** sub d) NO LIVING MATTER ON MOLECULES WITH ONLY SEMI RADICAL REACTIONS:
- 7.7.4 **STAP 10c):** sub a) NO LIVING MATTER ON MOLECULES WITH EXCLUSIVELY REACTION ON COVALENT CHARGE BONDS (+L2cb):
- 7.7.5 NUMBER OF MONO MOLECULES; ON EARTH ALL MONO MOLECULES EXIST:
- 7.8 **STEP 11:** WHICH TYPES OF ELEMENTS OF THE PERIODIC TABLE MUTUALLY FORM COVALENT CHARGE BONDS (+L2cb):
- 7.9 **STEP 12:** THE DRIVING FORCE IN THE CHEMISTRY OF LIFE PROCESSES:
- 7.10 **STEP 13:** PHYSICAL REACTION CIRCUMSTANCES; SOLID SUBSTANCE AS REACTION MEDIUM:
- 7.10.1 PHYSICAL SOLID SUBSTANCES AS REACTION MEDIUM:
- 7.10.2 CHEMICALLY SOLID SUBSTANCES/ POLYMERES UNSUITABLE REACTION MEDIUM:
- 7.10.3 **STEP 14:** GASES /SUPER CRITICAL REACTION MEDIUM:
- 7.10.4 **STEP 15:** WHICH TYPES OF LIQUID ARE SUITABLE AS REACTION MEDIUM?:
- 7.10.5 **STEP 16:** LIMITED SOLUBILITY OF MOLECULES IN OTHER NEWTONIAN LIQUIDS THAN WATER; ONLY WATER IS SUITABLE:
- 7.10.6 **STEP 17:** RELATION METALLOIDS <-> REACTION MEDIUM LIQUID WATER; Si TURNS OUT TO BE UNSUITABLE AFTER ALL:
- 7.11 **STEP 18:** EVALUATION MONOMERIC LEVEL; ALL LIFE BASED ON CARBON CHEMISTRY:
- 7.11.1 ROLE OF NYZYMES AND CATALYSTS
- 7.11.2 **STEP 19:** EVALUATION MONOMERIC LEVEL; ALL LIFE BASED ON THE CARBON CHEMISTRY AND SPECIFICALLY ON BP:
- 7.12 FORMING AND INSOLUBILITY OF POLYMERES:
- 7.12.1 FORMING OF POLYMERES THROUGH RADICAL REACTIONS:
- 7.12.2 **STEP 20:** FORMING OF POLYMERES VIA COVALENT CHARGE BONDS AND REACTIONS:
- 7.12.3 **STEP 21:** TYPES OF MOLECULES BEFORE AND AFTER CHEMICAL REACTION STEPS:
- 7.12.3.1 TYPES OF REACTIONS/ PHYSICAL CHANGES:
- 7.12.3.2 BASIC MATRIXES IN THE BIOCHEMISTRY OF LIVING MATTER:
- 7.13 **STEP 22:** ENERGETIC DEMANDS TO THE REACTION MEDIUM:
- 7.14 **STEP 23:** RECYCLING OF C, H, O, N, S and P:
- 7.15 **STEP 24:** THE FORMING OF POLYMERES AND CELLS:
- 7.16 **STEP 25:** THE FORMING OF REPRODUCIBLE SYSTEMS:
- 7.17 TOP-DOWN AND BOTTOM-UP HAVE A SHARED INTERSECTION:
- 7.17.1 NECESSITY DIGITAL PROOF OF BP AND BP etc.:
- 7.17.2 BP AS WELL AS LIVING MATTER HAS ALREADY BEEN EMBEDDED IN THE CATEGORISATION OF THE ELEMENTS OF THE PERIODIC TABLE:
- *8) DEDUCTION UNIVERSAL LIMITING CONDITIONS BIOCHEMICAL STRUCTURE OF LIVING MATTER:**
- 8.1 COMPLETION BIOCHEMISTRY IN LIVING MATTER IS CENTRAL ON THE MONO MOLECULAR LEVEL:
- 8.2 NECESSITY OF A SINGULAR IRREVERSIBLE DRIVING FORCE:
- 8.2.1 DRIVING FORCE, GOING BACK IN TIME AND MORTALITY:

- 8.3 CHEMICAL CATEGORISATION VIA BIOCHEMICAL CHIP CONSTRUCTIONS:
- 8.3.1 BASICS OF BIOCHEMISTRY:
- 8.3.2 CONTROLLING BIOCHEMISTRY AND INHERITING THROUGH RNA/DNA:
- 8.4 MIN /MAX 1 PRINCIPLE AS BASIC STRUCTURE BIOCHIP:
- 8.5 LIVING MATTER ELSEWHERE IN THE UNIVERSE FUNCTIONS ON THE BASIS OF BP:
- 8.6 OTHER POSSIBILITIES THAN BP?:

***9) THE FORMULATION OF THE LAWS OF BIOCHEMISTRY:**

- 9.1 PREFACE:
- 9.2 LAWS OF BIOCHEMISTRY GROUPED AROUND THEMES AND A SET OF BASIC DEMANDS:
 - 9.2.1 sub I) THE FIRST LAW OF BIOCHEMISTRY:
 - 9.2.2 sub II) THE SECOND LAW OF BIOCHEMISTRY:
 - 9.2.3 sub III) THE THIRD LAW OF BIOCHEMISTRY:
 - 9.2.4 sub IV) THE FOURTH LAW OF BIOCHEMISTRY:
 - 9.2.5 sub V) THE FIFTH LAW OF BIOCHEMISTRY:
 - 9.2.6 sub VI) THE SIXTH LAW OF BIOCHEMISTRY:
- 9.3 CONCLUSION:

***10) SUMMARY**

***11) DISCUSSION:**

***12) FINAL CONCLUSIONS:**

***13) COPYRIGHT:**