CHEMICAL ACTION

According to 'MATTER (Re-examined)'

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Abstract: Atoms are stable and self-stabilizing 3D matter-bodies, which spin about their nuclear/atomic axes. Unless in extreme conditions or due to accidents, no part of atom may removed from it and under no circumstance additional parts may be included in the structure of stable atom. Atoms of all elements (except those of inert elements) have resultant external fields about them. Complimentary atoms arrange themselves to form groups until most of their resultant external fields are inhibited by rotary motion the atoms in planes across their atomic axes. Molecules form crystals and other groups in similar manner for the same purpose. In order to form different combinations of atoms and/or molecules, it is necessary to break present bonds between atoms or between molecules by varying their rotary speeds to enable their resultant external fields to be effective and form different kinds of groups (molecules, crystals, etc.). These actions are generally known as chemical actions.

Keywords: Universal medium, fields, atoms, molecules, chemical action.

Introduction:

An alternative concept, proposed in the book 'MATTER (Re-examined)', envisage an all-encompassing universal medium, structured by quanta of matter, fills entire space outside basic three-dimensional matter-particles. Self-stabilizing property of its structure enables universal medium to apply compression on convex surfaces of all basic three dimensional matter-particles. This phenomenon is gravitation. Magnitude of gravitational pressure depends on extent of universal medium in the direction from where the pressure is applied. Extent of universal medium between two basic 3D matter-particles is always less the extents of universal medium on their outer sides. Therefore, greater gravitational actions from outer sides against smaller gravitational pressure from between these bodies compel them to move towards each other. This action is understood as gravitational attraction.

Universal medium is combination of two-dimensional latticework structures by quanta of matter. Structurally deformed region in universal medium is a field. Fields are classified according to nature of structural distortions in them. Nature of distortions is indicated by imaginary lines of force. Circular lines of force indicate electric field, linear lines of force indicate magnetic field and radial lines of force indicate nuclear field. Due to 2D nature of fields, two fields can interact only when they are in the same plane and

within range. Different fields in the same plane may interact to produce inertial efforts on corresponding 3D matter-bodies about which these fields are present.

Should one of the fields turn perpendicular to plane of fields or two fields rotate mutually about each other in plane perpendicular to plane of the fields, interactive efforts develop only when planes of fields coincide. During rotary motion of an electric field (in perpendicular directions to its plane of existence) interaction with another static electric field takes place only twice every turn. Rapid rotary motion of an electric field with respect to another static electric field or rapid relative rotary motions of two electric fields about each other (across their axes) vary/nullify their average interactive efforts. Hence, average inertial effort produced by interaction of rotating fields depends on angular speeds of the fields.

It may be generally stated that sense of interactive effort between two fields depends on their natures and magnitude of interactive effort depends on distance between the fields. However, senses and magnitudes of interactive efforts (forces) between electric fields depend not only on type of electric fields (electric charges) but also on the distance between them. Within zilch-effort distance; similar electric charges repel each other and dissimilar electric charges attract each other. Beyond zilch-effort distance, similar electric charges attract each other and dissimilar electric charges repel each other. At zilch-effort distance between them two electric fields do not produce interactive effort.

Corpuscles of radiation (photons) are the most basic 3D matter-particles. Disc-shaped 3D matter-cores of photons are created by gravitational actions, from free quanta of matter available in gaps in universal medium. 3D matter-core of corpuscle gives photon its particle-nature. 3D matter-cores of photons are moved linearly and spun at critical speeds about one of its diameters by structural distortions formed in surrounding universal medium (due to gravitation). Linearly moving and rotating structural distortions around 3D matter-core of a corpuscle has many similarities with EM waves. This part of distortions in universal medium gives the corpuscle its wave-nature. Disc-shaped 3D matter-core and linearly moving rotating structural distortions about it in universal medium, together, form the most basic 3D matter-particle (corpuscle of radiation or photon).

Under gravitational attraction, two complimentary photons, in binary combination (moving in common circular path and spinning in unison at their critical speeds), form a primary 3D matter-particle (biton). Bitons, in various combinations, form all other superior 3D matter-particles and macro bodies. Linear and spin motions of photons in common circular path in a biton distorts structure of surrounding universal medium, circularly. This field is indicated by circular lines of force and is the primary electric field. Formation of superior 3D matter-particles by bitons arranges constituent primary electric fields in different patterns to yield different types of resultant fields about a 3D matter-body. Resultant fields about a 3D matter-body (or superior 3D matter-particles), together, form the body's distortion-field (or matter-field) in and about the body.

Atomic nuclei are very robust structures. Only extreme external conditions or accidents can fragment them. No constituent of an atom may be removed from its structure under stable conditions. No additional constituents may be included in an atom under ordinary conditions. Chemical actions take place without structural changes to atoms. Constituent atoms in a chemical action maintain all their constituents, individual charecteristic properties and parameters, including numbers of constituents and their relative arrangements.

All conclusions expressed in this article are from the book 'MATTER (Re-examined)' [1]. For details, kindly refer to the same.

Structure of Atom:

Gravitational attraction exists continuously between basic 3D matter-particles (disc-planes of whose 3D matter-cores are co-planar) in each pair of 3D matter-bodies. Additionally, as and when two 3D matter-bodies are nearer, their matter-fields interact to produce field-efforts (electric, magnetic and/or nuclear efforts) between them. Constituent 3D matter-particles of an atom come together under gravitational attraction. When they are within range, corresponding fields about them also take part in

actions to form and stabilize atoms. Except very few very large types of atoms, all others are self-stabilizing 3D matter-bodies and have almost infinite life. For detailed descriptions on structure, development and sustenance of atoms and molecules, kindly refer [1].

Atomic nuclei:

Nuclei of all atoms (except in hydrogen) are formed (mostly) by deuterons. Deuteron is a 3D matter-particle developed by forming two neutron-like single layered spherical shells about a positron in the middle. Each deuteron is presently counted as one proton + one neutron. Single neutron-like spherical shell formed on one side of a positron makes the combination a proton. Only in few cases of nuclei, protons and neutrons are included as nucleons. Neutrons are used to fill vacant spaces in nuclear structure or where their presence is required as balance weights to stabilize nuclear spin motion.

In nuclei of larger atoms, whose nuclei are formed by number of sections, nucleons form (single layered) circular sections. Nucleons in different orientations in circular arrangements produce different resultant fields about them. Depending on numbers and arrangement of nucleons, each section may be of different girth and have different resultant field about it. Availability of nuclear sections and their relative field properties guide them to attach with each other side-by-side to form tubular structure, centred along (imaginary) nuclear axis. Nuclear axis is an imaginary longitudinal line joining central points of all circular sections. Different numbers of circular arrangements by nucleons of different girths, together, form a nucleus. Nuclei (especially in smaller atoms) may have one or more nucleons, in one or more sections, placed on their nuclear axes. As long as free nucleons are available in a region, development of static nuclei will continue to include more and more of them in their structures.

Development of atom:

First orbital electron that approaches a (developing) nucleus starts to spin the nucleus in either direction about nuclear axis by repeatedly transferring angular momentum (work) to matter-field of nucleus. Difference in direction of spin produces allotropic properties. Commencement of spin motion stops further development of nucleus and determines type of atom formed. Only those formations of nuclei, which can overcome stress due to spin motion, can survive to become part of atoms. Those formations, which cannot survive stress due to spin motion will breakdown to re-form similar or different types of nuclei.

All further additions of orbital electrons will conform to the direction of nuclear spin. Numbers of orbiting electrons about any section of nucleus are strictly equal to number of positrons in that nuclear section. An orbiting electron and its corresponding positron in nuclear section will always be in alignment and in phase with each other. By this arrangement of orbiting electrons, they form another circular formation around each nuclear section. Orbital electrons around all nuclear sections, together, form another tubular structure outside and enveloping the nucleus. As a single unit, nucleus of an atom floats inside its electronic envelope. Alignment of atomic axis (central axis of electronic envelope) and nuclear axis is maintained automatically by interactions between corresponding fields of nucleus and electronic envelope. Angular deflection between atomic axis and nuclear axis causes production of resultant electric field (electric current) about the atom. Should atomic axis deflect angularly; nucleus automatically follows the electronic envelope until nuclear axis aligns with atomic axis to restore stability. Angular deflection of atomic axis of an atom with respect to atomic axes of neighbouring atoms is the atom's electric potential.

Internal electromagnetic actions of an atom take place between fields from its nucleus and fields about its electronic envelope. External electromagnetic actions by/on atoms are dominated by exterior fields about their electronic envelopes. Orbital motions of electrons appear as spin motion of electronic envelope. Spin motions of nucleus and electronic envelope endows them with gyroscopic properties.

Because of this type of relative arrangements of 3D matter-particles in an atom, despite spin motion of atom, most of all atoms (except atoms of inert elements) have some sort of residual external resultant fields about them. Depending on relative arrangements of (nucleons and) orbiting electrons, residual external resultant field about an atom may differ in nature, direction and field-strength at different regions around the atom.

Chemical action:

Participant elements in a chemical action are reagents. Most types of atoms (except those of inert elements) exhibit some sort of resultant external field about them. In order to stabilize their co-existence with other atoms, by inhibiting resultant external fields about them, these atoms are compelled to form union with matching atoms and stay together as stable molecules. Similar processes are repeated in cases of molecules with resultant external fields to form crystal (and other types of) formations. Similar combination process will continue (if possible) until the resulting body has no effective resultant external field about it.

Superior 3D matter-particles (molecules/crystals/etc.) of each reagent are individually stable and their matter-fields have no resultant external fields about them. However, bringing two or more non-complimentary 3D matter-particles in near-contact to manipulate their matter-fields or to change their 3D matter-content levels may destabilize matter-fields of one or more participants. Destabilizing matter-field of a molecule/crystal will disturb spin and rotation patterns of individual atoms and reduce or remove bonds between them. This may release individual atoms from bonds with corresponding atoms in present molecular formation and free them or enable them to choose to form molecule with more suitable atoms in present conditions.

Residual resultant external fields about an atom prevent its independent existence. The atom is bound to search and form group with any other atom (of its own kind or of different kind) or atoms until magnitude of all resultant external fields (except magnetic fields in special cases) in the group are inhibited. Groups formed by atoms to neutralize each other's resultant external fields are the molecules. Bonds between constituent atoms of a molecule may be dissolved by manipulating molecule's matter-field or its 3D matter-content level. Once the bonds between member atoms of molecules in a compound are broken, constituent atoms become free to re-form into same alliance or to form alliance with any other type of complimentary atoms available in the vicinity. This process is a chemical action or reaction. Chemical actions may be temporary, permanent, reversible or irreversible.

Bitons are primary 3D matter-particles. Constituent photons of a biton move at the linear speed of light along common circular path and spin in unison about a common axis. Attempt to bring these photons nearer by external pressure compels their 3D matter-cores to lose parts of their 3D matter-contents and expand biton's radial size. This phenomenon, in turn, causes expansion of a 3D matter-body. This process is heating. Reverse process is cooling. Changes in 3D matter-contents of constituent bitons of a body change magnitude of the body's matter-field. Changes in 3D matter-contents of bitons also change magnitude of gravitational attraction on it. As linear speeds of photons do not vary, primary electric field about a biton remains more or less steady.

Manipulation of matter-fields of reagents in a chemical action may be performed by heating (lowering 3D matter-content level), by cooling (increasing 3D matter-content level), by increasing or reducing external pressure, by presence of suitable catalyst in vicinity, or by changing any other factor that may alter matter-field in a suitable way.

Catalysis:

Catalysis is the change in the rate of a chemical reaction due to presence of a substance called a catalyst. Unlike other reagents, participating in a chemical action, catalyst participating in the action is not consumed during chemical action itself. A catalyst may participate in multiple chemical transformations. Catalysts that accelerate the chemical action are positive catalysts (or promoters). Catalysts which slow down a reversible chemical reaction are called inhibitors (or negative catalysts) and those which slow down a irreversible chemical reaction are called catalytic poisons. Although catalysts are not consumed directly by a chemical action, they may be inhibited, deactivated, or destroyed by secondary processes during a chemical action. Catalysts taking parts in chemical actions in biology are called enzymes.

A catalyst works by modifying environment about the reagents. Combining matter-fields of catalytic agent with those of reagents, overall distortion-density and relative directions (hence

nature of distortion-field) of distortions in universal medium about the region (matter-field) are modified appropriately to suit the requirement, without suffering changes to its own matter-field.

Mechanism of chemical action:

Mechanism of chemical action may be illustrated by formation and dissolution of an imaginary homonuclear molecule formed by two atoms, whose relative spin are in opposite directions (shown by thick grey curved arrows). Figure 1 shows ideal conditions for two atoms of the same element with dissimilar relative spin motions. Each of the atoms has four nuclear sections shown by thick ellipses centered along nuclear axis, xx. Ellipses in dashed lines enclosing the nuclear sections are electronic envelopes. Three of the nuclear sections and their electronic envelopes are smaller than the fourth nuclear section and its electronic envelope. Due to uneven distribution of 3D matter-particles, centre of gravity of the atom is displaced from geometrical centre of nuclear axis. Gravitational attraction, g, between two atoms M_1 and M_2 may be considered to act through their centers of gravity, as shown by thin black arrows, g. However, electric fields due to nucleons and orbital electrons are distributed somewhat evenly and hence resultant interaction between them may be considered to act through geometrical centre of nuclear axis, as shown by arrows, e, in thin dashed lines.

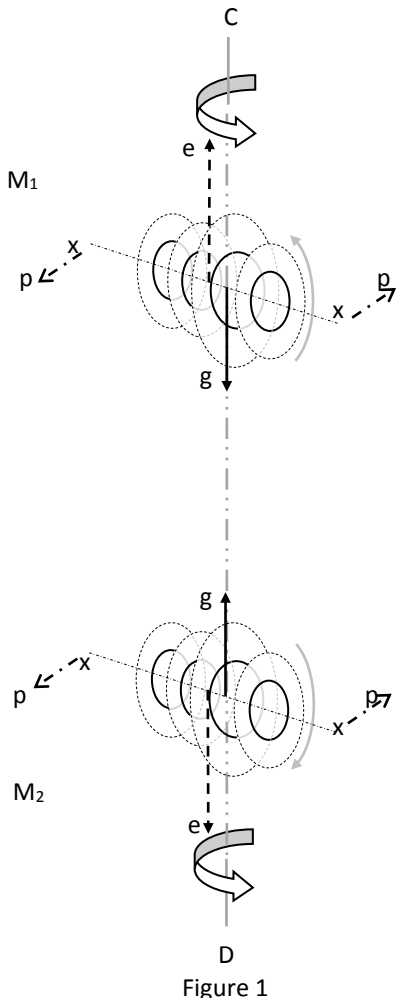

Figure 1

Due to identical directions of spin motion of nuclear sections and electronic envelopes in individual atoms, structural distortions produced in universal medium along atomic axis about any atom are circular (electric field) in same direction as the direction of motion of orbital electrons, in planes perpendicular to atomic axis (shown by grey curved arrow). Atoms M_1 and M_2 spin in opposite directions, as shown by thick grey arrows in figure 1. Therefore, their electric fields are dissimilar to each other.

Figure 1 shows the atoms before and during stable molecular formation. In a region, where complimentary atoms are present, atoms are gravitationally attracted towards each other. In due course of their natural movements, these atoms may align so that their atomic axes are parallel to each other. As and when their electric fields become coplanar, they will start to interact. In the case, shown in figure 1, electric fields of atoms M_1 and M_2 are dissimilar and distance between them is more than zilch-effort distance. Interactive effort produced by these electric fields is of repulsion, as shown by arrows, e, in dashed lines and act against gravitational attraction between the atoms and slow down atoms' approach towards each other. Atoms will come to settle at a distance from each other, where gravitational attraction is fully neutralized by part of repulsion due to electric fields. In this state, electric fields from electronic envelopes of both atoms are able to interact with any other coplanar external electric fields.

Due to departures between points of application of gravitational attractions and resultant of interactive efforts (due to electric fields), parts of repulsive efforts between the atoms may be considered to act through centre of gravity to oppose gravitational attractions and remaining parts through points on nuclear axes away from atoms' centers of gravity. The parts of repulsion that act away from centers of gravity invoke gyroscopic precession, p, on both atoms to turn them about a common axis, CD, perpendicular to and passing through both nuclear axes. As the atoms approach each other, they will start to rotate in unison about axis, CD, in the direction shown by curved block arrows (anti-clockwise looking from C to D).

Details of rotary action of combination of atoms are shown in figure 2. Larger ellipses represent electronic envelopes of atoms M_1 and M_2. Grey elliptical areas within larger ellipses represent atomic nuclei. Parts of resultant efforts on electronic envelopes are shown by arrows f_1. Precessions on electronic envelopes are in the direction of arrows p_1. Both electronic envelops tend to turn (rotate) anti-clockwise (looking from C to D) direction at angular speeds, represented by curved arrows xa, in horizontal plane (with reference to figure 2). Stabilizing efforts within atoms compel nuclei to align with corresponding electronic envelopes by action of efforts represented by arrows f_2. Precessions on nuclei tilt nuclear axes of both atoms in opposite directions by angle xb. Nuclear axis of atom M_1 tilts upwards and nuclear axis of atom M_2 tilts downwards (with reference to horizontal plane in figure 2). Aligning efforts between nuclei and electronic envelopes acting as reactions on electronic envelopes are represented by arrows F. System will reach equilibrium when reactive efforts F equal precession efforts that rotate the atomic envelopes. Final state of atoms in the molecule is both atoms are rotating in horizontal plane at constant angular speed and their nuclear axes are tilted away from each other at equal angles from their stable (parallel to each other) condition. Inherent spin motions of atoms (in vertical planes, as in figure 2) or individual resultant fields of atoms with respect to each other are not affected. However, due to rotary motions of atoms, effectiveness of their external resultants fields is inhibited. As a result the molecule becomes inert with respect to all external fields, while resultant fields of constituent atoms remain fully effective within this combination, called a molecule.

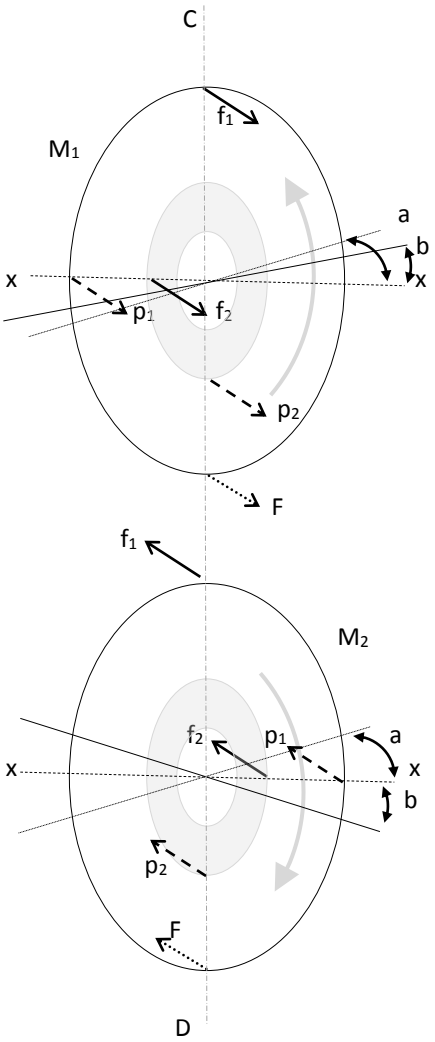

Figure 2

Chemical actions are the results of interactions between external fields of participating atoms and molecules. External field about a molecule is resultant of fields of all its constituent atoms. A molecule is stable when its external resultant field cannot interact with external fields about other atoms or molecules. As major parts of external fields of atoms and molecules are electric in nature, they can interact only in the planes of their existence. Rotation of electric field in plane perpendicular to plane of its existence reduces and inhibits its ability to interact with external fields from other atoms or molecules. Hence, ability of an atom or a molecule to enter into chemical action depends on its rotary speed in planes across atomic axes. Higher the rotary speed, lower is the magnitude of external field and its ability to chemically react.

Rotation speeds of individual atoms and combined rotation speed of molecule are determined by magnitude of torque available to rotate electronic envelopes of atoms. Torque produced depends on arrangements of nucleons in atomic nuclei (distance between centre of gravity and point of application of electromagnetic repulsion) and relative magnitudes of gravitational attraction and electromagnetic repulsion between constituent atoms. Changes in parameters of atoms (like, variations in 3D matter-content level, nature of surrounding universal medium, etc.) can also affect stability of molecules. Relative positions of atoms in molecules formed by more than two atoms or by atoms of different kinds may be slightly different from that is explained above. Larger molecules may have multiple stages of spin and rotary motions.

Reduction in 3D matter-content level of a stable molecule (by heating or by applying higher external pressure) alters gravitational attraction between its constituent atoms. Reduction in gravitational attraction enables repulsion due to interactions of electromagnetic fields to move constituent atoms of

the molecule farther. Increased distances between atoms reduce magnitudes of repulsive actions between atoms. Proportionate reductions in magnitudes of gravitational attraction and electromagnetic repulsion in certain kinds of molecules may permit them to maintain their stable states, irrespective of reduction in 3D matter-content level. However, disproportionate reductions in gravitational attraction and electromagnetic repulsion between atoms change their (combined) rotation speeds in plane across nuclear axes. Lowered rotation speeds let atoms to exhibit their external fields, partially. Magnitudes of external fields exhibited by the atoms are determined by reduction in their rotation speeds. Strengthened external fields are now able to interact with fields of other atoms or molecules in the vicinity. If these atoms are complimentary to each other, original molecule may break up and liberated atoms may enter into new unions with complimentary atoms or molecules to form new types of molecules and/or to release free atoms from their molecular state.

When a stable molecule is in the vicinity of another atom or molecule, their external fields interact and they are gravitationally attracted towards each other. External efforts, caused by these actions may interfere with stability of the molecule. As gravitational attraction between stable molecule and external atom or molecule acts through centre of gravity of individual atoms in the molecule, precession caused by it on molecule may be minimal. However, magnitudes and point of actions (on atomic axes) of electromagnetic repulsion between atoms may differ from one kind of atom to another. Changes in parameters of electromagnetic repulsion vary angular speeds of molecular rotation that may change effective external field of the molecule.

Atoms in larger molecules settle at suitable distances, relative directions and at angular rotary speeds required to inhibit each other's external resultant fields. Ability of atoms to form molecules depends on overall magnitude of their external resultant field about them and the distance between centers of gravity and centers of action of field-efforts. Those atoms, in which these two centers coincide, are not able to form molecules with any other atom of its own kind and of different kinds. Severity of molecular formation or dissolution (chemical action) corresponds to distances between centers of gravity and centers of action of external resultant fields on nuclear/atomic axes of participating atoms. Only those atoms whose external fields are compatible and can accommodate each other in suitable relative alignments can form molecules. On dissolution of molecules, constituent atoms may go free or they may form different types of molecules.

Conclusion:

Most types of atoms have external resultant fields about them. They form molecules through electromagnetic interactions until external resultant field about the group becomes neutral. Atoms in a molecule rotate in the planes of their atomic axes at angular speeds required to inhibit each other's resultant fields. Intensity of chemical action by an atom is determined by distance between its centre of gravity and centre of action by external resultant field about the atom. Ability and efficiency of chemical actions between atoms may be varied by changing their 3D matter-content levels (heating/cooling), by changes in external pressure on them, by having presence of catalysts in vicinity or by any other methods that influence their external resultant fields.

Reference:

References are self-published by the author. They are neither reviewed nor edited.

[1] Nainan K. Varghese: MATTER (Re-examined). Createspace on-line publishers (2013) Vol I - https://www.createspace.com/4415292, Vol II - https://www.createspace.com/4415297 .

[2] Nainan K. Varghese, ARTICLES, http://www.matterdoc.info

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