CHEMICAL ACTION

According to 'MATTER (Re-examined)'

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Abstract: Atoms are stable and self-stabilising 3D matter bodies that spin about their nuclear/atomic axes. Unless in extreme conditions or due to accidents, no part of an atom may be removed from it, and under no circumstances may additional parts be included in the structure of a 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 the rotary motion of the atoms in planes across their atomic axes. Molecules form crystals and other groups in a similar manner for the same purpose. In order to form different combinations of atoms and/or molecules, it is necessary to break the present bonds between the atoms or between the 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)', envisages an all-encompassing universal medium, structured by quanta of matter, that fills entire space outside the most basic three-dimensional matter particles. The self-stabilising property of its structure enables the universal medium to apply compression to convex surfaces of all basic three-dimensional matter particles. This phenomenon is called gravitation. The magnitude of gravitational pressure depends on the extent of the universal medium and the direction from which the pressure is applied. The extent of universal medium between two basic 3D matter particles is always less than the extents of universal medium on their outer sides. Therefore, greater gravitational actions from the outer sides against smaller gravitational pressure from between these bodies compel them to move towards each other. This action is understood as gravitational attraction.

The universal medium is a combination of two-dimensional latticework structures made up of quanta of matter. A structurally deformed region in the universal medium is a field. Fields are classified according to the nature of structural distortions in them. The nature of distortions is indicated by imaginary lines of force. Circular lines of force indicate an electric field; linear lines of force indicate a magnetic field; and radial lines of force indicate a nuclear field. Due to the 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 in and about which these fields are present.

Should one of the fields turn perpendicular to the plane of the fields or two fields rotate mutually about each other in a plane perpendicular to the plane of the fields, interactive efforts develop only when planes of fields coincide. During the 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. The rapid rotary motion of an electric field with respect to another static electric field or the rapid relative

rotary motions of two electric fields about each other (across their axes) vary or nullify their average interactive efforts. Hence, the average inertial effort produced by the interaction of rotating fields depends on the angular speeds of the fields.

It may be generally stated that the sense of interactive effort between two fields depends on their natures, and the magnitude of interactive effort depends on the distance between the fields. However, the senses and magnitudes of interactive efforts (forces) between electric fields depend not only on the 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 the universal medium. The 3D matter-core of a corpuscle gives a photon its particle nature. 3D matter-cores of photons are moved linearly and spun at critical speeds about one of their diameters by structural distortions formed in the surrounding universal medium (due to gravitation). Linearly moving and rotating structural distortions around the 3D matter-core of a corpuscle have many similarities with EM waves. This part of structural distortions in the universal medium gives the corpuscle its wave-nature. Disc-shaped 3D matter-core and linearly moving rotating structural distortions about it in the universal medium, together, form the most basic 3D matter particle (a corpuscle of radiation or a photon).

Under gravitational attraction, two complimentary photons, in binary combination (moving in a common circular path and spinning in unison at their critical speeds), form a primary 3D matter particle (a biton). Bitons, in various combinations, form all other superior 3D matter particles and macrobodies. Linear and spin motions of photons in a common circular path in a biton distort the structure of the surrounding universal medium circularly. This field is indicated by circular lines of force and is the primary electric field. The 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 characteristics, and parameters, including the number 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 an 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 interactive efforts) between them. Constituent 3D matter particles of an atom come together under gravitational attraction. When they are within the interacting range, corresponding fields about them also take part in actions to form and stabilise atoms. Except for a very few very large types of atoms, all others are self-stabilising 3D matter bodies and have almost infinite life. For detailed descriptions of the structure, development, and sustenance of atoms and molecules, kindly refer to [1].

Atomic nuclei:

The nuclei of all atoms (except hydrogen) are formed (mostly) by deuterons. A deuteron is a 3D matter particle developed by forming two neutron-like, single-layered spherical shells with a positron in

the middle. Each deuteron is presently counted as one proton plus one neutron. A single neutron-like spherical shell formed on one side of a positron makes the combination a proton. Only in a few cases of nuclei are protons and neutrons included as nucleons. Neutrons are used to fill vacant spaces in nuclear structures or where their presence is required as a balance weight to stabilise nuclear spin motion.

In the nuclei of larger atoms, whose nuclei are formed by a number of sections, nucleons form (single-layered) circular sections. Nucleons in different orientations in circular arrangements produce different resultant fields around and about them. Depending on the numbers and arrangement of nucleons, each section may have a different girth and a different resultant field around and about it. The availability of nuclear sections and their relative field properties guide them to attach with each other side-by-side to form a tubular structure, centred along an imaginary nuclear axis. The nuclear axis is an imaginary longitudinal line joining the 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, the development of static nuclei will continue to include more and more of them in their structures.

Development of an atom:

The first orbital electron that approaches a (developing) nucleus starts to spin the nucleus in either direction about the nuclear axis by repeatedly transferring angular momentum (work) to the matter-field of the nucleus. A difference in the direction of spin produces allotropic properties. The commencement of spin motion stops further development of the nucleus and determines the type of atom formed. Only those formations of nuclei, which can overcome stress due to spin motion, can survive and 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. The number of orbiting electrons around any section of the nucleus is strictly equal to the number of positrons in that nuclear section. An orbiting electron and its corresponding positron in the nuclear section will always be in alignment and in phase with each other. Through this arrangement, the orbiting electrons 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, the nucleus of an atom floats inside its electronic envelope. The alignment of the atomic axis (the central axis of the electronic envelope) and the nuclear axis is maintained automatically by interactions between the corresponding fields of the nucleus and the electronic envelope. Angular deflection between the atomic and nuclear axes causes the production of a resultant electric field (electric current) about the atom. Should the atomic axis deflect angularly, the nucleus automatically follows the electronic envelope until the nuclear axis aligns with the atomic axis to restore stability. The angular deflection of the atomic axis of an atom with respect to the atomic axes of neighbouring atoms, from their natural alignment, 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 and on atoms are dominated by exterior fields about their electronic envelopes. Orbital motions of electrons appear as spin motions of the electronic envelope. The spin motions of the nucleus and electronic envelope endow them with gyroscopic properties.

Because of this type of relative arrangement of 3D matter particles in an atom, despite the spin motion of an atom, most of all atoms (except the atoms of inert elements) have some sort of residual external resultant field about them. Depending on the relative arrangements of nucleons and orbiting electrons, the residual external resultant field around 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 stabilise their co-existence with other atoms, by inhibiting the resultant external fields about them, these atoms are compelled to form unions 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. A 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 around and about them. However, bringing two or more non-complimentary 3D matter particles into close contact to manipulate their matter-fields or to change their 3D matter-content levels may destabilise the matter-fields of one or more participants. Destabilising the matter-field of a molecule or crystal will disturb the 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 the present molecular formation and free them or enable them to choose to form molecules with more suitable atoms in the present conditions.

Residual resultant external fields about an atom prevent its independent existence. The atom is bound to search for and form groups with any other atom (of its own kind or of a different kind) or atoms until the magnitude of all resultant external fields (except the magnetic fields in special cases) in the group is inhibited. Groups formed by atoms to neutralise each other's resultant external fields are the molecules. Bonds between constituent atoms of a molecule may be dissolved by manipulating the 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 the same alliance or to form alliances with any other type of complimentary atom available in the vicinity. This process is a chemical action or reaction. Chemical actions may be temporary, permanent, reversible, or irreversible.

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

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

Catalysis:

Catalysis is the change in the rate of a chemical reaction due to the presence of a substance called a catalyst. Unlike other reagents participating in a chemical action, a catalyst participating in the chemical action is not consumed during the chemical action itself. A catalyst may participate in multiple chemical transformations. Catalysts that accelerate chemical action are positive catalysts (or promoters). Catalysts that slow down a reversible chemical reaction are called inhibitors (or negative catalysts), and those that slow down an 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 part in chemical actions in biology are called enzymes.

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

The mechanism of chemical action may be illustrated by the formation and dissolution of an imaginary homonuclear molecule formed by two atoms whose relative spins 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 centred along the 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 the uneven distribution of 3D matter particles, the centre of gravity of the atom is displaced from the geometrical centre of the nuclear axis. Gravitational attraction, g, between two atoms M_1 and M_2 may be considered to act through their centres of gravity, as shown by thin black arrows, g. However, the electric fields due to nucleons and orbital electrons are distributed somewhat evenly, and hence the resultant interaction between them may be considered to act through the geometrical centre of the nuclear axis, as shown by arrows e in thin dashed lines.

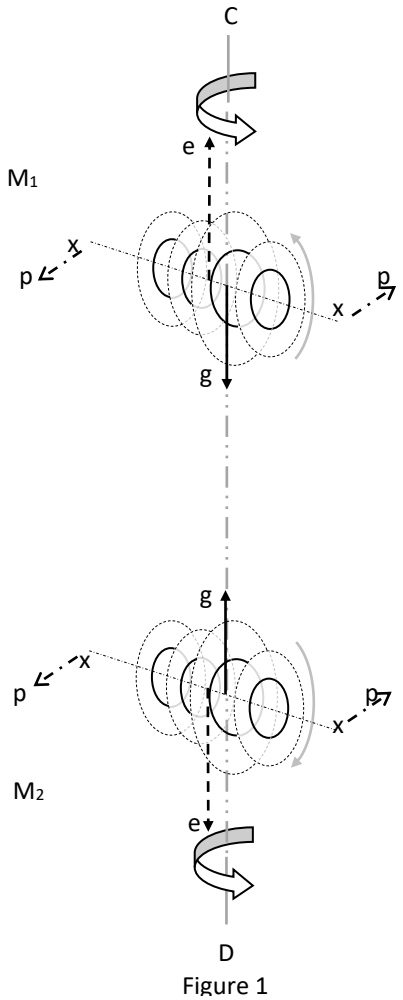

Figure 1

Due to identical directions of spin motion of nuclear sections and electronic envelopes in individual atoms, structural distortions produced in universal medium along the atomic axis about any atom are circular (electric field) in the same direction as the direction of motion of orbital electrons in planes perpendicular to the atomic axis (shown by a grey curved arrow). Atoms M_1 and M_2 spin in opposite directions, as shown by the 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 to each other. In the 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, the electric fields of atoms M_1 and M_2 are dissimilar, and the distance between them is greater than the zilch-effort distance. The interactive effort produced by these electric fields is repulsion, as shown by arrows e in dashed lines, which act against gravitational attraction between the atoms and slow down the atoms' approach towards each other. Atoms will come to settle at a distance from each other, where the gravitational attraction is fully neutralised by part of repulsion due to electric fields. In this state, electric fields from the electronic envelopes of both atoms are able to interact with any other coplanar external electric fields.

Due to the departures between points of application of gravitational attractions and the resultant of interactive efforts (due to electric fields), parts of repulsive efforts between the atoms may be considered to act through the centre of gravity to oppose gravitational attractions, and the remaining parts through points on the nuclear axes away from the atoms' centres of gravity. The parts of repulsion that act away from the centres 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 the rotary action of a combination of atoms are shown in figure 2. Larger ellipses represent the electronic envelopes of atoms M_1 and M_2. Grey elliptical areas within larger ellipses represent atomic nuclei. Parts of the 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 envelopes tend to turn (rotate) in an anti-clockwise (looking from C to D) direction at angular speeds, represented by curved arrows xa, in the horizontal plane (with reference to figure 2). Stabilising efforts within the atoms compel nuclei to align with corresponding electronic envelopes by the action of efforts represented by arrows f_2. Precessions on the nuclei tilt the nuclear axes of both atoms in opposite directions by angle xb. The nuclear axis of atom M_1 tilts upwards, and the nuclear axis of atom M_2 tilts downwards (with reference to the horizontal plane in figure 2). Aligning efforts between nuclei and electronic envelopes acting as reactions on electronic envelopes are represented by arrows F. The system will reach equilibrium when reactive efforts F equal precession efforts that rotate the atomic envelopes. The final state of the atoms in the molecule is that both atoms are rotating in a 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 the rotary motions of atoms, the effectiveness of their external resultant fields is inhibited. As a result, the molecule becomes inert with respect to all external fields, while the resultant fields of constituent atoms remain fully effective within this combination, called a molecule.

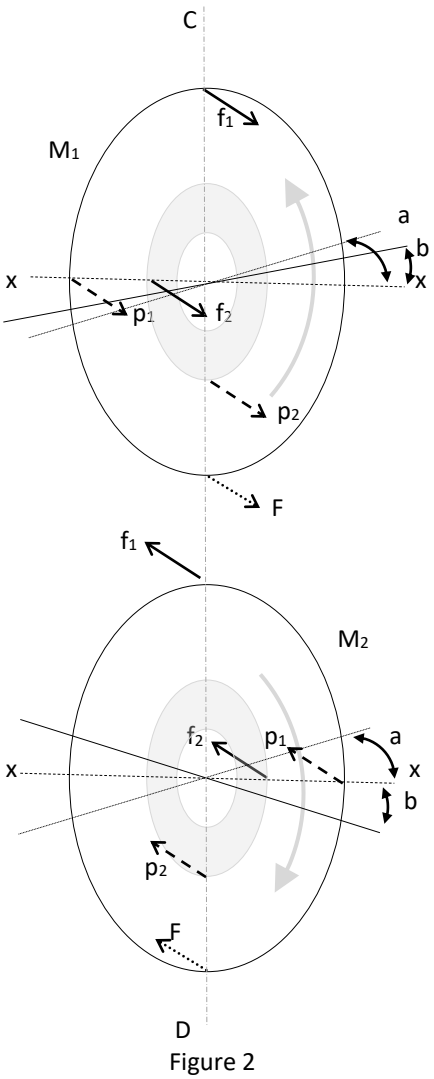

Figure 2

Chemical actions are the results of interactions between the external fields of participating atoms and molecules. An external field about a molecule is the resultant of the 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 the external fields of atoms and molecules are electric in nature, they can interact only in the planes of their existence. The rotation of an electric field in a plane perpendicular to the plane of its existence reduces and inhibits its ability to interact with external fields from other atoms or molecules. Hence, the ability of an atom or molecule to enter into chemical action depends on its rotary speed in planes across the atomic axes. The higher the rotary speed, the lower the magnitude of the external field and its ability to chemically react.

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

A reduction in the 3D matter-content level of a stable molecule (by heating or applying higher external pressure) alters the gravitational attraction between its constituent atoms. Reduction in

gravitational attraction enables repulsion due to interactions of electromagnetic fields that move constituent atoms of the molecule farther. Increased distances between atoms reduce the magnitude of repulsive actions between the atoms. Proportionate reductions in the magnitudes of gravitational attraction and electromagnetic repulsion in certain kinds of molecules may permit them to maintain their stable states, irrespective of a reduction in the 3D matter-content level. However, disproportionate reductions in gravitational attraction and electromagnetic repulsion between the atoms change their (combined) rotation speeds in a plane across the nuclear axes. Lower rotation speeds let the atoms exhibit their external fields, partially. The magnitudes of external fields exhibited by the atoms are determined by a 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, the original molecule may break up, and the 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 the stability of the molecule. As gravitational attraction between a stable molecule and an external atom or molecule acts through the centre of gravity of individual atoms in the molecule, the precession caused by it on the molecule may be minimal. However, the magnitudes and points of action (on atomic axes) of electromagnetic repulsion between atoms may differ from one kind of atom to another. Changes in the parameters of electromagnetic repulsion vary the angular speeds of molecular rotation, which may change the effective external field of the molecule.

Atoms in larger molecules settle at suitable distances, relative directions, and angular rotary speeds required to inhibit each other's external resultant fields. The ability of atoms to form molecules depends on the overall magnitude of their external resultant field around them and the distance between the centres of gravity and the centres of action of field efforts. Those atoms, in which these two centres coincide, are not able to form molecules with any other atom of its own kind and of different kinds. The severity of molecular formation or dissolution (chemical action) corresponds to the distances between the centres of gravity and the centres of action of external resultant fields on the nuclear and 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 the external resultant field about the group becomes neutral. Atoms in a molecule rotate in the planes of their atomic axes at the angular speeds required to inhibit each other's resultant fields. The intensity of chemical action by an atom is determined by the distance between its centre of gravity and the centre of action by an external resultant field about the atom. The ability and efficiency of chemical actions between atoms may be varied by changing their 3D matter-content levels (heating or cooling), by changes in the external pressure on them, by the presence of catalysts in the 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). https://www.matterdoc.info/

[2] Nainan K. Varghese, ARTICLES, https://www.matterdoc.info/matter/mattoc.pdf

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