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Scalia Physics

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INTRODUCTION

The following is a new explanation of molecular structure I call Scalia Physics that consists of two fundamental particles that when clearly defined can be used to model any physical or chemical reaction. The new explanation of molecular structure was developed as a result of research done in the field of combustion which resulted in a paper I called Combustion Physics in 2007. This paper is a result of research I have been doing in the field of lighting and heat transfer and expands on the principles of Combustion Physics. In this paper the relationship between electricity, mass, heat, light, magnetism, electromagnetic waves, energy, and conversion of mass into energy are defined and ten principles are stated.

The **first principle** of Scalia Physics is that everything tends towards equilibrium where there is a balancing of forces. Once in equilibrium everything remains in equilibrium until acted upon by an outside force.

The **second principle** of Scalia physics is that there are two fundamental particles: the **Electron (e)** and the newly proposed **Inertatron (I).** All matter and energy reactions can be modeled by an accurate description of these two fundamental particles. A proton can be described as the combining of 1836 Inertiatrons. A neutron can be defined as the combining of a proton and an electron.

The **third principle** of Scalia physics is that the universe was formed by the creation of two fundamental particles: the electron and the Inertiatron. All of the matter, energies, and reactions in the universe, after the creation of the two fundamental particles, happened spontaneously as a result of the characteristics of the two fundamental particles. Therefore an accurate description of the characteristics of the two fundamental particles can be used to computer model any matter, energies, and reactions in the universe.

The **forth principle** of Scalia physics is that protons and neutrons combine to form **Dynamic Crystalline Structures** that become the nucleus of atoms. The nucleus of an atom is a region in space in the shape of a sphere with in which the protons and neutrons reside and orbit in defined ways. The protons and neutrons in the nucleus of an atom spontaneously arrange themselves in dynamic crystalline structures. These dynamic crystalline structures dictate the properties of the atom and how atoms react with each other.

The **fifth principle** of Scalia physics is inertia or mass is a resistance to change from a state of equilibrium. Inertia can be converted into energy which is the absence of equilibrium and an affinity for change toward a state of equilibrium.

The **sixth principle** of Scalia physics is a nucleus has a static electrical charge and is spherical in shape therefore the nucleus has a charge density on its surface that can be calculated. The Surface Charge Density (SCD) of the Nucleus would be the charge of the nucleus divided by the surface area of the nucleus. The charge density would be in Coulombs per meter squared.

The **seventh principle** of Scalia physics is that electricity has a mass or inertia component. One electron or proton, 1.60219 E -19 coulombs of charge has an electrical inertia of 4.5217E-20 kilograms (1.60219 E -19 C / 3.5433 m/s^2). One coulomb of charge has electrical inertia of .2822 kilograms. When one coulomb of charge is converted into heat energy 2.822 E 16 joules of heat is released (E = MC^{2}so E = .2822 kilograms times (speed of light squared) = 2.5363 E 16 Joules). One Coulomb of charge has 2.5363 E 16 joules of potential energy stored in its inertia. The combustion reaction results in the conversion of electrical mass into energy.

The **eighth principle** of Scalia physics is that “Dark Matter” can be defined as the uniform distribution of Inertiatron in space.

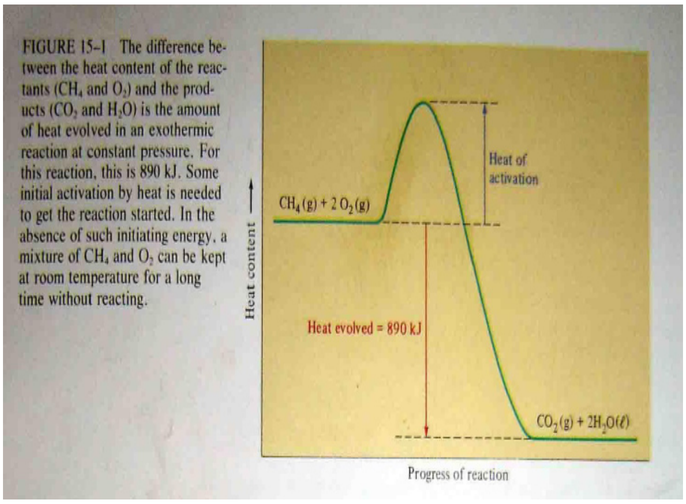
The **ninth principle** of Scalia physics is that electromagnetic waves such as light are formed by the alignment of Inertiatrons in a chain formation. The mechanism through which the propagation of an electromagnetic wave through space is achieved is the conversion of inertia, in the form of equilibrium distribution of Inertiatron in a region of space, into energy in the form of Inertiatron alignment in a chain that has an affinity to convert back into inertia once the wave has passed.

The **tenth principle** of Scalia Physics is that a “Black Hole” in space can be defined as a high density concentration of Inertiatrons.

COMBUSTION

The following is an attempt to understand the combustion process.

Combustion is a chemical reaction between a fuel and oxygen. Complete combustion results in the production of water, carbon dioxide, heat, sound, and electromagnetic wave energy including light. An example of a combustion reaction is found on page 435 of General Chemistry by Whitten, Gailey, and Davis (ref 1). "At 25 degrees Celsius the change in internal energy for the combustion of methane is – 887 KJ/mol. The change in heat content is –890 KJ/mol (Section 15-1). The small difference is due to work done on the system as it is compressed by the atmosphere." Heat content is said to be negative when heat is released.



Graph is from ref 1

The equation for the reaction is given as:

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l) + 890KJ$

(page 431 ref 1)

The equation indicates that the reaction is exothermic. The amount of heat generated from the reaction was experimentally determined to be 890 KJ/mol. In the combustion of methane potential energy stored in the fuel and oxygen is converted into heat energy.

The energy released would be due to the differences in bond energies between the reactants (fuel and oxygen) and the products (water and carbon dioxide). The average bond energies for the bonds involved in the methane reaction are listed on page 445 of ref 1 and are as follows.

C–H ---- 414 KJ/mol O=O ---- 498 KJ/mol

C=O ---- 741 KJ/mol O-H ---- 464 KJ/mol

Bond energy is the amount of energy that has to be added to break a bond.

CH_4 (methane) has 4 C-H bonds. In the above equation 1 mole of CH_4 was reacted so there was a total of 4 moles of C-H bonds. 4 moles of C-H bonds times 414 KJ/mol

= **1656 KJ**

O_2 (oxygen) has 1 O=O bond. In the above equation 2 moles of O_2 was reacted so there was a total of 2 moles of O=O bonds. 2 moles of O=O bonds times 498 KJ/mol = **996 KJ**

CO_2 (carbon dioxide) has 2 C=O bonds. In the above equation 1 mole of CO_2 was produced so there was a total of 2 moles of C=O bonds. 2 moles of C=O bonds times 741KJ/mol

= **1482 KJ**

H_2O (water) has 2 O-H bonds. In the above equation 2 moles of H_2O was produced so there was a total of 4 moles of O-H bonds. 4 moles of O-H bonds times 464 KJ/mol

= **1856 KJ**

If the above equation is written in the form of bond energy changes it can be written as follows. **1656 KJ + 996 KJ → 1482 KJ + 1856 KJ**

2652 KJ → 3338 KJ

2652 KJ - 3338 KJ = - 686 KJ

From this it can be seen that 686 KJ of the 890 KJ of heat generated can be attributed to changes in bond energies indicating that something other than differences in bond energy must be contributing to the heat released. Additionally energy released in the form of electromagnetic waves and sound must be attributed to something other than bond energy changes.

686 KJ / mole of methane is equal to 18,433 Btu / lb of methane combusted

890 KJ / mole of methane is equal to 23,914 Btu / lb of methane combusted

According to the Combustion Hand Book when one pound of carbon is burned it produces 14,500 Btu of heat. When one pound of Hydrogen is burned it produces 61,095 Btu of heat. Using this method to calculate the heat released from the combustion of methane the calculated heat of 23,875 Btu / lb is similar to the measured heat release of 23,914 Btu / lb. This method of calculating the heating value of fuels works for all hydrocarbon based fuels regardless of the state (solid, liquid, or gaseous) or bond type (single, double, or triple carbon bonds).

The energy of other chemical reactions involving fuel and oxygen can be determined by the differences in bond energy.

For example

The energy necessary to disassociate water into hydrogen and oxygen in an electrolysis process can be determined by the differences in bond energies of the water and hydrogen and oxygen. (The reverse of combustion)

The energy liberated in the form of electricity in a fuel cell that converts hydrogen and oxygen into water and electricity. (Slow combustion at low temperatures)

The combustion process happens fast and instead of electricity it gives off heat and light at higher rates than are possible due to changes in bond energy. The following is an attempt to understand combustion. Some new ways of describing or looking at known phenomena will be proposed in an attempt to understand combustion and the relationship between electricity, heat, and light.

SCALIA PHYSICS

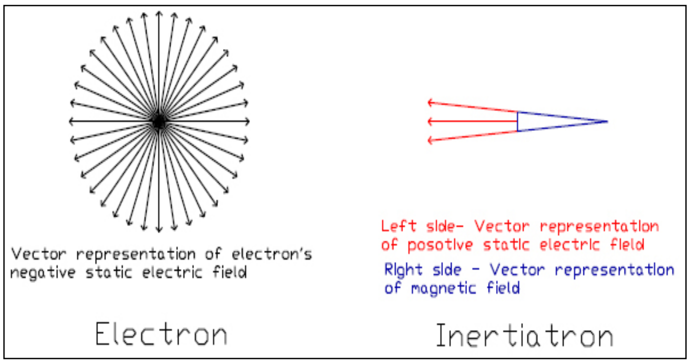
The **first principle** of Scalia Physics is that everything tends towards equilibrium where there is a balancing of forces. Once in equilibrium everything remains in equilibrium until acted upon by an outside force. This is simply a restatement of the principle of an object at rest stays at rest until acted upon by an outside force, and the application of that principle to all physical and molecular reactions.

One fundamental theory in chemistry and physics is that for every action there is an equal and opposite reaction. An enhancement to this theory might be that for every action there is an equal and opposite resultant reaction. This would mean that an action could have more than one reaction that combine to form an equal and opposite resultant reaction. An extension of this theory could be that for every particle there is an equal and opposite particle and particles can combine to form a resultant particle that is equal and opposite of another particle.

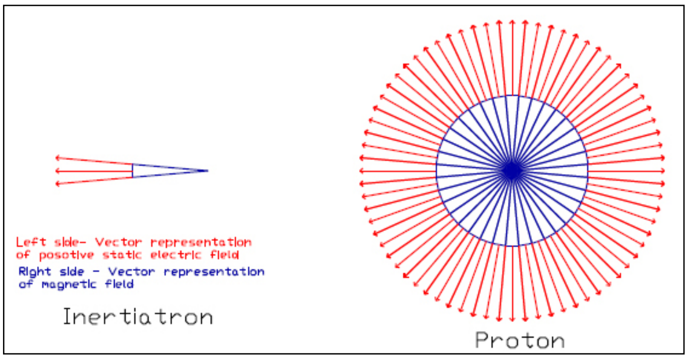
The **second principle** of Scalia physics is that there are two fundamental particles: the **Electron (e)** and the newly proposed **Inertatron (I).** All matter and energy reactions can be modeled by an accurate description of these two fundamental particles.

The electron and Inertiatron both have a mass of 9,11E-31 kilograms. The electron and Inertiatron have opposite electrical charge. The electron has a negative charge and the Inertiatron has a positive charge. The magnitude of the electrical charge for the electron is 1.602E-19 coulombs. The magnitude of the electrical charge for the Inertiatron is 8.7255E-23 (1.602E-19 / 1836) coulombs. The Inertiatron also has a magnetic type charge. The shape of the electron is spherical. The shape of the Inertiatron is planer or flat. It could be visualized as a disk or "coin like" shape.

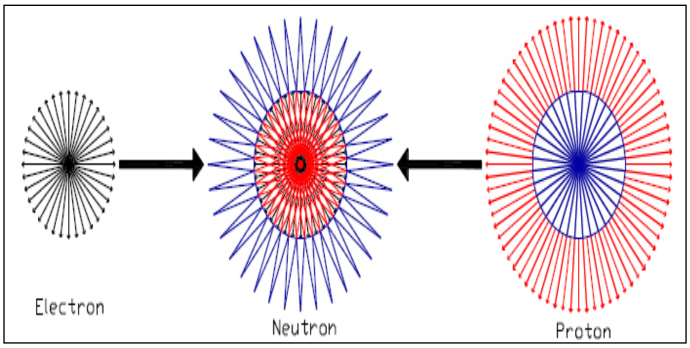
Radial vectors pointing outward from the center of the electron can describe the negative static electric field of the electron. The Inertatron can be visualized as having a disk or coin like shape. There is a magnetic type field on one side of the coin and a positive static electrical field on the other side of the coin. Volumetric vectors that have a cone shape can describe the magnetic field. The base of the cone is adjacent to the Inertatron and the tip of the cone is 6E-16 meters away from the Inertiatron. This means that the magnetic field has a range of 6E-16 meters. The radial vectors that describe the positive electric field of the Inertiatron point toward the tip of the cone that describes the magnetic field. The direction of the electron's and Inertiatron's electric field show that the electron will be attracted to the electric side of the Inertiatron and repelled by the magnetic side of the Inertiatron.



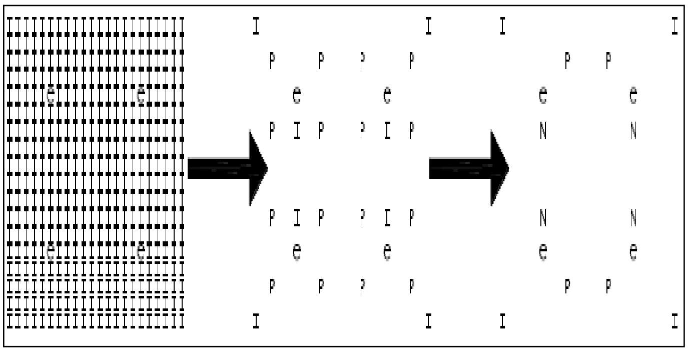
The electron has high resistance to combining with other electrons. The Inertiatron readily combines with other Inertiatrons to form resultant particles.



1836 Inertiatron combine to form a traditional proton. Dividing the mass of a proton by the mass of an electron arrived at the number 1836. The number of Inertiatron that combine to form a proton will be divisible by three since the destruction of a proton results in particles with 1/3 and 2/3 the charge of a proton. (Ref 4) The shape of the proton is a sphere. The Inertiatron reside on the surface of the sphere shaped proton. The magnetic field points towards the center of the sphere shaped proton. The radius of the proton is 6E-16 meters. Since the magnetic field of the Inertiatron can be represented as a cone shape of length 6E-16 there will be no resultant force of repulsion due to the Inertiatron magnetic field inside the proton. The cones will line up next to each other and dissipate at the center of the proton. Any movement in the placement of the Inertiatron would result in a large force of magnetic repulsion that would restore the Inertiatron position. The force of repulsion of the positive electric field on the outside and magnetic field on the inside will hold the Inertiatron in a spherical shape and the proton's spherical shape will be very stable. The mass of the proton will be 9.11E-31 times 1836 or 1.6726E-27 kilograms. The Inertiatron will be evenly spaced about the surface of the proton and radial vectors similar to the ones used to describe the electrons field but opposite in direction can represent the positive static electrical field of the proton. The electron and proton will attract each other electrically. The charge density in coulombs per meter squared of the electric field of the electron at a distance of 6E-16 meters from the center of the electron will be equal to the charge density of the surface of the proton.



If an electron hits a proton at a high enough speed it will travel to the center of the proton. The Inertiatron will flip their orientation such that the electric side will face in and cancel out the electrons electric field and the magnetic side will face out. The result is a neutron. A neutrons magnetic type field will dissipate at a distance of 6E-16 meters from its outer surface. (On page 789 of ref 4 it states that the radioactive decay of a free neutron results in the production of a proton, an electron, and the antiparticle for a neutrino, which has no rest mass but has energy similar to but opposite an electron. I propose that this antiparticle is the manifestation of the energy needed to drive the electron to the center of the proton) The electron would be attracted to the proton but repelled by the neutron.



Initially there was an abundance of electrons and Inertiatrons. The Inertiatrons have a high affinity for combining to form protons and as protons were formed the average distance of separation between the new set of particles began to increase. As electrons and protons began combining to form neutrons the average distance of separation increased even more. Eventually the Inertiatrons became separated by a great enough distance that they could no longer combine and Inertiatrons became thinly distributed background mass that does not affect many chemical and molecular reactions. This thinly distributed background mass is a useful description of "Dark Matter".

The **third principle** of Scalia physics is that the universe was formed by the creation of two fundamental particles: the electron and the Inertiatron. All of the matter, energies, and reactions in the universe, after the creation of the two fundamental particles, happened spontaneously as a result of the characteristics of the two fundamental particles. Therefore an accurate description of the characteristics of the two fundamental particles can be used to computer model any matter, energies, and reactions in the universe.

When the proton moves its electrical field creates a magnetic field that is perpendicular to its direction of motion. When the neutron moves its magnetic field creates an electrical field that is perpendicular to its direction of motion. When a proton and neutron in motion come near each other their magnetic and electric fields interact and the particles take on orbital paths of motion that result in a balancing of their magnetic and electric fields to form the nucleus of atoms. The resultant nucleus can be described as a **Dynamic Crystalline Structure.**

The **forth principle** of Scalia physics is that protons and neutrons combine to form **Dynamic Crystalline Structures** that become the nucleus of atoms. The nucleus of an atom is a region in space in the shape of a sphere with in which the protons and neutrons reside and orbit in defined ways.

The following information will be used to more clearly describe the dynamic crystalline structure.

2ELEMENT	Hydrogen	Helium	Lithium	Beryllium	Boron	Carbon	Nitrogen	Oxygen	Fluorine
2Symbol	H	He	Li	Be	B	C	N	O	F
2%Isotope	99.985	100	92.48	100	80.22	98.892	99.635	99.759	100
2# Electrons	1	2	3	4	5	6	7	8	9
2# Protons	1	2	3	4	5	6	7	8	9
2# Neutrons	0	2	4	5	6	6	7	8	10
2Atomic #	1	4	7	9	11	12	14	16	19
3Radius of Nucleus	1.2E-15	1.9E-15	2.29E-15	2.49E-15	2.67E-15	2.75E-15	2.89E-15	3.02E-15	3.2E-15
4SAON	1.81E-29	4.56E-29	6.62E-29	7.82E-29	8.94E-29	9.47E-29	1.05E-28	1.15E-28	1.29E-28
5Charge on Nucleus	1.6E-19	3.2E-19	4.81E-19	6.41E-19	8.01E-19	9.61E-19	1.12E-18	1.28E-18	1.44E-18
6SCD of Nucleus	8.85E+09	7.03E+09	7.27E+09	8.19E+09	8.96E+09	1.01E+10	1.07E+10	1.12E+10	1.12E+10
7Atomic Radius	3.70E-11	5.00E-11	1.52E-10	1.11E-10	8.80E-11	7.70E-11	7.00E-11	6.60E-11	6.40E-11
8SAOBO	1.72E-20	3.14E-20	2.9E-19	1.55E-19	9.74E-20	7.45E-20	6.16E-20	5.48E-20	5.15E-20
9CD of Bonding Orbital	9.31E+00	1.02E+01	1.65E+00	4.14E+00	8.23E+00	1.29E+01	1.82E+01	2.34E+01	2.80E+01
10Ionization	(+,-) 1	None	(+1)	(+) 2	(+) 3	None	(-) 3	(-) 2	(-) 1
11Ionization energy	1312	2372	520	899	801	1086	1402	1314	1681
12Ionic Radius			6.00E-11	3.10E-11			1.71E-10	1.40E-10	1.36E-10
13Radius of Nucleus	1	1.586668	1.911691	2.078561	2.222203	2.287533	2.408023	2.517514	2.665784
14Melting Point	-259.1	-272.2	181	1277	2177	3500	-210	-218	-220
15Boiling Point	-252.7	-268.9	1336	2484	3658	3930	-196	-183	-188
16CSASTP	Gas	Gas	Bcc	Hex	Hex	Hex	Gas	Gas	Gas

2ELEMENT	Neon	Sodium	Magnesium	Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
2Symbol	Ne	Na	Mg	Al	Si	P	S	Cl	Ar
2%Isotope	90.92	100	78.6	100	92.27	100	95.018	75.4	99.6
2# Electrons	10	11	12	13	14	15	16	17	18
2# Protons	10	11	12	13	14	15	16	17	18
2# Neutrons	10	12	12	14	14	16	16	18	22
2Atomic #	20	23	24	27	28	31	32	35	40
3Radius of Nucleus	3.25E-15	3.41E-15	3.46E-15	3.6E-15	3.64E-15	3.77E-15	3.81E-15	3.92E-15	4.1E-15
4SAON	1.33E-28	1.46E-28	1.5E-28	1.63E-28	1.67E-28	1.78E-28	1.82E-28	1.93E-28	2.11E-28
5Charge on Nucleus	1.6E-18	1.76E-18	1.92E-18	2.08E-18	2.24E-18	2.4E-18	2.56E-18	2.72E-18	2.88E-18
6SCD of Nucleus	1.2E+10	1.21E+10	1.28E+10	1.28E+10	1.35E+10	1.35E+10	1.41E+10	1.41E+10	1.37E+10
7Atomic Radius	7.00E-11	1.86E-10	1.60E-10	1.43E-10	1.17E-10	1.10E-10	1.04E-10	9.90E-11	9.40E-11
8SAOBO	6.16E-20	4.35E-19	3.22E-19	2.57E-19	1.72E-19	1.52E-19	1.36E-19	1.23E-19	1.11E-19
9CD of Bonding Orbital	2.60E+01	4.05E+00	5.97E+00	8.10E+00	1.30E+01	1.58E+01	1.89E+01	2.21E+01	2.60E+01
10Ionization	None	(+) 1	(+) 2	(+) 3	None	(-) 3	(-) 2	(-) 1	None
11Ionization energy	2081	497	738	578	786	1012	1000	1251	1521
12Ionic Radius		9.50E-11	6.50E-11	5.00E-11			1.84E-10	1.81E-10	
13Radius of Nucleus	2.711708	2.840896	2.881445	2.996706	3.033218	3.137787	3.171137	3.267192	3.415749
14Melting Point	-248.6	98	650	660	1412	44	115.2	-101	-189.4
15Boiling Point	-246	881	1105	2447	2680	280	444.6	-34	-185.9
16CSASTP	Gas	Bcc	Fcc	N/A	N/a	Liquid	N/A	Gas	Gas

Explanation Of Data Table

1. The data shown in this table is a combination of currently accepted data and new data being proposed. The following is an explanation of where the data in the data table originated. The numbers to the far left of the data table correspond with the following numbers that designate the explanation of origin.

2. The data shown in this section is from ref – 4 page 812. (% Isotope) is the relative abundance of the isotope of the element. Other isotopes are shown on sheet 2 of the xls file. The other isotopes have the same number of electrons and protons but a different number of neutrons.

3. The data in this section was calculated using the formula on page – 754 of ref 4 in which the radius of the nucleus is equal to 1.2x10^ -15 times the cube root of the atomic number. R = (1.2E-15) X (A^.333)

4. SAON stands for the surface area of the Nucleus. The data in this section was calculated using the previously calculated radius of the nucleus and the equation for the surface area for a sphere.

5. The data in this section was calculated using the formula on page – 754 of ref 4 in which the charge on the nucleus is equal to the number of protons times 1.60219E-19 Coulombs.

6. The data in this section was calculated based on information on page – 754 of ref 4, which states that the nucleus is spherical. The radius of the nucleus was calculated in section 3 above. SCD of Nucleus stands for the charge density of the surface of the nucleus which would be the charge divided by the surface area of the nucleus. The equation for the surface area of a sphere is A = 4 X 3.1428571 X (R^2).

7. The data shown in this section is from page 133 0f Ref. 1.

8. SAOBO stands for surface area of the bonding orbital. The data in this section was calculated using the atomic radius shown in section 7 of ref 1 and the equation for the surface area for a sphere.

9. CD of Bonding Orbital stands for the charge density of the Bonding Orbital. And is the charge of the nucleus divided by the surface area of the sphere that describes the bonding orbital. The atomic orbital are concentric spherical regions in space that surround the nucleus. The outer most orbital is called the bonding orbital. The electrons involved in bonding and ionization reside in the bonding orbital. The atomic radius shown in section 6 of ref 1 can be used to calculate the surface area of the outer most orbital (the bonding orbital) and the charge density of the bonding orbital. The charge density would once again be in Coulombs per Meter squared.

10. Ionization is the tendency of the atom to take on or loose electrons. A positive ionization means that the atom tends to loose electrons resulting in a net positive charge. A negative ionization means that the atom tends to gain electrons resulting in a net negative charge. The data in this section came from page 133 of ref 1

11. Ionization energy is the energy necessary to remove an electron from the neutral atom. The data in this section came from page 134 of ref 1.

12. The data in this section came from page 133 of ref 1. Figure 5-2 shows the ionic radius and charge of elements that have a tendency to ionize.

13. The data in this section shows the radius of the nucleus in terms of number nuclei. The data was produced by dividing the calculated nuclear radius of section 3 by 1.2e-15 (the diameter of a proton or neutron). Example: Hydrogen has

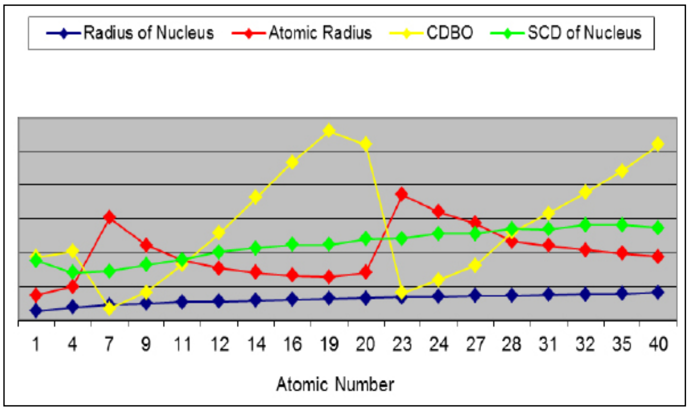
a nuclear radius of the diameter of one proton, because its radius divided by the diameter of a proton is equal to 1. This information was used when making three dimensional drawings of the proposed Dynamic Crystalline Structures to make sure the protons and neutrons would fit in a sphere of the specified radius in their proposed static state orientations and could rotate with out exiting the sphere.

14. Melting Point The data in this section is from data tables shown in ref 2.

15. Boiling Point The data in this section is from data tables shown in ref 2.

16. CSASTP stands for Crystal structure at standard temperature and pressure. Most elements arrange themselves into crystalline structures in the solid state. The information in this section is from ref 2.

Analysis of Data Table



Analysis of the data table begins with the following graph. The elements have been plotted in order of increasing atomic mass number.

The blue line is a plot of the radius of the nucleus verses the number of protons and neutrons present in the nucleus. Notice how the radius of the nucleus increases regularly with an increase in the number of atomic particles present in the nucleus. This would seem logical. The more particles present the larger the nucleus.

The green line is a plot of the surface charge density of the nucleus. Notice how there is a decrease in charge density between hydrogen and helium. This is because the charge on helium is twice the charge on hydrogen but the atomic mass number of helium is four times the atomic mass number of hydrogen. After helium the surface charge density of the nucleus increases regularly with an increase in the number of atomic particles present in the nucleus

The red line is a plot of the radius of the atom verses the number of protons, neutrons, and electrons present in the atom. Notice how the radius of the atom does not regularly increase with an increase in the number of atomic particles present in the atom. Notice how the radius of the atom also does not increase and decrease in proportion to the charge density of the nucleus.

The yellow line is a plot of the charge density of the bonding orbital. Notice how an increase in charge density of the bonding orbital corresponds to a decrease in the atomic radius and a decrease in charge density of the bonding orbital corresponds to an increase in atomic radius. This seems logical because a decrease in charge density of the bonding orbital would mean that the electrons in the bonding orbital are being attracted to the nucleus with less force and would exist further away from the nucleus making the radius of the atom larger.

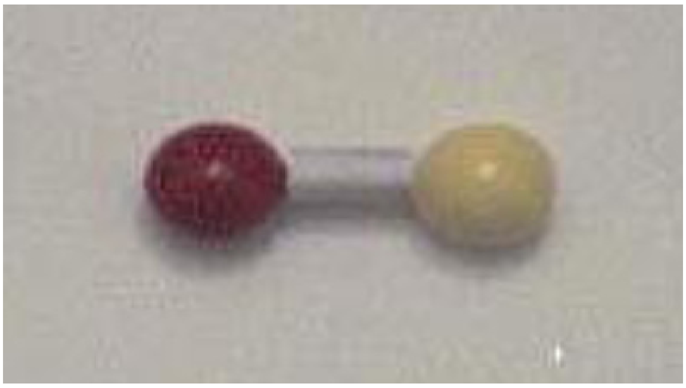
The data and graph may explain why Lithium tends to loose an electron and become a positive ion. The electrons in the bonding orbital of Lithium are further away from the nucleus and are attracted to the nucleus by a weaker charge density. The data and graph may also explain why Oxygen tends to gain an electron because the electrons in the bonding orbital are closer to the nucleus and attracted to the nucleus with a stronger charge density. The increased charge density would have the ability to attract additional electrons.

The data and graph does not explain why the charge density of the bonding orbital could decrease when the charge density of the nucleus increases. Example: The charge density on the nucleus of helium is 7.0X10^ 9 coulombs per meter squared. The charge density on the nucleus of lithium is 7.27X10^9. The charge density of the bonding orbital of helium is 10.2 coulombs per meter squared. The charge density of the bonding orbital of lithium is 1.65 coulombs per meter squared. There is a slight increase in the charge density of the nucleus of lithium as compared to helium, but a large decrease in the charge density of the bonding orbital of lithium as compared to helium.

The following proposed theories of the structure of the nucleus explain why the charge density of the bonding orbital is independent of the charge density of the nucleus.

The **forth principle** of Scalia physics is that protons and neutrons combine to form **Dynamic Crystalline Structures** that become the nucleus of atoms. The nucleus of an atom is a region in space in the shape of a sphere with in which the protons and neutrons reside and orbit in defined ways. The protons and neutrons in the nucleus of an atom spontaneously arrange themselves in dynamic crystalline structures. These dynamic crystalline structures dictate the properties of the atom and how atoms react with each other.

The following illustrations show proposed dynamic crystalline structures of the nucleus in a static state and the position of the electrons that would result in the highest force of attraction between the electrons and protons in the static state. The dynamic crystalline structures of the nucleus can be visualized by rotating the static state representations about proposed axis of rotation. Red balls represent the protons. Blue balls represent the neutrons. Yellow balls represent the electrons.

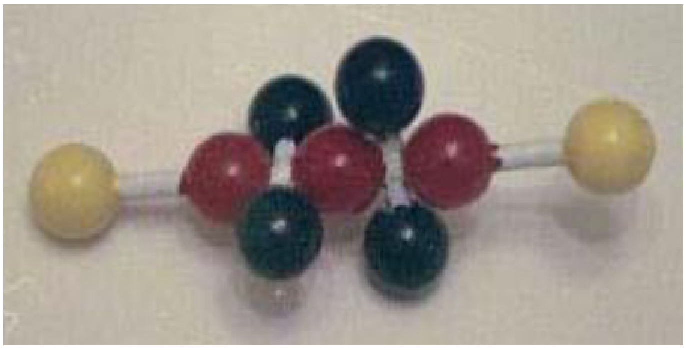


Hydrogen

Hydrogen has one proton in its nucleus, which is orbited by one electron. In section 3 of the data table the ***radius*** of the nucleus of hydrogen was determined to be equal to the ***diameter*** of a proton. **The nucleus of the hydrogen atom is proposed to be a region in space in the shape of a sphere whose diameter is twice the diameter of a proton.** This would indicate that the proton is not stationary or in a static state. It is in motion. It moves in an orbital fashion and would tend to drag the electron with it.

Helium

Helium has two protons and two neutrons. If the protons rotate about an axis of rotation drawn through the center of the neutrons and the neutrons rotate at the same speed about an axis of rotation drawn perpendicular to the page and through the center of the nucleus, then they can rotate with no change in the balance of the attractive and repulsive forces between the neutrons and protons. The nucleus of the helium atom could absorb energy in the form of rotational motion while maintaining a perfect balance of attractive and repulsive forces. Rotation can occur with out changing the distance between the protons and neutrons. Section 13 of the Data Table shows the radius of the nucleus as 1.59 nuclei particles or a diameter of 3.18 nuclei particles. As can be seen in the above picture the distance from the far left of the proton on the left to the far right of the proton on the right would not exceed 3.18 protons in length. The same is true for the neutrons. The proposed dynamic crystalline structure fits into the region of space in the shape of a sphere that is given as the size of the helium nuclei. The electrons would tend to orbit the nucleus about the same axis of rotation as the protons due to the non-uniform charge density on the surface of the nucleus caused by the position of the protons. The neutrons tend to limit the randomness of motion of the electrons. The attractive forces of the protons would hold both electrons tightly and the element would be stable, gaseous, and inert.



Lithium

In order of increasing complexity the next element on the periodic table would have 3 protons and 3 neutrons and 3 electrons. However, Lithium has 3 protons and 4 neutrons and 3 electrons. As can be seen in the above representation, the removal of one of the 4 neutrons would cause an unbalanced force between the protons and neutrons. As can be seen in the above representation, two of the electrons would be held tightly and one electron would be held more loosely. The neutrons shield the third proton. The less tightly held electron would exist at a greater distance from the nucleus. The less tightly held electron would be in the outermost (bonding) orbital. This would explain why there is a slight increase in the charge density of the nucleus of Lithium as compared to Helium, but a large decrease in the charge density of the bonding orbital of Lithium as compared to Helium. This would explain why there is a large increase in the atomic radius between Helium and Lithium. This also explains why Lithium tends to loose an electron and become a positive ion. The radius of the positively ionized atom of Lithium would be much smaller than the radius of the Lithium atom in its neutral state. This is in concert with the data shown in the data table. The neutrons can rotate about an axis of rotation drawn through the center of the protons without changing the balance of attractive and repulsive forces. The outside protons can rotate about the center proton without changing the balance of attractive and repulsive forces. The nucleus of the Lithium atom would be stable with 3 protons and 4 neutrons because it could absorb energy in the form of increased motion without disrupting the balance of attractive and repulsive forces between the protons and neutrons. The radius of the nucleus of lithium is given as 1.9 nuclei particles or a diameter of 3.8 nuclei particles. As can be seen in the above picture the proposed dynamic crystalline structure fits into the region of space that describes the size of the lithium nucleus.

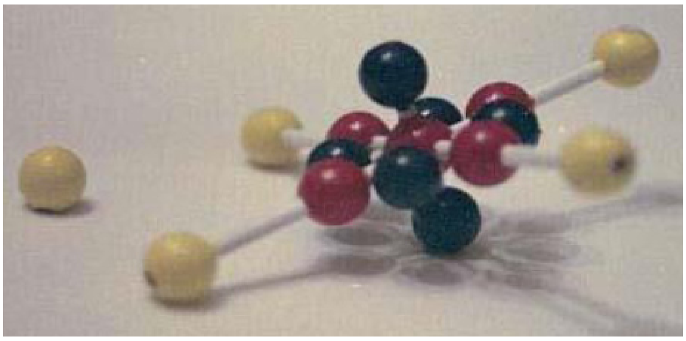
In order of increasing complexity the next element on the periodic table would have four protons and 4 neutrons. The following representation shows a structure of four protons and four neutrons. As shown in the following representation, a combination of four protons and four neutrons would result in a rigid structure. The protons and neutrons could not rotate or move without changing the relative distances of separation or equal forces of attraction. Energy could not be absorbed in the form of rotational motion. The rigidity of the structure would make it unstable because it would tend to break instead of allow rotational motion. Three is no element or isotope of an element with four protons and four neutrons.

Addition of a fifth neutron results in the following dynamic crystalline structure.

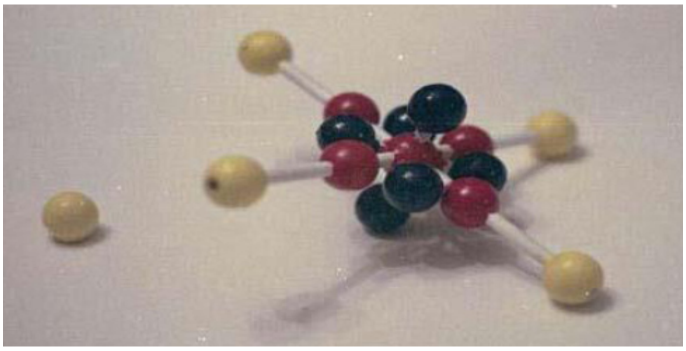
Beryllium

Beryllium has four protons and five neutrons in its nucleus. There is the possibility of multiple axes of rotation about the center neutron. The four electrons would be tightly held. The ionization energy would be higher than the ionization energy of Lithium. The data table shows ionization energy of 520 for Lithium and 899 for Beryllium. The radius of the Beryllium atom would be smaller than the Lithium atom. The data table confirms this. The diameter of the nucleus of Beryllium is 4.156 nuclei particles. As can be seen in the above picture the proposed dynamic crystalline structure fits into the region of space that describes the size of the Beryllium nucleus.

The next element on the periodic table is Boron.



Boron

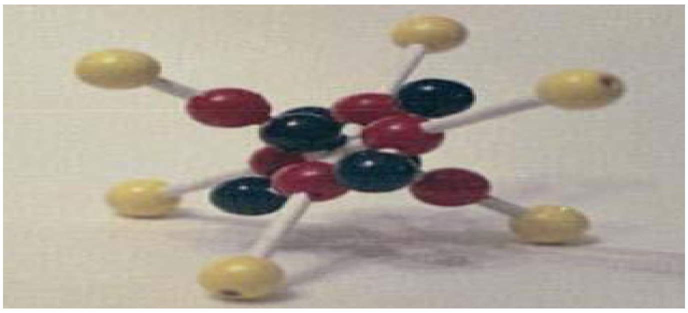


Boron

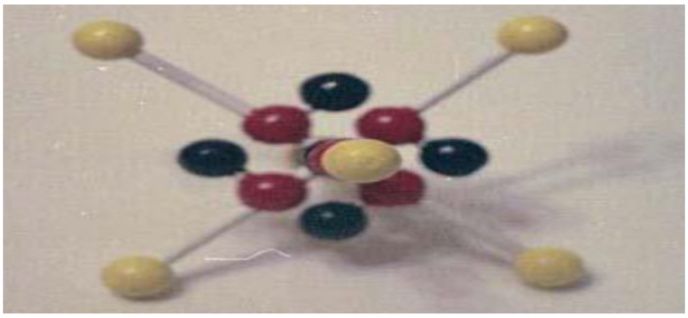
Boron has five protons and six neutrons. One of the electrons would not be as tightly held. However, the charge of the nucleus of Boron is much higher than the charge of the Lithium nucleus. The charge density of the bonding orbital of Boron would be much higher than the charge density of the bonding orbital of Lithium due to the position of the other four protons. The loosely held electron of the Boron atom would exist closer to the nucleus than the loosely held electron in the Lithium atom. The ionization energy of Boron would be higher than the ionization energy of Lithium. The importance of the dynamic crystalline structure of the nucleus can be further realized when comparing Boron and Beryllium.

The charge on the nucleus of Boron is a little higher than the charge on the nucleus of Beryllium, but the charge density of the bonding orbital of Boron is two times the charge density of the bonding orbital of Beryllium. Boron and Beryllium have similarly shaped dynamic crystalline structures, but the position of the protons and neutrons are reversed. Boron has a proton in the center of the dynamic crystalline structure of the nucleus. The neutrons would be attracted to the center proton and the other four protons would balance the forces of attraction and repulsion by being nearer the outside of the dynamic crystalline structure. The combined attractive forces of the four protons being nearer the outside of the dynamic crystalline structure would create a higher charge density in the Boron bonding orbital. Beryllium has a neutron in the center of the dynamic crystalline structure of the nucleus. The four protons would be attracted to the center neutron and the other four neutrons would be near the outside. The combined shielding of the four neutrons would create a weaker charge density in the Beryllium bonding orbital.

Carbon is the next element on the periodic table.



Carbon



Carbon

Carbons dynamic crystalline structure results in two tightly held electrons and four more loosely held electrons. Carbon would have the ability to make four bonds of equal strength (methane CH_4). Carbon in the solid form

spontaneously arranges itself into layers of hexagonal crystals. Six carbon atoms with the previously proposed dynamic crystalline structure would spontaneously form a repeating hexagonal pattern; all four of the bonding electrons are used in the formation of the single layer of crystals. The tightly held electrons, resulting in weaker bonds between the layers would attract the layers to each other. Beryllium and Boron should form similar crystal structures in their solid form.

In certain situations Carbon can have a tetrahedral crystalline structure in its solid form. This can be seen in diamonds. The dynamic crystalline structure of the Carbon nucleus is deformed by heat and pressure to allow the tetrahedral crystalline structure of diamonds. When Carbon is in a triple bonding situation with another Carbon the dynamic crystalline structure of the nucleus deforms in the same way (acetylene). The dynamic crystalline structure of carbon allows for rotational motion but would require a large amount of energy to overcome the balanced forces of attraction and repulsion between the protons and neutrons. Carbon would tend to have vibratory motion prior to rotational motion. This may explain its very high melting point and the very high activation temperature of 4000 F necessary to combust solid carbon. The vibratory motion of carbon indicates that the shared electrons involved in the combining of carbon and hydrogen to create hydrocarbon fuels would have a region of motion that is tightly confined to the space between the carbon and hydrogen. The hydrogen electrons would take on the vibratory motion of the more powerful carbon nucleus thus positioning the proton in the hydrogen nucleus to the outside of the fuel molecule.

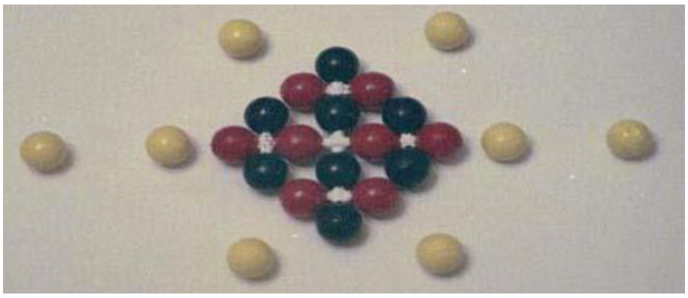
The next element on the periodic table is Nitrogen. The dynamic crystalline structure of nitrogen would result in one very tightly held electron, three less tightly held electrons, and three electrons in the bonding orbital. Notice how one side of the dynamic crystalline structure of the Nitrogen nucleus contains a proton while the other side contains a neutron. When two Nitrogen atoms form a Nitrogen molecule, the molecule would tend to force the neutron sides of the nuclei away from each other causing the proton side to attract the shared electrons causing the bonding. The electrons would have a greater tendency to gravitate between the two nuclei in a tire shape similar to the single atom of Helium. Nitrogen would be in gaseous form and relatively non-reactive at room temperature. This could explain the high activation temperature of 2500 F necessary to combust nitrogen in air.

Nitrogen

Nitrogen

Nitrogen

The elements of importance in hydrocarbon based combustion processes are Hydrogen, Carbon, Nitrogen, and Oxygen. The final element to be discussed will be Oxygen. The dynamic crystalline structure of the nucleus of Oxygen results in two tightly held electrons, four less tightly held electrons and two electrons in the bonding orbital.



Oxygen

The diameter of the nucleus of oxygen is 5.034 nuclei particles. As can be seen in the above picture the proposed dynamic crystalline structure fits into the region of space in the shape of a sphere that describes the size of the oxygen nucleus.

Notice how the protons and neutrons are arranged into four sets of structures similar to the Helium structure. The structures shown at the top and bottom will be designated as structures #1 and #3. The structures to the left and right will be designated as structures #2 and #4. Structures 1and 3 account for the four less tightly held electrons. Structures 2 and 4 account for the two tightly held electrons and the electrons in the bonding orbital. The rotation of the Helium atom can be applied in the following way.

The neutrons in structure 2 rotate about an axis of rotation drawn through the center of the protons of structure 2. The protons rotate about an axis of rotation drawn through the center of structure 2 and perpendicular two the paper.

The axis of rotation of the neutrons of structure 3 will be drawn through the center of structure 3 and perpendicular two the paper. The protons of structure 3 will rotate about an axis of rotation drawn through the center of the neutrons of structure 3.

The neutrons in structure 4 rotate about an axis of rotation drawn through the protons of structure 4. The protons rotate about an axis of rotation drawn through the center of structure 4 and perpendicular two the paper.

The protons of structure 1 will rotate about an axis of rotation drawn through the center of the neutrons of structure 1. The neutrons of structure 1 will rotate about an axis of rotation through the center of structure 1 and perpendicular two the paper.

The dynamic crystalline structure of Oxygen can readily absorb energy in the form of rotation of the protons and neutrons while maintaining a balance of the attractive and repulsive forces between the protons and neutrons. One important characteristic of the dynamic crystalline structure of Oxygen is the paring of the protons responsible for the most tightly held and most loosely held electrons in the axes of rotation shown above. The protons of structures 2 and 4 rotate from the inside of the nucleus to the outside of the nucleus and back. The protons' functions exchange as they rotate. The protons responsible for generating the weakest force of attraction become the protons responsible for generating the strongest force of attraction. Then they switch back again. When two Oxygen atoms form an Oxygen molecule this changing in the protons functions results in an oscillating motion of the most tightly held electrons. The most tightly held electrons spend a portion of their time in the bonding orbital and act as unbound electrons in the bonding orbital. Then they spend a portion of their time tightly held. This makes oxygen very reactive. The unbound electrons in the bonding orbital cause the generation of a negative static field. This negative static field will be attracted to a positive static field. The negative field will also be attracted to a magnetic field. According to ref – 2 and ref – 1, Oxygen molecules have been shown to be attracted to a magnetic field. It has been theorized that there are unpaired electrons in the bonding orbital of an Oxygen molecule.

Hydrocarbon based fuels tend to have hydrogen on the outside of the molecule and carbon in the middle. The hydrogen tends to create a positive field because the sharing of its electron with carbon tends to expose the hydrogen nuclei. The oxygen causes a negative field. Combustion occurs when the fuel and oxygen come close enough to each other to allow the electrical affinity to disassociate the molecules which then reform into water and carbon dioxide. A mechanical means must be used to bring the fuel and oxygen to with in a certain distance of separation. Activation energy must then be added so that the energy can be stored in the form of increased rotational motion causing a stronger electrical field. The electrical field draws the fuel and oxygen closer together until the attraction between the oxygen and hydrogen is stronger than the attraction between the hydrogen and carbon. The molecules then spontaneously disassociate and recombine.

The following enhanced understanding of atomic structure can be achieved when considering the above information. The fundamental particles in the nucleus of atoms spontaneously arrange themselves into dynamic crystalline structures. These dynamic crystalline structures dictate the properties of the atoms and how they react with each other. These dynamic crystalline structures also dictate how atoms absorb and release energy. Additionally the randomness of motion is limited to definable regions of motion.

The role of dynamic crystalline structure in combustion can be better understood after investigating the phenomena of inertia.

One fundamental concept of physics is that of inertia. Inertia is the resistance to change or motion. The opposite of inertia would be the affinity of change or motion.

Combustion is a reaction between oxygen and fuel in an essentially gaseous state. A good description of the characteristics of molecules in a gaseous state is needed to understand the combustion process. The current theory states that the molecules of a gas are constantly moving at a high rate of speed in linear motion. The linear motion is said to store kinetic energy. When confined to a container the gas molecules impact the walls of the container and each other to produce pressure. When heated the molecules move faster and impact harder creating higher pressures. This description works well for pressures above "0" but does not explain a pressure of zero or a vacuum. A pressure of zero would mean no impacts and the loss of all kinetic energy. A vacuum cannot be explained by impacts.

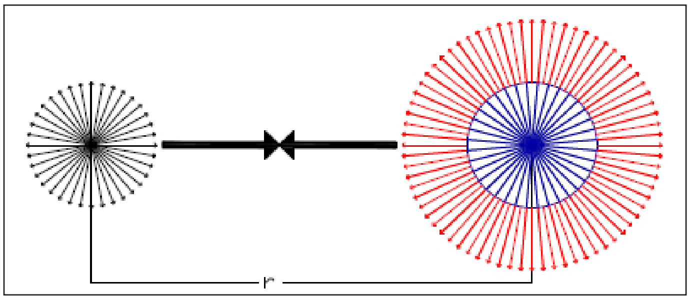
The above description of molecular structure along with the concept of inertia can be used to describe the characteristics of molecules in a gaseous state. The molecules have inertia so they will remain stationary unless an external force is applied. The molecules of gas in a container are not moving with linear motion they are evenly distributed in a stationary lattice type configuration that is the result of a balance of the forces of attraction and repulsion between the various molecules. The particles that make up the molecules have rotational or vibratory motion within the confines of the molecule. When multiple gases are contained in a container they distribute themselves equally through out the container as a result of balancing the electrical forces. For example air is 80 % Nitrogen and 20 % oxygen so there is 1oxygen for every 4 nitrogen molecules. A uniform distribution of each gas would result in a body centered square type distribution. The 4 nitrogen molecules would make up the 4 corners of a square and the oxygen would reside at the center of the square. When a gaseous fuel is introduced to the container it will be equally distributed through out the container thus spontaneously rearranging the gasses into another lattice type structure that is caused by the balancing of the forces and uniform distribution of each gas. For combustion to occur activation energy would have to be added to do the work of counter acting the spontaneous uniform distribution so that the fuel and oxygen could move close to each other and react while the nitrogen is pushed out of the way.

The gaseous molecules in the container are attracted to each other with equal and opposite forces of attraction. The molecules are repelled from each other with equal and opposite forces of repulsion. The forces of attraction and repulsion are due to the opposite electrical charges of the proton and electron. At a pressure of zero the forces of attraction equal the forces of repulsion. At pressures above zero the forces of repulsion are greater then the forces of attraction. At pressures below zero (vacuum) the forces of attraction are greater than the forces of repulsion. When confined to a container the gas molecules next to the walls of the container are close enough to the walls of the container such that the mass attraction force or magnetic forces can take effect. The outer most gas molecules are attracted with a large force or "attached" to the walls of the container. If the volume of the container is increased (like the classic piston experiment) the molecules attached to the walls of the container will stay attached. The attaching force is higher than the electrical forces of attraction and repulsion. When the volume of the container is expanded the average distance of separation between the molecules increases, because the piston pulls on the gas molecules attached to it and the gas molecules attached to the piston pull on adjacent gas molecules. The repulsive forces are due to like charges repelling. The attractive forces are due to the nucleus of one atom attracting the electrons of adjacent atoms and dipole forces. When the distance of separation increases the protons move further apart and repulsive forces decrease. The electrons can move such that the attractive forces of adjacent molecules are reduced less than the repulsive forces. Eventually a distance of separation will be reached at which the attractive forces between the gas molecules can no longer balance the force of the piston pulling on the gas molecules attached to it. A maximum vacuum will be reached. On earth there is a maximum vacuum pressure of 22.5 psi. Just as the magnetic forces have a distance of dissipation, the electrical forces have a distance of separation at which they are no longer effective. This description of the behavior of molecules in the gaseous state is useful in describing the flow of fluids in a pipe where it has been experimentally determined that the velocity of the fluid at the wall of the pipe is zero and increases as you move towards the center of the pipe. It is also useful in describing capillary action and things like evaporation. The water air interface of a puddle of water would be similar to the wall air interface of a container filled with air. This description of gaseous molecules also indicates that at pressures other than zero the gas molecules will have a negative inertia component and will have a tendency to change towards a distance of separation that result in equilibrium or a balance of attractive and repulsive forces.

The **fifth principle** of Scalia physics is inertia or mass is a resistance to change from a state of equilibrium. Inertia can be converted into energy which is the absence of equilibrium and an affinity for change toward a state of equilibrium.

The **sixth principle** of Scalia physics is a nucleus has a static electrical charge and is spherical in shape therefore the nucleus has a charge density on its surface that can be calculated. The Surface Charge Density (SCD) of the Nucleus would be the charge on the nucleus divided by the surface area of the nucleus. The charge density would be in Coulombs per meter squared. If the nucleus has a charge density on its surface than a charge density can be calculated for (R) a point a particular distance from the surface of the nucleus. The charge density at that distance would be the charge on the nucleus divided by the surface area of the sphere whose radius is equal to the distance from the center of the nucleus to the point in question.

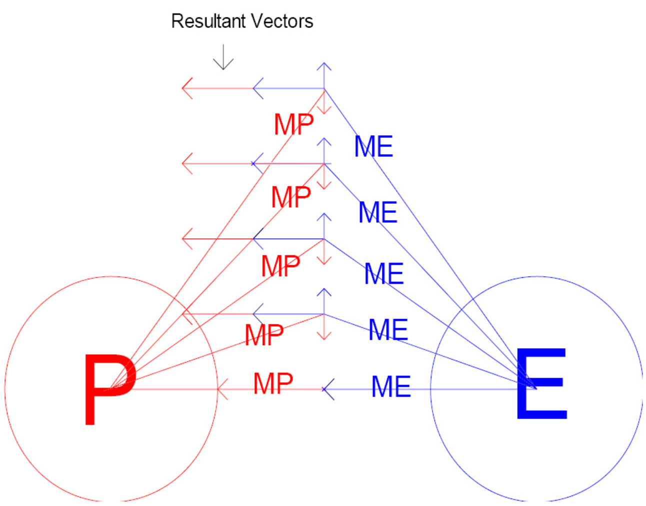
Earlier it was proposed that the electrical forces could be described by vector quantities. The force of attraction can be shown as the sum of vector quantities. The direction of the vector is radially inward on sphere P (the proton) and radially out of sphere E (the electron). The distance of separation between the centers of the spheres is r.



The charge density would be calculated as follows.

Separation r	Radius of Sphere	Charge	Charge Density
1.20E-15	6.00E-16	1.60E-19	3.5402E+10

The total force would be the sum of the resultant vector quantities between the spheres. The total force could be resolved into a circular area between the spheres. The circular area would have a resultant charge density and resultant area. The force would be coulombs per meter-squared times the resultant square meters involved or coulombs. This would be similar to pounds per square inches times the square inches involved in hydraulic pressure and force.



If a line drawn between the centers of the two spheres is called 0 degrees, the vectors would have to be resolved from 0 to 90 degrees. Any vectors beyond 90 degrees would not have a resultant vector in a direction that would cause attraction. The resultant from 0 to 90 would then have to be rotated 360 degrees on an axis of rotation drawn between the spheres and would create the circular area involved in the force of attraction mentioned above.

Coulombs law can also be used to describe the force of attraction. Force = K $((q_1*q_2)/r^2)$ q is the charge in coulombs and r is the distance from center to center between the proton and electron in meters. K = 9E9 Nm^2/C^2, so the force of attraction is in neutons.

If 1.2E-15 meters separate the proton and electron, the force of attraction could be calculated as follows. Force = K $((q_1*q_2)/r^2)$ = 9E9((1.60219E-19 * 1.60219E-19)/ (1.2E-15)^2 = 160 N

The force of attraction would equal the force of equal mutual attraction so:

Force N = Charge Density * area

160 N = 3.5402E10 * area

Area = 160 N / 3.5402E10 = 4.53E-9 meters squared

Area of a circle = 3.14 * Radius squared

Radius = the square root of area / 3.14 = 3.79905E-05 meters

The radius of the circle that describes the area of the resultant vectors divided by the radius of the sphere that describes the charge density (1/2 the distance of separation) would be the tangent of the angle through which the resultant vectors were summed. This should be 90 degrees. The following calculations are made for the attractive forces between the proton and electron in the hydrogen atom. The "radius of sphere" column is the radius of the sphere used to calculate the force of equal mutual attraction and in this case would be half way between the electron and proton. The "charge" is the charge of the proton or electron. The "charge density" is charge divided by the surface area of the sphere used to calculate the charge density. The "area" is the circular area used to calculate the force of attraction (coulombs per meter squared times meters squared or force calculated using coulombs law divided by calculated charge density at point of equal mutual attraction). The "radius" is the radius of the circular area. The "tangent" is the radius of the circular area divided by the radius of the sphere used to calculate charge density. The "degrees" is the angle described by the tangent and is equal to the angle through which the vectors were resolved. The angle drops below 90 degrees in the E-09 meter range.

Separation r	Radius of Sphere	Charge	Charge Density	Area	Radius	Tangent	Degrees
1.00E-15	5.00E-16	1.60E-19	5.09E+10	4.53E-09	3.80E-05	7.60E+10	90.0000
1.00E-14	5.00E-15	1.60E-19	5.09E+08	4.53E-09	3.80E-05	7.60E+09	90.0000
1.00E-13	5.00E-14	1.60E-19	5.09E+06	4.53E-09	3.80E-05	7.60E+08	90.0000
1.00E-12	5.00E-13	1.60E-19	5.09E+04	4.53E-09	3.80E-05	7.60E+07	90.0000
1.00E-11	5.00E-12	1.60E-19	5.09E+02	4.53E-09	3.80E-05	7.60E+06	90.0000
1.00E-10	5.00E-11	1.60E-19	5.09E+00	4.53E-09	3.80E-05	7.60E+05	89.9999
1.00E-09	5.00E-10	1.60E-19	5.09E-02	4.53E-09	3.80E-05	7.60E+04	89.9992
2.00E-09	1.00E-09	1.60E-19	1.27E-02	4.53E-09	3.80E-05	3.80E+04	89.9985
3.00E-09	1.50E-09	1.60E-19	5.66E-03	4.53E-09	3.80E-05	2.53E+04	89.9977
4.00E-09	2.00E-09	1.60E-19	3.18E-03	4.53E-09	3.80E-05	1.90E+04	89.9970

5.00E-09	2.50E-09	1.60E-19	2.04E-03	4.53E-09	3.80E-05	1.52E+04	89.9962
6.00E-09	3.00E-09	1.60E-19	1.41E-03	4.53E-09	3.80E-05	1.27E+04	89.9955
7.00E-09	3.50E-09	1.60E-19	1.04E-03	4.53E-09	3.80E-05	1.09E+04	89.9947
8.00E-09	4.00E-09	1.60E-19	7.95E-04	4.53E-09	3.80E-05	9.50E+03	89.9940
9.00E-09	4.50E-09	1.60E-19	6.29E-04	4.53E-09	3.80E-05	8.44E+03	89.9932
1.00E-08	5.00E-09	1.60E-19	5.09E-04	4.53E-09	3.80E-05	7.60E+03	89.9925
1.00E-07	5.00E-08	1.60E-19	5.09E-06	4.53E-09	3.80E-05	7.60E+02	89.9246
1.00E-06	5.00E-07	1.60E-19	5.09E-08	4.53E-09	3.80E-05	7.60E+01	89.2462
1.00E-05	5.00E-06	1.60E-19	5.09E-10	4.53E-09	3.80E-05	7.60E+00	82.5041
1.00E-04	5.00E-05	1.60E-19	5.09E-12	4.53E-09	3.80E-05	7.60E-01	37.2348
1.00E-03	5.00E-04	1.60E-19	5.09E-14	4.53E-09	3.80E-05	7.60E-02	4.3461
1.00E-02	5.00E-03	1.60E-19	5.09E-16	4.53E-09	3.80E-05	7.60E-03	0.4354
1.00E-01	5.00E-02	1.60E-19	5.09E-18	4.53E-09	3.80E-05	7.60E-04	0.0435
1.00E+00	5.00E-01	1.60E-19	5.09E-20	4.53E-09	3.80E-05	7.60E-05	0.0044

When applied to the combustion process we can see that a mechanical means must be used to move the fuel to a distance of separation in the 5.00E-09 meter range. After this the electrical attraction can take over and complete the combustion reaction. An average distance of separation between the fuel and oxygen of no more than 5.00E-09 meters must be maintained in order for the combustion reaction to continue. The activation energy is the energy necessary to overcome the inertia of the uniform distribution of the nitrogen, oxygen and fuel in the gaseous mixture by causing increased electrical attraction between the hydrogen nuclei and oxygen.

The following forces of attraction were calculated using coulombs law.

Force = K $((q_1*q_2)/r^2)$

Separation r	r squared	Charge Squared	Constant K	Force N
3.70E-15	1.37E-29	2.56701E-38	9.00E+09	1.69E+01
3.70E-11	1.37E-21	2.56701E-38	9.00E+09	1.69E-07
3.70E-10	1.37E-19	2.56701E-38	9.00E+09	1.69E-09
3.70E-09	1.37E-17	2.56701E-38	9.00E+09	1.69E-11
3.70E-08	1.37E-15	2.56701E-38	9.00E+09	1.69E-13
3.70E-05	1.37E-09	2.56701E-38	9.00E+09	1.69E-19
3.70E+00	1.37E+01	2.56701E-38	9.00E+09	1.69E-29

The following forces of attraction were calculated using the charge density times area method

Separation	Charge Density	Area	Force C
3.70E-15	3.7238E+09	4.5319E-09	1.69E+01
3.70E-11	3.7238E+01	4.5319E-09	1.69E-07
3.70E-10	3.7238E-01	4.5319E-09	1.69E-09
3.70E-09	3.7238E-03	4.5319E-09	1.69E-11
3.70E-08	3.7238E-05	4.5319E-09	1.69E-13
3.70E-05	3.7238E-11	4.5319E-09	1.69E-19
3.70E+00	3.7238E-21	4.5319E-09	1.69E-29

The charge density method and coulombs law method are in agreement when used to calculate the force of attraction. Analysis of the units show that coulombs law measures the force in neutons and the charge density method measures the force in coulombs. This means that coulombs is a measure of force and allows for the following comparison of matter and electricity.

The study of physics has shown that matter has an inertia component called mass. Physics has also shown a similarity between electricity and matter in that there is a force of attraction that is described by the following similar equations:

Force = $G(m_1*m_2)/r^2$ for matter

Force = $K(q_1*q_2)/r^2$ for a charged sphere

Through mathematics it can be shown that matter and electricity can be described in very similar ways. It can be shown that like matter electricity has an inertia or mass component. A coulomb is the force necessary to give an electrical mass of one kilogram an acceleration of 1 meter per second squared. The above equation used to calculate the force of mass attraction uses mass. By changing the proportionality constant force can be used instead of mass. The equation to calculate the force of attraction between charged particles uses force to make the calculation. By changing the proportionality constant mass can be used to calculate the force of attraction. The following calculations show the similarity between matter and electricity.

Matter	Electricity
Inertia = mass measured in kilograms	Inertia = mass measured in kilograms
$E = MC^2$	$E = MC^2$
Energy = Inertia * speed of light squared	Energy = Inertia * speed of light squared
For matter gravity	For electrical gravity
Acceleration due to gravity = 9.8 m/s^2	Acceleration due to gravity = 3.5433m/s^2
$9.8 = \Pi^2$	3.5433 = the square root of 4Π
Acceleration Squared = Π^4	Acceleration Squared = 4Π
Force = mass * acceleration	Force = mass * acceleration
Work = Force * change in distance	Work = Force * change in voltage
Work = Force * $(d_f - d_o)$	Work = Force * $(V_f - V_o)$
Force = $G_m(m_1*m_2)/r^2$ when using mass	Force = $K_f(q_1*q_2)/r^2$ when using force
G_m = 6.67E-11 NM^2 / kg^2	K_f = 9E9 NM^2 / C^2 or M^2 / C
N is Newtons, M is meters, kg is kilograms	N is Newtons, M is meters, C is coulombs
Kilograms is a measure of mass	Coulombs is a measure of force =$C/M^2 * M^2$
Force = $G_f(F_1*F_2)/r^2$ when using force	Force = $K_m(m_1*m_2)/r^2$ when using mass
F is in newtons	m is inertia in kilograms
$G_f = G_m$ /(acceleration due to gravity)^2	$K_m = K_f$ * (acceleration due to gravity)^2
$G_f = G_m / \Pi^4$	$K_m = K_f$ * 4Π
G_f = 6.84E-13 M^2 / N	K_m = 1.1299E11 NM^2 / kg^2
N is Newtons, M is meters	N is Newtons, M is meters, kg is kilograms
	E_o= 1 / 4ΠK=8.85E-12permittivity constant

The **seventh principle** of Scalia physics is that electricity has a mass or inertia component. One electron or proton, 1.60219 E -19 coulombs of charge has an electrical inertia of 4.5217E-20 kilograms (1.60219 E -19 C / 3.5433 m/s^2). **One coulomb of charge has electrical inertia of .2822 kilograms. When one coulomb of charge is converted into heat energy 2.822 E 16 joules of heat is released (E = MC^2so E = .2822 kilograms times (speed of light squared) = 2.5363 E 16 Joules). One Coulomb of charge has 2.5363 E 16 joules of potential energy stored in its inertia. The combustion reaction results in the conversion of electrical mass into energy.** The energy released from combustion that can not be described by bond energy differences can be described by the conversion of electrical inertia into energy.

The following calculations can be used to account for the energy released through conversion of electrical inertia.

Charge density (CD)=charge on nucleus / (12.5714 * (R^2))

R is the distance from the center of the nucleus to a particular point in question.

Example Carbon – Hydrogen attraction

CD Hydrogen = CD Carbon

CDH = 1.6E-19 / (12.5714(RH^2))

CDC = 9.61E-19 / (12.5714(RC^2))

1.6E-19 / (12.5714(RH^2)) = 9.61E-19 / (12.5714(RC^2))

1.6E-19 (RC^2) = 9.61E-19 (RH^2)

(1.6E-19 / 9.61E-19) (RC^2) = RH^2

.016649(RC^2) = RH^2

.408(RC) = RH

RH + RC = DISTANCE OF SEPORATION

.408(RC) + RC = DISTANCE OF SEPORATION

1.408(RC) = DISTANCE OF SEPORATION

RC= DISTANCE OF SEPORATION / 1.408

RH = DISTANCE OF SEPORATION – RC

If a carbon and a hydrogen atom are 1.5 angstroms apart their force of equal attraction for each other's electrons in the bonding orbital can be calculated as follows.

DISTANCE OF SEPORATION = 1.5E-10 Meters

RC = 1.5E-10 Meters / 1.408 = 1.065E-10 Meters

RH = 1.5E-10meters – 1.065E-10 Meters = .435E-10 Meters

Charge density of the force of attraction

CDH=1.6E-19/(12.5714(RH^2))=1.6E-19/(12.5714(.435E-10^2)) = 6.73 Coulombs per meter squared CDC = 9.61E-19 / (12.5714(RC^2)) = 9.61E-19 / (12.5714(1.065E-10^2)) = 6.73 Coulombs per meter squared

The charge density of the equal attraction is 6.73 coulombs per meter squared.

Example O – H Attraction

CDH = CDO

CDH = 1.6E-19 / (12.5714(RH^2))

CDO = 12.8E-19 / (12.5714(RO^2))

1.6E-19 / (12.5714(RH^2)) = 12.8E-19 / (12.5714(RO^2))

1.6E-19 (RO^2) = 12.8E-19 (RH^2)

(1.6E-19 / 12.8E-19) (RO^2) = RH^2

.125(RO^2) = RH^2

.35355(RO) = RH

RH + RO = DISTANCE OF SEPORATION

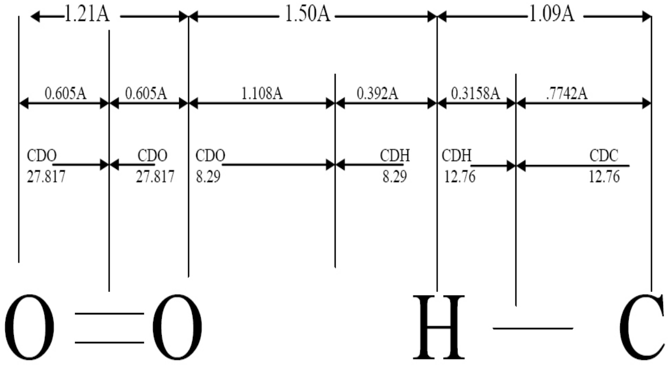
.35355(RO) + RO = DISTANCE OF SEPORATION

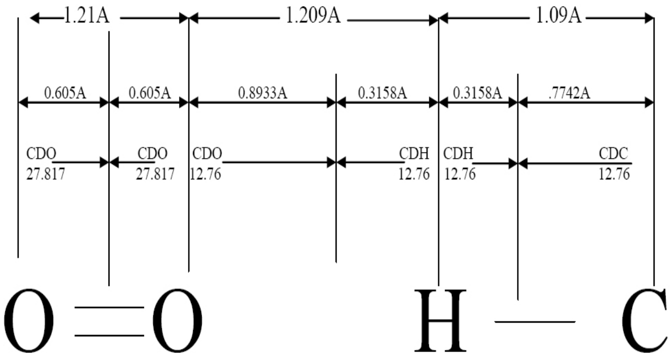
1.35355(RO) = DISTANCE OF SEPORATION

RO= DISTANCE OF SEPORATION / 1.35355

RH = DISTANCE OF SEPORATION – RO

The charge density of the equal mutual attraction to the electrons in the bonding orbital can be calculated for Oxygen and fuel molecules as they approach each other as follows.





When a distance of 1.5 angstroms separated the fuel and the Oxygen, the force of attraction between the Hydrogen and Carbon was stronger than the force of attraction between the Oxygen and Hydrogen. When the fuel and Oxygen moved closer and became separated by 1.209 angstroms the force of attraction between the Oxygen and the Hydrogen equals the force of attraction between the Carbon and Hydrogen. At this point the fuel molecule will decompose and spontaneous combustion will occur. At a distance of separation greater than 1.209 angstroms spontaneous combustion does not occur. If the fuel and oxygen do not have sufficient activation energy they cannot do the work of moving closer together.

The mechanism through witch combustion works can be stated as follows. If a fuel in the gaseous state and oxygen are placed in a container they will spontaneously arrange themselves into a uniform distribution in the container as a result of the balancing of their electrical forces of attraction and repulsion. If activation energy is added to the box in the form of heat, the dynamic crystalline structures of the nuclei will absorb the heat energy in the form of increased rotational and orbital motion. This increased motion will cause increased motion of the electrons as they tend to be dragged along by the protons. The orbital nature of the motion will cause the protons and electrons to appear at any one point in their path of motion more times per second resulting in a stronger force of attraction between the positive proton of the hydrogen in the fuel molecule and the negative unbound electrons of the oxygen. The increased force of attraction will counteract the inertia of the spontaneous uniform distribution and the fuel and oxygen will move closer together. As the fuel and Oxygen molecules move closer together the balance of attractive forces holding the molecules together changes. At a distance of separation of 1.209 angstroms the Oxygen's force of attraction for the Hydrogen is equal to the Carbon's force of attraction for the Hydrogen even though the Carbon and Hydrogen are bound together in the form of a fuel molecule. The fuel molecule decomposes and combustion occurs.

The following analysis of the previously described methane combustion reaction is a quantification of the amount of electrical mass converted into heat energy for the particular known methane combustion reaction.

CH_4 (g) + 2O_2 (g) → CO_2 (g) + 2H_2O (l) + 890KJ

In this particular methane combustion reaction 890 KJ/mol of heat was released. 686 KJ/mol can be attributed to changes in bond energies and 204 KJ/mol can be attributed to the conversion of mass into energy. 8.04E-12 coulombs or 2.27E-12 kilograms of electrical inertia was converted into heat energy.

Using the above container analogy the following calculations can be made to account for the consumed electrical inertia. One mole of methane and two moles of oxygen are put into a container at STP. After combustion the container will be returned to STP by the loss of heat to the outside of the container.

One mole of a gas at STP occupies 22.414 liters or .022414 cubic meters of space so the container volume is .022414 * 3 = .067242 cubic meters.

There are 6.022E23 molecules per mole of gas so there are 1.8066E^24 molecules in the container. .067242 cubic meters / 1.8066E^24 molecules = 3.722E-26 Cubic meters per molecule. The average distance of separation = (3.722E-26)^.3333 = 3.345E-9 meters

The force of equal mutual attraction and repulsion between the oxygen and fuel at an average distance of separation of 3.345 E-09 meters can be calculated is as follows.

RO= DISTANCE OF SEPORATION / 1.35355

RH = DISTANCE OF SEPORATION – RO

RO = 3.345E-9 / 1.35355 = 2.47153E-09 meters

RH = 3.345E-9 - 2.47153E-09 = 8.7347E-10 meters

CDH = 1.6E-19 / (12.5714(RH^2)) = .01668 coulombs/meter squared

CDO = 12.8E-19 / (12.5714(RO^2)) = .01668 coulombs/meter squared

Force N = Charge Density * area

Area = 4.53E-9 meters squared

Force = .01668 coulombs/meter squared * 4.53E-9 meters squared = 7.55604E-11 coulombs Electrical Inertia of Uniform Distribution = 7.55604E-11 coulombs / 3.5433 m/S^2= 2.3E-11 Kilograms

Activation energy must be added to overcome the inertia of the uniform distribution causing the fuel and oxygen to move from an average distance of separation of 3.345 E-09 meters to an average distance of separation of 1.21E-10 Meters. At that point the force of attraction between the hydrogen and carbon will equal 5.78E-8 Coulombs and the force of attraction between the oxygen and hydrogen will equal 5.78E-8 Coulombs. However the attraction between the two oxygen atoms in the oxygen molecule will be 1.26E-7 coulombs. The fuel molecule will disassociate. and become 4 moles of hydrogen and 1 mole of carbon. The container was at STP with the original 3 moles of gas. Now there are 7 moles because of the disassociation of the fuel molecule. The container volume is constant and can not increase in pressure because there is a balance in the forces of attraction so according to the ideal gas laws there has to be an increase in temperature. The temperature increase is manifested as increased rotational and orbital motion in the nuclei of the hydrogen, oxygen, and carbon. The increased motion causes an increased affinity for the oxygen. The oxygen molecule disassociates resulting in a total of 9 moles of atoms in the container. The velocity of the motion of the nuclei reaches the speed of light. The oxygen combines with hydrogen to make water and with carbon to make carbon dioxide. Upon combining a portion of the electrical inertia is converted into energy and discharged from the container in the form of electromagnetic waves creating light. The velocity of nuclei motion slows to the measured temperature of the combustion flame. The activation heat and heat from combustion are then allowed to escape from the box. The water and carbon dioxide are allowed to cool to STP (thus returning the contents of the container to equilibrium). The 2 moles of water will be in liquid form and occupy .000032 cubic meters. The one mole of carbon dioxide will occupy the remaining .06721 cubic meters. The average distance of separation will be 4.82E-9 which is larger than the average distance of separation of 3.345E-9 meters for a gas at STP. **The electrical inertia converted into energy and released during the combustion process is accounted for by the loss of inertia in the carbon dioxide resulting in a change from equilibrium and an affinity for the energy necessary to change to a state of equilibrium.** The Carbon dioxide would be inducing a vacuum on the container so it would have a disorder that is greater than its energy level. Energy would have to be added in order for the carbon dioxide to be at equilibrium or a pressure of zero. The energy necessary to reach equilibrium would be the energy necessary to expand one mole of CO2 at constant pressure from .022414 cubic meters to 06721 cubic meters.

The ideal gas laws state that PV = NRT.

V1*T2 = V2*T1

V1 = .022414 cubic meters

T1 = 25 C

V2 =.06721 cubic meters

T2 = 75 C

1 Mole of CO2 = 44 grams = .044 Kg

1 Mole of CO2 = .022414 cubic meters

Density = 1.96 Kg/M^3

Specific Heat = .850 Kilojoules / Kg C

Energy required to raise the temperature of one mole of CO2 50 degrees C

= Specific Heat * Density * Volume * Delta T

= .850 Kj/KgC * 1.96 Kg/M^3* .022414 M^3* 50 C

= 1.867 Kilojoules 0r 1,867 Joules

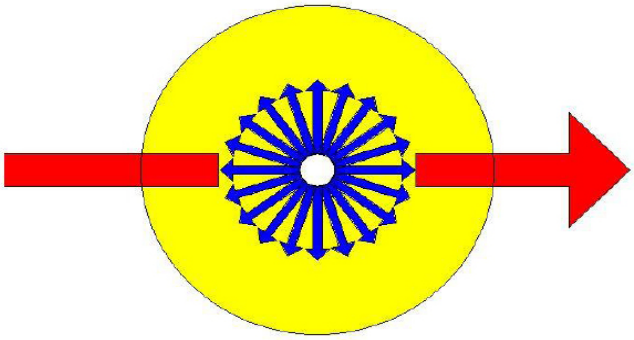
From this we see that there is 1,867 joules of energy missing from the contents of the container that can be attributed to inertia conversion and accounted for by a loss of electrical inertia in the container when cooled to STP.

Previously it was shown that 890 Joules of heat was released from the combustion of one mole of methane. Previously it was shown that 686 Joules of the heat released could be attributed to bond energy changes. Now it can be shown that the remaining 204 joules of heat can be attributed to inertia conversion. The balance of (1867 – 204) 1663 joules of energy is available for the emission of light, sound, and other forms of electromagnetic waves.

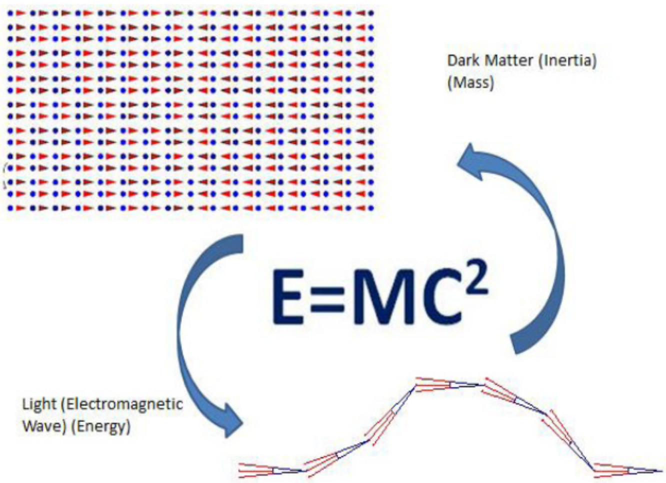
The goal of this description of combustion is to understand combustion in a way that lends itself well to computer modeling. The complexity of mixing gases and heat exchanges can result in cumbersome and memory consuming calculations. The importance of the newly proposed **Inertatron** and the resulting spontaneous arrangement of the dynamic crystal structure can be appreciated when applied to the production of electromagnetic waves.

The **Inertiatron** is a coin shaped particle with a mass equal to the electron. It is 1836 times smaller than the proton and has an electrical charge on one side of the coin that is 1836 times smaller than the electron's electrical field. It also has a magnetic charge on the other side of the coin that is 1836 times less than the neutron's magnetic field. It's small size and weak electrical force would allow a single Inertiatron to pass through a molecule with out effecting it. If a region in empty space was filled with electrons and Inertiatrons they would spontaneously form protons and neutrons resulting in the spontaneous formation of atoms and molecules with dynamic crystalline structures. After the conversion of a certain percentage of the Inertiatron into atomic particles the spontaneous uniform distribution of the particles would result in a distance of separation between the Inertiatron that is too great for continued reaction. Just like the combustion process the process of converting Inertiatron into atomic particles would stop at a particular distance of separation resulting in a uniform distribution of Inertiatron that has no effect on the atoms and molecules. The Inertiatron would be attracted to electrons on their electric side and repelled by electrons on their magnetic side. The Inertiatron would also be attracted and repelled by the neutrons. The Inertiatron would be attracted and repelled by protons. **Finally the magnetic side of the Inertiatron would be attracted to the electric side of another Inertiatron.** As stated previously the uniform distribution would result in a distance of separation that would result in no measurable effect on the atoms and molecules. However, as energy is added to the system and the dynamic crystalline structure results in increased orbital motion of the nuclei the charge density of the electrical fields generated by the molecules and atoms increase in intensity. When the velocity of the nuclei particles approaches the speed of light the electrical fields are powerful enough to drag around or affect the Inertiatron. The Inertiatron begin to line up nose to tail (magnetic to electrical) and form lines or chains. The orbital motion of the nuclei causes the chains of Inertiatron to take on a wave type motion resulting in electro magnetic waves. The energy contained in the wave results in the various frequencies and amplitudes of electromagnetic energy forming light, microwaves etc. When the waves interact with molecules the energy is strong enough to affect the molecules. Some interactions would result in a breaking of the chain of Inertiatrons and dissipation of the wave back into a uniform distribution of Inertiatron. Light has been determined to be electromagnetic waves that can have characteristics of particles.

When a jet breaks the speed of sound it gives off a sonic boom.



When a particle breaks the speed of light it gives off a light boom.



The **eighth principle** of Scalia physics is that "Dark Matter" can be defined as the uniform distribution of Inertiatron in space.

The **ninth principle** of Scalia physics is that electromagnetic waves such as light are formed by the alignment of Inertiatrons in a chain formation. The mechanism through which the propagation of an electromagnetic wave through space is achieved is the conversion of inertia, in the form of equilibrium distribution of Inertiatron in a region of space, into energy in the form of Inertiatron alignment in a chain that has an affinity to convert back into inertia once the wave has passed.

This leads to a model of molecular structure that can be defined by two specific particles that spontaneously react in a predictable way. The computing power necessary to model reactions between molecules is greatly reduced. The following are a couple of examples of what can be accurately modeled.

1. The combustion process as outlined above.

2. The relationship between heat, light, and electricity for LED advancement.

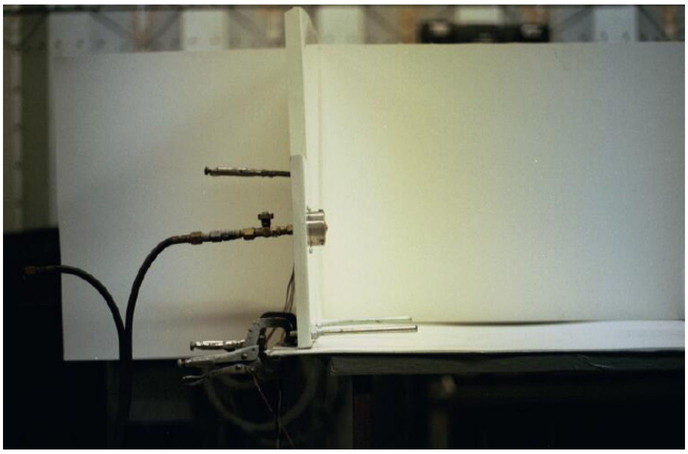
3. Air flow through a burner. Mass attraction causes a layer of air molecules to attach to the surfaces of the burner. Electrical fields generated by the dynamic crystalline structure of the molecules will affect the molecules in a predictable way allowing for the 3-d modeling of flow patterns through air vanes and holes and interactions with fuel.

The following experiments were conducted to try to validate and propose the preceding theories on molecular structure and combustion.

Experiment 1

Question – Does heating an already gaseous fuel such as acetylene prior to combustion effect the combustion reaction?

Apparatus - The following pictures show the apparatus used in the experiment. A standard acetylene tank, regulator, hose, and anti flash back valve used to deliver the fuel for an acetylene torch were used to deliver the fuel for the experiment. A devise was built which allowed the fuel to be heated just prior to combustion. A cn 132 temperature controller and solid-state relay that power cartridge heaters in the heating devise maintained the temperature of the fuel. A thermocouple provided communication between the temperature controller and the heating devise. The temperature controller allows temperature set points to be maintained. A manual valve was installed on the heating devise so that the flow of the fuel could be controlled.

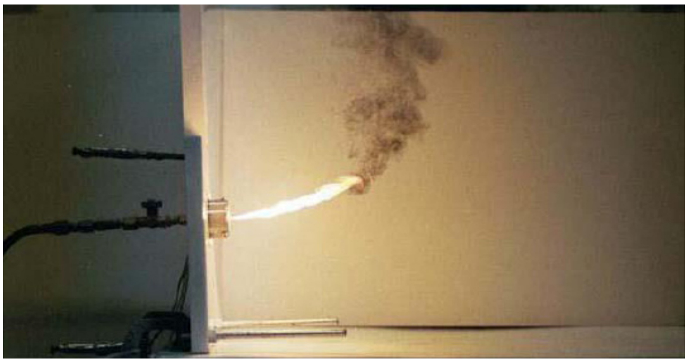


Procedure

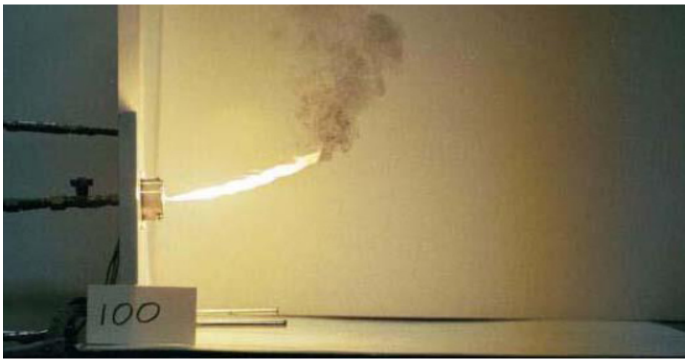
The manual valve was opened so that a steady flow of fuel could be maintained. The fuel was ignited and a steady flame was maintained with no heating of the fuel. Pictures of the flame were taken to document flame color and the amount of smoke with no heating of the fuel. The temperature controller was turned on and an initial set point of 100 degrees F was chosen. Pictures were taken to document flame color and the amount of smoke when the fuel was heated to the desired set point. The procedure was followed for set points of increasing temperatures.

Results

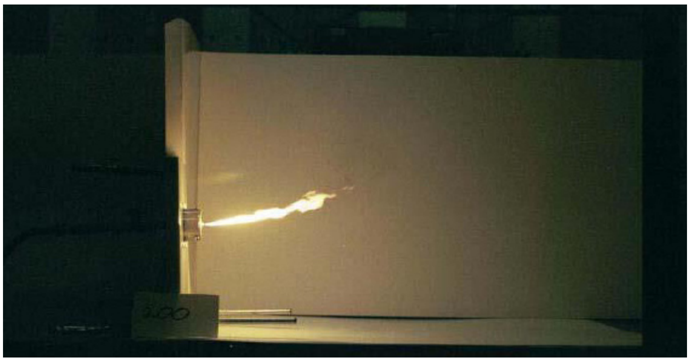
The following pictures show how flame color and amount of smoke were affected by heating the fuel prior to combustion.



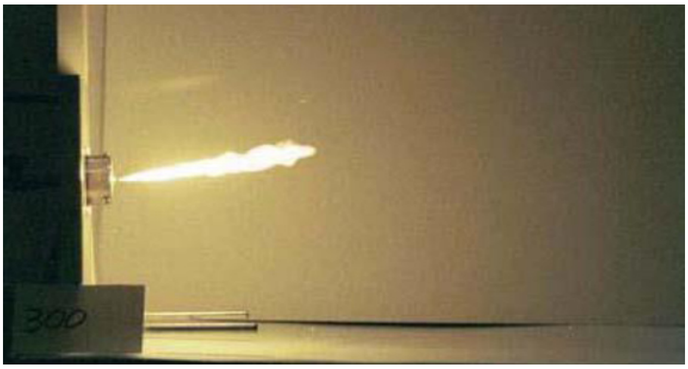
No Heating



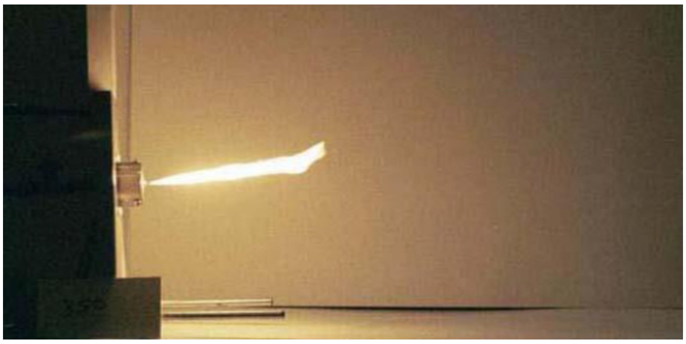
Fuel Pre-heated to 100 F



Fuel Pre-heated to 200 F



Fuel Pre-heated to 300 F



Fuel Pre-heated to 350 F

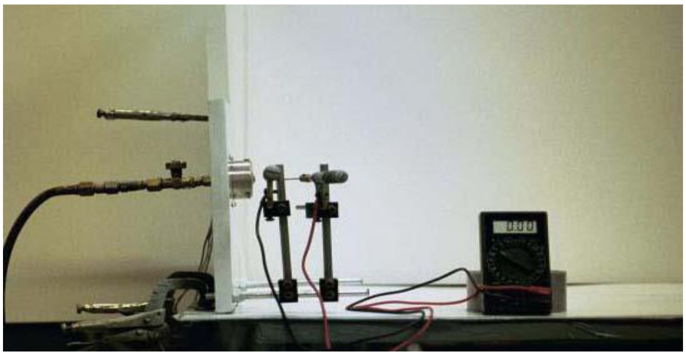
With no heating of the fuel solid Carbon is exhausted in the form of thick black smoke. The flame is a dark orange. When the fuel is heated to 100 F prior to combustion the flame is a brighter orange and the smoke becomes less thick. When the fuel is heated to 200 F prior to combustion the flame begins to turn more yellow and the smoke is almost gone. When the fuel is heated to 300 F prior to combustion the flame is a brighter yellow and the smoke is completely gone. When the fuel is heated to 350 F prior to combustion the flame becomes almost white. The flame also makes a louder rumbling sound.

The results of the experiment seem to indicate that heating the fuel prior to combustion has a positive effect on the combustion reaction of an already gaseous fuel such as acetylene.

Experiment 2

Question – Is there a measurable electrical component to combustion that can be measured and does heating the fuel prior to combustion affect the electrical component?

Apparatus - The apparatus was to same as the one used in experiment 1with the addition of a voltmeter connected to adjustable probes. The apparatus is pictured below.



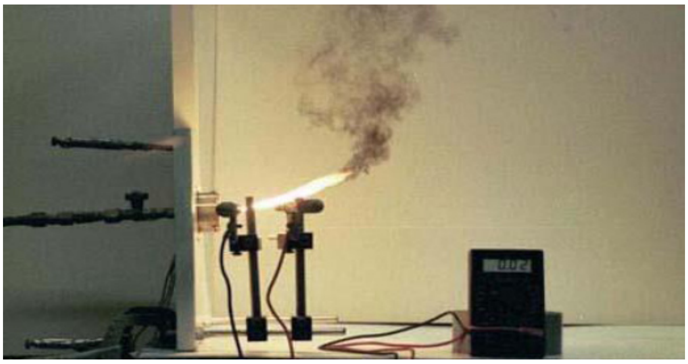
Procedure - The manual valve was opened so that a steady flow of fuel could be maintained. The fuel was ignited and a steady flame was maintained with no heating of the fuel. One of the probes was positioned such that it barely touched the flame. The other probe was positioned such that it was about one sixteenth of an inch away from the flame. The voltmeter was turned on to determine if there was a potential difference present. A photograph was taken to record the flame color, amount of smoke, and potential difference. The temperature controller was set to 100 F and turned on.

When the temperature of the fuel reached 100 F prior to combustion a photograph was taken to record flame color, amount of smoke, and potential difference. The procedure was followed for increased fuel temperature set points.

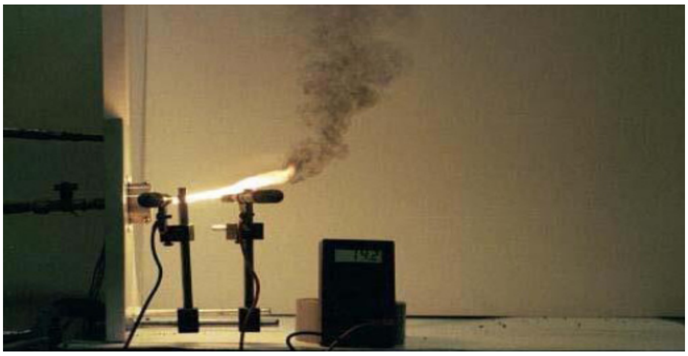
Atmospheric conditions

It was a partly cloudy day. It had rained all night the night before and part of the morning. The experiment was conducted at about 3 in the afternoon. The air temperature was 57 F. The barometric pressure was 30.18 and rising.

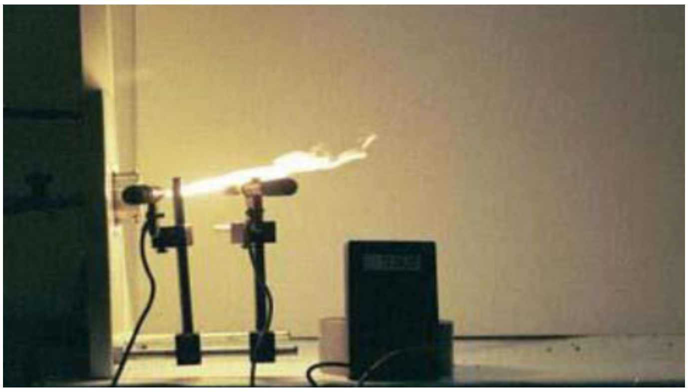
Results - The following pictures show how flame color, amount of smoke, and potential difference were affected by heating the fuel prior to combustion.



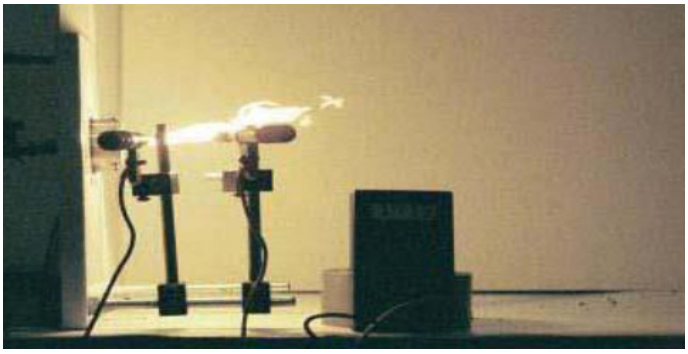
No Heating 0.02 Volts



100F 0.142 Volts



300 F 0.989 Volts



350 F 1.112 Volts

The results show that there is a measurable potential difference between the region of reaction and the air near the region of reaction. The results show that the potential difference is increased when the fuel is heated prior to combustion. The results show that heating the fuel prior to combustion causes more complete combustion. The smoke disappears and the flame color changes from dark orange to white.

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