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A Concept of Energy, Embracing Earth's Environmental Mechanisms

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Abstract
The universal force of attraction between all matter dominates Earth's 'environmental mechanisms' through the Moon's orbit and Man's concept of gravitational forces, creating intricate relationships between energy flow and the planet's ecosystems, such as photosynthesis, geothermal activity, biogeochemical movements and hydrological cycles. These dynamic reactions shape both the stability and evolution of the planet's systems. The Moon's gravitational pull regulates tidal movements, influencing marine ecosystems and coastal landscapes. Similarly, the intricate balances within biogeochemical cycles ensure the seamless transfer of nutrients between living organisms and the inert components of Earth's surface, sustaining life across the biosphere.

The Oceans cover over 70% of Earth's surface and are in perpetual motion due to earth's natural environmental mechanisms, providing vast natural 'energy storage' reservoirs for major kinetic energy resources around the globe. The development of Man's Science 'fluid mechanics' techniques, to harness this energy, will provide long-term sustainability for mankind.

Human activities are now impacting on all major ecosystems and the biogeochemical cycles they influence, and urgently requires careful identification and analysis. This requires new international laws on Climate Change and other related issues causing severe harm to all matter on our planet.

Man's present approach to nature's biogeochemical cycles for Earth's 'matter' must be addressed, particularly related to present laws of Physics and Chemistry, and with reference to the modern framework for the Periodic Table.

Keywords: Environmental Mechanisms, Fluid Mechanics, Boundary Conditions, Stratification, Kinematic Viscosity, Energy, biogeochemical process, Matter, Periodic Table.

Appendices: *[To be read in conjunction with]*
Appendix 1: Fluid Mechanics
Appendix 2: Additional Methodologies / Regional High Seas and Oceans

Addendum: *[for general reference]*

1. Periodic Table – Basic format / structure
2. Structure of the Atom
3. Atmospheric Prevailing Winds

Introduction

The universal force of attraction between all **matter** dominates Earth's environmental mechanisms, with the Moon's location prominent.

This **gravitational** concept embraces the intricate relationships between energy flow and the planet's ecosystems, such as photosynthesis, geothermal activity, biogeochemical cycles, and hydrological cycles. Indeed, it provides an approach towards a better understanding of these mechanisms in a sustainable manner.

Atmosphere[1]: The energy from the Sun **heats** the atmospheric matter, which rotates in unison with Earth and is responsible for creating the circulation of all **'elastic fluidised'[2] matter.** The curvature of Earth creates the variation of heat between the equator and the poles, producing two atmospheric (Hadley) cells; less dense air at the equator rises creating low pressure, and cold dense air falls at the poles.

The environmental mechanism on earth allows the air to rise at the equator and flow to the 30^{O} latitudes, creating three cells for each hemisphere, (Hadley / Ferrel / Polar)[3]. [Ref: Addendum 3]

The earth 's rotation on a tilted axis, produces perpetual motion of the oceans in the southern hemisphere, while there is a greater land mass in the northern hemisphere.
This creates complex global weather patterns across the six cells around the planet.
The dynamic of combined mechanism switching between temperature and pressure, drives the movement of air masses, influencing weather patterns and climatic zones.
The atmospheric mechanisms also facilitate the distribution of moisture, shaping ecosystems and weather systems across the planet, including atmospheric pollution[4].

Anthropology defines the **Coriolis effect,** resulting from earth's rotation**,** as the pattern of deflection taken by objects not firmly connected to the ground as they travel long distances around earth, and which is responsible for many of the critical weather patterns. At the equator a maximum distance is travelled in one day, approaching 1,000 miles[5], while the distance travelled at the poles, approaches zero travel. In the northern hemisphere the motion is to the east, while in the southern hemisphere it is to the west. The build-up of trade winds and cyclones are examples of the Coriolis effect.

Oceans[6]: The Sun's **energy** is directly responsible for the **stratification** process to earth's oceans, which creates the environmental mechanisms to produce layers of transition boundaries through the ocean's depths, vital for all marine life, as we know and understand it. In Lakes and small bodies of water, the warm surface layer is less dense and forms a **thermocline** *boundary condition*, above which is the 'epilimnion', with the cooler water disconnected below as the 'hypolimnion'.

In the Oceans, the thermocline's environmental mechanism is influenced by the depth of the ocean's waves, which creates a mixing process boundary layer condition in the upper 100 metres. The temperature decreases rapidly from the mixed upper layer of the ocean (epipelagic zone) to the much colder deep water in the thermocline (mesopelagic zone).

Below the thermocline are colder, denser waters, and below 3,300 feet to a depth of about 13,100 feet, the water temperature remains constant[7]. The deeper (stratified) layers contain colder, denser bottom waters where rare and unknown life forms exist[8].

The relationship between depth and temperature is significant, as different marine species thrive in specific layers. *This environmental mechanism may be a key area for studying the origins of life.*

Creatures who live at great depths do not have air in their bodies such as the swim bladders found in fish that live in more shallow waters. Without air in their bodies, the pressure problem is solved. Fish, crab, octopus, worms, limpets and clams are just some of the creatures found in the depths of the oceans.[9]

Despite its central role in the global climate, the Southern Ocean circulation is still one of the least understood ocean circulation systems of the planet[10].

The term El Niño (Spanish for 'the Christ Child') refers to a warming of the ocean surface, or above-average sea surface temperatures, in the central and eastern tropical Pacific Ocean[11]. The low-level surface winds, which normally blow from east to west along the equator ("easterly winds"), instead weaken or, in some cases, start blowing the other direction (from west to east or "westerly winds"). El Niño recurs irregularly, from two years to a decade, and no two events are exactly alike. El Niño events can disrupt normal weather patterns in the United States and globally.

The structural intricacies of ocean layers are further influenced by nutrient cycles and biological activity. In the epipelagic zone, where sunlight penetrates most effectively, primary producers like phytoplankton perform photosynthesis, generating the foundation of oceanic food webs. These upper layers are teeming with life due to nutrient upwelling, a phenomenon driven by ocean currents and the movement of tectonic plates. As depth increases, the availability of sunlight diminishes, creating stark contrasts in biodiversity and energy dynamics between the epipelagic and mesopelagic zones.

The mesopelagic zone, often referred to as the "twilight zone," hosts unique adaptations among its inhabitants, such as bioluminescence and specialized feeding mechanisms, enabling survival in low-light conditions.

This zone also serves as a transitional environment where carbon and nutrients are sequestered, playing a critical role in the global carbon cycle.
For example, phytoplankton, which are tiny plant-like organisms, flourish in sunlight-rich zones, whereas, zooplankton, which feast on these nutrients, occupy various depths depending on the time of day.

The 'high seas' is in perpetual motion, embracing vast kinetic energy resources[12], sufficient for long-term sustainability, and the Oceans are earth's 'natural **Energy Storage** reservoirs' for all mankind. Man's Science is now sufficiently developed to co-ordinate and organise a Structure Plan embracing the additional methodologies[13] to harness all earth's natural energy resources, based on 'Fluid Mechanics' concepts.

New Environmental Laws[14] to embrace the high seas vast energy resources are beyond the scope of this paper, but mention should be made that the high seas remain beyond national jurisdiction, at this time, and the new laws, when ratified, will require expansive amendments in future to embrace these natural energy resources.[15]

Climate change[16] is a part of 'Earth's environmental balance mechanism', defined by *'boundary conditions'* and based on '*Man's Laws of Science'*. Human activities are now impacting all major ecosystems and the biogeochemical systems they influence, necessitating careful identification and analysis. '*Earth Systems Science'*, encompassing geology and chemistry, pertains in part to 'the movement and transformation of chemical elements and compounds between living organisms', known as the *biogeochemical cycle*, which involves *'fluxian'[17] boundary conditions* through anthropological boundaries, and land matter conditions.

Environmental Mechanisms, embracing Greenhouse Gases (GHG).
Energy enters or leaves the Earth's environmental system through electromagnetic radiations. It radiates from the surface by 'infrared radiation', 'visible light' and 'ultraviolet radiation'. This temperature is controlled by the planet's environmental mechanisms and when Earth's surface absorbs as much energy as it releases, the planet's energy budgets are balanced, and the temperature remains stable.[18] The following points apply:

(i) Extremely **high energy** objects (Sun) emit high-energy electromagnetic radiation, classified as short wavelength, embracing **'ultraviolet radiation'** and **visible light**.

(ii) For **cooler energy objects**, such as Earth's surface, much less intense radiation has a longer wavelength radiation and is classified as **infrared radiation**.

(iii) Earth's atmosphere is not totally transparent to all electromagnetic radiations, it behaves as a selective filter, which absorbs, reflects and allows through distinctive radiations bands, dependent on the atmospheric make-up of the gases.

(iv) The physical properties of some gases tend to be **opaque to infrared radiations**. When present in the atmosphere, they reflect a proportion of gases emitted from earth back towards the surface, and this causes an imbalance, warming the earth's surface, both day and night. It prevents some of the heat absorbed from the Sun from being released back to space.

(v) This balancing environmental mechanism appears to be unique to our small planet, Earth. The mechanism is critical to life. Without the 'partial opacity' of Earth's atmosphere to infrared radiation, the planet's surface would reach sub-zero temperatures at night when cut-off from sunlight. Life forms would cease, as on the Moon.

Carbon dioxide is one of the primary contributors to the 'greenhouse effect', which traps heat within Earth's atmosphere. Its sources are varied, ranging from natural processes such as volcanic eruptions and respiration to human activities including the burning of fossil fuels and

deforestation. The environmental impact of CO_2 extends beyond the temperature rise condition; it influences ocean acidification, disrupts ecosystems, and accelerates biodiversity loss.

Matter is anything that occupies space, has mass, and is made up of substances called **elements**, which are composed of extremely small particles called **atoms**[19], and have specific **chemical** and physical properties. Man's Science classifies three 'body states' of matter as, gaseous / fluid / solid states, with the Science **'Fluid Mechanics'**[20], embracing gaseous as elastic fluids.

Man's Science explains the **atom** structure as comprising, protons, neutrons, and electrons, ***perceived within a sphere of influence***, controlled by 'attraction' and 'repulsion' forces, *and not by a boundary condition around that perceived sphere of influence*.

Size(Space): Man's Science has no 'real perception' of size related to the world's surroundings and our environment. He is unable to conceive the sheer magnitude of the Universe when related to the conceived size of the perceived atom, and is beyond the scope of this paper, except to mention a general observation in Addendum, 2.

The complete tabular array of all **chemical** elements is classified under the **'Periodic Table'**[21]**.**
The structure co-ordination of the chemical elements, organized by ***atomic number,*** is from the element with the lowest atomic number, hydrogen, to the element with the present highest atomic number, 'oganesson' (Fig 1)*. Reference Addendum 1- Important Basic Facts of present Periodic Table*.

The fundamental elements interact dynamically to form **molecules**, which are the building blocks of matter. For example, water (H_2O), a critical molecule for life, exhibits unique properties like high 'specific heat' capacity, 'cohesion', and 'surface tension', *which are essential for regulating Earth's climate and supporting ecosystems.*

Fluid Mechanics[22]**:** Under man's perceived mechanism, if a fluid is moving slowly, within a constrained space, a ***shear stress*** is created within the liquid called **'viscosity'. *Sir Isaac Newton***[23] referred to this as the ***'coefficient of molecular viscosity'***[24].

"All forms of life on earth are immersed in a fluid or another, either the air of the atmosphere or the water of a river, lake or ocean; even, soils are permeated with moisture. So, it is no exaggeration to say that life, including our own, is bathed in fluids. A slightly closer look at the situation further reveals that it is the mobility of fluids that makes them so useful to the maintenance of life, both internally and externally to living organisms".[25]

The study of 'matter' and its transformations[26] is not merely academic; Man's Laws of Science needs to underpin technological advancements and solutions to pressing global challenges, such as renewable energy and long-term sustainable resource management.

Energy / Matter Interactions:

Energy, the capacity to do work, is intricately connected to matter. In physics, the 'Law of Conservation' states that *energy cannot be created or destroyed but only transformed*. This principle governs natural processes and Classifications[27], from the photosynthesis that powers ecosystems, through biogeochemical processes, and to the geothermal activity driving tectonic shifts.
Fresh approaches towards a long-term Sustainable future: The connection between energy and matter is crucial in understanding Earth's systems and environmental mechanisms, as it determines the flow of nutrients, the cycling of carbon, and the dynamics of climate regulation.

Early History of the Elements and Original Periodic Table:

Mendeleev initiated the famous periodic law that **Element properties are a periodic function** and to organize the elements according to their atomic weight (later changed to Atomic No), while also leaving gaps for undiscovered elements that he predicted based on the periodicity of the table. This prediction was later confirmed with the discovery of gallium, scandium, and germanium, which had properties that matched Mendeleev's predictions.

Johann Wolfgang Dobereiner – The law of Triads 1829 - He observed that groups of three elements (triads) could be formed in which all the elements shared similar physical and chemical properties.

John Newlands, British, 1864 – first to arrange the elements into a periodic table with increasing order of atomic masses. He Identified pattern repeated every 8th element – 'law of Octaves'.

Mendeleev[28] (1834–1907) – Was considered the first for preparing a Framework Plan to set-up and record the idea of co-ordinating a structured range of elements (**1869)**.
He wrote Books on the principles for Chemistry, including:
- Organic Chemistry (carbon compounds & living things)
- Inorganic Chemistry (minerals.)

Julius Lothar Meyer[29] (1830–1895) – He arrived at the same theory as Mendeleev. They lived over 1000 miles apart, in the same period. *This synchronicity in elements discoveries raises questions about how shared knowledge and scientific exchanges of the time, like those at Heidelberg, could foster parallel development.*

Ernest Rutherford[30] (born August 30, 1871, was the first person to split the atom (1918). He is known for his pioneering studies of radioactivity and the atom. He discovered that there are two types of radiation, alpha and beta particles, coming from uranium.

Figure 1

Global Long-term Sustainability Project (embracing environmental mechanisms):
At last, Man has the knowledge to develop new innovative methodologies required to harness earth's natural energy resources. Vast kinetic energy reserves are available in the high seas, which cover over 70% of the surface of earth.

An early example of Man's Innovative ideas, was recorded in the late 60s, following research work into 'fluid mechanics' relating to 'thick liquids' for municipal sewage sludges.

Research studies[31] were successfully carried out on site to ascertain the effective range of *'kinematic viscosity'* of 'thick liquid' municipal sludges, embracing the importance of 'boundary conditions', and 'shear stress' mechanisms within a fluid. (Table 1) The kinematic viscosity of water was recorded at 0.000012 ft^2/sec. (Reference Appendix 1)
A research paper[32] was presented to the UK, Institution of Civil Engineers in 1971 and awarded recognition in July 1972. The results were adopted in the Leicester City Corporation's Sludge Disposal Project design works, to replace temporary facilities with a permanent structure, adjacent to their Compost Plant, and was successfully completed in 1970.
Table 1 furnishes the range of 'Kinematic Viscosity' figures used in the Design Works calculations for their successful "*Sludge Tankering Project"* at the Wanlip Sewage Treatment Works.

% solids	Calculated Kinematic Viscosity	Required pipe size	Time for 1,000 galls to flow to reservoir
2.39	.0007 ft ^{2}/sec	Transitional	Zone
2.67	.001 ft ^{2}/sec	-	-
4.27	.00552 ft ^{2}/sec	6" dia	22.85 mins.
4.27	.00552 ft ^{2}/sec	8" dia	7.12 mins.
4.27	.00552 ft ^{2}/sec	12" dia	1.44 mins.
4.27	.00552 ft ^{2}/sec	15" dia	.585 mins.
4.45	.011 ft ^{2}/sec	6" dia	46.00 mins.
4.45	.011 ft ^{2}/sec	8" dia	14.32 mins.
4.45	.011 ft ^{2}/sec	12" dia	2.88 mins.
4.45	.011 ft ^{2}/sec	15" dia	1.175 mins.

Range of Kinematic Viscosity values for Municipal Sludge
– Wanlip STW Sludge Project, 1971
(Imperial Units)

Table 1

With the Advent of the 'Biodiversity Before National Jurisdiction' (BBNJ)[33] Agreement being ratified, further important legislation is now required to embrace the additional methodologies for harnessing the natural kinetic energy storage in the Regional High Seas.
This Agreement recalled the relevant provisions of the United Nations Convention on the Law of the Sea (UNCLOS)[34] of 10 September 1982 and covered just the global surface for the territorial sea and its contiguous zone[35].

New legislation must include the regional areas of the High Seas for coastal nations, and to be embraced under the UNCLOS 'high seas sections'[36], to embrace the methodologies for harnessing natural kinetic energy storage zones.

i.) One methodology to identify is in the 'Epipelagic Zone'[37] of the high seas, which could embrace the traversing of sailing vessels over vast areas. Fluid mechanics

design techniques to be adopted to provide hulls of ships to be fitted with equipment during their passage journeys through the surface waters, to 'collect / hoover / transfer / store' the continuous kinetic energy produced. Major Energy Companies[38] to be set up to prepare schedules for multiple passages across the regional seas, with destinations to many energy ports within the coastal management zones.

ii.) Slope Currents contiguous to the Continental Shelves.

a. Japan's Kuroshio currents: Japan's coastline, due to unstable Teutonic plates, appear unsuitable for fixed turbines to the seabed. Reference 'Experimental verification of a floating ocean current turbine with single rotor for use in the Kuroshio current.'[39]
b. European "Slope Current around the British Isles, potential location for European Slope Current Project, embracing stabilised bathymetric seabed profile[40].

Summary, *and linkages to relevant environmental references.*

The Incompleteness and uncertainties of Man's Laws of Science towards a Long-term Sustainable Future have revealed much about the complexities of Earth's systems, and they also underscore the fragility of our small planet. By leveraging the principles of matter, energy, and environmental mechanisms, a sustainable future may be envisioned. This involves not only technological innovation but also a harmonious integration of human activities with the planet's natural cycles, ensuring that the balance essential for life is maintained for generations to come.

Pressure: Relentless increase in 'pressure's mechanism' throughout Earth's Ocean depths produce multiple linkage to other mechanisms, creating ever evolving environmental conditions which may be key areas for studying the origins of life as we currently understand it. Life's stratified layers, down to the Mariana Trench depth, are vital research areas for mankind.

It is now essential to restructure an intelligent approach towards setting out a UK structured framework for 'air pollution' controls based upon 'common but differential responsibility'[41].

Vast Kinetic Energy resources are available, once additional methodologies have been developed, to harness earth's natural energy resources, as it will provide a long-term sustainability for all mankind, once the World's legislation has been ratified and brought into force[42]. An approach towards a Structure Plan Model for Oceans total energy methodologies is recommended, based on proven modern project management services techniques. (APMS)[43].

Fluid Mechanics embraces the major 'environmental mechanisms'[44] within 'Man's Science'.

The protocol on environmental protection to the Antarctic treaty to be considered as a suitable model[45].

Appendix 1 **Fluid Mechanics**

Definition*: "A fluid is matter in a readily distortable form, so that the smallest unbalanced external force on it causes an infinite change of shape, if applied for a long enough time".*

Newton's Laws of motion[46]:
1st Law: Motion of object remains constant unless a force acts upon it.
2nd Law: force of an object is equal to its mass times its acceleration
3rd Law: two objects apply forces to each other, equal magnitude / opposite direction.

A *Newtonian Fluid*, such as water is perceived to operate in the '**turbulent flow' zone** range, with sufficient velocity to create the turbulent state. *Reference: '**Thin Liquids'.*** Materials with different physical properties, are termed ***Non-Newtonian Fluids***. Dense 'thicker' liquids are perceived under **'laminar flow'** range. *Reference: '**Thick Liquids'**.*

Viscosity: fluid's resistance to flow, (thickness of a fluid.)
Viscosity calculated in the Laboratory, known as **Absolute Viscosity**
Dynamic density calculated in the field, called the **kinematic viscosity[47]**.

Boundary Layer conditions create Inertia Force on fluid in motion.
Reynold's No = Ratio of Forces perceived in fluid motion, [***Inertia*** *force /* ***viscous*** *force.]*
Note: *Can only be used for one type of boundary face, such a* ***rugosity of circular pipe****, or* ***hull of ship motion*** *in water, or shape of plane wing in flight. Only perceives rugosity to particular shape of boundaries.*

'Boundary Layer': Influence on fluids flowing in circular Pipes:
'Thick Liquids' – Laminar flow zone properties – **Re** No. below 2300 Reynolds Number (applicable to flow in pipes only). Smooth flow conditions through circular pipes. C/S pipe velocities: 0 to Max^{m} in Centre. Flow conditions perceived as *shear stresses* on very large number of the 'shear rings" motion through its contiguous shear rings.
'Thin Liquids' – Turbulent flow zone properties set of curves based on bore roughness
Universal pipe friction diagram chart, adopted for pipes of all diameters and roughnesses, and for all velocities and 'kinematic viscosities. The uncertain theory requires a transitional zone chequered pattern, between the 2 zones. *See Diagram 1.*

Laminar Flow: Poiseuille[48] law or Poiseuille equation, is a physical law that gives the pressure drop in an incompressible and Newtonian fluid in **laminar flow** flowing through a long cylindrical pipe of constant cross section.

Turbulent Flow: Darcy[49] Equation is a theoretical equation that predicts the frictional energy loss in a pipe based on the velocity of the fluid and the resistance due to friction. It is used almost exclusively to calculate head loss due to friction in **turbulent flow.**

***End Note**: Temperature has a major effect on the viscosity of any fluid.*

Appendix 2.) Ocean Methodologies.

Information Sheet
26 June 2025
Subject: Additional Methodologies to harness Ocean Energy in the Regional High Seas[50].

Augmentation of present Methodologies to harness vast kinetic energy resources in the High Seas[51].

Proven performance of existing methodologies (Continental Shelf)
(1. La Rance[52] Tidal Power Station / 2. MayGen[53] Tidal Power Station)

1. *Tidal Range Projects* in coastal waters
Sihwa Lake Tidal Power Station is the world's largest tidal power installation, with a total power output capacity of 254 MW Megawatt. When completed in 2011, it surpassed France's 240 MW Rance Tidal Power Station, which was the world's largest for 45 years. It is operated by the Koreann Water Resources Corporation.

2. *Tidal Stream Projects* in coastal waters
MayGen Tidal Energy Project, continues to break records, delivering over 37GWh of clean and predictable renewable energy[54].
"*In December 2024, the final turbine of the four turbines for Phase 1 were deployed, and therefore the site is now fully operational. This means that the site is delivering 6 MW of power"*[55].

Classification for High Seas expected methodologies to harness Kinetic Energy resources in Oceans.

3. Epipelagic Zone (mixed layer) : *Ocean Passage collection projects* in regional high seas. *Reference 6.2.(i)*

Mesopelagic Zone – restricted to transition zone for carbon sequestration.

4. Slope currents contiguous to continental shelves.[56]
Continental Slope Stream Projects

5. Artic Ocean[57] Deepwater current along Oceans' transition zone

Deep Stream Oceans Projects

References:
Energy Act 2023 /footnote, Addendum A, p24
Reference, Part I New Domestic Law, Patentability, Inventive step

Addendum 1.	**Periodic Table – Basic format / Perceived Structure[58]**

118 atoms are classified in the form of 7 periods (Rows) and 18 groups (Columns) .

To follow the perceived structure of physical statistics, two strings named **lanthanides** and **actinides** are located below in 2 rows ⇩

The **lanthanide** or **lanthanoid** series of chemical elements comprises at least the 14 metallic chemical elements with atomic numbers 57–70, (element 71), is sometimes included[59]

⇩

The **actinide** or **actinoid** series encompasses at least the 14 metallic chemical elements also included with atomic numbers from 89 to 102, lawrencium is sometimes included.

Distinctive Groups:
The Alkali Metals (Group 1, except hydrogen)

The Alkaline Earth Metals (Group 2)

The Transition Metals (Groups 3-11)

Post Transition Metals: located between transition metals and metalloids.

Metalloids: display both properties of metals and non-metals.

Halogens Group 17): Fluorine, F / Chlorine, Cl / Bromine, Br / Iodine, I /
& Radioactive elements **/ Astatine, At / Tennessine, Ts**

Noble Gases (Group 18): Helium, He / neon, Ne / argon, Ar / krypton, Kr / xenon, Xe / radon, Ra / oranesson, Og ------ Group 18 (VIIIa) **----** *Initially believed they could not combine with other elements.* (Later, Group No. changed from group O to group 18.)

Basic Structure Spine Framework
The outline structure frame is perceived as being presented in 4 blocks – s-d-p-f.
The f-block, 'fundamental' intended before column 3, and the two rows shown below blocks s, d, p.[60] (Lanthanide and actinide rows.)

End notes:

Metals are found on the left of the periodic table and non-metals on the right.

Man's Science perception for Chemical elements structure plan[61] (Reference Addendum 1) The periodic table Structure may be used to locate any element**.**

Anthropology states the **elements of life** as: carbon (C), oxygen (O), hydrogen (H), and nitrogen (N)—which make up 96% of living matter.

Main components of air: **N, 78% / O_2 21% / CO^2 0.04% / Argon .93% / Traces .03%**

Addendum 2:	**Perceived Structure of the Atom**

Perceived Definition: Atoms consist of a **nucleus** containing **protons** and **neutrons**, surrounded by **electrons** in shells. The numbers of *subatomic particles* in an atom can be calculated from its atomic number and mass number[62].

Man's Science*: Atoms are perceived to be* ***extremely small, positively charged nucleus surrounded by a cloud of negatively charged electrons****.* The nucleus is perceived to be less than one ten-thousandth the size of the atom the nucleus contains more than 99.9% of the mass of the atom[63].

Size: A convenient unit of length for measuring atomic sizes is the angstrom (Å), defined as 10^{-10} metre. The radius of an atom measures 1–2 Å. Compared with the overall size of the atom, the nucleus is even more minute. It is in the same proportion to the atom as a marble is to a football field. In volume the nucleus takes up only 10^{-14} metres of the space in the atom—i.e., 1 part in 100,000. A convenient unit of length for measuring nuclear sizes is the femtometre (fm), which equals 10^{-15} metre. The diameter of a nucleus depends on the number of particles it contains and ranges from about 4 fm for a light nucleus such as carbon to 15 fm for a heavy nucleus such as lead. Despite the small size of the nucleus, virtually all the mass of the atom is concentrated there.

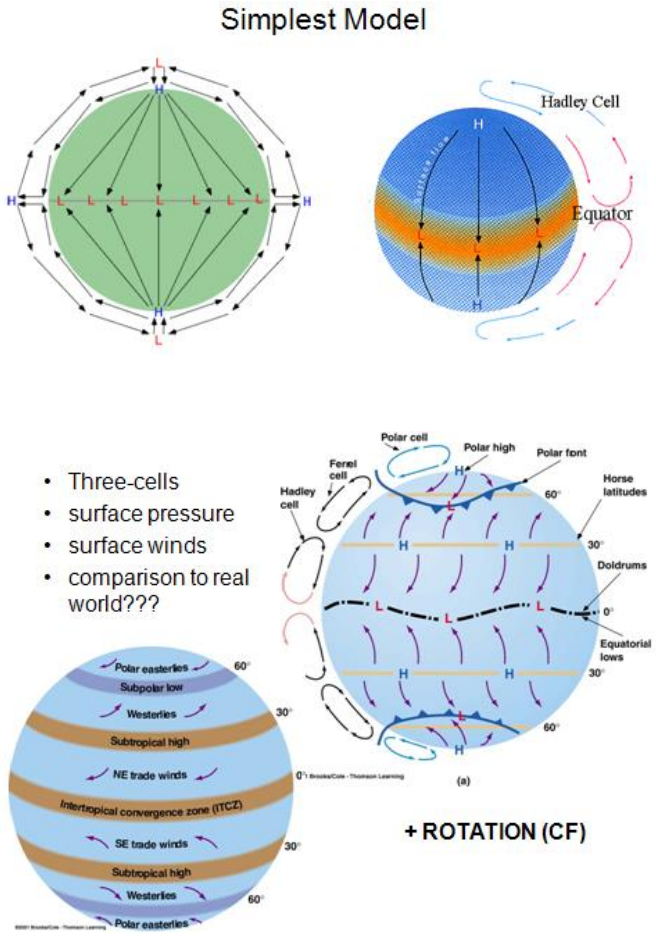
Perceived Structure: The protons and neutrons form the atom's central nucleus.
(The ordinary hydrogen atom is an exception; it contains one proton, but no neutrons.)
Protons have a positive electrical charge.
Neutrons are electrically neutral—they carry no charge.
Circling the nucleus is a cloud of Electrons, which are negatively charged.
Perceived like opposite ends of a magnet that attract one another, which binds them to the nucleus.
The nucleus is small and dense compared with the electrons, which are the ***lightest charged particles in nature.***
The electrons circle the nucleus in orbital paths called shells , each of which holds only a certain number of electrons. The outer shell is the valency shell[64].
An ordinary, neutral atom has an equal number of protons (in the nucleus) and electrons (surrounding the nucleus); thus, the positive and negative charges are balanced.
Some atoms, however, lose or gain electrons in chemical reactions or in collisions with other particles.
Ordinary atoms that either gain or lose electrons are called ions. If a neutral atom loses an electron, it becomes a positive ion. If it gains an electron, it becomes a negative ion.

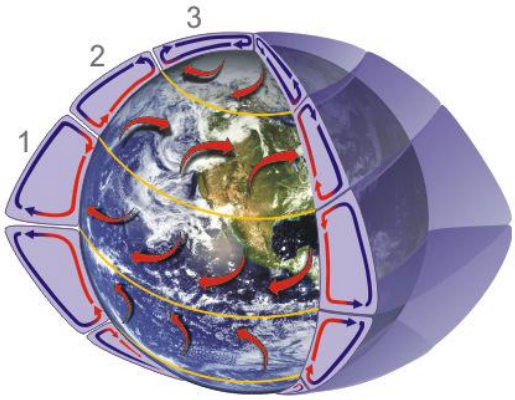
These basic **subatomic particles—protons, neutrons, and electrons**—are themselves made up of smaller substances, such as quarks and leptons.[65]

As Perceived through quantum physics: The electron wave is uniform in all directions from the nucleus, is peaked at the centre of the atom, and has the same phase everywhere. Higher energy levels in the atom have waves that are peaked at greater distances from the nucleus.
Quantum Physics definition: Atoms, the smallest particles of an element that exhibit the properties of that element, consist of negatively charged electrons around a central nucleus composed of more massive positively charged protons and electrically neutral neutrons.23 Jun 2019

Endnote: *Perceived as a shell, or wave; Or created, or formed by another undiscovered energy form?*

Addendum 3.). Atmospheric Prevailing Winds[66]





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Cushman-Roisin B et al "Environmental Fluid Mechanics: Current issues and future outlook", 1st Edition, 2008, Abstract, 1st paragraph

Darcy, 17th century Paris: Darcy measured the discharge of a tube by measuring the volume of water that flows out of the outlet during a fixed period of time.

Earth System Science, Earth Labs, Lab 4: It's all connected; Global Circulation, Part A: Tracing Pathways, Caption

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