Indian Journal of Advanced Physics (IJAP)
ISSN: 2582-8983 (Online), Volume-5 Issue-2, October 2025

Unification of the Fundamental Equations in Physics: A Single Functional Relation Between Mass and Volume

Nishant Sahdev, Chinmoy Bhattacharya

***Abstract:** Since the inception of classical physics, scientists worldwide have continually introduced new equations. Notably, the three fundamental physical variables—mass, time, and temperature—have consistently played central roles in these formulations. However, these variables are often treated as 'abstract' quantities, particularly because their physical dimensions, about length (L), have seldom been explicitly addressed. In this research, a novel thermodynamic approach has been employed to investigate the dimensional relationships between time (t), mass (M), and temperature (T) and length (L). The new dimensions revealed for these variables have the potential to reshape both modern and classical physics. The equation mass = density × volume holds profound significance in physics. Density, in this context, serves as an indirect measure of a material's cohesiveness, or orderliness; among materials of varying density, the one with the greater density will house more molecules within a fixed volume, and is thus more cohesive. Density is, therefore, an index of order. Conversely, increasing the volume of a given mass—such as by introducing air voids or foams—decreases density, thereby diminishing cohesiveness and increasing disorder or randomness. Density, then, is the "creator" of order, while volume gives rise to disorder or randomness. Thus, mass, being the product of density and volume, is inherently a composite variable that embodies both order and disorder. This article demonstrates that the contribution of density (order) outweighs that of volume (randomness), making mass, as a hybrid parameter, primarily indicative of order. Every physical, mechanical, or chemical process is fundamentally an interplay of order and disorder, manifested in the equation mass = density × volume. Core principles of physics—including the laws of motion, mass-energy equivalence, ideal gas behaviour, wave-particle duality, the uncertainty principle, and the quantum mechanics of microscopic particles—can all be understood as manifestations of these order–disorder phenomena. Consequently, all fundamental equations in physics may ultimately converge upon, or be unified with, the relation mass = density × volume. Such unification or convergence can only be fully understood once the three principal variables—mass, time, and temperature—lose their abstraction and are properly embodied. In this research, we offer a foundational embodiment for these variables, opening new horizons for modern physics.*

Manuscript received on 26 July 2025 | First Revised Manuscript received on 08 August 2025 | Second Revised Manuscript received on 27 September 2025 | Manuscript Accepted on 15 October 2025 | Manuscript published on 30 October 2025.
Correspondence Author(s)
Nishant Sahdev, Department of Physics, University of North Carolina at Chapel Hill, US, India. Email ID: nishantsahdev.onco@gmail.com, ORCID ID: 0009-0007-2249-1006
Chinmoy Bhattacharya*, Austin Paints & Chemicals Private Limited, 3 Ambika Mukherjee Road, Belghoria, Kolkata (West Bengal), India. Email ID: chinmoy00123@gmail.com, ORCID ID: 0000-0002-1962-0758

***Keywords:** Dimensional Analysis, Mass-Volume Relation, Unified Physical Equations, Thermodynamic Compactness & Hard-Core Volume (HCV).*

Abbreviations:
HCV: Hard-Core Volume
FV: Free Volume
KE: Kinetic Energies
PE: Potential Energies

I. INTRODUCTION

The *Pressure (P)* parameter (as claimed to be an intensive property) of an ideal gas is expressed as 'energy per unit volume' [1] (P = nRT/V, R is the universal gas constant, T and V are the absolute temperature and volume, respectively, of the gas). As per the ideal gas equation, if at constant temperature and volume, more molecules (increasing the number of moles, n) are being introduced in a system of gas, the pressure does increase. Since the number of moles increases, the mass of the system also increases. Consequently, pressure becomes directly proportional to the mass, as (RT/V) remains a constant. The label of intensive character is being imposed on the pressure parameter, but it does not stand.

It is argued that since the pressure of any solid substance or liquid (any mass of matter) remains constant when kept at ambient temperature and left open, the atmosphere exhibits the same pressure, which is atmospheric pressure; hence, it is intrinsic. However, this argument is flawed, despite its widespread dissemination throughout the global scientific community. The model of pressure has been developed (in the kinetic theory of gas [1]) for a constant temperature and volume condition, and pressure is shown as energy per unit volume. However, when it is stated that a sample of x grams of a substance has the same pressure as another n-gram sample (where n is a positive integer) of the same substance, it contradicts the model of pressure mentioned above. To follow the model, both the samples of x gm and nx gm must be brought under the exact condition of volume and temperature. If n > 1, the sample of higher mass must be compressed to achieve the same volume as the sample of x grams, and in that case, the pressure will be higher for the sample of nx grams than for the sample of x grams. If n<1, the reverse would be true. Hence, according to the kinetic theory of gases, pressure is highly dependent on the mass of the gas. So, pressure cannot be called an intrinsic property based on this model. Therefore, the definition of pressure in terms of energy per unit volume is falsifiable, as it cannot retain the 'intensive physical variable' characteristic of the pressure parameter. Therefore, a new model of pressure needs to be developed, one that retains its intensive characteristic.

When one takes an attempt to insert in a substance (of a certain specific mass) more molecules of the same substance (be it a liquid or solid or gas at a pressure P) without altering the temperature and volume of the substance, the pressure has to be exerted externally by an amount (P +ΔP, ΔP is positive) to do this task. So, the said pressure (P +ΔP) becomes the new pressure of the substance. After increasing the mass, the pressure increases; therefore, it cannot be an intensive property, as per the model of the kinetic theory of gases.

The critical physical parameter in Physics is 'pressure', which has been assigned a dimension of 'energy per unit of volume'. The problem in science is that the absolute definition of pressure could not be developed or proposed by anyone till the time of proposing the kinetic theory of gas, but that too was a 'relative' definition and not an 'absolute' one since it imposed the condition of constancy of both the 'temperature' and 'volume'.

The kinetic theory of gas [1] [2] took the help of the principle of Newton's second law of motion (which states force is directly proportional to the rate of change of momentum). This law is purely empirical, and Newton did not provide any supporting evidence (regarding physics, thermodynamics, and topology) for the principle in question.

The definition of pressure was being developed in the following manner:

i) In a closed vessel containing gas molecules, the force exerted by the molecules on the wall of the vessel is equated to 'change in momentum of the molecules after and before striking the wall per unit time'(t): (which is the Newton's second law, however, which says force is directly proportional to the rate of change of momentum, not being equal and how far logical is it to apply his law for a closed thermodynamic system since the law was proposed for the mechanical motions of objects itself in open systems).

$$= \left[\frac{mv - mu}{t}\right] \quad \dots \quad (1)$$

[*m, u* and *v* stand for mass, initial velocity and final velocity of the molecules, respectively].

ii) Then pressure is defined as force per unit area (A)

$$= \frac{\left[\frac{mv-mu}{t}\right]}{[A]} \quad \dots \quad (2)$$

Suppose the above model of pressure is being examined analytically. In that case, it turns out that for the mechanical motions of the objects (when the object itself is changing its position as a function of time) the linking of pressure/force with the 'change in momentum' (as Newton did in his second law of motion) is not much logical since Newton did not thermodynamically explain the hypothesis, nor did he give any experimental proof of the same. Pressure is a parameter which is more related to volume rather than the 'velocity 'as in the above equation (1), hence the 'temperature' parameter has to be considered since the volume is dependent on temperature. One of the defects of this model of pressure calculation is that temperature has not been considered, which is a matter of ignoring the **'thermodynamics of motion'**. Now, according to the kinetic theory of gas, the expression for the average velocity of the molecules of a gas is,

$$v_{av} = \sqrt{\left(\frac{8RT}{\pi M}\right)} = \sqrt{\left(\frac{8RT}{\pi N_0 m}\right)} \quad \dots \quad (3)$$

[R = universal gas constant, T = temperature in Kelvin, M is the molecular weight of the gas, and N_0 is the Avogadro number].

If the dimension of (mv/tA) is being considered regarding both 'time' and 'temperature', its dimension comes out to be as under, which would be the dimension of pressure as per equations (1) and (2) above.

$$\left(\frac{\text{mv}}{\text{tA}}\right) = \frac{m\left[\sqrt{\left(\frac{8RT}{\pi N_0 m}\right)}\right]}{[tA]}$$

$$= m\sqrt{\frac{\left[k\sqrt{\left(\frac{RT}{m}\right)}\right]}{[tA]}} \qquad \left[k = \sqrt{\left(\frac{8}{\pi N_0}\right)}\right]$$

$$= \sqrt{\left[\sqrt{\left(\frac{kRT}{tA}\right)}\right]} \quad \dots \quad (4)$$

So, it turns out from equation (4), when the 'mechanics' and the 'thermodynamics' of motion are both being considered, the 'pressure' becomes a function of both the 'time' and 'temperature' and not only the time as is done in conventional Physics. Later on in this article, equation (4) will be split further into dimension [1].

The dimension of pressure in the form of 'energy per unit volume' does not fit the model of Boyle's law either. The said law is, when the temperature (T) remains constant, the pressure (P) is inversely proportional to the volume (V) of a gas (number of moles n is continuous), and it is mathematically expressed as,

$$\text{P} \propto \frac{1}{\text{V}} \text{ or P=} \left(\frac{\text{k}}{\text{V}}\right) \text{[k is Boyle's constant]} \quad \dots \quad (4a)$$

$$\text{Since } P = \left(\frac{\text{energy}}{\text{volume}}\right) = \left(\frac{\text{E}}{\text{V}}\right),$$

So, equation (4a) takes the form,

$$\left(\frac{\text{E}}{\text{V}}\right) = \left(\frac{\text{k}}{\text{V}}\right) \quad \dots \quad (4b)$$

In equation (4b) above, the LHS and the RHS contain the same variable V. However, in a proportionality relation, the LHS and the RHS cannot contain the same variable. So, the dimension of pressure in the form of 'energy per unit volume' is not acceptable.

In the context of this article, especially to grasp the new concept, new logic, and new philosophy regarding the 'pressure' parameter, the understanding of the physical significance of the Boyle's constant (k) is fundamental. When a gas in a closed system is compressed at a constant temperature, keeping the number of moles of the gas constant, both the volume and the free volume (FV) decrease, but the total hard-core volume (HCV) of the gas molecules remains constant. While a gas is being expanded (at constant temperature, keeping the number of moles of gas, n, constant), both the volume and free volume increase; however, the total hard-core volume of the gas molecules remains constant. Regarding Boyle's law, it can be concluded logically that Boyle's constant k is HCV per mole of the gas.

The perfect model of pressure should be based on volume since volume is connected to HCV, FV, the mass of the molecules (m), time (t), temperature (T) and area (A) [the physical variables in equation (4)] as explained below:

i) **Mass Dependency**: As the mass of the molecules increases, the density of the gas increases and the volume per unit of mass, or the specific volume, changes.

ii) **Time Dependency:** For thermal expansion/contraction of a gas, the volume decreases or increases as a function of time.

iii) **Temperature Dependency:** The volume of a gas is very much dependent on temperature.

iv) **Area Dependency:** Volume itself is a function of area and length.

Volume = (area x length)

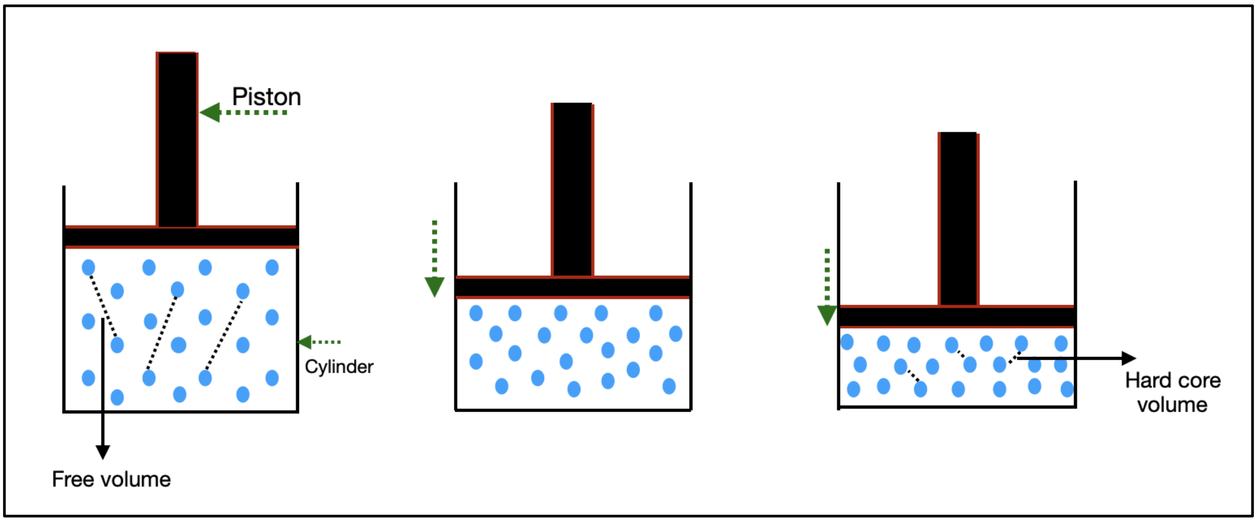
v) **Dependency on HCV and FV**: Volume of a gas, V = (HCV + FV)

The volume of a substance, irrespective of whether it is a gas, liquid or solid, is the sum of two volumes:

Total Volume = [Free Volume (FV) + Total Hard-Core Volume of the molecules (HCV)]

As shown in Figure 1 below, as the piston of the cylinder containing a gas is being put more downwards, the pressure (P) increases, volume (V) decreases, and the temperature (T) increases (as follows from the ideal gas equation $PV = RT$). At any stage of the said compression, as shown in Figure 1, the *HCV (total)* remains constant, but what changes is the *volume (V)* of the gas. The higher the magnitude of force on the piston, the lower the ratio of (HCV/V) becomes, since V is decreasing and HCV remains constant. From one gas to another gas, though the mass of the molecules would be varying, the *force on the piston* will remain proportional to the ratio of HCV *to* V. When the said ratio is higher, the *force on the piston* will be lower, and when the said ratio is lower, the force will be higher. So,

$$Force\ on\ the\ piston\ \alpha\ \left[\frac{HCV}{V}\right]\ \ldots\ \ (5)$$



[Fig.1: Representation of Pressure as a Function of Volume (V) and Hard-Core Volume (HCV)]

The relation as shown in equation (5) is a universal one and will not at all be dependent on how the process is being carried out (isothermal, adiabatic or constant pressure condition), and the said proportionality of equation (5) or this suggested model of pressure is applicable for any substance, whether it be a solid, liquid or gas.

Any generalised expression of 'force' must be valid for all three states of substances, i.e., gas, liquid, and solid. Additionally, the mathematical expression of force (unlike the equation derived in the kinetic theory of gases) should also be applicable for varying temperatures and volumes.

The subjects of Physics and physics are being overly burdened with the problems of circularity in the definitions of physical variables. For example, Force is depicted as (pressure × area), and on the other hand, pressure is defined as force per unit area. Mass is being defined as (density x volume), and density is being defined as (mass/volume). However, no fundamental definition of mass has been created. Velocity is defined as Distance per unit of time, and time is defined as (distance/velocity). However, 'time' is not being defined fundamentally and has been labelled as an 'abstract' variable. However, many such examples would be found in this cycle.

From Figure 1, it can be observed that as the piston is moved downwards, the temperature of the system increases. Conversely, when the piston is pushed upwards from a downward position, the temperature decreases. Hence, this is a case of varying temperature and volume. When the piston is moved downwards, the volume decreases; there is a change in the length (height) of the piston, and the reverse is true. So, the Force can be defined fundamentally from the thermodynamic point of view as being proportional to the rate of change of volume concerning the height or depth of the substance (vis–à–vis length) as shown below, Force ∝ (Rate of change of volume with depth or length)

$$k\left(\frac{dV}{dL}\right) = L^0\left(\frac{L^3}{L}\right) = L^2$$

$$\text{Or, Force } = k\left(\frac{dV}{dL}\right) = L^0\left(\frac{L^3}{L}\right) = L^2 \quad \ldots \quad (5a)$$

The proportionality constant, k in equation (5a), is the ‘ratio of the total hard-core volume of the molecules (HCV) to the total free volume (FV) of the material’. It will differ from one material to another and will be dimensionless since it is the ratio of two volumes.

For the gases, the (THCV) << (FV), the magnitude of k would be lower. However, for liquids, the said ratio (HCV/FV) is typically higher (for water, it is approximately 63%), and the k value is higher for liquids than for gases. For solids, the ratio is typically higher (for naphthalene, it is approximately 170%). So, the k value, in general, would be the highest for the solids. Since in the case of gases, the free volumes are relatively high, and as a result, upon application of a small force, the parameter (dV/dL) will attain a high value. The higher the (dV/dL), the higher the compressibility of a substance. In contrast to that, the magnitude of (dV/dL) would be very low for solids since the HCVs are higher. While a gaseous substance, upon application of a force of amount F, will be compressed by a percentage of x%, a solid substance, upon application of the same force, F, will be compressed by a percentage of << x%. Therefore, the magnitude of (dV/dL) for the gaseous substance and the solid substance would differ significantly.

The parameter k in equation (5a) (being the ratio of HCV to FV) represents the ‘compactness’ of a substance. The higher the ratio of (HCV/FV), the more compact a substance would be, and the reverse would be true. While k represents the ‘degree of compactness of a substance’, the parameter in the form of the differential coefficient of V and depth (length), (dV/dL), represents the ‘degree of deformation’ of a substance. The hybrid effect of ‘degree of compactness’(k) and the ‘degree of deformation' (dV/dL) of a substance is indeed what the force is.

The ’degree of compactness’, k, does take into account the ‘intermolecular attractive forces’ of a substance. For any substance in which the (HCV to FV) ratio is high, it originates from the higher level of cohesiveness among the molecules, causing them to come closer and closer to each other, which reduces the free volume. As the free volume decreases, the HCV-to-FV ratio increases to a higher value. So, the model of Force or pressure as is being presented in this article is an universal model and should not be considered as a model for the ideal gases only (or for the perfect behavior of the molecules of a substance) as had been done in the model of kinetic theory of gas where the effect of intermolecular attractive forces among the molecules were being entirely ignored.

The calculation of (HCV/FV) for oxygen gas, water, and naphthalene at 298K, based on their literature-reported molecular diameters [3] and empirical data obtained, is shown in Table 1 below.

[The principle of calculation: 1 mole of a substance contains the same number of molecules, which is the Avogadro number, N (= 6.023 x 1023). Considering the molecules to be spherical with radius (r), the mathematical expressions of Volume (V), HCV and FV would be, $HCV = N\left[\frac{4\pi r^3}{3}\right]$ V = [molecular weight /density], density obtained from literature. $\text{FV} = [\text{V} - \text{N}\left(\frac{4\pi r^3}{3}\right)]$

However, the magnitude of the parameter (dV/dL) will be dependent on the geometry of the object or the substance. The typical plots of V versus L for the compression of a gas in a cubic cylinder and the compression of a spherical substance (uniformly compressed, despite its surface area) are shown in Figures 2 and 3 below. The empirical data for the figures are presented in Table 2a and Table 2b, respectively.

The calculation of (dV/dL) has been made for two cases: i) a gaseous substance in a cubical cylinder with a piston, and ii) a solid spherical substance (not hollow). For the cubical cylinder (of length L), as the piston is moved downwards, the length and breadth remain at L each, and the height (or depth) does change. If the depth is xi at any stage, the volume of the gas would be (L^2 xi). The plot has been created of volume versus xi at different stages of compression.

Table 2a: Empirical Data of HCV and FV of substances

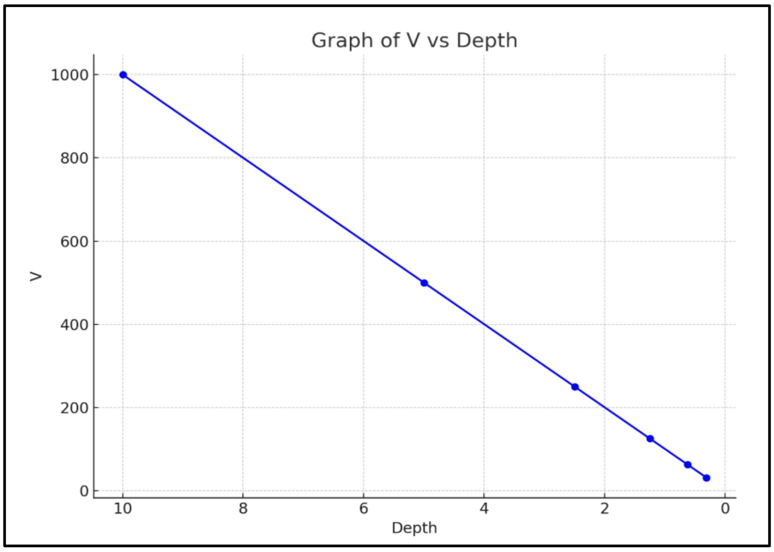
Substance	Radius (cm)	Molar Volume (cm^3/mol) Va	Hard Core Volume, HCV (cm^3/mol) N [$4\pi r^3/3$]	Free Volume (cm^3/mol), FV [V - N ($4\pi r^3/3$)]	HC Volume/ Volume (HCV/V)	HC Volume/ Free Volume (HCV/FV)
Oxygen (O_2)	1.52×10^{-8}	22,400	8.86	22,391.14	0.0004	0.0004
Water (H_2O)	1.40×10^{-8}	18.07	6.92	11.15	0.383	0.6209
Naphthalene	3.00×10^{-8}	108	68.11	39.89	0.6306	1.7073

Table 3a: Empirical Data of Depth vis-à-vis Volumes of the Gases at the Different Stages of Compression

Depth (x_i)	Percent Compression (%)	V (y_i)
10.00	0%	1000.00
5.00	50%	500.00
2.50	25%	250.00
1.25	12.5%	125.00
0.625	6.25%	62.50
0.3125	3.125%	31.25

Retrieval Number:100.1/ijap.B106605021025
DOI:10.54105/ijap.B1066.05021025
Journal Website: www.ijap.latticescipub.com

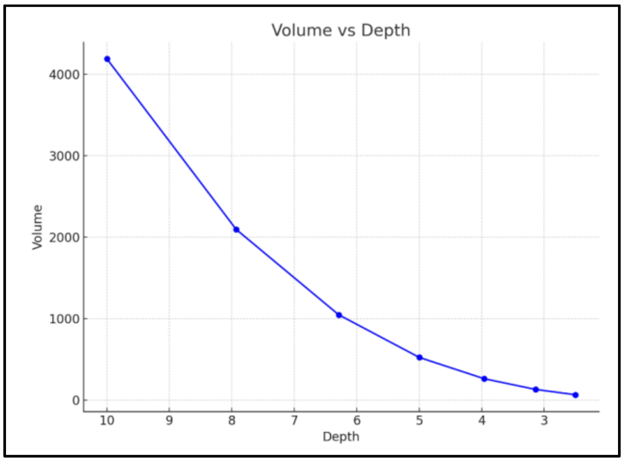
Published By:
Lattice Science Publication (LSP)



[Fig.2: Plot of Volume Versus Depth at Different Stages of Compression of a Gaseous Substance (Data Table 3a)]

Table 2b: Empirical Data of Compression (Radius and Volume) of a Spherical Solid Substance, although its External Surface Area is Uniformly

S. No.	Volume Expression	Volume (Approx)	Volume Compression (%)	Radius Expression	Radius (Approx)
1	$V_1 = 4000\ \pi/3$	4188.79	0%	$R_1 = (3V_1/4\pi)^{1/3}$	10.00
2	$V_2 = V1/2$	2094.40	50%	$R_2 = (3V_2/4\pi)^{1/3}$	7.93
3	$V_3 = V1/4$	1047.20	25%	$R_3 = (3V_3/4\pi)^{1/3}$	6.29
4	$V_4 = V1/8$	523.60	12.5%	$R_4 = (3V_4/4\pi)^{1/3}$	5.00
5	$V_5 = V1/16$	261.80	6.25%	$R_5 = (3V_5/4\pi)^{1/3}$	3.96
6	$V_6 = V1/32$	130.90	3.125%	$R_6 = (3V_6/4\pi)^{1/3}$	3.14
7	$V_7 = V1/64$	65.45	1.5625%	$R_7 = (3V_7/4\pi)^{1/3}$	2.50



[Fig.3: Plot of Volume Versus Radius of a Solid at the Different Stages of Compression (Data from Table 3b)]

The expression of pressure as obtained from equation (5a) is,

$$\text{Pressure} = P = (\text{force per unit area}) = \left(\frac{L^2}{L^2}\right) = L^0 = \text{dimensionless} \quad \ldots \quad (5b)$$

Now, as per the model of force/pressure in this article, Force = (Compactness of the substance, k) x (degree of deformation, $\left(\frac{dV}{dL}\right)$ ... (5c)

Now, (dV/dL) has the dimension of area, $\left(=\frac{L^3}{L}\right) = L^2$.

So, Pressure = (Force /area) = k (compactness of the substance) (5d)

Since compactness (= HCV/FV) does not depend on the mass of the substance, the pressure parameter turns out to be an 'intensive' property. The compactness of a substance is a function of temperature only, like the 'refractive index' of a substance. The refractive index is an intensive property that also depends on temperature.

So not only does equation (5) reveal that parameter P is a dimensionless parameter (since it is a ratio of two volumes only), but it is also found from equations (5a) and (5b) too.

Newton, while proposing that 'force is directly proportional to the rate of change of momentum', had tactfully avoided the proportionality constant and equated force straightaway to (mass x acceleration), which is not acceptable. However, as shown in equation (5a), in this article, the proportionality constant has been retained in the newly proposed equation of force, and the proportionality constant has to be there.

The mathematical expression of force and pressure [Equation (5a), (5b) and (5c)] are the generalized and absolute expressions of the said variables without any constraint (like constant temperature and constant volume) being imposed on them and is being based on the dimension of L only, since any volume be it V, HCV or FV holds a dimension L^3. Since only through dimension L have the mathematical expressions of 'force' and 'pressure' been obtained in this article, and for this apparent reason, it is called 'absolute'.

The physical variable is defined as 'force' is not a standard term in physics. However, it is introduced in this research article in a tripartite manner, about mathematics, Physics, and topology or geometry.

As per Physics, the dimensions of 'energy' and 'volume' are:

$$Energy \;= M\,L^2\,T^2 = PV \;\; \ldots \;\; (6)$$

$$Volume \;= L^3 \;= V \;\; \ldots \;\; (7)$$

Since P is dimensionless, as is being proved, the dimension of 'energy' and 'volume' merges to the same point, and that is being L^3 (or volume) and hence the dimensions of energy and volume are the same indeed.

Comparing the equations (6) and (7) it (since P is dimensionless), one gets,

$$MT^{-2} \;= L \;\; \ldots \;\; (8)$$

Therefore, the derived equation (8) is significant in physics, as it shows that the three dimensions, L, M & T, are interconnected with each other. So, it is a diametrically opposite finding to that of conventional Physics, where the three principal dimensions L, M & T are considered to be independent of each other. Equation (8) has far-reaching implications, which will become apparent to the readers as this article progresses further in the subsequent sections.

A. Law of Conservation of Mass-Energy and the Dimensions of 'Mass' and 'Density'

The equation for energy is:

$$\text{Energy} \;=\; \text{Force x distance} \;\; \ldots \;\; (9)$$

Now equation (9) can be rearranged in its reciprocal form,

$$\frac{1}{energy} = \frac{1}{force} \text{ x } \frac{1}{distance} \ldots \;\; (10)$$

Now, for the time being, setting aside equations (9) and (10), let us examine how the law of conservation of energy-mass (E & M) in science can be mathematically presented. The law states that 'the total amount of mass and energy remains constant and does not change.' The possible mathematical statement can be multiple, as under:

$$[E \; + \; M] = constant \;\; \ldots \;\; (11)$$

$$[E/M] \;\; = constant \;\; \ldots \;\; (12)$$

$$[E \; x \; M] = constant \;\; \ldots \;\; (13)$$

However, equation (11) is not acceptable since 'energy' and 'mass' have different dimensions and cannot be added up to each other.

Equation (12) is also not acceptable since, as the mass tends to zero, the energy would also tend to zero. If both the mass and energy became zero, the universe would not have existed at all.

Therefore, the only equation that would be acceptable is equation (13), as in this equation neither the mass nor the energy is allowed to attain values of 'zero' or 'infinity'. Equation (13) is the hybrid form of 'energy' and 'mass'. Now the dimensionality of equation (13) would be:

$$(E \; x \; M) = (\; ML^2T^{-2} \; x \; M) = (MLT^{-1})^2$$
$$= (impulse)^2 \;\; \ldots \;\; (14)$$

The dimension of 'impulse' is $M\,L\,T^{-1}$, and impulse has been defined as the change in momentum of an object when a force acts upon the object for some time Δt, and is the change in momentum of an object arising from a sudden collision with another object. Since it has been proved in this article that 'pressure' is a dimensionless parameter, impulse is dimensionless too. Therefore, the product of energy and mass is a constant quantity, as shown in Equation (13), and is dimensionless.

Now returning to equation (10), it can be written in the following form based on equation (13),

$$\left[\left(\frac{M}{dimensional\ less\ constant\ (k)}\right)\right]$$
$$= [\frac{1}{(pressure\ x\ area)}]x\left[\frac{1}{ditance}\right]$$
$$= \left[k_1\left(\frac{1}{area}\right)x\left(\frac{1}{distance}\right)\right] \;\ldots\;\; (15)$$

[Since P is dimensionless and (1/P) = constant at a specified temperature = k_1]

Now, leaving the dimensionless constants both in the LHS and RHS and retaining only the dimensional or variable parts of equation (15), it can be written as:

$$M = \left(\frac{1}{V}\right)[since\ (area\ x\ distance\ = volume)]$$
$$= \left(\frac{1}{L^3}\right)(1/L^3) \;\; \ldots \;\; (15a)$$

$$M \;= (1/V^2 x\ (V) \;\; \ldots \;\; (16)$$

Now, if equation (16) is being compared with the following most fundamental equation in Physics,

$$Mass\ (M) = (density)x\ (volume) = (\rho\ V) \;\; \ldots \;\; (17)$$

The dimension of density (ρ) is obtained to be,

$$Density = \;\rho = \left(\frac{1}{V^2}\right) \;\; \ldots \;\; (18)$$

$$\text{Or, } \rho = \left(\frac{1}{V^6}\right) [\text{since } V = L^3] \;\; \ldots \;\; (19)$$

B. Dimension of 'Time' and 'Temperature'

From equation (8), it has been found that,

$$MT^{-2} = L$$

Now, in equation (16), it has been established that M = (1/V), and so putting it in equation (8), one gets,

$$\left(\frac{1}{V}\right)T^{-2} = L$$

$$\text{Now since } V = L^3, T^2 = \left(\frac{1}{L^3}\right)x\left(\frac{1}{L}\right) = \left(\frac{1}{L^4}\right)$$

$$\text{Or, Time} = \text{t} = \left(\frac{1}{l^2}\right) \;\; \ldots \;\; (20)$$

[Time from now will be presented in this article as t instead of T of the conventional physics to avoid the mix-up with temperature, which will be represented by T in this article].

Now in thermodynamics, the Boltzmann constant k =

$$\left(\frac{\text{Energy}}{\text{Temperature}}\right) = \left(\frac{\text{E}}{\text{T}}\right) \dots \quad (21)$$

The mathematical expression for energy in thermodynamics is E kT, and this can be written as,

$$E \ = \left(\frac{Energy}{Temperature}\right) x\ (Temperature)$$

$$= \left(\frac{E}{T}\right) x\ (T) \quad \dots \quad (22)$$

The Planck's expression for energy is,

$$E \ = \ h\surd = \ (Energy\ x\ Time) x \left(\frac{1}{Time}\right)$$

$$= \ (Et) x \left(\frac{1}{t}\right) \quad \dots \quad (23)$$

[h = Planck's constant = Energy. sec and √ = frequency = (1/second)]

Now, if the two equations (22) and (23) are compared to each other, one finds,

$$Temperature \ = T \ = \left(\frac{1}{t}\right) \dots \quad (24)$$

$$Or, Tt \ = \ 1 \ \dots \ (25)$$

So, from equation (24), it is being established that 'temperature' and 'time' are multiplicative inverses to each other [1], and it is also being found that,

$$T = L^2 \quad \dots \quad (26)$$

The dimension of the universal gas constant/Boltzmann constant can now be evaluated from the ideal gas equation, PV = RT, as shown below:

From the ideal gas equation, it follows that R = (PV/T) = (volume/temperature) [since P is dimensionless].

$$= \left(\frac{L^3}{L^2}\right) = L \quad \dots \quad (27)$$

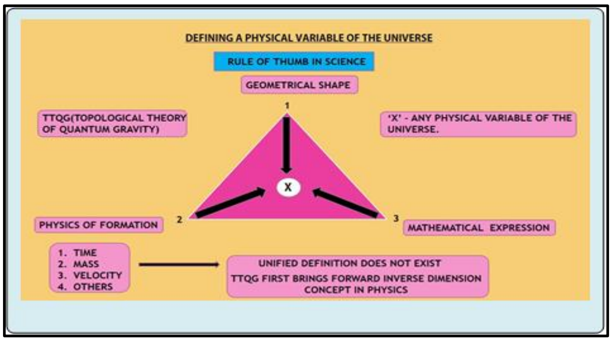
The Boltzmann constant = (R/N0) [N0 is Avogadro's number and is dimensionless]. So, both R and k have the same dimension, which is distance, L.

The expression for velocity is (L/t), and the concept of 'velocity' merges with the concept of 'volume'. since t = (1/L2), and hence, velocity becomes [(L/(1/L2)] = L3 = volume = V.

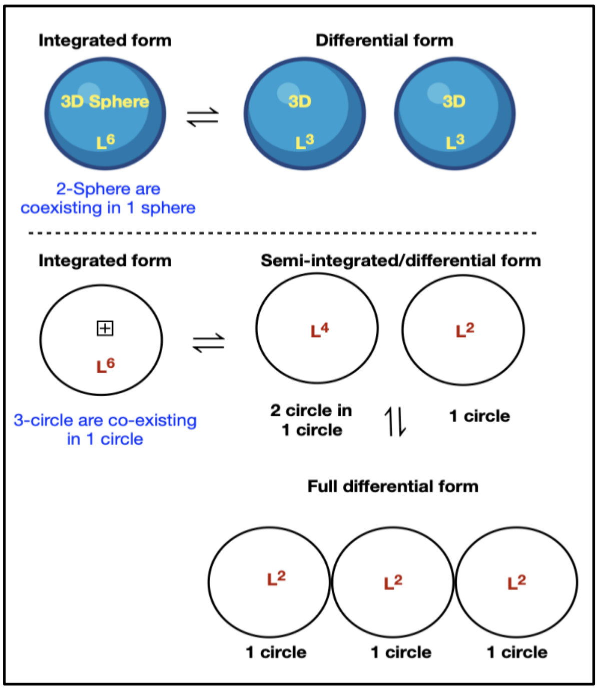
The physical concept behind this phenomenon is that, for an object to move, it has to overcome the 'time frame' (t), which does exist in the inverse form of (length)2 (is an attractive force). So, once it overcomes the time-attractive force, it converges to a volume.

Velocity is related to volume in the sense that when the velocity of the molecules of a gas increases upon heating at constant pressure, the volume also increases.

1. Dimension of momentum (p), Planck's constant (h), gravitational constant of Newton (G), acceleration due to gravity (g)/acceleration (f), kinetic energy (E), potential energy (V), stefan- boltzmann constant (σ), surface tension (ϒ), viscosity-coefficient(η), electric charge (Q), current (I), voltage(V), electrical resistance (R) and wave function ψ of quantum mechanics.



[Fig.3: Physics of Formation, Mathematical Expression and the Geometrical Shape]



[Fig.4: The Concept of Integrated and Differential Forms of Physical Variables]

Regarding the dimensions of the physical variables, the following points are to be noted:

i) Every physical variable has to have a geometrical shape: there must exist a function of its evolution, and finally, for the measurement of its magnitude, a mathematical formula has to be in place. This is referred to as a 'tripartite' representation of a physical variable, as illustrated in Figure 3 above.

ii) Any physical variable has three forms: the integrated form, the partial differentiation/partial integrated form and the fully differential form.

iii) When a person is observing an object, such as a 3D round shape object, it might so happen that two 3D spheres are coexisting in one round object. This is the integrated form, where the dimensionality is six inherently. But when the same object is being shown in its differential form (separating the two spheres from each other and being placed side by side), what would be observable to a person is that two 3D objects are lying adjacent to each other. The concept of 'integrated form', 'partial integrated/differential form' and the 'complete differential form of a physical variable is being shown pictorially in Figure 4 above.

iv) The entire concept of 'dimensionality' of the physical variables has to be rebuilt. As it will be shown later in this article, the dimensionality of the 'acceleration' parameter is 5. The physical significance of the same is that it is composed of a 3D sphere and a 2D circle. One would find it in a 3D form of shape (which represents the integrated state), but in its differential form, it would be found as a combination of a 3D sphere and a 2D circle.

The Planck constant had been defined in Heisenberg's uncertainty principle as:

$$\mathrm{Et} = \mathrm{h} \quad \ldots \quad (28)$$

$$So, \; (L^3 x\ 1/L^2) = h$$

$$\mathrm{Or\ h} = \mathrm{L} \quad \ldots \quad (29)$$

The dimension of h turns out to be the 'length' only.

Momentum, p, has been defined as, p = mu (m is mass and u the velocity of an object)

So, $p = \left(\frac{1}{L^3}\right) x\ (L^3) = 1$

So, momentum p is a dimensionless parameter.

Now, entropy, S, in thermodynamics has been defined as (Q/T), where Q stands for energy, and T stands for temperature. So,

Degree of Randomness = Entropy = S = (energy/temperature)

$$= \left(\frac{L^3}{L^2}\right) = L \quad \ldots \quad (30)$$

Degree of order = (1/ Entropy) = (1/ S) = (temperature /energy) = $\left(\frac{L^3}{L^2}\right)\left(\frac{1}{L}\right) \quad \ldots \quad (30a)$

The 'acceleration(f) / acceleration due to gravity (g) = $\left(\frac{L}{T^2}\right)\left[\left(\frac{L}{\frac{1}{L^2}}\right)2\right] = L^5 \quad \ldots \quad (31)$

The dimensionality of the g/f reaches five dimensions.

The Gravitational law of Newton is,

$$F = G\left(\frac{m1m2}{r^2}\right) \quad \ldots \quad (32)$$

The masses of the two objects are m_1 and m_2, respectively: r is the distance of separation; F is the force; and G is the gravitational constant.

Rearranging equation (32), it can be written as,

$$G = \left(\frac{r^2}{m1m2}\right) \quad \ldots \quad (33)$$

Considering the masses, m_1=m_2 = m and putting the dimensions of force, distance and the masses in equation (33),

$$G = [(L^2 x L^2)/(1/L^3)^2 L^{10} \quad \ldots \quad (34)$$

While the 'acceleration' is being L^5, the gravitational constant attains the dimension L^{10}. The phenomenon of gravitation arises out of the 'overlapping' of two acceleration fields, and the dimensionality in such a way reaches 10. Through this exercise, the dimensionality is also revealed.

The kinetic energies (KE) and the potential energies (PE) are defined as,

$$\frac{KE = (mu^2)}{2} \quad \ldots \quad (35)$$

$$\mathrm{PE} = \mathrm{mgh} \quad \ldots \quad (36)$$

The parameter h in equation (36) represents height (length), and u is the velocity, which merges to form volume (L^3). So, putting the dimensionalities of the physical variables in equations (35) and (36), one gets

$$KE = E = \left(\frac{1}{L^3} x L^6\right) = L^2 \quad \ldots \quad (37)$$

PE = V (as in quantum mechanics)

$$= \left(\frac{1}{L^3} x L^5 x L\right) = L^3 \quad \ldots \quad (38)$$

The energy expression in the Stefan–Boltzmann law is,

$$E = \sigma\, T^2 \ldots \quad (39)$$

$$So, \sigma = \left(\frac{E}{T^4}\right) = (L^3\ (L^2))^4] = (\frac{1}{L^5}) \ldots \quad (40)$$

The mathematical presentation of surface tension (ϒ) is,

$$\frac{\Upsilon = \left(\frac{\text{Force}}{\text{distance}}\right) = L^2}{L} = L \quad \ldots \quad (41)$$

The mathematical expression for the viscosity coefficient (ŋ) is,

$$(\eta) = \left[\frac{\frac{\text{force}}{\text{area}}}{\frac{\text{velocity}}{\text{distance}}}\right] \quad \ldots \quad (42)$$

Now putting the dimensions of the physical variables in equation (42),

$$n\left[\left(\frac{\frac{L^2}{L^2}}{\frac{L^3}{L}}\right)\right] or\ n = \left(\frac{1^2}{L}\right) \quad \ldots \quad (43)$$

So, the dimension of 'viscosity coefficient' and 'time' comes to be the same. Viscosity is the resistance to flow that arises from intermolecular attractive forces. As mentioned earlier in this article, 'time' is also an attractive force.

Retrieval Number:100.1/ijap.B106605021025
DOI:10.54105/ijap.B1066.05021025
Journal Website: www.ijap.latticescipub.com

Published By:
Lattice Science Publication (LSP)

The Columba's law of the force (F) operating between the two arbitrary electric charges q_1 and q_2 at a distance r, is:

$$F = k\left(\frac{q1q2}{r^2}\right) \quad \dots \quad (44)$$

[k is the Columba's constant = ($1/4\pi€_0$), where $€_0$ stands for the permittivity and is the ratio of two capacitances, $€_0 = C/C_0$ and hence k is a dimensionless parameter]

Putting the dimensionalities of the physical variables in equation (44), and with the assumption $q_1 = q_2 = q$, one gets,

$$q^2 = (r^2 x F) = (L^2 x\, L^2) = L^4 \text{ or electric charge } q = L^2 \quad \dots \quad (45)$$

The dimension of 'current' (I) is (T^{-1} Q), where T is time ($1/L^2$) and Q is electric charge = q = L^2 and hence,

$$I = (T^{-1}Q) = (L^2 x\, L^2) = L^4 \quad \dots \quad (46)$$

The dimension of 'voltage' is ($L^2MT^{-2}\,Q^{-1}$), where T stands for time and M for mass. So, the dimension of voltage (V) turns out to be,

$$V = \left[\left(\frac{L^2 1}{L^3 x\, L^4 x\, L^{-2}}\right)\right] = L \quad \dots \quad (47)$$

Now the Ohm's law is, Voltage = (Current x Resistance) = (I x R) … (48)
Putting the just-now-derived dimensions of V and I, it is found,

$$\mathrm{R} = \text{Resistance} = \left(\frac{\mathrm{V}}{\mathrm{I}}\right) = \left(\frac{\mathrm{L}}{L^4}\right) = \left(\frac{1}{L^3}\right) \quad \dots \quad (49)$$

So, the dimensions of 'mass' and 'resistance' converge on each
other. Mass is an attractive force too (like time), and mass is a squeezing phenomenon that resists the current (I) from flowing.

The angular momentum is defined as the product of mass, velocity, and radius. While m is the mass, v is the velocity, and r is the radius of an electron's orbit. So, the dimensionality of the angular momentum converges to: Angular momentum mvr $= \left[\left(\frac{1}{L^3}\right) x (L^3) x\, L\right] = L \quad \dots \quad (50)$

Now the Schrodinger equation in quantum mechanics is,

$$\left(\frac{d^2\psi}{dx^2}\right) + \left(\frac{8\pi^2 m}{h^2}\right)[E - V]\psi = 0 \quad \dots \quad (51)$$

[Here ψ is the wave function, and h, E, m, and V stand for the Planck's constant, mass, total energy and potential energies, respectively]
Regarding equation (51), the following points are to be noted [1] [2]:

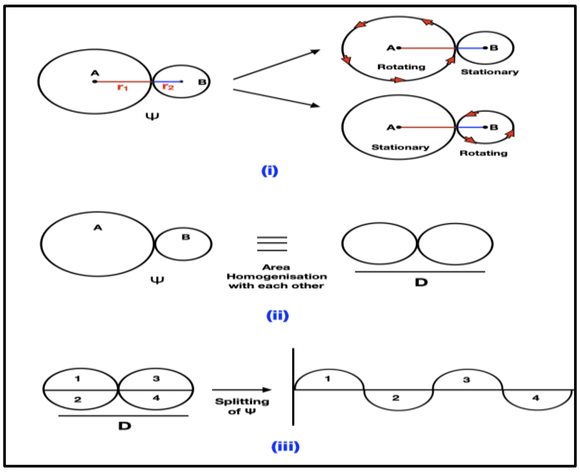
i) The parameter ψ is in the form of a mechanical wave, and the second derivative of such a wave can attain both positive and negative values depending on its shape. On a point of the wave, if the said second derivative is positive, then the shape of the wave is convex or concave upwards. If the said derivative is negative at a point, the shape is concave or convex downwards.

ii) The sum of the two terms in equation (51) has to be zero always. So, when the second derivative is positive (the first term), the second term must attain a negative value. In contrast, when the first term/second derivative is negative, the second term must achieve a positive value.

iii) The value of the second term in equation (51) can attain positive or negative values depending on the following factors: (to note here that in the second term, none of the constant parameters h or m could be negative)
   a. When E > V (kinetic energy is higher than potential energy) – 2^{nd} term is positive.
   b. When V >E (potential energy is higher than kinetic energy) – 2^{nd} term is negative.

iv) For the right-hand side of equation (51) to be zero, the following mathematical conditions have to be true:
   a. When ($d^2\psi/dx^2$) is positive, (E-V) is negative.
   b. When ($d^2\psi/dx^2$) is negative, (E-V) is positive.
   c. In either of the case modulus ($d^2\psi/dx^2$) = modulus ($8\pi^2 m/h^2$) [E -V] ψ

The topology of ψ in equation (51) becomes a unique one, which could be solved only through an analytical approach through the model of a pair of adjacent circular orbitals in the space, as shown in Figure 4 below:



[Fig.5: Topology Ψ Function of Quantum Mechanics (Integrated Form, Semi-Integrated Form and Differential Form)]

In Figure 5(i), between the two orbitals A & B, orbital A is higher in size/area than orbital B. When A is stationary and B is rotating, then V is higher than E since the size of A is higher. When B is stationary, and A is moving, the reverse becomes true, i.e., E > V.

[When an orbital is stationary, its entire energy is potential. As the orbital starts rotating, the potential energy begins to convert to kinetic energy. In this article, it has been established that the higher the volume, the higher the energy. So, the larger circle has a higher potential energy. It might also be argued that this is why two numbers of circles are being considered, and why not three or more circles? One ψ quantum would originate a complete mechanical wavefront in space. The definition of a whole wave front is that the wave must contain two peak maxima and two peak minima, and this can originate from two circles only, as shown in Figure 4. The more the number of ψ quantum splits in space, the farther the mechanical wave moves in space] [2]. Now, the mechanical wave is being originated in space from the wave function ψ in the manner shown in Figure 5 (iii) above. So the dimensionality of the wave function ψ stands out to be L^4 since it is indeed a hybrid of 2 circles (each of which is πL^2), so dimensionally,

$$\Psi = L^4 \quad \dots \quad (52)$$

Table 3 below lists the dimensions of the physical variables that have been addressed and evaluated thus far in this article.

Table 3: The Dimensions of the Physical Variables

S. No.	Physical Variable	Evaluated Dimensions in Terms of L
1.	Pressure (P)	L^0
2.	Volume (V)	L^3
3.	Energy (E)	L^3
4.	Force (F)	L^2
5.	Time (t)	$1/L^2$
6.	Temperature (T)	L^2
7.	Velocity (v)	L^3
8.	Mass (m or M)	$1/L^3$
9.	Momentum (MV)	L^0
10.	Entropy (S)	L
11.	Angular momentum (mvr)	L
12.	Wave function (ψ)	L^4
13.	Current (I)	L^4
14.	Acceleration (f)	L^5
15.	Voltage (V)	L
16.	Resistance (R)	$(1/L^3)$
17.	Surface tension (ϒ)	L
18.	Viscosity Coefficient (η)	$(1/L^2)$
19.	Electric charge (q)	L^2
20.	Universal gas constant (R)	L
21.	Boltzmann constant (k)	L
22.	Stefan-Boltzmann-constant (σ)	$(1/L^5)$
23.	Gravitational constant (G)	L^{10}
24.	Planck's constant (h)	L
25.	Density (ρ)	$(1/L^6)$
26.	Velocity of light (C)	L^3
27.	Wavelength (λ)	L
28	$(8\pi^2 m/h^2)$ (E-V) Schrodinger's equation	= $[-(1/L^2)]$ when (E-V) is negative and $(d^2\psi/dx^2)$ is positive = $[(1/L^2)]$ when (E–V) is positiveand $(d^2\psi/dx^2)$ is negative
29	Weight (mg)	L^2
30	Degree of order = Coherence (C_h) A newly introduced parameter in Physics is discussed in this article	(1/L)

II. DERIVATION OF THE MATHEMATICAL FORMULA OF THE FORCE OF NEWTON'S SECOND LAW OF MOTION

Starting with the mathematical relation, Mass = Volume × Density. The above equation is derived based on the dimensions of the physical variables in Table 3. Using this mass-density equation, one can write,

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 \text{ x } 1}{L^6}\right) \dots \quad (53)$$

$$\text{Or. } L^3 = \left[\left(\frac{1}{L^3}\right) \text{x } L^6\right], \text{Or. } L^2 = \left[\left(\frac{1}{L^4}\right) \text{x } L^6\right], \text{Or. } L^3 \left[\left(\frac{1}{L^3}\right) \text{x } L^5\right] \quad \dots \quad (54)$$

From the dimensions shown in Table 1, it is found from equation (54),

$$\text{Force} = (\text{mass x acceleration}) \quad \dots \quad (55)$$

Equation (55) is the mathematical statement of Newton's second law of motion.

A. Derivation of the Ideal Gas Equation

Following the mass-density equation,

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 x 1}{L^6}\right), or,\ L^3 = [\left(\frac{1}{L^3}\right) x\ L^6)], or,\ L^0\ L^3 = (L\ x\ L^2)\quad \dots\quad (56)$$

$$\text{or PV} = \text{RT (as per Table 3)}\quad \dots\quad (57)$$

B. Derivation of Planck's Energy Equation, E =h√

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 x 1}{L^6}\right), or,\ L^3 = [\left(\frac{1}{L^3}\right) x\ L^6)], or,\ L^3[(\text{L})\text{x}\,L^2)]\ , or,\ L^3[(L)x\ (\frac{L^3 x 1}{L})]\quad \dots\quad (58)$$

$$\text{or, E} = (\frac{\text{hc}}{\lambda}) = \text{h}\surd\ \text{(as per Table 3)}\quad \dots\quad (59)$$

C. Derivation of Albert Einstein's Mass-Energy Equivalence Equation, E = mc²

$$L^3 = \left[\left(\frac{1}{L^3}\right) x\ L^6\right], or,\ L^3 = \left(\frac{1}{L^3}\right) x\ (L^3)^2]\quad \dots\quad (60)$$

$$\text{or, E} = \text{m C}^2\quad \dots\quad (61)$$

D. Derivation of De Broglie's Equation, λ = (h/mv)

$$L^3 = \left[\left(\frac{1}{L^3}\right) x\ L^6)\right], or, L = \left[\left(\frac{L}{\frac{L^3}{L^3}}\right)\right]\quad \dots\quad (62)$$

$$\text{or, } \lambda = \text{(h/mv) (as per Table 3)}\quad \dots\quad (63)$$

E. Derivation of Heisenberg's Uncertainty Principle (Et=h)

$$\left(\frac{1}{L^3}\right) = \frac{L^3 x 1}{L^6}\Big), or, (L^3) x \left(\frac{1}{L^2}\right) - (L)\quad \dots\quad (64)$$

$$\text{or, Et} = \text{h (as per Table 3)}\quad \dots\quad (65)$$

F. Schrodinger's Wave Equation

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 x\ 1}{L^6}\right)\quad \dots\quad (53a)$$

When (E-V) in equation (51) is positive, ($d^2\psi/dx^2$) is negative.
$\Psi = L^4$ (as derived in equation 52), so ($d^2\psi/dx^2$) = ($- L^2$)
So, from equation (53a), one can write,

$$(-L^2) = \left(\frac{d^2\psi}{dx^2}\right) = \left(\frac{L^5}{L^3}\right), or, (-L^2) = \left(\frac{d^2\psi}{dx^2}\right) = \left(\frac{L^5}{L^3}\right) x (L^4), or\ (L^2) + [-\left(\frac{L^5}{L^3}\right) x (L^4)] = 0\quad \dots\quad (65)$$

$$or, \left(\frac{d^2\psi}{dx^2}\right) + \left(\frac{8\pi^2 m}{\text{h}^2}\right)[E - V]\psi = 0\quad \dots\quad (51)$$

G. Derivation of Ohm's Law (V = I x R)

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 x\ 1}{L^6}\right), or, (L) = \left(\frac{L^4 x\ 1}{L^3}\right)\quad \dots\quad (66)$$

$$\text{Or,}\quad \text{V} = \text{(I x R) (as per Table 3)}\quad \dots\quad (67)$$

H. Derivation of Power Formula, P = (E/t)

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 x\ 1}{L^6}\right), or, (\ L^5) = \left(\frac{L^3 x\ 1}{\frac{1}{\text{L}^2}}\right)\quad \dots\quad (68)$$

$$\text{Or,}\quad \text{P} = \left(\frac{\text{E}}{t}\right)\qquad \text{(as per Table 3)} \dots\quad (69)$$

I. Derivation of the Equation of Pressure, P = hρg

$$\left(\frac{1}{L^3}\right) = \left(\frac{L^3 x\ 1}{L^6}\right), or, (\ L^0) = (L) x\ (\frac{1}{L^6})\ x\ (\ L^5)\quad \dots\quad (70)$$

$$\text{Or,}\quad \text{P} = \text{h}\rho\text{g}\qquad \text{(as per Table 3)} \dots\quad (71)$$

III. CONCLUSION

The mathematical equations proposed so far are all converging to the same equation, mass = (density x volume), and this is the other form of the equation, (Energy = force x distance), which has been shown in this article. All the equations discussed in this research article are inherently the same, but they have been presented in different mathematical forms by scientists over time, involving various physical variables.

The following two-dimensional relations are noteworthy outcomes of this research article, and the expression of the concept of mass represents a significant new value addition to Physics and general science. Energy(E) = (force x distance) = (L^2 x L) = (temperature x degree of randomness) = TS Mass (M) = (density x volume) = ($1/L^6$ x L^3) = ($1/L^2$ x 1/L) = (time x degree of order) = tC_h.

The most intriguing findings of this research article are the evaluations of the absolute dimensions of time, entropy, force, energy, mass, EM wave, acceleration, momentum, surface tension, and the wave function of quantum mechanics, among others. and the others. The entire field of physics would take on a new shape as a result of this.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted with objectivity and without any external influence.
- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate ethical approval or consent to participate with supporting documentation.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Authors' Contributions:** The authorship of this article is contributed equally to all participating individuals.

REFERENCES

1. Atkins, P., De Paula, J., & Keeler, J. (2017). *Atkins' Physics* (11th ed.). Oxford University Press. https://books.google.co.in/books/about/Atkins_Physical_Chemistry.html?id=3QpDDwAAQBAJ&redir_esc=y
2. Rakshit P C (2021). Physical chemistry (7th ed.). Sarat Publishing House. https://archive.org/details/dli.scoerat.3576elementaryphysicalchemistry
3. https://pubchem.ncbi.nlm.nih.gov/ptable/atomic-radius/

AUTHOR'S PROFILE

Nishant Sahdev is a distinguished researcher in Theoretical Physics & Author of the upcoming book Last Equation Before Silence, and currently serves as a Researcher at the University of North Carolina at Chapel Hill, United States. His work is based on quantum gravity, cosmology, and dark matter, contributing to the development of a unified quantum gravity theory and an innovative model of space quantisation. Nishant has published extensively in leading scientific journals and has further honed his expertise in advanced mathematics during research training at King's College London, England. Dedicated to expanding the frontiers of scientific knowledge, Nishant's current work focuses on pioneering theories and equations that challenge conventional understanding. Beyond his academic pursuits, he's a columnist for national newspapers, seamlessly blending science with creative expression.

Chinmoy Bhattacharya earned his PhD in Polymer Physics in 1988 and completed postdoctoral research on liquid crystal polymers at Laval University in Canada. Returning to India in 1991, he joined ICI India Ltd. and later founded his own paint company. He is a former chairman of the Indian Paint Association and a leading figure in India's paint industry. Bhattacharya's research spans quantum gravity, cosmology, and dark matter, culminating in a unified quantum gravity theory and a novel space quantization model. He has numerous publications in prestigious journals, including his work on a new initiator for free radical polymerization, published in Polymer Chemistry (Royal Society of Chemistry, DOI: 10.1039/COPY00180E). As a guest faculty member at the University of Calcutta, he teaches courses in Colour Physics, Polymer Physics, and the Rheology of Coatings to postgraduate students, continuing to inspire the scientific community.