

## Current Atomic Theory

Current atomic theory has as its base the concept of the discontinuity of matter, or the existence of a void, or vacuum, between the atoms of matter in any state. The origins of this idea go back to Greek philosophers of around 2500 years ago who intuitively suggested that matter was divisible only up to a certain, then unspecified, minuscule point.

While this was a logical idea for solid matter, in which solid, spherical atoms could be pictured in close proximity as in a pile of oranges, the problem was to explain the fluidity of liquids and of air (as the latter had been identified by Empedocles as having substance).

This was resolved by assuming that the atoms in these states of matter were moving in an eternal 'kinetic' motion surrounded by an empty space that was a perfect vacuum, which by definition could not itself exert any force or influence the motions or interactions of the atomic matter in any way.

This idea of the existence of an all-encompassing vacuum was soundly rejected by, amongst others, Aristotle, whose theories, such as the concept of just four material elements (earth, air, fire and water), predominated and which later became part of the accepted 'science' by the Ecclesiastical Roman Empire which ruled Western Europe for a thousand years. The church allowed no deviation from these concepts and, often brutally, enforced acceptance of them, but with the dissipation of the churches power from the 16th century onwards and with technological advances, such as Galileo's refinement of the telescope, natural philosophers began to openly explore the realities of the material environment.

In 1643 a pupil of Galileo, Torricelli, inverted a long glass tube sealed at one end and filled with mercury into an open container of the same element. The resultant space that appeared at the top of the column of mercury in the tube was generally assumed to be a perfect vacuum. (This apparatus, later to be used as the barometer, also appeared to confirm that the atmosphere surrounding earth extended only to a certain altitude, whereupon the perfect vacuum of space began.)

Shortly after in 1647, as a result of this apparent demonstration of the voids existence, Gassendi resurrected and refined Democritus' atomic theory. When, in the latter part of the 18th century, Aristotle's four elements theory was finally demolished by the separation of two of its constituents, air and water, into their component elements, and his long-standing authority was further diminished.

The assumptions that are the basis of atomic theory today were presented by Clerk Maxwell in 1859 in his statistical analysis of atomic interactions in gases, the Laws of Distribution of Velocities, which laws were later modified by Boltzmann.

This quantitative model of the kinetic atomic theory of gases, provided the means to be able to predict with reasonable accuracy the behaviour of gases in differing conditions. However it should be noted at this point that similar quantitative kinetic theories for the liquid and solid states, in which atoms are also suggested to be in kinetic motion in empty space, have since proved impossible to formulate.

One of the main assumptions presented by Clerk Maxwell was that "the volume of molecules is infinitesimal compared to the volume of the gas", which

means that with respect to air at sea level, the volume of atomic matter is just 1/1000th of the total of any volume.

Clerk Maxwell himself assumed that this empty space was not a vacuum but the hypothetical 'luminiferous aether', but this concept of a 'space-filling' non-matter, that facilitated the transmission of light, was dealt a fatal blow by the Michelson and Morley experiments with light in 1887, the intentions of which were to prove the aether's existence in interplanetary space and which patently failed to do so.

However intense debate on the possibility of the existence of the state of vacuum continued until the turn of the last century, when physics was in a state of chaos, with Planck's controversial 'quanta' solution to the 'Ultra-violet Catastrophe' and with pro and anti-atomists at loggerheads.

This state of affairs was ended by the scientists of the day progressively accepting Einstein's theories during the following two decades, culminating in the apparent confirmation of his Relativity theories by Eddington's observations of a solar eclipse in 1919.

The day after these results were published the London Times ran the headlines '*Revolution in science. New theory of the Universe. Newtonian ideas overthrown.*' and Einstein became a global superstar.

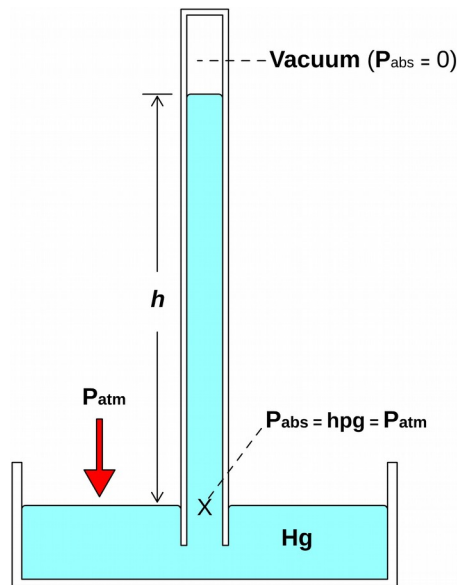
As a biographer put it "*sickened by the useless slaughter (of the 1914-18 World War) people – turned from incompetent generals to a new hero – who had drawn a new picture of nature and the structure of the universe. That (his) work was far beyond them did not matter. Tired of the old bloody world they were ready to worship the new one and its creator – it was sudden, overwhelming fame.*"<sup>1</sup>

In 1904 Einstein published a paper which affirmed his acceptance of kinetic atomic theory and the attendant existence of the void, and stated that "*the concept of an ether is superfluous*", and his subsequent fame and authority eliminated the opposition to discontinuity within the scientific community, and this concept today remains one of the cornerstones of atomic physics.

It is now 377 years since Torricelli's experiment in 1642, but it is still generally believed today, (and taught in early physics education, as in the currently published diagram below) that a mercury barometer contains an absolute vacuum above the liquid, and accordingly there is a condition of absolute zero pressure here. However it is also suggested that there are a few mercury atoms in 'kinetic' motion within this vacuum and which, it is implied, essentially do not generate any pressure on the liquid surface by means of their very rare collisions with it.

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1 'Albert Einstein', Milton Dank, Impact, 1983



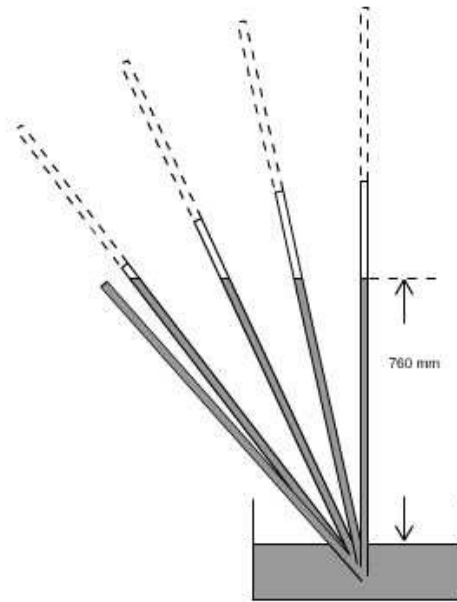
This assumes that the external atmospheric pressure acting on the surface of the exposed mercury liquid is the only force, acting against the pull of gravity on the liquid in the tube, that maintains the observed level of around 760 mm above the exposed liquid at sea level.

The Torricellian barometer was produced by simply filling the glass tube with liquid mercury and, placing a finger over the open end, inverting and emerging it at an angle into a bowl of the liquid and then after removing the finger the tube was elevated to vertical, as in the diagram below.

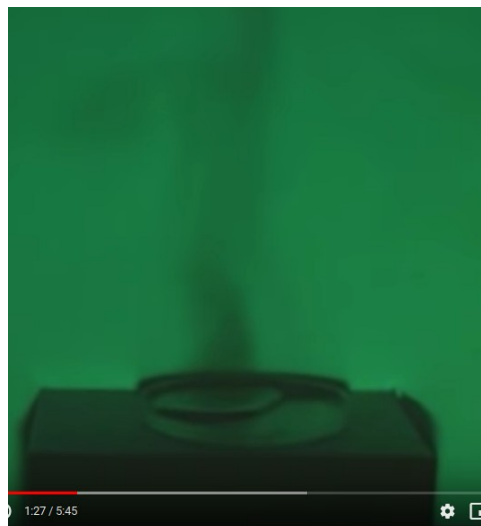
When this elevation angle reaches the point where the top is at 760 mm above the exposed liquid, with any further elevation the liquid in the tube remains at this level whatever length of tube is used, as indicated in this diagram.

However if this apparatus is taken up a mountain this level will fall in the tube, as in Pascal's subsequent experiment where he found that at an elevation of around 4000 metres, in the conditions of a lower atmospheric pressure here, a level of around 640 mm was observed in the tube.

From this experiment it was assumed that the reduction in atmospheric pressure was the only determinant on the level of the liquid in the tube and that the volume of vacuum increased accordingly, as is depicted in the longer tubes in diagram **B**. In other words this implied that the vacuum component had no influence whatever on the level of mercury and that it could freely expand (or contract) in volume.



However it is now proven by experiment, as is evident in the photo below and in this video <https://www.youtube.com/watch?v=lpZF88fqrl8>, that mercury evaporates rapidly at sea level, and so in the depicted elevation of a glass tube full of the liquid, with the progressive and consequent reduction of pressure at its upper surface in contact with the top of the glass tube, evaporation will also occur. And with further elevation of the tube, past the 760 mm mark, as in diagram **B**, the volume above the liquid will be composed of mercury in its gaseous state.



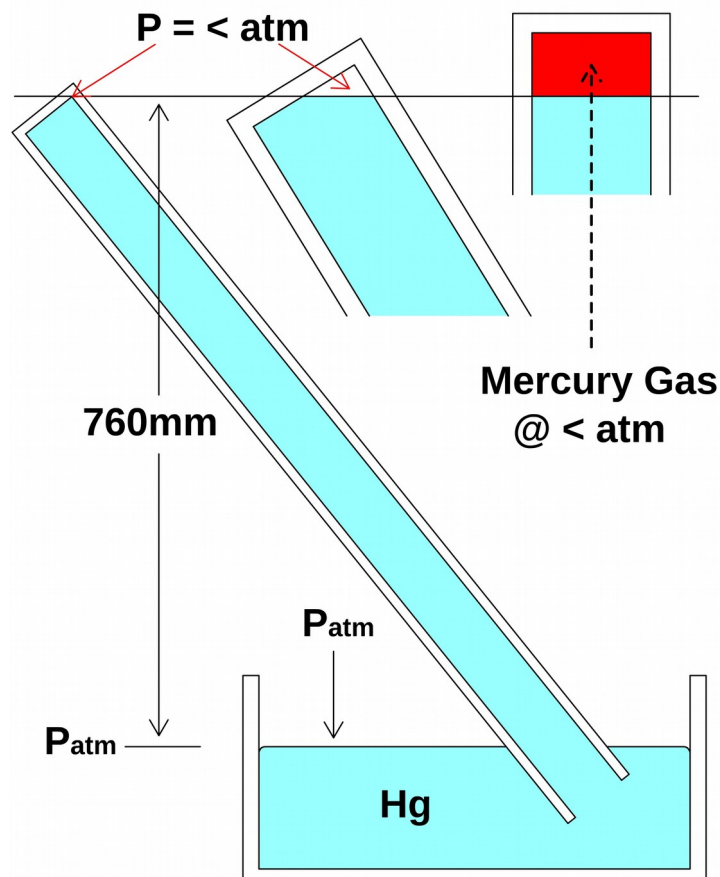
But, with respect to the postulates of the kinetic atomic theory of gases, if this space were 'full' of a 'kinetic' gas that is composed mostly of a volume of inter-atomic vacuum (i.e. 99.9% of the total volume of atmospheric gases) then, as this component by definition can have no influence on the 'kinetic' motions of atoms, the high velocity collisions of these, massive, 'kinetic' mercury atoms will apply a force of pressure on the surface of the liquid, and in this non-zero, low pressure environment further evaporation should obviously occur and the surface level would eventually subside to that of the surface exposed to atmospheric pressure.

As this clearly does not happen, it is evident that there is a force acting here within the tube to maintain the liquid at this level, and if any volume of vacuum,

either inter-atomic or sub-atomic were present, then such vacua, patently, could not generate such a force.

And so in the diagram below where the tube filled with mercury is elevated at an angle to a height of just below 760 mm the pressure at the top of the column of mercury is NOT immediately absolute zero, but is simply lower than atmospheric and the pressure progressively reduces as the tube is raised further.

In these circumstances as the tube is further elevated mercury will begin to evaporate, at a greater rate than at atmospheric pressure, and as the tube is raised further evaporation will continue, so that any volume of 'space' above the liquid will be full of mercury vapour.



As mentioned, if this vapour were a 'kinetic' gas composed mostly of vacuum then, as stated there is absolutely no possibility of this discontinuous gas applying any force to hold the column up against the pull of gravity.

This pure assumption of the existence of a void space has led to current theoretical absurdities.

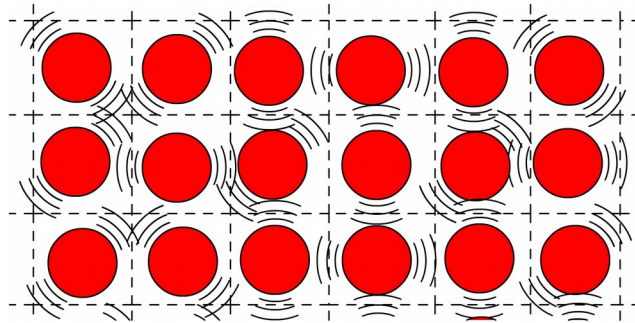
For an example:—

Since the introduction of Electron Microscopy in the 1980's the atomic structure of solids, e.g. metals, needed revision, in the first diagram below this structure was previously one of atoms oscillating in a 'lattice', consisting of a relatively huge interstitial vacuum of a volume of 500% of the total.

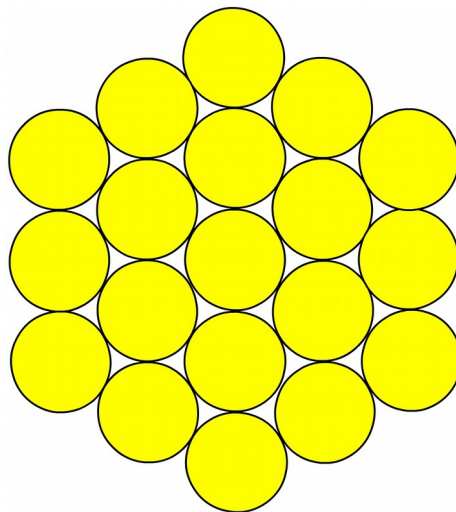
But to conform to the images produced by this technology, this hypothetical structure was 'adjusted' to the currently assumed one of atoms in "close packed arrays" as in the second diagram.

Here the atoms were now assumed to be in continuous contact at their face diagonals and were "*kinetically rotating and vibrating*" and "*separated*" by an interstitial vacuum of a volume amounting to just 28% of the total.

### Lattice Structure

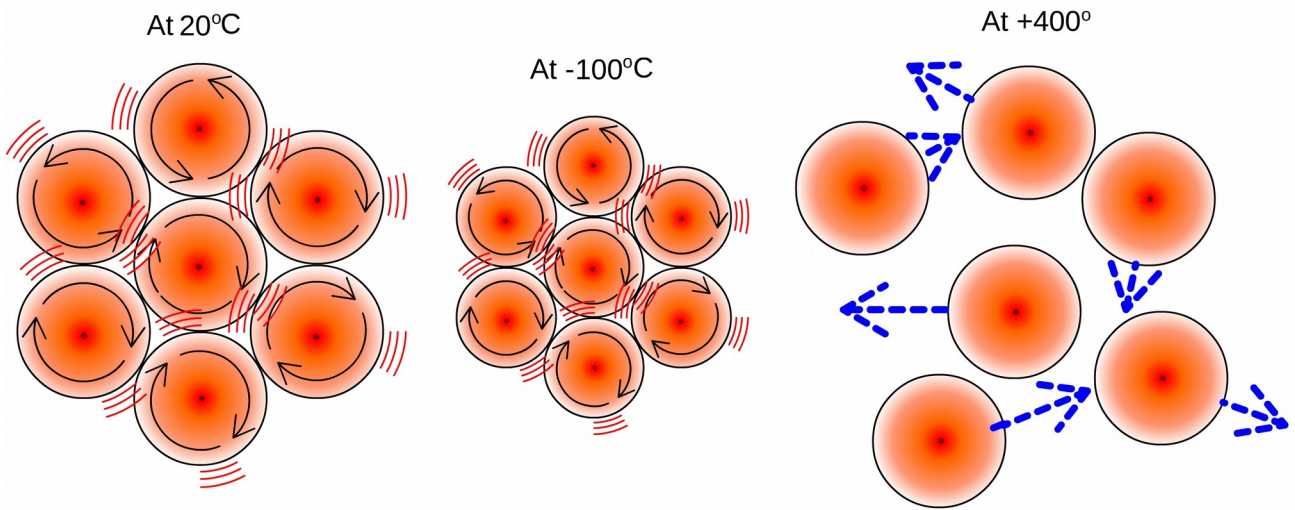


### Close Packed Array



But this created a problem, as this was the assumed structure of matter at 20°C as in the first diagram below, and so, in the observed reduction in the volume of a metal, with a reduction in temperature (accompanied of course by an increase in the mass per unit volume), it was theoretically necessary to suggest that all the component atoms, as well as the interstitial vacuum, were physically reduced in volume, as depicted in the center image below at -100°C.

However in complete contrast it is now stated that, in the opposite direction, on the introduction of heat energy to these atoms at 20°C they do not increase in volume (as must occur in the transition from -100°C to 20°C) but instead the vacuum alone expands as in the third image at 400°C, where of course the "kinetic" energy of motion is said to have moved them apart randomly into a greater volume of vacuum.



All this implies that the ultimate structure of matter in the conditions of STP here at the surface of the Earth are the 'gold standard' **universally**, which is a totally absurd assumption of theoretical physicists alone.