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METEOROLOGY (THE CHEMISTRY PERSPECTIVE)

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ABSTRACT

Weather reports are important to any society the sea and sea and air transport industries rely on accurate forecast and prediction, and thus, reliable weather report based on reliable forecast and prediction should be well rooted in the physical sciences geography and meteology. This paper thus attempt to look at low physical sciences like chemistry is used in understanding the complex dynamics of the atmosphere which shape our weather/climate patterns. The perfect gas was considered how temperature and pressure affect atmospheric charateristics was analysed. Individual gas laws and principles were summarized into the perfect gas equations of state. The impact of the gas laws on environmental science(gas laws and theb weather) was reviewed. The paper conclusively opined that atmosphere being a complex system of gases, is better understand using the perfect gas equation of state. The perfect gas equation is one of the general experiments to describe the atmospheric conditions in a wide range of conditions that are used throughout thermodynamics.

Keywords: meteorology, weather forecast, sea transport, scientific model

INTRODUCTION

When we listen to news, we hear of weather reports by the meteorology department. Such weather reports are important for many reasons;

1. It helps us to know if the day will be sunny, rainy, cloudy, dry, humid and snowy
2. It helps us to know whether there will be storm, hurricane or tropical cyclone.

What the weather is likely to be good/bad weather, what the weather is expected to be in the near future depends on being able to forecast the weather (a description of what the weather is expected to be in the near feature). The Earth and ocean are very important when it comes to weather conditions (the earth and ocean are in continuous contact and conditions in one are certain to influence conditions in the other). The interaction of ocean and atmosphere moderates surface temperatures shapes Earth weather and climate and creates most of the sea's waves and currents (Garrison, 2005).

The atmosphere responds to uneven solar heating by flowing over the Northern and Southern hemisphere. The circulation of air is responsible for about two-third of the heat transfer from tropical to Polar Regions.

The flow of air within each hemisphere is influenced by Earth's rotation. To observers on the surface, Earth's rotation causes moving air (or any moving mass) in the Northern Hemisphere to curve to the right of its initial path, and in the southern hemisphere to the left. The apparent curvature of path is known as the Coriolis effect (Garrison, 2005).

Uneven flow of air within the Hemisphere is one cause of the atmosphere changes we call weather. Large storms are spinning areas of unstable air that occur between or within air masses. Extra tropical cyclone originate at the boundary between air masses, tropical cyclones, the most powerful of Earth's atmospheric storms occur within a single humid air mass. The immense energy of tropical cyclones is derived from water's latent heart of vaporization (Garrison, 2005). Movement of the atmosphere can cause movement of ocean water. Wind blowing over the ocean creates surface currents, and deep currents form when the ocean surface is wormed or cooled as the season's change.

Currents join with the atmosphere to form a giant heat engine that move energy from regions of excess (Tropics) to regions of scarcity (Poles). This energy keeps the tropical sea from boiling away and the polar ocean from freezing solid in its basins. The ocean's surface currents are governed by both Coriolis effect and uneven solar heating. Taken together, an understanding of air and water circulation is at the heat of physical oceanography. Different amounts of solar energy are absorbed at different latitudes. The tropics are warner than the polar region because of this difference.

The Coriolis effect does not initiate the movement of air or water but once moving, it influence the direction of their movement. Ocean currents account for one third of the heat transfer from tropical to polar regions.

Physical Chemistry and weather

The atmosphere where weather conditions manifest is a mixture of gases and understanding the behaviour of the atmosphere requires the knowledge of physical chemistry (Physical chemistry has to do with the sturdy of chemical processes using physical concepts, such hermodynamics and quantum mechanist (Golearnig, 2023).

Understanding the dynamics of the atmosphere begins with an idealized version of a gas, a perfect gas, and how the properties of real gases differ from those of a perfect gas, and the construction of an equation of state which describe their properties.

The Perfect Gas

A gas can be pictured as a collection of molecules (or atoms) in continuous random motion, with average speed that increases as temperature is raised. Gases differ from a liquid in that except during collisions, the molecules of a gas are widely separated from one another and move in paths that are largely unaffected by intermolecular forces. (Atkins, 2010).

State of Gases.

Physical state, that is, physical conditions of a gas, is specified by giving its volume, v, amount of substance (number of molecules), n, pressure, p, and temperature, T. However, it has been established experimentally that it is sufficient to specify only three of these variables in order to fix the fourth variable. This is an experimental fact that each substance that each substance is described by an equation of state, an equation that interrelates these four variables. This equation is given as
$P = f(T,V,n)$ ------------------ (1)
From the above equation, we can see that knowing the values of T,V, and n for a particular gas then the pressure has a fixed value. Each substance is describes by its own equation of state, but we know the explicit form of the equation in only a few special cases. For a
e equation of state has the form $P = nRTN/v$, where R is a constant.

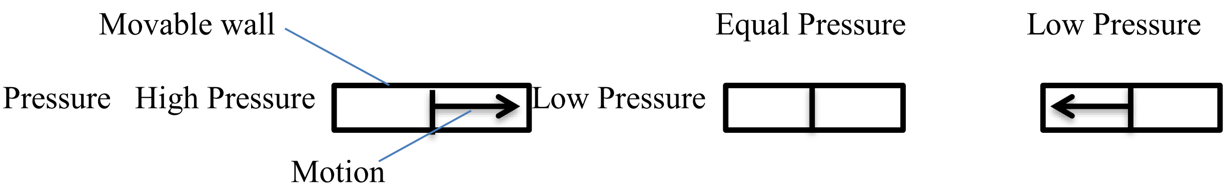
Origin of this Equation of State.
For us to construct this equation of state, we need to understand the following concept;

a) Pressure:

Pressure is the equivalent when a force is divided by the area to which the forces is applied. The greater the force per unit area, the greater the pressure. The force exerted by a gas is due to the incessant battering of the molecules on the walls of its container. Due to the numerous Collisions of the gas molecules, they exert an effectively steady force, which is experienced as a steady pressure. Pressure has the SI unit of Pascal (Pa), and this is equal to one Newton per meters square.

$1Pa = iNm^{-2}$ ------------(2)

This is also equal to, 1 Pa = $1kgm^{-2}c^{-1}$ in base unit. The most common units of pressure are the atmosphere and the bar, l_{atm} = 1.01325 x 10^5 Pa exactly.
1 bar = 10^5 Pa. A pressure of 1 bar is the standard pressure for reporting data, denoted by p^0.
If two gases are in separate container that share a common movable wall, figure 1, the gas that has the higher pressure can be as shown below;



(a) (b) (c)

Figure 1: *when region of high pressure is separated from a region of low pressure by a movable wall, the wall will be pushed into one region or the other, as in (a) and (c). But if the two pressure are identical, the wall will not move (b). The later condition is one of mechanical equilibrium between the two regions.*

Pressure will tend to compress (reduce the volume of) the gas that has lower pressure. The pressure of the high-pressure gas will fall as it expands and the pressure of the low-pressure gas will rise as it compassed. A state will come when the two pressures are equal and the wall has no further tendency to move. This condition of equality of pressure on either side of a moveable wall (a 'position') is a state of mechanical equilibrium between the two gases. The pressure of a gas is therefore an indication of whether a container that contains the gas will be in mechanical equilibrium with another gas with which it shares a moveable wall.

(b) Temperature

Temperature, T, is the property that indicates the direction of the flow of energy through a thermally conducting rigid wall. As indicated in fig 2, energy flows from A to B when they are in contact, and we say that A has a higher temperature than B. There are two types of boundary that can separate the objects. A diathermies boundary (thermally conducting) if a change of sate is observed when two objects at different temperature are brought into contact (Atkins, 2010).

A metal container has diathermies walls. A boundary is adiabatic (thermally insulating) if no change occurs even though the two objects have different temperatures. A vacuum flask is an approximation to an adiabatic container.

Energy as heat Equal temperature

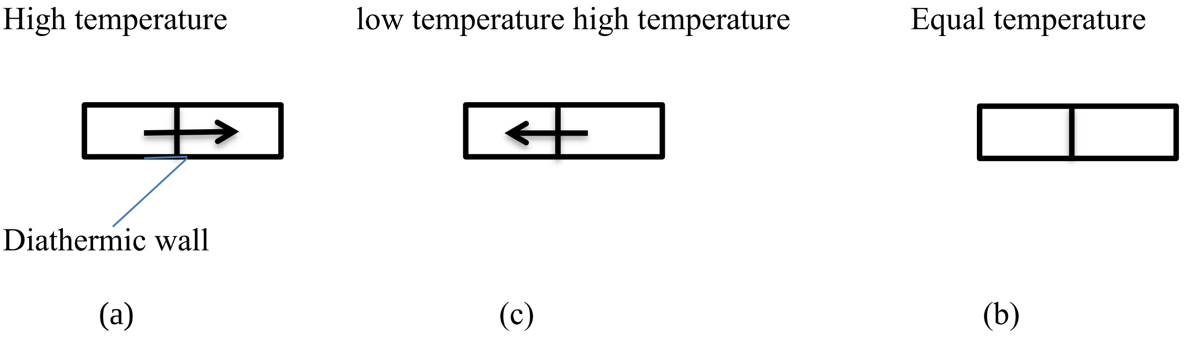


Figure 2: Energy flows as heat from a higher temperature to one of lower temperature if the two are in contact through a diathermies wall, as in (a) and (c). However, if the two regions have identical temperature, there is no net transfer of energy as heat even though the two regions is separated by a diathermies wall (b). The latter condition corresponds to the two regions being at thermal equilibrium. Two objects are at thermal equilibrium if they would not exchange energy as heat or electromagnetic radiation, if they were placed in thermal contact. Let us consider two objects A and B, which are not in thermal contact, and a third object C, which is thermometer. We want to determine if A and B are in thermal equilibrium with each other. The thermometer, Object C, is first placed in thermal contact with A until thermal equilibrium is reached as shown in Figure, 2a.

From the moment on, the thermometer reading remains constant and the reading is recorded. The thermometer is then moved from object A and place in thermal contact with object B as shown in Figure 3b. The reading is again recorded after thermal equilibrium is reached. If the two reading are the same, object A and B are in thermal equilibrium with each other. If they are placed in contact with each other as in Figure 3c, there is no exchange of energy between them. This result are summarized in a statement known as the Zeroth law of thermodynamics (the law of equilibrium)the law state that if object A and B are separated in thermal equilibrium with a third object C, then A and B are in thermal equilibrium with each other.

The Zeroth law justifies the concepts of temperature and the use of a thermometer, a device for measuring the temperature.

If object A and B are separately in thermal equilibrium with a third object C, then A and B are in thermal equilibrium with each other.
This statement can easily be proved experimentally and is very important because it enables us to define temperature. Temperature can be thought of as the property that determines whether an object is in thermal equilibrium with other objects. Two objects in thermal equilibrium with each other are at the same temperatures. On the other hand, if two objects have different temperature, there are not thermal equilibrium with each other (Jeweth et'al, 2008).

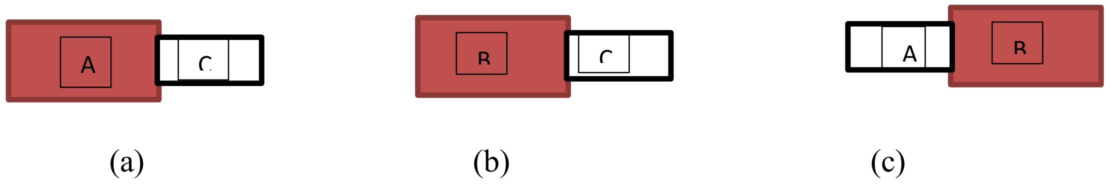


Figure 3, *The Zeroth law of thermodynamics (a,b) if the temperature of A and B are measured to* *be the same by placing them in thermal contact with a thermometer (object C), no energy will be exchange between them when they are placed in thermal contact with each other (c).*

The unit of temperature is degree Celsius (°C) and symbol K. there is also the thermodynamic temperature scale. On this scale, temperatures are denoted by T and are normally reported in Kelvins, K (not ok). Thermodynamic and Celsius temperatures are related by the exact expression.
$K = \O/C + 273.15$------------(3)
The relation in the form
$\O/T = K-273.15$,-------------(4)
This is the current definition of the Celsius scale in terms of the more fundamental Kelvin scale. It implies that a different in temperature of 1^0 C is equivalent to a different of IK (Atkins, 2010).
Another unit of temperature is the Fahrenheit, which is used in the United State. Degree Fahrenheit is ^{0}F.
$T_F = 9/5\ Tc + 32F\text{-}C$ -------- (5)
To interrelate this three temperature scale, we use the relation
$\Delta T_C = \Delta\ T = 5/9\ \Delta TF$ (Jewett, et al, 2008)

Convection:
Convection is heat transfer by fluid motion. It occurs as heated fluid becomes less dense and therefore rises.
Figure 4: shows two plates of different temperatures, with fluid between them. Fluid heated by the lower plate rises and transfer heat to the upper plate. The cooled fluid sinks and the process repeats. The pattern of raising and sinking often acquires a striking regularity.

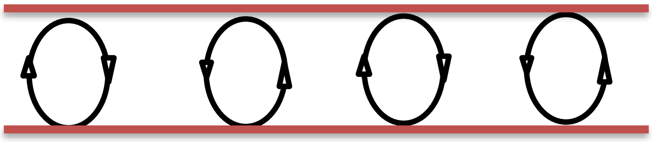


Figure 4: *Convection between two plates at different temperatures.*
Convection is important in many technological and natural environments. For example, convection associated with solar heating of Earth surface drives the vast air movements that establish our overall climate. Violent convection, as in thunderstorm, is associated with localized temperature differences.

As with conduction, the convective heat-loss rate often is approximated proportional to the temperature difference. But the calculation of convection heat loss is complicated because of the associated fluid motion. The study of convection process is an important research areas in many fields of contemporary science and engineering (Wolfson, 2012).

Latent Heat
A substance can undergo a change in temperature when energy is transferred between it and its surroundings. In some situations, however, the transfer of energy dose not result in a change in temperature. That is the case whenever the physical characteristics of the substance change from one form to another. Two common examples of phase changes are from solid to liquid (melting) and from liquid to gas (boiling). The reverse is also true, from liquid to solid (freezing) and from gas or vapour to liquid (condensation). Another is a change from in the crystalline structure of a solid (crystallization). All such face changes involve a change in the systems' internal energy but no

change in temperature ( ). Thus, if a quantity Q of energy transfer is required to change the phase of a mass M of a substance, the latent heat of the substance is defined as
$L = Q/M$ --------------- (6)
This parameter is called latent heat (literally, the 'hidden' heat) because this added or removed energy does not result in a temperature change. Inadvertently, the value of L for a substance depends on the nature of the phase as well on the properties of the substance (Jewett et al, 2008).

Types of Latent Heat

There are two main types of latent heat:

1) Latent heat of fusion (LHF): the amount of heat required to change from a solid to a liquid state , or vice versa, without changing its temperature is known as latent heat of fusion.
2) Latent heat of vaporization: this is the amount of heat energy required to change a substance from a liquid to a gas state, or vice versa, without changing its temperature. This is also known as heat of vaporization.

These two types of latent heat are important in understanding phase transitions and heat transfer in various scientific and engineering applications such as weather and climate change.
The latent heats of various substances vary considerably as data in the table 1 below shows:
Table 1: Latent Heat of Fusion and Vaporization

SUBSTANCE	MELTING POINT (^{0}C)	LATENT HEAT OF FUSION (J/Kg)	BOILING POINT (^{0}C)	LATENT HEAT OF VAPORIZATION (J/Kg)
Helium	-269.6	5.23×10^3	-268.93	2.09×10^4
Nitrogen	-209.97	2.55×10^4	-195.81	2.09×10^5
Oxygen	-218.79	1.38×10^4	-182.97	2.13×10^5
Ethyl alcohol	-114	1.04×10^5	78	8.54×10^5
Water	0.00	3.33×10^5	100.00	2.26×10^6
Sulphur	119	3.81×10^4	444.60	3.28×10^5
Lead	327.3	2.45×10^4	1750	8.70×10^5
Aluminum	660	3.97×10^5	2450	1.14×10^7
Silver	960.80	8.82×10^4	2193	2.33×10^7
Gold	1063.00	8.82×10^4	2660	1.58×10^6
Copper	1083	1.34×10^5	1187	5.06×10^6

Source: Atkin Physical chemistry, 2020 ed.

The Gas law

For a gas at low pressure, its equation of state can be established by combing series of empirical laws.

1) The Perfect Gas law:
   The individual gas laws are well kwon;
   Boyles law: PV = Constant, at constant n,T ---------(7)
   Charles law: V = constant XT, at constant n, P ------(8)
   P = constant XT, at constant n,V -----------------------(9)
   Avogadro's principle, V = constant X n at constant P,T --------(10)

The first two laws of Boyles and Charles are designated as limited law, meaning that they are strictly true only in a certain limit. Avogadro's principle is commonly expressed in the form equal volumes of gases at same temperature and pressure contain equal numbers of molecules. In this form it is increasingly true as **P** **O.** Even though they are only true at P O, they are reasonably reliable at normal pressures (P =1 bar).

→ →

The variation of the pressure of a sample of as the volume is changed is depicted in Figure 5, each curve in the graph corresponds to a single temperature and is called an isotherm. For Boyle's law, the isotherms of gasses are hyperbolas. Alternatively, this isotherm can be depicted as a plot of pressure against I/volume as shown in Figure 6. According to Charles law these lines are examples of isobars, or lines showing the variation of properties at constant pressure. Figure illustrates the linear variation of pressure with temperature. These lines are examples of isochors or lines showing the variation of properties at constant volume.

Figure 5

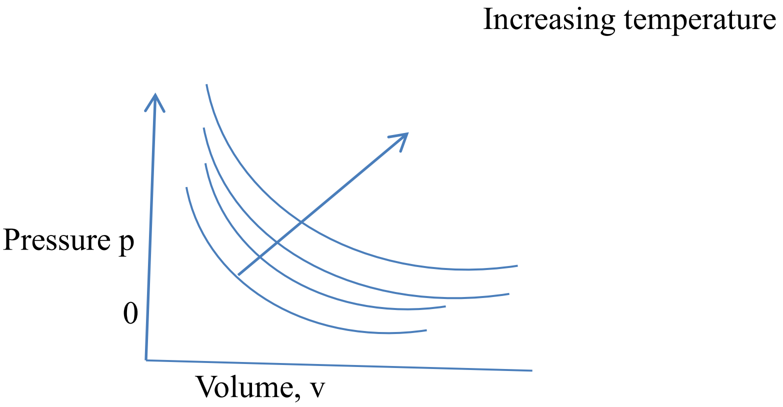


Figure 6

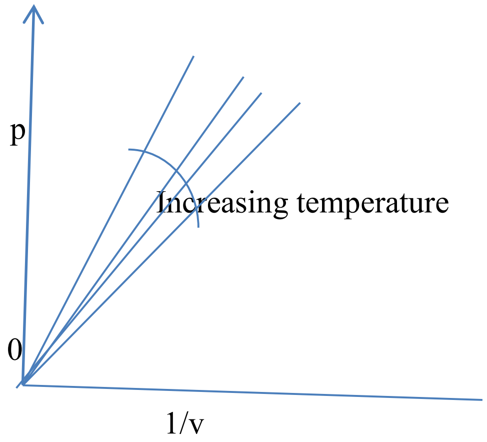


Figure 5. The pressure -volume depends of a fixed amount of perfect gas at different temperature. Each curve is a hyperbola (Pv = constant) and is called an isotherm.

Figure 7

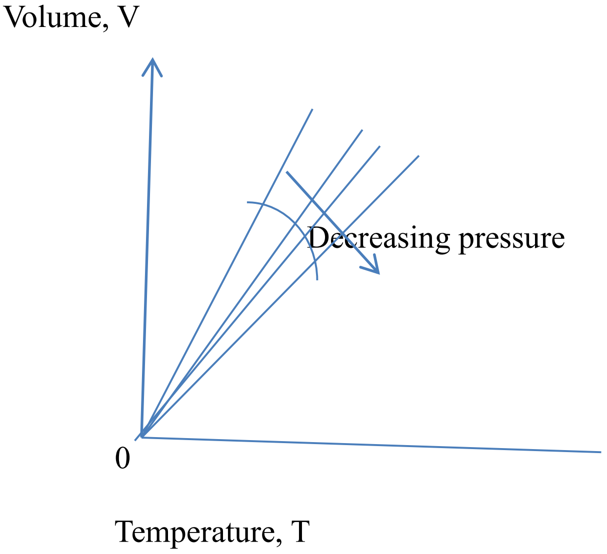


Figure 8

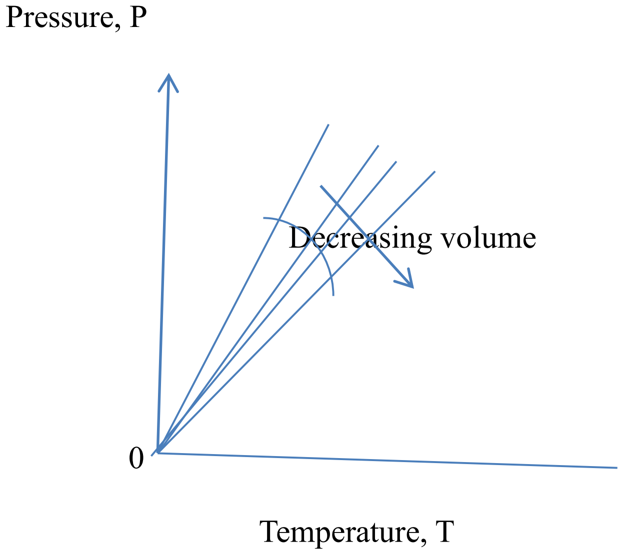


Figure 7. Straight lines are obtained when the volume is plotted against temperature T at constant pressure. Figure 8. The pressure also varies linear with temperature at constant volume and extrapolates to zero at T=0 (-273°c)

The empirical observations summarized by the gas law can be combined into a single expression.
Pv = Constant X & T
The above expression is in consonance with Boyle's law (Pv = laws) holding n and T constant, with both forms of Charles law (P is proportional to T, V is proportional to T) when n and either V or P are held constant, and with Avogadro's principles (V n) when P and T are constant.
The constant of proportionality has been found experimentally to be same for all gasses, and denoted by R, and is called the gas constant with this the expression because
PV = nRT---(11)
And this is the project gas equation. It is the approximate equation of state of ideal gas, and becomes increasingly exact as the pressure of the gas approaches zero. The gas that obeys the perfect equation under all condition is called a perfect gas (or ideal gas). A real gas, an actual gas behaves more like a perfect gas , the lower the pressure, and is described exactly by this equation in the limit of P O. R can be obtained by evaluating R=Pv/nT for a gas in the limit of zero pressure (to guarantee that it is behaving perfectly). A more accurate value is gotten by measuring the speed of sound in a low-pressure gas, with argon in practice, and extrapolating its value to zero pressure. The values of R in various units are listed in table 2:

Table 2, The Gas Constant/unit

Gas Constant(R)	Unit
8.31557	$1K^{-1}mol^{-1}$
8.20574×10^{-2}	$dm3atmK^{-1}mol^{-1}$
8.31447×10^{-2}	$dm3bark^{-1}mol^{-1}$
8.31447	$pam3k^{-1}mol^{-1}$
1.62.364	$dm3Torrk^{-1}mol^{-1}$
1.98721	$cal\ k^{-1}mol^{-1}$

Source: Atkins' Physical Chemistry

The perfect gas equation is of the greatest importance in physical chemistry, as it is used to derive a wide range of relations that are used throughout thermodynamic. Among other applications, the perfect gas equation can be used to discuss processes in the atmosphere that give rise to the weather (Atkins, 2010).

Application of Gas Laws to Weather and Climate Change Forecast

The atmosphere is a mixture of gases with composition summarized in table 3. The composition is maintained moderately constant by diffusion and convection (Winds, particularly the local turbulence known as eddies) but the pressure and temperature vary with attitude and with local conditions, particularly in the troposphere, the sphere of change, the layer extending up to about 11Km.
Table 3 The Composition of Dry Air at Sea Level

COMPONENT	PERCENTAGE BY VOLUME	BY MASS
Nitrogen, N	79.08	75.53
Oxygen, O_2	20.95	23.14

argon, Ar	0.93	1.28
carbon dioxide, CO_2	0.031	0.047
hydrogen, H_2	5.0×10^{-3}	2.0×10^{-3}
neon, Ne	1.8×10^{-3}	1.3×10^{-3}
helium, He	5.2×10^{-4}	7.2×10^{-5}
methane, CH_4	2.0×10^{-4}	1.1×10^{-4}
krypton, Kr	1.1×10^{-4}	3.2×10^{-6}
nitro oxide, NO	5.0×10^{-5}	1.7×10^{-6}
xenon,Xe	8.7×10^{-6}	1.2×10^{-5}
ozone, O_3	7.0×10^{-6}	1.2×10^{-6}
water, H_2O	2.0×10^{-6}	5.3×10^{-6}

Source: McGrawHill Encyclopedia of Science and Technology

In the troposphere the average temperature is 15°C at sea level, dropping to -57°C at the bottom of the troposphere at 11Km. but when expressed on the Kelvin scale, ranging from 288K to 216K, an average of 268K, this variation is much less pronounced. Assuming that the temperature has its average values with attitude, h, according to the barometric formula
$P = P_0a-b/^R$ --------------(12)
Where P_0 is the pressure at sea level and H is a constant approximately equal to 8km., H is better estimated using the expression
$H=RT/Mg$,----------------(13)
Where M is the average molar mass of air and T is the temperature. The barometric formular is the observed pressure distribution quite well even for regions well above the troposphere
figure 8). This implies that the pressure of the air and its density drops to half their sea-level
Hue at h=Hln2, or 6Km.
Level variations of pressure, temperature, and the composition in the troposphere are manifested as 'Weather'. A small region of air is termed a parcel. We know that a parcel of Warm air is less dense than the same parcel of cool air. As a parcel rises, it expands adiabatically, without transfer of heat from its surroundings, so it cools. Cool air can absorb warm air, is less dense than the same parcel of cool air. As a parcel rises, it expands adiabatically, without transfer of heat from its surroundings, so it cools. Cool air can absorb lower concentrations of water vapour than warm air, so the moisture forms clouds. Cloudy skies can therefore be associated with rising air and clear skies are often associated with descending air.

The motion of air in the upper attitudes may lead to an accumulation in some regions and a loss of molecules from other regions. The former result in the formation of regions of higher pressure ('high' or Ganticyclones) and the latter result in regions of low pressure ('low' depression, or cyclones). These regions are shown as H and L in the weather map of Fig. the lines of constant pressure differing by 4mbar (400Pa, about 3Torr)- marked on it are called isobars. The elongated regions of high and low pressure are known, respectively as ridges and
troughs.

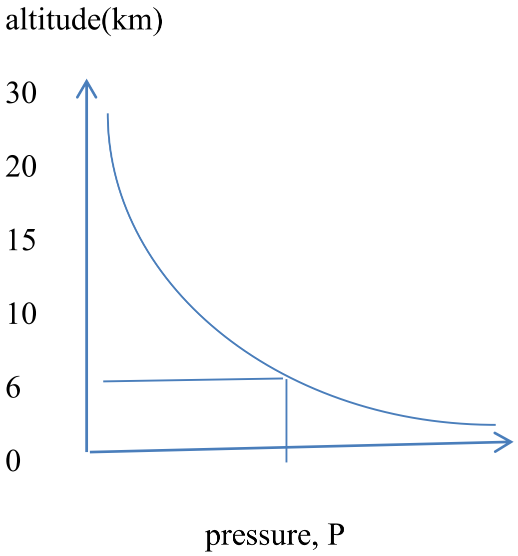


Figure 9: *The variation of atmospheric pressure with altitude, as predicted by the barometer formula and as suggested by the 'US standard Atmosphere' which takes into account the variation of temperature with altitude.*

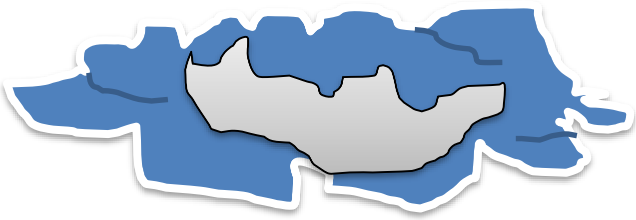


Figure 10. *A typical weather map; in this case, for the Nigeria on 1 January, 2020.*

In meteorology, large-scale vertical movement is called convection. Horizontal pressure different result in the flow of air that we called wind (figure 10). Winds coming from the north in the Northern hemisphere and from the southern hemisphere in the South are deflected towards the West as they migrate from a region where the Earth is rotating slowly (at the poles) to where it is rotating most rapidly (at the equator). Winds travel nearly parallel to the isobars, with low pressure to their left in the Northern hemisphere and to the right in the southern hemisphere. At the surface, where wind speeds are lower, the winds tend to travel perpendicularly to the isobars from high to low pressure. This differential motion results in a spiral outward flow of air clockwise in the Northern hemisphere around a high and inward counter clockwise flow around a low.

The air lost from regions of high pressure is restored as an influx of air converges into the region and descends. We have above that descending air is associated with clear skies. It also becomes warmer by compression as it descends, so regions of high pressure are associated with high surface temperatures. In winter, the cold surface air may prevent the complete fall of air, and results in a temperature invasion, with a layer of warm air over a layer of cold air.

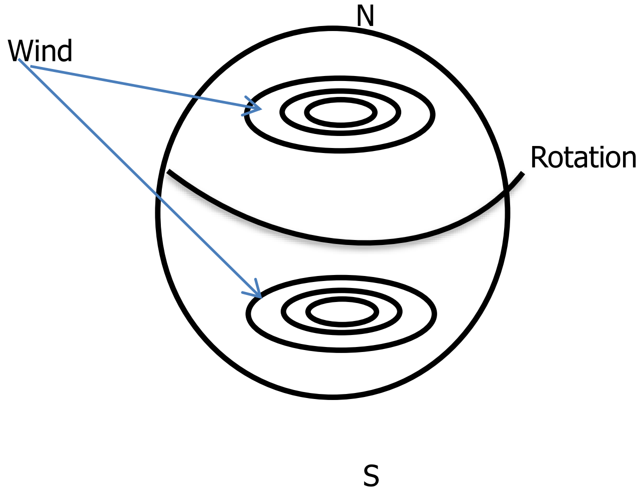
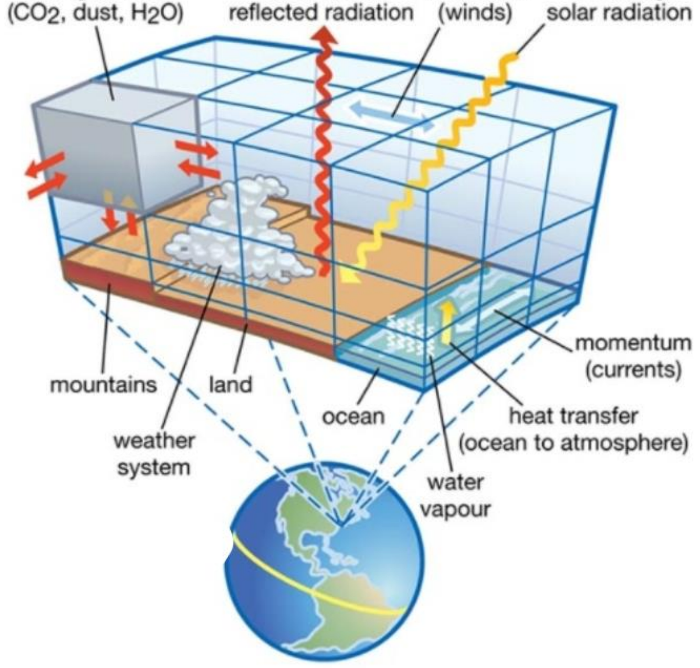


Figure 9. *The flow of air ('Wind) around regions of high and low pressure in the Northern and southern hemispheres.*

Scientific modeling:

In order to understand real phenomenon, such as weather, that is difficult to observe directly, scientists use models to generate physical, conceptual or mathematical representation of such real phenomenon. Scientific models are used to explain and predict the basic view of real objects or systems and are used in a variety of scientific discipline. In disciplines such as physics, chemistry and Earth science, models are used to understand and explain the earth complex behaviour of Earth's climate, and modern climate, models just as the one below is generated.

Figure 10: Concept Diagram of Climate Modeling



Source: 2000.W.F. Ruddiman (visited January,2026)

In understanding weather and climatic processes, physical chemistry focuses on the composition of the atmosphere, aerosol-cloud interactions, and chemical transformations.

- **Chemical Kinetics (Reaction Rates):** This is crucial for modeling the atmosphere, especially in understanding how quickly pollutants transform, such as the photochemical reactions that create tropospheric ozone.
- **Gas-Particle Partitioning & Nucleation:** Physical chemistry explains how water vapor turns into liquid droplets (condensation) or ice crystals (deposition) around tiny particles known as condensation nuclei (dust, sea salt, pollutants).
- **Solute Effect & Cloud Droplet Growth:** The Köhler equation, a principle of physical chemistry, helps determine how solutes within cloud droplets influence their growth and the resulting cloud brightness, which impacts Earth’s albedo (reflectivity).
- **Atmospheric Chemistry & Ozone Depletion:** Chemical reactions in the stratosphere, particularly the catalytic destruction of ozone by chlorine-containing radicals (from CFCs), are understood through kinetic studies.
- **Acid Rain Formulation:** The conversion of sulfur dioxide and nitrogen oxides into sulfuric and nitric acid within clouds is a key application of aqueous-phase chemistry.

General Applications to Weather and Climate Change

- **Numerical Weather Prediction (NWP):** Modern forecasts use computers to solve these equations of motion and thermodynamics to compute the future state of the atmosphere.
- **Greenhouse Effect Understanding:** Physical chemistry explains how specific gases (CO2, CH4) are "opaque" to infrared radiation, causing them to absorb and re-emit heat, thus increasing the Earth's surface temperature.
- **Climate Modeling (AOGCMs):** Atmosphere-Ocean General Circulation Models (AOGCMs) couple these physical and chemical principles to simulate long-term climate changes, such as the 7% increase in atmospheric water vapor for every 1°C of warming (Clausius-Clapeyron equation).
- **Aerosol-Climate Interactions:** Particles from pollution scatter or absorb light (direct effect) and act as cloud nuclei (indirect effect), impacting global dimming and cloud lifetimes.

In summary, while classical physics governs the **movement and energy** of the atmosphere, physical chemistry dictates the **composition and phase changes** within it especially in gas operating principles. . Together, they allow for the prediction of daily weather and the projection of long-term climate shift through classical modelling.

Understanding and explaining the complex behaviour of Earth climate, modern climate Models are used.

The Nigeria Meteorological Society is a forum for scholars, scientists, researchers and stakeholders to promote the ideals of climate science in order to guarantee the safety and wellbeing of the people, reduce poverty and protect, and improve the environment of Nigeria and the rest of the world for further generation. The society holds regular conferences, which foams on relevant and current scientific and technical information in the climate whence. The society also publishes the reports of scholarly research in climate science as it affects agriculture, water resources, medicine, engineering and transportation. Its initial information organ was the Journal of Nigeria Meteorological Society. A New Journal of Meteology and climate science evolved with better packaging for quality and international relevance.

CONCLUSION

We can see that in order to understand the complex dynamics of the atmosphere and the processes of meteorology, thorough knowledge of different atmospheric parameters is needed. The atmosphere being a complex system of gases, one better to understand using the perfect gas equation of state. The perfect gas equation is one of the general experiments to describe the atmospheric conditions in a wide range of conditions that are used throughout thermodynamics.
Among other applications, the equation of state can be used to discuss pressure in the atmosphere that give rise to the weather.

RECOMMENDATION

- We recommend that chemists (physical chemists) should actively be involved in weather and climate research-meteorological research
- Atmospheric chemistry should be given robust attentions, as atmospheric chemist can collaborate with meteorologist in weather forecast, prediction.

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