A Modification in Behavior of Gases

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ABSTRACT

Wave nature is a form of heat energy. Call it as heat energy wave. Heat energy wave holds some force which takes a great effect on outer surface of molecules as well as takes effect in behaviour of gases. How heat energy wave takes effect in behaviour of gases is described in details in this article. The roll of heat energy wave in behaviour of gases is a new idea and a second way. This new idea will help us as a second way to explain the behaviour of gases, to assume the size of minute particle atom, molecules etc., for more efficient weather reporting and many others.

Keywords: Wave, force, outer surface, exert

INTRODUCTION

In physics, a wave is an oscillation accompanied by a transfer of energy that travels through a medium such as solid, liquid or gas. Waves are available everywhere in the nature and therefore can be described as a disturbance that travels through a medium from one location to another location. It is in the form of heat energy and heat energy is the result of the movement of tiny particles. These tiny particles play a continuously up and down movement in nature like ocean waves and river waves. Ocean waves and river waves play up and down and spread.

A sound wave is spread in all directions from the sound source and therefore we can hear from any point. Similarly, heat energy waves play up and down spread in all direction in nature. Heat waves moves in three ways: Radiation, conduction, and convection and every heat energy wave have length, height and breadth. For example the plasma waves can have a range of wavelengths and hence a range of phase velocities (Modena et al., 1995). Wave nature is a form of heat energy. Call it as heat energy wave. The sun's heat ("The Sun & its Energy,") is the electromagnetic waves composite with different wavelength and frequency i.e. heat energy waves are transmitted through the vacuum in the form of a wave and reach the earth ("Kinds of Energy," 2016). Heat energy waves play up and down like ocean waves, river waves and exist everywhere in the universe. Light, sound, heat and water waves carry energy. Energy is the ability to do some work. In physics, work is the movement of an object in the direction of the force applied to it. $W = Fd$. W is the work, F is a force, d is the distance covered. Waves do work when they move objects. We can see this job when large logs move across ocean basins or sands transport. Properties of ocean waves, river waves and heat energy waves are similar all carry some power. Ocean waves and heat energy waves carry energy to hold some force during play up and down. Ocean waves exert the force on the outer surface of a log and log go ahead. Heat energy waves use the force on the outer surface of tiny particles (atoms, molecules, etc.) and gases spreads from one location to another location in the atmosphere. Every wave has some surface area what exert a force capturing some outer surface of an object. Heat energy waves play up and down between as well as among molecules. Some of these heat energy waves exert a continuous force on covering the outer

surface of tiny particles-atoms, molecules, etc. and reserve gaps between as well as among tiny particles of gases. The Tiny particulate matter and waves together hold the size and shape of gases as well as an atmosphere of the earth. Heat energy wave force in gases varies with the coverage by the heat energy waves of the outer surface of the tiny particle of gases. During application of the heat energy wave, if gases cannot move forward for the barrier in a closed gas container, in turn, the corresponding force of the heat energy waves, consecutively and cumulatively exerts a force on the inner surface of a closed gas container through tiny particles-atoms, molecules. The Role of heat energy wave behind the behaviour of gases for a moment is shown in Fig 1.
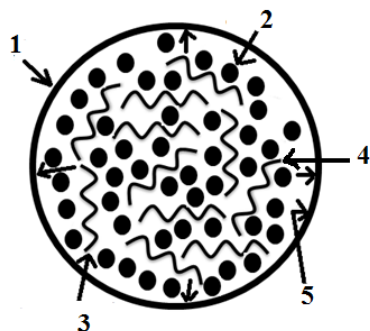

Fig 1. Role of heat energy waves.

1. Spherical shaped gas container.
2. Outer surface of a spherical shaped molecule.
3. Wave of heat energy holds some force during play up & down continuously.
4. Wave exerting force on coverage of outer surface of a molecule,
5. Inner surface of a spherical shaped gas container where corresponding force of waves is exerted.

The figure shows the behaviour of gases for a moment. Heat energy wave continuously are playing up & down between as well as among molecules and exert force on the outer surface of molecules of gases and in turn corresponding force consecutively and cumulatively exert force through molecules on the inner surface of a closed container of gases. There are two arguments in the above context.

1- Heat energy wave holds some force. 2-Wave exerts force on covering some outer space of molecules and product of heat energy wave force and some outer surface of molecules covered by heat energy wave reflects on inner surface of gas container. It is to say, the product of pressure of gases and inner surface area of a closed gas container varies with the variation of the product of covered some outer surface area of molecules by the heat energy wave and average force of a heat energy wave i.e. $PS \propto Af$ when other conditions remain stable. Therefore, $P \propto \frac{Af}{S}$ where here P is the pressure of gases in a closed gas container, S is Inner surface area of a closed gas container, A is the portion of outer surface area of molecules covered by the heat energy wave and f is the average force of a heat energy wave. Without going in internal basic cause, on some apparent physical phenomena of gases, ideal gas equation was propounded like below,

$$PV = n R T \qquad (1)$$

Where, $P \propto \frac{1}{V}$ when other conditions remain stable. P is Pressure, V is Volume, n is number of mole, R is constant of proportionality and T *is* temperature. On internal basic cause behind the behaviour of gases, we can replace $\frac{1}{V}$ by $\frac{Af}{S}$ in ideal gas equation and get a modified ideal gas equation. Therefore, modified ideal gas equation is

$$P S = U n A f T \qquad (2)$$

n is number of moles, U is Constant of proportionality. P, S, n, A & T are variable and f is fixed depending on the kind of wave, U is also fixed. Again, $f U$ is C (fixed) MPa/mole-kelvin. Now modified ideal gas equation is

$$PS = CnAT \qquad (3)$$

DISCUSSION IN REFERENCE TO VAN DER WAALS' WORK

Physical quantity i.e. volume, pressure, temperature etc. what was used by the Van der Waals to establish his equation of state are true and practical. His assumption about molar volume is also practical and true as all molecules have some volume. On the other hand, data which is obtained according Van der Waals' equation of state that is also true and practical equivalent to experimental cause as well as reliable as true data shown in Table 1.

Very used standard data such as Vander Waals' constants, the volume of gases, the number of moles, the temperature of gases, molar gas constant, etc. are collected from ("General Chemistry Textbook Maps," 2016) and used in the above table. Calculation and assessment of pressure of some common gases in agreement with the Van der Waals' equation of state $\left[P + \frac{an^2}{V^2}\right](V - nb) = nRT$ in atm is shown in column (8) and later converted into MPa as to 1 atm = 0.10132501 MPa is shown in column (9).

Data regarding the volume of gases available in litter converts into cubic decimetres for same numeric value as to inner and the outer surface area assess easily. There is the additional factor in the new modified ideal gas equation than ideal gas equation like A, f moreover, $\frac{Af}{S}$ replace in $\frac{1}{V}$.

Hence, it is necessary to assess a new molar gas constant for the new modified ideal gas equation. The Atomic weight (Britannica, 2016), also called relative atomic mass , the ratio of the average mass of a chemical element's atoms to some standard. Since 1961 the standard unit of atomic mass has been one-twelfth of the mass of an atom of the isotope Carbon-12. In connection with this article, consider, one-mole carbon dioxide is a standard relative molecule to assess an outer surface area of tiny particles-atoms, molecules. We may use the following data of Carbon dioxide available in agreement with the Van der Waals equation of state to graph a new modified molar ideal gas constant (C) collected from Table 1. *P* (Pressure of the gas) is 164.0917205 MPa, T (Temperature) is 273K, *V* (Volume of a gas container) is 0.05 dm^3, *S* (Inner surface area of a gas container) is 0.656342904 dm^2 (derived from the volume), *n* (number of moles) is 1

Table 1. Assessment of Pressure & Inner Surface Area

Common Gases	Volume (dm³) of the Gas	Number of Mole	Van der Waals Constants for Common Gases		Temperature (Kelvin)	R= Molar Gas Constant for ideal gas (L-atm/mol-K)	Assessed Pressure		Assessed Inner Surface area of a spherical shaped container [Square decimetre(dm²)] derived from volume in litter or dm³ in column (2)
			a (L²-atm/mol²)	b (L/mol)			In atm	Convert atm to MPa as to 1 atm = 0.10132501 PMa)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	V	N	A	B	K	R	P	P	S
	0.05	1	3.592	0.04267	273	0.08206	1619.46	164.091721	0.656343
Carbon	0.2	1	3.592	0.04267	273	0.08206	52.591	5.32878616	1.65388
dioxide	22.4	1	3.592	0.04267	273	0.08206	0.99486	0.10080381	38.42815
Helium	0.2	1	0.03412	0.0237	237	0.08206	126.217	12.7889037	1.65388
Neon	0.2	1	0.2107	0.01709	273	0.08206	117.21	11.8763158	1.65388
Hydrogen	0.2	1	0.2444	0.02661	273	0.08206	123.092	12.4723246	1.65388
Argon	0.2	1	1.3450	0.03219	273	0.08206	99.8735	10.1196814	1.65388
Oxygen	0.2	1	1.3600	0.03803	273	0.08206	104.312	10.5694053	1.65388
Nitrogen	0.2	1	1.3900	0.03913	273	0.08206	104.508	10.5892398	1.65388
Carbon monoxide	0.2	1	1.4850	0.03985	273	0.08206	102.759	10.4120298	1.65388
Methane	0.2	1	2.2530	0.04278	273	0.08206	86.1657	8.73073535	1.65388
Ammonia	0.2	1	4.1700	0.03707	273	0.08206	33.247	3.36874875	1.65388

Putting the above data in equation $PS = CnAT$ or $\frac{PS}{nT} = CA$. Therefore,

$$CA = \frac{164.0917205 \times 0.656342904}{1 \times 273} = \frac{107.7004364}{273}$$

$$= 0.3945070929$$

The volume of one mole CO_2 is 0.04267 dm³ [Van der Waals' molar constant (volume)]. The entire outer surface area of one mole CO_2 is 0.590517202 dm² (derived from the related volume). How much is A & C?
On the condition in the preceding paragraphs, the coverage of the outer surface area by heat energy waves of one mole CO_2

must be less than 0.590517202 dm². Considering the 1/10 (One tenth) of the entire outer surface area of one mole CO_2 i.e. 0.0590517202 dm² (about) for A as a standard relative element. The assessed new modified molar ideal gas constant(C) is

$$\frac{CA}{A} = \frac{0.3945070929}{0.0590517202} = 6.680704501 \text{ MPa/mole-Kelvin.}$$

Therefore, A for one mole CO_2 is 0.0590517202 dm² (about), and C is 6.680704501 MPa/mole-Kelvin (estimated). The part of the outer surface area covered by the heat energy waves of one mole of different gases according to new modified ideal gas equation (shown in Table 2 captioned Assessment of covered of outer Surface area of molecules).

Table .2 Assessment of covered outer surface area of molecules

Common Gases	Data collected from Table 1				Assessed a portion of outer surface area(dm²) of molecules of one mole of gas covered by heat energy wave [A = (PS)/(nTC)]	New Gas constant (PMa/mole-kelvin)
	No. of Mole	Pressure (MPa)	Inner surface area of container (dm²)	Temperature (Kelvin)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	N	P	S	T	A	C
	1	164.091721	0.656343	273	0.0590517202	6.680704501
Carbon	1	5.32878616	1.65388	273	0.0048322290	6.680704501
dioxide	1	0.10080381	38.42815	273	0.0021239365	6.680704501
Helium	1	12.7889037	1.65388	237	0.0115971835	6.680704501
Neon	1	11.8763158	1.65388	273	0.0107696341	6.680704501
Hydrogen	1	12.4723246	1.65388	273	0.0113101044	6.680704501
Argon	1	10.1196814	1.65388	273	0.0091766898	6.680704501
Oxygen	1	10.5694053	1.65388	273	0.0095845067	6.680704501
Nitrogen	1	10.5892398	1.65388	273	0.0096024930	6.680704501
Carbon monoxide	1	10.4120298	1.65388	273	0.0094417960	6.680704501
Methane	1	8.73073535	1.65388	273	0.0079171712	6.680704501
Ammonia	1	3.36874875	1.65388	273	0.0030548355	6.680704501

Calculation and assessment of covered outer surface area of molecules by heat energy wave of some common gases according to modified ideal gas equation $[PS = CnAT]$ of this article shown in column (6).

CONCLUSION

Roll of heat energy wave in behaviour of gases is a new idea and a second way. This new idea will help us as a second way to explain the behaviour of gases, assume the size of minute particle atom, molecules etc., for more efficient weather reporting and many others. This opens a new area-physics of gases. Further research may made on this new idea.

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