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ETHER FRIENDLY PHYSICS AND GAS LAWS

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The Summary

The Ether Friendly Physics proposes as the most rational Physical Units System the one dubbed Absolute Units System (AUS) built on only two main physical units: the one of length (meter) and the second of time (second). Dimensions of all other units may be deduced from these two. The pressure in a volume of gas is its energy distributed to its volume. The gas temperature is its energy distributed to its mass. The universal gas constant is nothing else as the conversional coefficient from a joule to a kelvin. Under a change of the qualitative composition of gas molecules in a set volume the saving of the same temperature and pressure is ensured by nothing else as by changing the velocity of molecules' motion.

On the Ideal gas law

From Thermodynamics is known the so called "Ideal gas law" that is formulated in form of equation $PV = nRT$ (1), where

P is the pressure of the gas,

V is the volume of the gas,

n is the amount of substance of gas in moles,

R is the ideal, or universal, gas constant, equal to the product of the Boltzmann constant and the Avogadro constant,

T is the temperature of the gas.

In SI units, P is measured in pascals, V is measured in cubic meters, n is measured in moles, and T in kelvins (273.15 kelvin = 0.00 degrees Celsius). R has the value $8.314 \text{ J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$.

Here it seems proper to remind that the Boltzmann constant $k_B = \frac{R}{N_A}$, as it infers from the mentioned above is the relation between the universal gas constant and the Avogadro number (the amount of molecules in one mole of substance). $k_B = 1.380\,6488 \times 10^{-23} \text{ Дж}\cdot\text{K}^{-1}$.

The above displayed equation of ideal gas can be reorganized with regard to the volume of one mole of the ideal gas:

$$V_m = \frac{V}{n} = \frac{RT}{P} \quad (2).$$

This molar volume of the ideal gas is calculated with extreme precision and e.g. under the pressure of 100 kPa and temperature of 0°C is $22.710\,980 \text{ dm}^3/\text{mole}$.

In spite of the law reproduced by the formulas (1) and (2) is named "the Law of ideal gas" in more or less degree it is correct for all gases independently of their qualitative composition i.e. masses of their molecules.

The physical content of the values entering the equation (2) seems understandable except the temperature and the connected with it constant R . As to the temperature, its definition is mainly brought to that is the numeric measure of hot or cold.

Absolute system of units

In order the further line of ideas be more understandable it seems useful to begin with conveying hereto some initials of the employed in the Ether friendly physics Absolute system of units.

The Ether friendly physics (EFP) believes that matter exists in infinite three-dimensional (Euclidian) space and absolute time. Its components are ether that is composed with minuscule particles, which geometric dimensions are and probably will long remain undetermined, and the familiar to us traditional matter made with greater particles in particular electrons and protons.

In order to explain numerous physical events the modern science has introduced numbers of physical units systematized to a number of systems and often incoherent one to another. The EFP believes that the most rational unities system could be built merely on the basis of units of length and time, because as it has been proved in [1], even the sense of such main physical concepts as mass and electric charge is nothing else as the screening area of respective objects.

Naturally as the main unit of length in the Absolute unities system (AUS) there was taken meter (m), and equally naturally as the main unit of time there was taken second (s). Other physical units necessary to explain the chosen topic will have the following dimensions.

Area – m^2 ,
 Volume – m^3 ,
 Velocity – ms^{-1} ,
 Acceleration – ms^{-2} ,
 Mass and electric charge – m^2 ,
 Force - $m^2 \times ms^{-2} = m^3s^{-2}$,
 Pressure - $m^3s^{-2} : m^2 = ms^{-2}$,
 Work, energy - $m^3s^{-2} \times m = m^4s^{-2}$, or $m^2 \times m^2s^{-2} = m^4s^{-2}$.

Analyse of the equation (2)

On the account of that in AUS joule has as its analogue m^4s^{-2} , and mole has a dimension of m^2 , the dimension of the universal gas constant can be represented as $m^4s^{-2} \times K^{-1} \times m^{-2} = m^2s^{-2} \times K^{-1}$, and the dimension of molar volume as $m^3 : m^2 = m$. The product PV_m , that has dimension $ms^{-2} \times m = m^2s^{-2}$ can be understood as the energy of one mole of gas and designated as E_m with a dimension of m^2s^{-2} :

$$PV_m = RT = E_m \quad (3).$$

The above equation can be split into

$$P = \frac{E_m}{V_m} = \frac{E}{V} \quad (ms^{-2} = m^2s^{-2} : m = m^4s^{-2} : m^3) \quad (4) \text{ and}$$

$$T = \frac{E_m}{R} \quad (K = m^2s^{-2} : m^2s^{-2}K^{-1}) \quad (5).$$

From the equation (4) one may understand that pressure is the energy of gas distributed over its volume, and from the equation (5) one may understand, firstly, that the temperature of gas is its energy distributed over its mass (or the amount of matter, or sum of its screening areas), and secondly – that the universal gas constant is nothing else as the coefficient of conversion from joules to kelvins. The fact of pressure being energy one may comprehend imagining a tank filled with immobile gas molecules incapable resulting from such immobility to strike onto the walls of the tank. Incurring no strikes from the immobile molecules the walls of the tank would not sustain any pressure that would testify that in the interior of the tank it would not exist at all.

It must be clear that while using the Absolute units system and while calculating temperature in m^2s^{-2} there would drop by itself any need to use in the equations (3) and (5) of the universal gas constant.

On the Avogadro law

The Law of Avogadro declares that under the same conditions, that is under the same temperature and pressure the same volumes of different gases contain the same amount of molecules and this, as it will be shown ensues from the above found equations. Indeed from the equations (4) and (5) there follows $\frac{P}{T} = \frac{R}{V_m}$, which means that under set pressure and temperature the molar volume is also set; and this set molar volume has to contain one mole of any gas that is the same amount of molecules independently of their nomenclature.

From the equation (5) there also follows that the molar energy, that is one of one mole of gas is set as well; and because energy E_m is the product of the molecules' mass and half square of their velocity, there results to conclude that under a change of the qualitative composition of gas molecules in a set volume the saving of the same temperature and pressure is ensured by nothing else as by changing the velocity of molecules' motion.

Conclusions:

- 1) The Ether Friendly Physics proposes as the most rational Physical Units System the one dubbed Absolute Units System (AUS) built on only two main physical units: the one of length (meter) and the second of time (second). Dimensions of all other units may be deduced from these two;
- 2) The pressure in a volume of gas is its energy distributed to its volume;
- 3) The gas temperature is its energy distributed to its mass;
- 4) The universal gas constant is nothing else as the conversional coefficient from a joule to a kelvin;
- 5) Under a change of the qualitative composition of gas molecules in a set volume the saving of the same temperature and pressure is ensured by nothing else as by changing the velocity of molecules' motion.

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