THE LAWS OF THERMOCHEMISTRY

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In this paper we give the Laws of Thermochemistry which generalize the ideal gas law postulated by Lavoisier and prove the Climate Equations.

The ideal gas law postulated by Lavoisier is incomplete because does not apply to gases in the large as, for example, the atmosphere. In a gas in small pressure, volume and temperature conditions the variations of pressure, volume and temperature are all equal for all molecules of the gas, however in a gas in large pressure, volume or temperature conditions the molecular variations of pressure, volume and temperature depend on the global pressure, volume or temperature and so vary in most of the molecules of the gas.

First Law of Thermochemistry: The sum of the molecular variations of pressure and volume are the molecular variations of temperature.

$$\frac{dP}{P} + \frac{dV}{V} = \frac{dT}{T}$$

Second Law of Thermochemistry: The molecular variations of entropy are the molecular variations of energy minus the molecular flow of matter per molecular relative temperature.

$$\frac{dS}{S} = \frac{dQ+V\,dP+PdV-\sum a_{ik}\mu_{ik}d\xi_k}{UT_m/T}$$

in which a_{ik} and μ_{ik} are the stoichiometric coefficients and the chemical potentials of the i chemical reactants and products in the k chemical reactions with extent of reaction ξ_k.

The Climate Equations

We give now the Climate Equations for Meteorology, Oceanography and Geology.
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Since the atmosphere is a gas in a spherical ring volume with a small radius h for which small molecular variations of temperature and large molecular variations of pressure occur, for $\frac{dv}{v} = -\frac{dh}{h}$, its thermochemical differential equation is

$$\frac{dP}{P} - \frac{dh}{h_0} = \frac{dT}{T_0}$$

and so

$$P_0e^{-h/h_0} = Pe^{-T/T_0}$$

in which P_0, h_0 and T_0 are the pressure, the heigth and the temperature of the atmosphere at sea level.

Since the Earth is a solid and also a liquid in a large volume in which small molecular variations of temperature and large molecular variations of pressure occur, its thermochemical differential equation is

$$\frac{dP}{P} - \frac{dh}{h} = \frac{dT}{T_0}$$

and so

$$Phe = P_0 h_0 e^{T/T_0}$$

in which P_0, h_0 and T_0 are the pressure, the radius and the temperature of Earth at sea level.

Since the nucleus of Earth is a liquid in a small volume in which large molecular variations of temperature and large molecular pressure occur, its thermochemical differential equation is

$$\frac{dP}{P} - 3h^2 \frac{dh}{h_0^3} = \frac{dT}{T}$$

and so

$$PT_0 e^{h^3/h_0^3} = P_0 T e$$

in which $P_{0,}$ h_0 and T_0 are the pressure, the radius and the temperature of the magmatic chamber surface.