# THE LAWS OF THERMOBIOCHEMISTRY

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In this article I give the Laws of Thermobiochemistry which unify the Theory of Biology, Chemistry and Physics

**First Law of Thermobiochemistry:** In an isolated Thermobiochemical System the variations of Energy tend to zero as time elapses

$$dU \to 0 \text{ as } t \to \infty$$

where $U$ is the Energy of the Thermobiochemical System and $t$ the time elapsed on the Thermobiochemical System

**Second Law of Thermobiochemistry:** In a Thermobiochemical System the Energy is conserved

$$\frac{dU}{U} = \frac{dQ+dW+dE+dmc^2+\gamma dA}{Q+W+E+mc^2+\gamma A}$$

where $U$ is the Energy, $Q$ the Heat, $W$ the Mechanical Energy, $E$ the Electromagnetic Energy, $mc^2$ the Mass Energy and $\gamma A$ the Surface Tension of the Thermobiochemical System

**Third Law of Thermobiochemistry:** In a Thermobiochemical System the sum of the variations of Thermomechanical Energy and Biochemical Kinetic Energy is the sum of the variations of Heat and Surface Tension

$$\frac{dPV+dBK}{PV+BK} = \frac{dQ+\gamma dA}{Q+\gamma A}$$

where $PV$ is the Thermomechanical Energy, $BK$ the Biochemical Kinetic Energy, $Q$ the Heat and $\gamma A$ the Surface Tension of the Thermobiochemical System

**Fourth Law of Thermobiochemistry:** In a Thermobiochemical System the Biochemical Kinetic Energy tends zero as Heat tend to zero

$$BK \to 0 \text{ as } Q \to 0$$

where $BK$ is the Biochemical Kinetic Energy and $Q$ the Heat of the Thermobiochemical System

**Fifth Law of Thermobiochemistry:** In a Thermobiochemical System the variations of Entropy are the variations of Heat minus the variations of Mass Energy by Heat average

$$\frac{dS}{S} = \frac{dQ-\sum n_{ij} d\xi_i c^2}{\frac{Q-mc^2}{Q_{avg}}}$$

where $S$ is the Entropy, $Q$ the Heat, $mc^2$ the Mass Energy, $n_{ij}$ the Stoichiometric Coefficients and $\xi_i$ the Extents of Reaction of the Biochemical Reactions of the Thermobiochemical System

**Sixth Law of Thermobiochemistry:** In a Thermobiochemical System the variations of Entropy due to irreversible Thermobiochemical Processes are always positive

$$dS_i \geq 0$$

where $S_i$ is the Entropy due to the irreversible Thermobiochemical Processes of the Thermobiochemical System

**Seventh Law of Thermobiochemistry:** In a Thermobiochemical System the Entropy tends to zero as Heat tends to zero

$$S \to 0 \text{ as } Q \to 0$$

**Eigth Law of Thermobiochemistry "Law of Life":** In a Thermobiochemical System the sum of the variations of Organic Chemical Potential and the variations of the Biochemical Kinetic Energy are the variations of Life

$$\frac{dBP+dBK}{BP+BK} = \frac{dL}{L}$$

where $BP$ is the Organic Chemical Potential, $BK$ the Biochemical Kinetic Energy and $L$ the Life of the Thermobiochemical System

**Ninth Law of Thermobiochemistry "Law of Health":** In a Thermobiochemical System the sum of the variations of Organic Chemical Potential, Organic Chemical Energy and Biochemical Kinetic Energy is the variation of Health

$$\frac{dBP+dBC+dBK}{BP+BC+BK} = \frac{dH}{H}$$

where $BP$ is the Organic Chemical Potential, $BC$ the Organic Chemical Energy, $BK$ the Biochemical Kinetic Energy and $H$ the Health of the Thermobiochemical System

**Tenth Law of Thermobiochemistry "Law of Evolution":** In a Thermobiochemical System the sum of the variations of Organic Chemical Potential and Organic Chemical Energy is the variation of Evolution

$$\frac{dBP+dBC}{BP+BC} = \frac{dE}{E}$$

where $BP$ is the Organic Chemical Potential, $BC$ the Organic Chemical Energy and $E$ the Evolution of the Thermobiochemical System

**Eleventh Law of Thermobiochemisty:** In a Thermobiochemical System the Organic Chemical Potential tends to zero as the Biochemical Kinetic Energy tends to zero

$$BP \to 0 \text{ as } BK \to 0$$

where $BP$ is the Organic Chemical Potential and $BK$ the Biochemical Kinetic Energy of the Thermochemical System

**Twelfth Law of Thermochemistry:** In a Thermobiochemical System the Organic Chemical Energy tends to zero as the Biochemical Kinetic Energy tends to zero

$$BC \to 0 \text{ as } BK \to 0$$

where $BC$ is the Organic Chemical Energy and $BK$ the Biochemical Kinetic Energy of the Thermobiochemical System

As a consequence as the Biochemical Kinetic Energy tends to zero the Thermobiochemical System comes to extinction

**References**

1. Cordero Grau, Daniel. The Laws of Thermochemistry.