

# 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

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

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

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

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

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

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

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

**Eighth 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 Thermobiochemistry:** In a Thermobiochemical System the Organic Chemical Potential tends to zero as the Biochemical Kinetic Energy tends to zero

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

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

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

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

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.