J. Chem. Chem. Eng. 12 (2018) 121-123
doi: 10.17265/1934-7375/2018.03.006

The Laws of the Chemical Psychology

Aibassov Yerkin[1], Yemelyanova Valentina[1], Savizky Ruben[2] and Askarova Gauhar[1]

1. Research Institute of New Chemical Technologies and Materials, Kazakh National University Al-Farabi, Almaty 005012, Kazakhstan

2. Columbia University, 3000 Broadway, New York, NY 10027, USA

Abstract: As a result of the research, new knowledge about the chemical mechanisms of mental processes in the brain was obtained, which allowed us to identify new patterns in chemical psychology. We proposed the laws of conservation of the quantity and energy of emotions.

Key words: Chemical psychology, laws of conservation of the quantity and energy of emotions.

1. Introduction

The relevance of the work is due to the fact that a lot of material has been accumulated about the chemistry of the brain. This material needs to be comprehended, structured and generalized. The practical value of the work lies in the fact that the results of the study can be used in medicine for the treatment of dementia.

The purpose of this work is the discovery of a new science-chemical psychology, as well as the study and conclusion of the laws of conservation of the quantity and energy of emotions.

2. Theory

At present, several billion sources of information must be collected and processed daily. For effective production, consumption and accumulation of such information flow, we proposed a new concept—Hyper-Information.

The human body contains approximately 10^{13} cells. The amount of information needed to build such a single structure out of $10^{13}!$ possible,

$$I = \log2\ (10^{13}!) = 10^{13} \log_2 10^{13} = 4 \times 10^{14}\ \text{bit}.$$

Decrease in entropy in the construction of the human body from cells will be

$$\Delta S \approx 2 \times 10^{-24} \times 4 \times 10^{14} \approx 10^{-9}\ \text{eu}$$

When evaporation of one gram of water, the entropy rises by about 1 eu.

Thus, the decrease in entropy in the transition from chaotically located cells to the human body is numerically equal to the increase in entropy upon evaporation of 10^{-9} grams of water.

The number of molecules of biopolymers (proteins, nucleic acids) in one cell is on average 10^8. Assume again that all the molecules are different, and their relative arrangement is unique. The amount of information needed to build a single cell from the finished biopolymers,

$$I = 108 \log2\ 10^8 \approx 2.6 \times 10^9\ \text{bit},$$

for all cells in the human body 2.6×10^{22} bit, which corresponds to a decrease in the entropy by approximately 6×10^{-2} eu.

The adult body contains about 7 kg of proteins and 150 g of DNA, which corresponds to $\approx 3 \times 10^{25}$ amino acid and $\approx 3 \times 10^{23}$ nucleotide residues. To create a single sequence from 203×10^{25} possible, for the protein is necessary $\approx 10^{26}$ bit. For DNA it is necessary $\approx 6 \times 10^{23}$ bit. In terms of entropy, we obtain 300 and 1.4 eu for proteins and DNA. respectively.

Thus, the ordering of the biological organization of the human body "costs" 301.5 eu and an overwhelming contribution is made by the ordered distribution of amino acid residues in proteins. Decrease in entropy in the occurrence of such a

Corresponding author: Aibassov Yerkin, professor, research fields: chemistry of brain, As, Sb and Bi.

biological organization is easily compensated by trivial physical and chemical processes. Increase in entropy by 300 eu is provided by evaporation of 170 g of water.

3. Results and Discussion

Chemical psychology is the science of the laws of the chemical nteraction of neurotransmitters and the development and functioning of the psyche, as a special form of life activity. The object of chemical psychology is the psyche, the subject is the basic laws of the generation and functioning of mental reality. The subject of chemical psychology is the study of the structure, functions of organic molecules on mental processes and human behavior.

The tasks of chemical psychology:

(1) The study of psychological facts and their patterns (the explanation of facts, the disclosure of the laws to which these phenomena are subject), and the establishment of mechanisms of mental activity (the establishment of order and interaction in the work of specific mental and psychophysiological structures that carry out a particular mental process).

2. Chemical psychology aims to establish the basic chemical laws of mental activity, trace its development, reveal the underlying mechanisms and describe the changes that occur in this activity.

Chemical psychology studies the brain and psyche, biological and social activities.

Basic concepts and laws of chemical psychology

The first law of emotion:

The forces of interaction of emotions are directly proportional to the product of the energy of emotion and inversely proportional to the square of the distance between the regions of the centers of emotions in the brain.

The law of interaction of several emotions:

If the emotion interacts simultaneously with several emotions, the resultant force acting on the given emotion is equal to the vector sum of the forces acting on this emotion from all other emotions.

$$E_1 = -E_2.$$

$$\Delta E = 1/4\pi\ RT/nF\ \lg[E^+]/[E^-]$$

where R is the universal gas constant, equal to 8.314 J/(mol·K); T is the absolute temperature; F is the Faraday constant equal to 96,485.55 $C \cdot mol^{-1}$; n is the number of electrons participating in the process; E^+ is positive emothion, E^- is negative emothion.

The law of conservation of quantity and energy of emotions

The number of emotions and the mass of all substances that have entered into a chemical psychic reaction is equal to the mass of all reaction products.

As a result of chemical reactions, emotions do not disappear and do not arise, but their rearrangement takes place (chemical transformation of emotion is the process of breaking some bonds between atoms and the formation of others, resulting in molecules of reaction products from the molecules of the initial substances). Since the number of atoms before and after the reaction remains unchanged, their total mass should also not change. Under the mass was understood the value characterizing the amount of emotion.

The law of the preservation of emotion

In studies (Herller, 1993), it was suggested that the valence of emotions depends on the following ratios of activities of the left (lfc) and right (rfc) frontal cerebral cortex.

lfc > rfc—Positive emotions

rfc > lfc—Negative emotions.

In work (Gimranov, Kurdyukova, 2005) it was shown that when the left hemisphere is activated, the positive sign of emotion not only increases, but the amount of emotional charge in the opposite hemisphere of the brain decreases, which is expressed by the equation of the “law of the preservation of emotion”:

lfc (> 60%) > rfc (□ 40%)—Positive emotions

rfc (> 60%) > lfc (□ 40%)—Negative emotions

rfc (40-60%) + lfc (40-60%)—Minimal emotions.

The results of a study using the technique of transcranial magnetic stimulation (TMS) confirm the

data that the right hemisphere is more associated with negative hemispheres and the left hemisphere with positive emotions.

These data allow us to conclude that the interaction of the emotional stimulus with a closed system of the brain causes fluctuations in the choice alternatives that are the result of the competitive activity of the right and left frontal cortex, subsequently leading the system to an equilibrium state and to the establishment of order.

Equation for the entropy of the choice of negative emotions:

$$dS = -\Sigma (Pd) \ln P(d) =$$
$$-\Sigma(P1,2) \ln P(1 + P2) = 0.6 + 0.4 = 1.0$$

for the entropy of the choice of positive emotions:

$$dS = -\Sigma (Pd) \ln P(d) =$$
$$-\Sigma (P2,1) \ln (P2 + P1) = 0.6 + 04 = 1.0$$

where P1 = P , P2 = P.

The comparison of these equations with all evidence indicates the effect of the law of conservation of energy, and in this case the “law of the preservation of emotion”.

4. Conclusion

As a result of the research, new knowledge about the chemical mechanisms of mental processes in the brain was obtained, which allowed us to identify new patterns in chemical psychology.

Thus, we proposed the laws of conservation of the quantity and energy of emotions.