CosmoIntel
The First Scientific Journal in T-Consciousness Research

Investigation of the Influence of Taheri Consciousness Fields on the pH of Pure Water in the Vicinity of Air

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DOI: doi.org/10.61450/joci.v1i9.142

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Abstract

T-Consciousness Fields (TCFs) have been introduced by Mohammad Ali Taheri and the effects of these fields on living and non-living systems have been studied in various experiments. Taheri's theory of *Mind-of-Matter* (Mental Body of Matter) has been discussed in the studies of the behavior of matter under the influence of T-Consciousness Fields. In the present study, changes in pH and temperature of pure water under the influence of three different TCFs have been investigated. Given that the environmental conditions and materials used in this study are the same for the control and the test samples, it is generally expected that all samples behave similarly in terms of pH and temperature of the solution. However, meaningful differences were observed between the behavior of the test samples and that of the control which necessitated performing thermodynamic calculations for better comparison. The results of this experiment, in addition to confirming the distinct effects of the TCFs, showed that: (1) the application of the TCFs has caused states with lower entropy to occur in the systems under the influence of TCFs; (2) The negligibly small difference between the enthalpy of the control and that of the test samples is indicative that there has been no energy transfer in the form of heat. And the energy available for sharing to the system under the influence of TCFs is considerably less than the amount required for conversion to mass. Hence, it seems that the application of TCFs and their interaction with the mind-of-matter have caused matter to transition from one mental state to another, and by assigning a new property appropriate to the new mental state, it has enabled matter to exhibit a new behavior.

Keywords: Mind of Matter; Taheri Consciousness Fields; Water pH; Entropy; Gibbs Free Energy; Enthalpy

Introduction

On the earth, life is not possible without water. In the history of the formation of the earth, the cooling of the earth's crust and the formation of water have been the main stages in the development of life. The prevailing hypothesis of the beginning of life by Oparin, 1957) and (Bernal, 1967) holds that low-molecular-weight organic components that constitute living organisms are produced abiotically and exist in low concentrations in the primordial waters of pre-life as the containing media. On the other hand, the presence of water as a reactant or product in most biological reactions emphasizes the active role of water in the formation of metabolism and favors the theory of the "metabolism first" over the "polymer formation first" (Frenkel-Pinter et al., 2021). In addition, water molecule chemistry and its significant differences in physicochemical properties have led scientists to consider it a better candidate for the formation and optimal homeostasis of life, among other fluids (Ball, 2017).

The unique properties of water, along with other capabilities, such as water memory (Fortner et al., 1988) and the effectiveness of its structure from positive energies (Emoto 2004, Radin et al., 2006), led us to study the pH of water under the influence of the T-Consciousness Fields (TCFs). According to Taheri's theory, there are various TCFs with different functions that are a subset of the Cosmic Internet Network or Cosmic Consciousness Network (CCN) and which have can an effect on all living and non-living systems, such as humans, plants, animals, microorganisms, all types of materials, substances, etc.

In the following, considering the thermodynamics of the water ionization reaction and the relationship between energy and pH, the theoretical foundations required for these studies are discussed. In this experiment, for the first time, the reaction of water ionization in the presence of T-Consciousness is investigated, and for this purpose, the pH of pure water under the influence of different TCFs is studied. Finally, calculating the thermodynamic parameters of water at constant pressure (atmospheric pressure) and in standard conditions, we study the mind of water based on Taheri Consciousness Field theory.

pH and Thermodynamics of Water

Of all the possible chemical reactions that take place in water, the most basic is water ionization, in which water ionizes spontaneously and produces hydroxide (OH^-) and hydronium (H_3O^+) ions (Stillinger 1978). The formation of a liquid state, the pH of water, and many of the basic processes in chemistry and biology that involve water are the result of this reaction (Agmon et al., 2016). Experiments show that the average lifespan of each water molecule before self-ionization is about 11 hours (Eigen and de Maeyer 1958, Natzle and Moore 1985).

Unlike the significant effect of carbon dioxide gas, the entry of neutral gases (H_2, O_2, N_2, He, Ar, CH_4, CO) into pure water (pH = 7), leads to a maximum pH change of only ± 0.06. However, when water is impure and saturated with these gases, its pH tends to reach somewhere between 7.5-8 (alkaline medium) (Fricke et al., 1973). Changes in thermodynamic parameters and energy flow (free energy and heat) as a result of exposure of water to carbon dioxide indicate a relationship between pH or water ionization and energy, the details of which are given in Appendix 1.

The Law of Conservation of Mass and Energy

According to Einstein's theory of special relativity, mass and energy can be converted into each other. Therefore, the amount of material mass that exists in the Cosmos cannot be considered constant, but by applying the theory of relativity to the principle of conservation of mass and the principle of conservation of energy, a more general law can be concluded according to which the total mass and energy

in the Cosmos is always constant. According to this theory, energy and mass can be converted to one another and are expressed by the following relation:

$$1)\ E = mc^2$$

Where E is energy, m is mass, and c is the speed of light in the vacuum. Among the phenomena in which mass is converted into energy, we can refer to the phenomena of fission and fusion of the nucleus and the destruction of the pair. Conversely, energy converts to mass in interactions, such as pairwise generation, gamma-gamma interaction, and collision of energetic particles. In all these phenomena, the principles of electric charge conservation, baryon number, total relativistic energy, and momentum transfer must be preserved.

Taheri Consciousness Fields

In the present century, the nature of consciousness and its place in the world of science has received much attention. Many philosophical and scientific theories have been presented in this field. In the 1980s, for the first time, Mohammad Ali Taheri proposed T-Consciousness Fields in which he introduced the novel fields that are non-material and non-energetic called Taheri Consciousness Fields (TCFs). In this theory, T-Consciousness is one of the three constituent elements of the universe apart from matter and energy. According to this theory, the mental body of matter includes information on each component of the system, the process of formation and all its equilibrium and unbalanced states, and mental states that were formed during the process of formation of matter and its equilibrium state. The function of the mental body of matter is to maintain the information, to interact with the CFs, to accept new mental states, and to exhibit behavior appropriate to the new mental state.

According to this theory, there are various TCFs with different functions, that are the subcategories of a network of universal internet called the Cosmic Consciousness Network (CCN). The major difference between the theory of TCFs and other theoretical concepts about consciousness is related to the practical application of TCFs. TCFs can be applied to all living and non-living systems, including humans, plants, animals, microorganisms, hard and soft materials, all types of substances, etc.

Figure 1 depicts a schematic image of the Connection to T-Consciousness Fields. The influence of the TCFs begins with the connection between CCN as the Whole Consciousness of the universe and the subjects under study. This connection, called “Ettesal”, is established by Faradarmangar's mind (a certified and trained individual who has been entrusted with the TCFs). The human mind (the Announcer) has an intermediary role that initiates the Ettesal by imparting a swift and brief attention to the object under study. The observed effect is, therefore, solely the result of the TCFs affecting the system. These fields cannot be directly measured by scientific means, but it is possible to investigate their effects on various subjects through reproducible laboratory experiments (Taheri 2013).

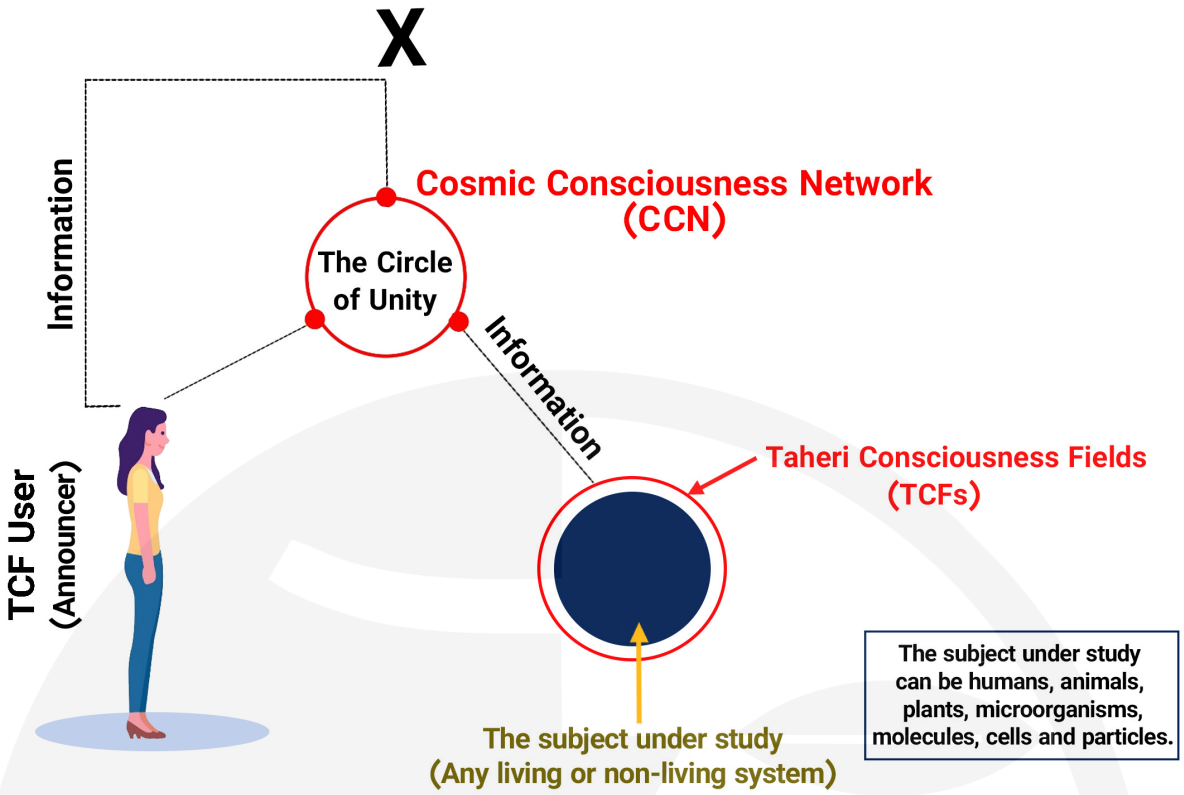


Figure 1. Schematic Image of Connection to the T-Consciousness Fields.

Mohammad Ali Taheri the founder of Erfan Keyhani Halqheh school of thought, introduced a new science in 2020 as a branch of this school. He coined the term Sciencefact for this new science because it utilizes scientific methods to prove the existence of T-Consciousness as an irrefutable phenomenon and a fact. Science focuses solely on the study of matter and energy, Sciencefact, by contrast, explores the effects of the non-material/non-energeticTCFs. Sciencefact has provided a common ground between the world of matter/energy and the non-matte/non-energy by facilitating the conduction of reproducible laboratory experiments in various fields of science, and has used the scientific approach in proving the existence of the T-Consciousness Fields.

Materials and Methods

Test method

In this experiment, twelve samples of double distilled water were prepared, and then, the pH and temperature of the samples were measured and recorded. Of these samples, three were marked as the control samples and were not subjected to any treatment by TCFs. Of the other samples, three sets of triplets are subjected to three different TCFs: TCF1, TCF2, and TCF3. The application of TCFs to the samples was only in the first 1.5 hours of the study during which the temperature and pH of all samples were measured every half hour and then every 24 hours for three days. All the test samples and controls were kept in the same laboratory under the same conditions of temperature and pressure.

The TCFs were applied to the samples according to the protocols regulated by the COSMOintel research center (www.COSMOintel.com). A request for connection to CCN to utilize TCFs can be placed through the COSMOintel website in the "Assign Announcement" section. This complimentary access is available for all researchers worldwide. To study and experience this connection, the researchers can register on the website above at any time and report the experiment to the COSMOintel research center. It is necessary to provide the center with the design and details of the experiments; for example, the number and the type of cases need to be specified.

Materials and Equipment

The following material and equipment were used in this experiment:

- Pure water: Double distilled water is used in this study. PET containers with a volume of 250 cc were used, and the volume of water samples was 200 ±10 cc.

- InoLab PH Level 2 pH meter made by WTW company was used in this study (Figure 2). This device automatically compensates its value for temperature.

Figure 2. InoLab Level 2 pH meter (photo courtesy of www.labstuff.eu)

Accuracy, Resolution, and Precision

- The *accuracy* of the equipment used in this study depends on its calibration. Considering the credibility of the laboratory and the establishment of the ISO 17025 standard in it, one can be certain of the proper calibration of the device and the required accuracy in its precision range.

- The pH and temperature measurement precision of the devices are ± 0.005 and ± 0.1 degrees Celsius, respectively.

Statistical analysis

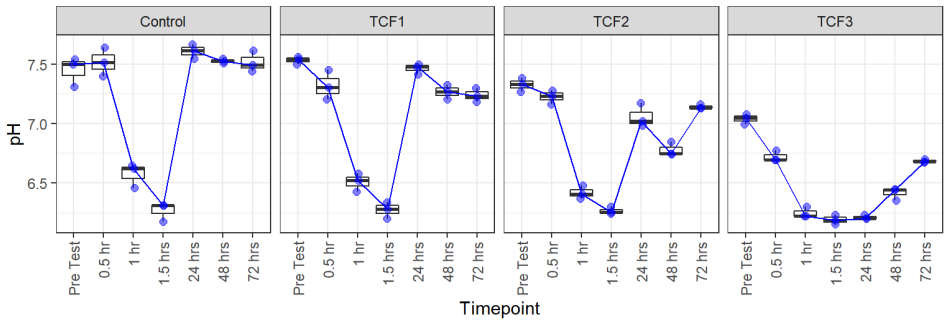
Data were analyzed using GraphPad Prism software version six. The values were expressed as mean ± standard error and analyzes were repeated at least three times. Then two-way variance analysis followed by multiple comparisons with 95% confidence intervals was performed and significant values less than 0.05 ($p < 0.05$) are presented.

Results

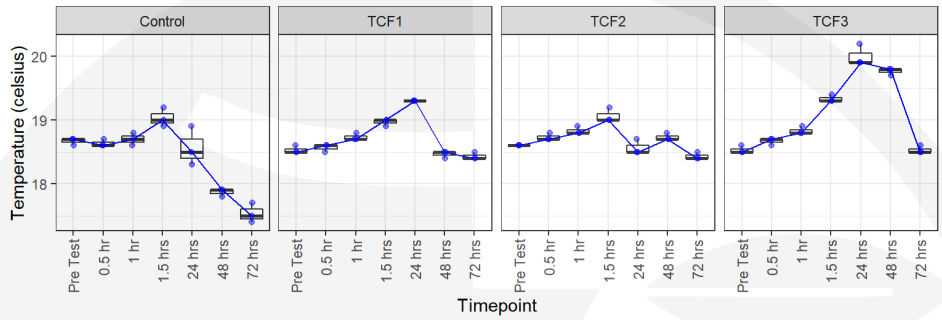
pH Comparison Between Test Samples and Control

The measured average pH and temperature of each batch of samples are shown in Figures 3a and 3b. The comparison of the test and the control samples over 72 hours of the experiment is plotted in Figure 3c. As can be seen in Figure 3c, all samples reached approximately the same value after 1.5 hours, but after that, the pH of each batch of samples reaches a different value than the rest. The control reached a higher pH level than the test samples and the samples under the influence of TCF1, TCF2, and TCF3 reached lower pH levels, respectively.

In addition, it can be seen that even after about 72 hours of TCFs treatment, their effect still remains. Comparison of pH values in the final three measurements, after the application of the three TCFs was completed (after the studied system reaches an equilibrium with the environment), indicates the difference in the susceptibility of the three samples (to TCFs) and their tendency to reach the pH values shown in Table 1.



(a)



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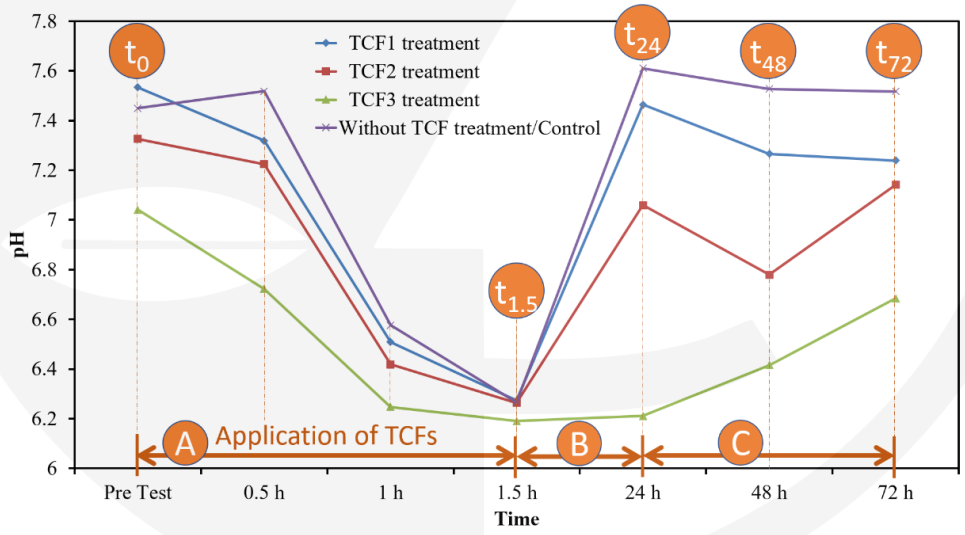

(c)

Figure 3. (a) Average pH and (b) temperature of the test samples and control at different measurement times separately with the standard deviation; (c) comparison of average pH of test and control samples and distinct zones.

Three distinct zones can be observed in Figure 3c. The behavior of the test and control samples in all three zones are discussed in detail in the discussion session. Brief explanations of the behavior of the test and control samples in zones A, B, and C, are provided below:

Zone A (from t_0 to $t_{1.5}$) is the duration of the exposure of the test samples to the TCFs. In this zone, the pH of the test and control samples decreases due to the dissolution of carbon dioxide from the air in the water, until they reach the minimum values at $t_{1.5}$. No distinct effect of TCFs on the test samples can be observed in this zone. Therefore, the effect of TCFs on the test samples is not considered in this zone.

Zone B (from $t_{1.5}$ to t_{24}) is the duration in which the dissolution of carbon dioxide in the water stabilizes. A major effect of TCFs on the test samples can be observed in this zone. The analysis of the effect of TCFs on the test samples starts from the beginning of this zone, where all the test and control samples have almost the same initial conditions (time $t_{1.5}$).

Zone C (from t_{24} to t_{72}) is the duration in which the dissolution of carbon dioxide in the water is stabilized in the control samples but not in the test samples. A significant effect of TCFs on the test samples can be observed in this zone which has also been included in the detailed analysis of the effect of TCFs on the test samples.

The result of the analysis of the significant pH differences between each group of samples compared to control samples based on the ANOVA method is shown in Figure 4. The differences between the test samples and the control for the last three time intervals of the study are significant and should be considered, except for the results of the pH of the samples under the influence of TCF1 at the 24th hour. The pH values of the samples under the influence of TCF1, TCF2, and TCF3 at the 72nd hour were 4%, 5%, and 11% lower than the control, respectively.

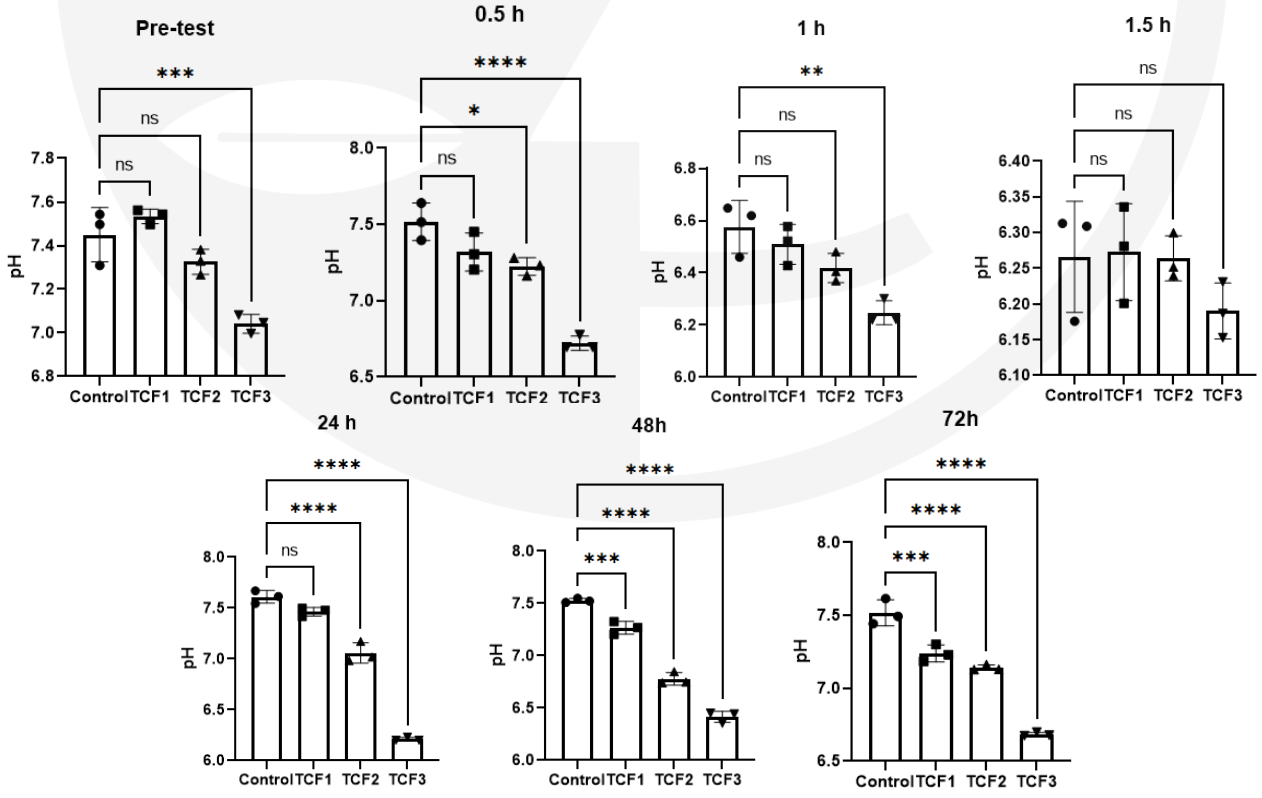

Figure 4. pH of each group of test samples at the different measuring times compared to control samples based on the ANOVA method.

The comparison between the mean, as well as all the data related to the pH values in the samples in the last three time intervals of the study (after the completion of the TCFs treatment), are given in Table 1 and Figure 5, respectively. The observed difference between the pH of all samples under the influence of TCFs is meaningful when comparing the pH of each group of samples and analyzing their significance in relation to each other and to the control.

Table 1- Mean pH values in the last three measurements of the study after completion of the treatment of TCFs - significant differences in comparison to the control are marked with * (p-value <0.05) and *** (p-value <0.001).

Sample	Averaged pH of the last three measurements
Control	7.55±0.04
TCF1	7.32±0.10
TCF2	6.99*±0.16
TCF3	6.44***±0.19

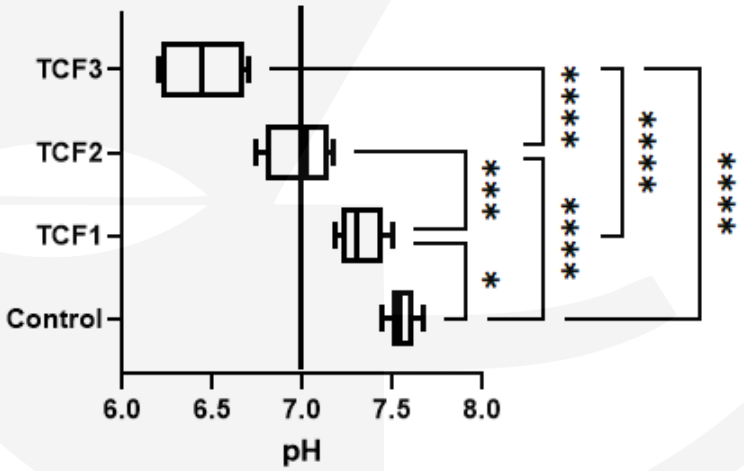

Figure 5. Representation of all data for measurements of the last three time intervals (24, 48 and 72 hours), including mean display per box and the the analysis of the significance of the values relative to each other and to the control by one-way ANOVA method *:p-value<0.05; **: p-value<0.01; ***:p-value<0.005; ****:p-value<0.001.

Temperature Measured in the Control and Test Samples

Since the temperature of the samples and the control were also recorded at the time of pH measurement, the average temperature of the last three measurements (after the completion of the TCFs treatment) for each batch of samples is shown in Table 2 and Figure 6.

Table 2 – Mean values of temperature in the last three measurements of the study

Sample	Three last Temp. measurements/°C
Control	17.99±0.43
TCF1	18.73±0.40
TCF2	18.58±0.12
TCF3	19.43±0.64

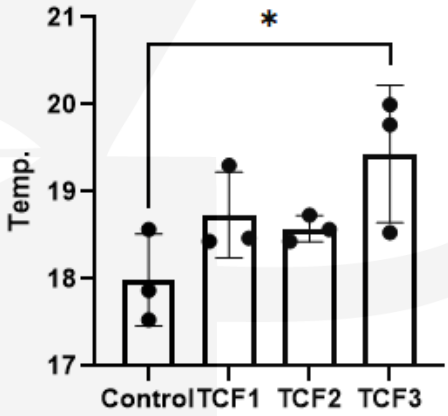

Figure 6. Representation of all data for measurements of the last three time intervals (24, 48 and 72 hours), including mean display per box and the analysis of the significance of the values relative to the control by one-way ANOVA method. Significant differences with the control are marked with * (p-value <0.05).

Calculation and Comparison of Thermodynamic Parameters

The values of thermodynamic parameters of the samples under the influence of TCFs and the control in the last three measurements of this study are compared in Table 3 and Figure 7.

Table 3. Comparison of the mean values of the thermodynamic parameters of the system (Enthalpy Changes (ΔH), Gibbs Free Energy (ΔG) and the entropy changes (ΔS)) calculated in the last three measurement times of this study.

	ΔG			ΔH			ΔS		
	Calculated (kJ/mol)	Difference with Control (kJ/.mol)	%Difference with Control	Calculat ed (kJ/mol)	Difference with Control (kJ/mol)	% Difference with Control (kJ/mol)	Calculated (kJ/K.mol)	Difference with Control (kJ/K.mol)	%Difference with Control
Control	-36.26	-	-	15.64	-	-	0.18	-	-
TCF1	-33.02	3.24	-8.94	15.66	0.02	0.14	0.17	-0.01	-6.45
TCF2	-27.6	8.66	-23.87	15.65	0.02	0.11	0.15*	-0.03	-16.81
TCF3	-19.79	16.47	-45.42	15.68	0.04	0.27	0.12	-0.06	-31.98

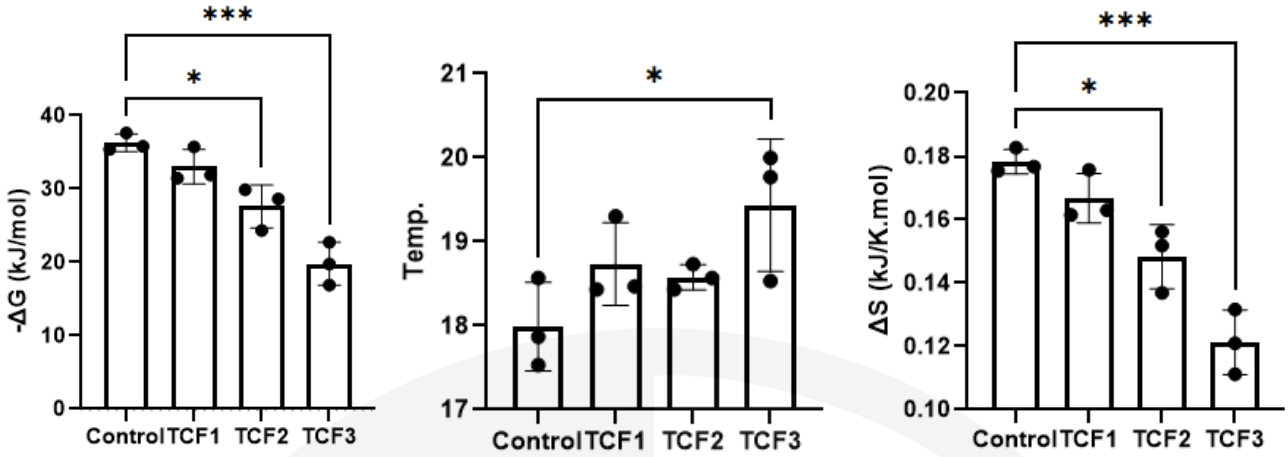

Figure 7. Comparison of the mean and all values of the thermodynamic parameters of the system calculated in the last three measurement times of this study including mean display per box and the analysis of the significance of the values relative to the control by one-way ANOVA method. Significant differences with the control are marked with *: p-value <0.05 and ***: p-value <0.005.

Details on the changes in entropy, Gibbs free energy, and enthalpy are provided below.

Entropy Changes

The entropy changes of the system (ΔS) in the average of the last three measurements of the study are shown in Table 3. The total entropy changes for different sample sets are shown in Figure 8. It can be observed that the total entropy after 1.5 hours is highest in the control. Samples under the influence of TCF1, TCF2 and TCF3 are at lower entropy levels, compared to the control. A comparison of system entropy in Table 3 demonstrates a decrease in system entropy in the samples under the influence of TCFs compared to the control. *Therefore, the application of TCFs made it possible for lower entropy states to occur.* The occurrence of states with lower entropy requires less energy to be distributed or shared, which is practically contrary to the natural selection of spontaneous processes.

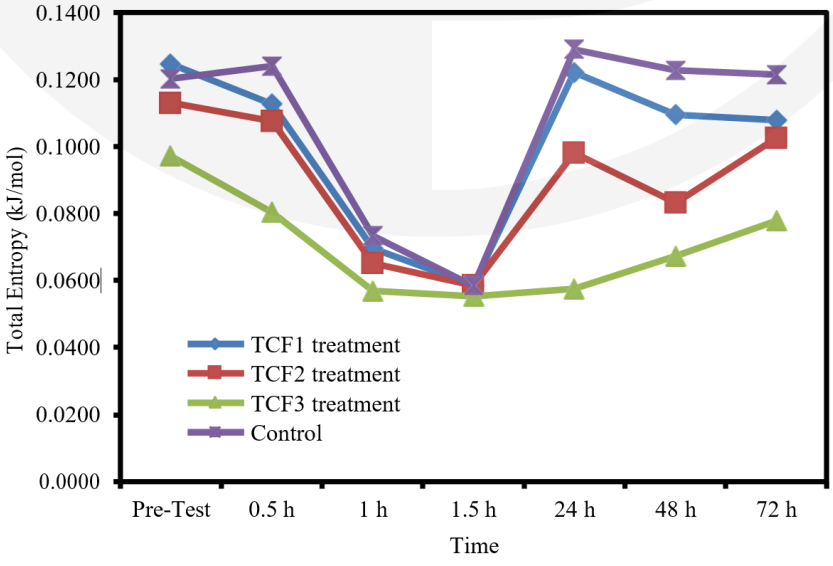

Figure 8. Total entropy (sum of system and environment) for the different sample sets.

Changes in Gibbs Free Energy

The average values of distributable or shared energy (Gibbs Free Energy, ΔG) for the last three measurements of the study are shown in Figure 9 and Table 3. Table 3 details that the application of TCF1, TCF2 and TCF3 reduces the values of distributable or shareable energy of the system compared to the control samples by about 9%, 24%, and 45%, respectively.

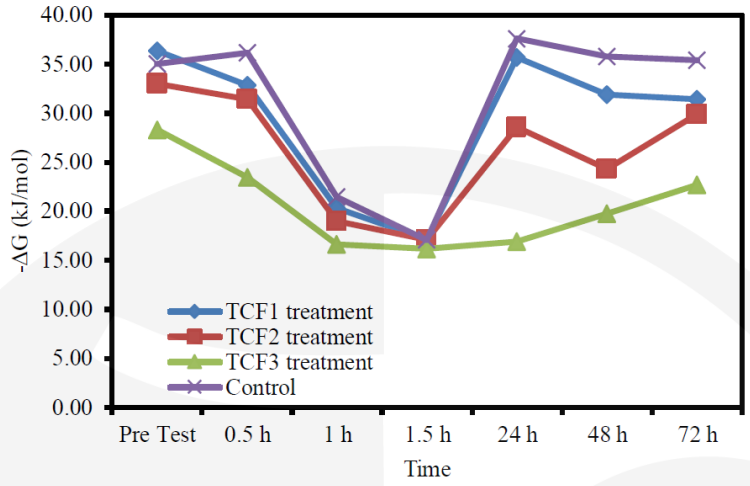

Figure 9. Amount of distributable or shareable energy (Gibbs free energy) of the system in the sample and control of this study.

Enthalpy Changes

Table 3 shows that the lowest amount of energy that is unavailable for distribution is 3.24 kJ/mol for TCF1 treatment. And the maximum difference between the enthalpy of the control and the samples under the influence of TCFs (ΔH) is 0.04 kJ/mol, which is much less than 3.24 kJ/mol. Therefore, the amount of energy difference (calculated in the previous section) has not appeared as heat.

Figure 10 shows the enthalpy values measured at different time intervals. It is plotted to check whether the energy available for distribution or sharing by the system (calculated in the previous section) has existed in the environment in the form of heat.

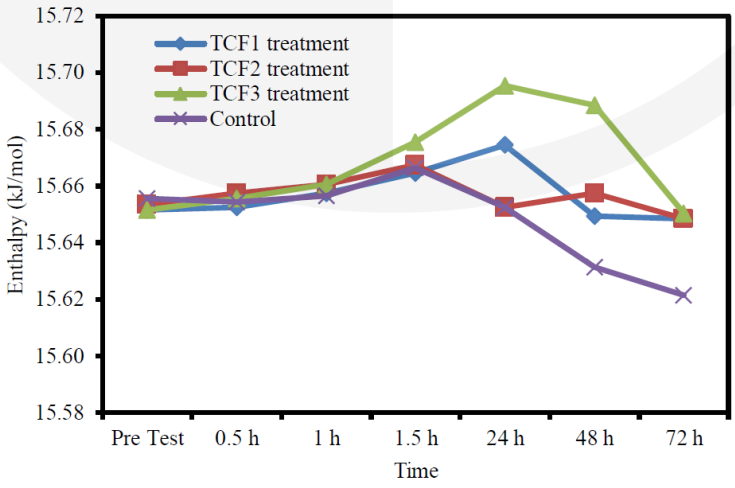

Figure 10. Enthalpy of samples and control at different measurement time intervals of this study.

Changes in Gibbs Free Energy in Various Micro-Reactions Affecting the Water pH

Figure 11 shows the contribution of each of the possible reactions in water that in some way affect its pH and Gibbs free energy. It is observed that the reaction of water ionization and dissolution of carbon dioxide in water has the largest share in regulating the Gibbs free energy in the new state compared to the state of control. Table 4 shows the contribution of each reaction in setting up the new state compared to the state of control. The data in Table 4 demonstrate that the pH of the samples under the TCFs treatment are often adjusted by changes in the rate of water ionization and also the rate of dissolution of carbon dioxide. Thus, in the application of TCFs, more carbon dioxide gas is dissolved in water compared to the control. However, its energy is not used for facilitating the bicarbonate production reaction, but rather it is used for water ionization and increasing H^+ concentration, thus lowering the pH.

Table 4. The contribution of each of the reactions in setting up the new state compared to the state of control.

Sample	Gibbs Energy (kJ/mol)				Share of each reaction to control (%)			
	Total	Water ionization	Dissolved CO^2	Bicarbonate production	Total	Water ionization	Dissolved CO^2	Bicarbonate production
Control	-36.26	-4.28	-33.45	1.47	-	-	-	-
TCF1	-33.02	-1.93	-32.64	1.55	8.94	72.35	25.18	2.47
TCF2	-27.60	1.81	-30.77	1.36	23.87	70.27	31.04	-1.31
TCF3	-19.79	7.82	-28.58	0.96	45.42	73.47	29.61	-3.08

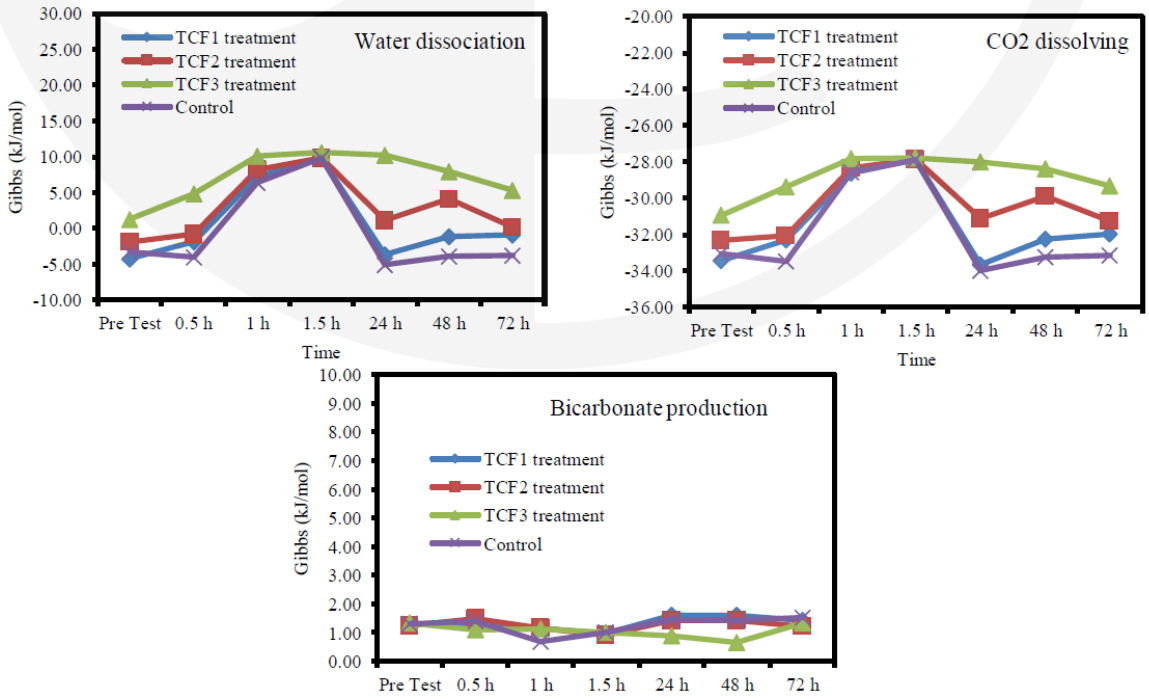

Figure 11. Contribution of each of the reactions affecting pH of water and Gibbs free energy.

Discussion and Conclusion

It has been reported by other researchers that the magnetic field has a pH-increasing effect on water (Gonet, 1985). As the ionization of water changes under the electromagnetic field, an increase in hydroxide ions and the adsorption of hydrogen ions occur (Mghaiouini et al., 2020). However, the pH of double distilled water (pH = 7) under the influence of magnetic fields with magnetic flux density in the range of 0 to 24000 Gauss has been reported unchanged (Quickenden et al., 1971). In another study, a change of approximately +0.62 in the pH was reported in the range of 1900-5700 Gauss (Joshi and Kamat, 1966).

As reported in previous studies by the authors, TCFs' influence on the materials is distinct from all physical fields, such as the magnetic field (Taheri et al., 2021). In this experiment, the distinctive effect of the TCFs on the properties of water is demonstrated. The results of the pH measurements show that the TCF types 1, 2 and 3 utilized in this study can affect the composition of water, and that their effects are different from one another. All three TCFs reduced the samples' pH compared with the control. Furthermore, the effects of the fields are maintained up to 72 hours after the application of TCFs. The behaviors of the test and control samples in all three zones shown in Figure 3c are discussed in detail below.

The pH of pure water is a function of different environmental parameters such as temperature (T), pressure (P), and atmospheric carbon dioxide (CO_2). Based on the assumptions of this study, the TCFs are other factors influencing the pH of pure water. Therefore , we can consider pH as a function of these parameters as shown below:

$$2)\ pH = f(T, P, Co_2, \ldots, TCFs)$$

In a standard laboratory environment, the environmental parameters (temperature, pressure, etc.) can be considered to be approximately equal for the test and control samples. However, the three types of TCFs are considered as different parameters for the samples and the control. Nevertheless, as was earlier discussed, one of the assumptions about the effect of TCFs on the pH is their effect on the rate of dissolution of carbon dioxide in water samples. In other words, the TCFs may change at least one of the environmental parameters affecting the water pH differently in the samples and in the control.

The first pH measurement at the pretest time (marked by t_0 in Figure 3c) shows a 10% difference between the test and control samples. Before the first pH measurement, the lids of the containers of the double distilled water samples were removed, and the water samples were immediately exposed to the ari in the laboratory environment, and consequently, the dissolution of carbon dioxide in the water samples started. To minimize human and measurement errors, one pH measurement system and only one lab technician were involved in this study. Therefore, there were different time delays in reading the measured pH by the one technician, and consequently, the dissolution of carbon dioxide in the water samples was different. This resulted in a 10% difference between the test and control samples.

The change in the pH of pure water exposed to air is a normal phenomenon of water molecules. Based on the reports of other researchers (Haghi et al., 2017), the pH of pure water gets to its minimum value approximately two hours after it is first exposed to the carbon dioxide in the air, and the dissolution of carbon dioxide in the water stabilizes in under 10 hours.

In this study, the change in the pH of water has been investigated under the influence of TCFs. Due to the exposure of both test and control samples to the carbon dioxide in the air, the changes in the water pH are observed in both the test and control samples throughout the test. The application of TCFs to the samples was only in the first 1.5 hours of the study. The

measurements of the water pH show that after 1.5 hours from the start of the experiment, the test and control samples reach the minimum value (marked by $t_{1.5}$ in Figure 3c). The last three measurements of the pH are done after 24, 48, and 72 hours to ensure the stability of the dissolution of carbon dioxide in the water. Comparing the behavior of the test and control samples at 24, 48, and 72 hours, marked by t_{24}, t_{48}, and t_{72}, respectively in Figure 3c, the effect of TCFs on the test samples can be observed and confirmed.

The calculation of thermodynamic parameters shows that all three types of TCFs reduced the total entropy. In other words, they reduced the system's accessibility to distributable or shared energy. However, the amount of reduction caused by each of three TCFs is different; TCF3 and TCF1 resulted in the maximum and minimum reduction, respectively. The maximum difference between the enthalpies of the control and the samples under the influence of TCFs was 0.04 kJ/mol, which is far less than the amount of energy that is unavailable to the system for distribution (3.24 kJ/mol for TCF1 which is the lowest value among the samples). And therefore, this amount of energy difference had not appeared as heat. According to the currently proposed model for materials, all materials have some level of mental body (Taheri et al., 2022). Therefore, the amount of energy unavailable for exchange or sharing can be attributed to the mind-of-matter. In other words, the application of TCFs on matter and their interactions with the mind of matter have caused a new behavior to emerge in matter, which here exhibits as the system having less energy available for sharing or exchange compared to the control.

Examination of Gibbs free energy changes in various reactions affecting the pH of the water and calculating the contribution of each reaction in altering the state of samples under the influence of TCFs compared to the state of the control shows that in applying TCFs, more carbon monoxide gas is dissolved in water compared to control. However, its energy is not used to aid the bicarbonate production reaction, but rather, it is used for water ionization and increasing the H^+ concentration, thereby, reducing the pH of the water. It should be noted that the rate of dissolution of carbon dioxide in samples affected by different TCFs is different and this value is the highest for TCF3 and the lowest for TCF1. In this study, water, in its molecular form as an environment, played the most important role in regulating the structure of samples influenced by TCFs.

On the one hand, it has dissolved more carbon dioxide gas, and on the other hand, it has favored the ionization process over the bicarbonate production reaction. Since this requires the samples under the influence of TCFs reach to lower entropy state, in comparison with the base state (control), this cannot be justified without considering some form of mental body for water; because, there is neither a material nor an energy factor that could be caused the selection of a path in which less energy is distributed or shared (Figure 11), a path contrary to that of the nature's tendency.

As mentioned, in this study, some of the total energy of the samples under the influence of TCFs was out of reach for sharing or distribution, and it was found that this energy did not appear as heat. In such a situation, one may assume that this energy has converted to matter/mass. However, if energy is converted to matter, as the mass increases, so does the number of microstates in which energy can be distributed, so the total entropy must increase; while the data from this study indicate that the total entropy has decreased. On the other hand, it should be noted that the amount of energy that is unavailable for sharing or distribution, according to Table 2, reaches a maximum of 16.5 kJ/mol in samples under the influence of TCF3.

In other words, each particle loses about 2.7×10^{-20} J or 0.17 eV energy (1 eV = 1.6×10^{-19} J).

The energy equivalent to the mass of the smallest known particle in the world, the electron neutrino, is estimated to be about 2.2 eV. Therefore, according to conservation laws, it can be stated that the amount of energy out of reach is much less than what is needed for production of such particles and thus this energy could not have been converted into mass.

"Thus, given that energy has not been transformed into another form (heat) or mass, there is a question as to where the shared energy or dissipated energy has gone."

To answer this question, we either have to consider the system to be open, which is improbable considering the control; or we must accept the effect of the TCFs as the agent that introduces a third component into the system and thus opening it up, which requires the assumption that there is a third component that plays a role here between matter and energy. According to Taheri's theory of TCFs, this third component is *information*. As it has been mentioned previously by the authors of the present study (Taheri et al., 2022), the announcer mediates the exchange of *information* with the mind of matter through the TCFs and by altering the mental state of matter as a result of this exchange of information, it changes the energy level of matter and, consequently, changes the behavior/properties of matter. Following this research, an article in concerning this energy and related details will be published by the authors. The observations of this study can be concluded as follows:

1- TCF types 1, 2, and 3 influence the pH of the water to varying degrees as their effects were different from one another.

2- All three types of TCFs reduce the total entropy, or in other words, they reduce the system's accessibility to distributable or shared energy.

3- Due to the fact that the amount of energy reduced under the influence of the TCFs does not appear as heat and that the occurrence of behaviors, such as increased dissolution of carbon dioxide, higher ionization of water instead of bicarbonate production, and the reduction of entropy is not possible without an intervening of a material and/or energetic factor, the existence of a mental body in matter according to Taheri's theory is therefore confirmed.

4- The observation that the energy loss is not converted to heat and is less than the amount required for conversion to mass warrants further research and investigation.

For future work, the authors plan to use robotic systems for the water pH measurement to decrease human error and various delays in the measurements of the test and control samples. Also, several gas sensors, including carbon dioxide sensors, will be used inside the water sample containers in order to obtain more accurate measurements of the effects of TCFs and higher precision of statistical analysis.

Conflict of Interest

The authors report no conflict of interest.

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Appendix: Theoretical Foundations Related to the Concept of pH and Thermodynamics of Water

In the chemistry literature, the term pH is used to describe the acidity or alkalinity of a liquid solution. The term is also widely used in biology and agriculture. The word pH means "hydrogen ion potential". The concept was introduced in 1909 by the biochemist Soren Sorensen. According to him, the pH of a solution is a measure of the concentration of hydrogen ions in it; in other words, it is equal to the negative logarithm of the concentration of hydrogen ions. If we write this definition for the concentration of hydronium ions, we will have:

$$1)\ pH = -Log\ ([H^+])$$

In 1924, Sorensen discovered that the pH of a solution was a function of the "activity" of the H+ ion and had nothing to do with concentration. Thus, he proposed a newer definition of pH. According to this definition, the pH of a solution is obtained from the following equation:

$$2)\ pH = -Log\ (a[H^+])$$

In this regard, a[H+] emphasizes the activity (effective concentration) of hydronium ions. The activity of an ion is a function of many variables, one of which is concentration.

Due to the difficulty of accurately measuring H+ activity in most solutions, the International Union of Pure and Applied Chemistry (IUPAC) and the National Bureau of Standards (NBS) define pH as read in pH meters standardized against buffer solutions. The most accurate way to measure the pH of a water sample is the potentiometric method. The potentiometric method is based on the Nernst equation, which defines the relationship between the potential of an electrode pair and the activity of a hydrogen ion:

$$3)\ E = E0-(2.303\ RT/nF) \times \log\ (a[H^+])$$

Where E is the total potential between the two electrodes (mV) and E0 is the standard potential depending on the temperature of the electrode. R is the general constant of gases ($Jmol^{-1}K^{-1}$), T is the absolute temperature (K), n is the ion capacity (charge) (n=1 for hydrogen ions), F is the Faraday constant ($Cmol^{-1}$) and $a[H^+]$ ion activity of hydrogen.

pH of Pure Water

Water is not always in the form of H_2O molecules, but water molecules react with each other to produce hydronium (H+), and hydroxide (OH-) ions:

$$4)\ H_2O \leftrightarrow H^+ + OH^-$$

This phenomenon is called spontaneous ionization of water. The concentrations of hydronium ions and hydroxide ions in pure water are equal. The molarity of hydronium ions and hydroxide ions at 25 °C are both 10-7. As a result, an equilibrium constant can be considered for the ionization of water. This equilibrium constant is obtained from the following relations:

$$5)\ K_w = [H^+] \times [OH^-]$$

$$6)\ (-\log 10\ [H^+]) + (-\log_{10}\ [OH^-]) = -\log_{10}\ K_w$$

$$7)\ pH + pOH = pK_w$$

The high numerical value varies with temperature so that the pH of pure water at zero and sixty degrees Celsius is 7.5 and 6.5, respectively.

Effect of carbon dioxide on water pH

One of the main sources of water acidification is carbon dioxide from air. Atmosphere contains an average of 0.032% of carbon dioxide, which is enough to reduce the pH of water. In the presence of CO_2, on the one hand, dissolved CO_2 is converted to carbonic acid, and on the other hand, it is exchanged with gaseous CO_2:

$$8)\ CO_2\ (g) + H_2O \leftrightarrow CO_2\ (aq) + H_2O$$

$$9)\ CO_2\ (aq) + H_2O \leftrightarrow H_2CO_3$$

Where g and aq refer to the gaseous and dissolved phases, respectively. Although the concentration of CO_2 (aq) is much higher than the concentration of H_2CO_3 (of the order of 10^3 times), here, the concentration of all CO_2 dissolved with [H_2CO_3] is displayed. According to Henry's law, the equilibrium between the gaseous and dissolved phases is shown by the molar solubility of K_0:

$$10)\ K_0 = \frac{H_2CO_3}{P_{CO2}}$$

Where P_{CO2} is the partial atmospheric pressure of CO2, in atm, K_0 solubility in mol/L.atm and concentration of dissolved CO_2, [H2CO3] + [CO2 (aq)], in mol/L. The average concentration of CO2 is 387 ppm. In other words, the average partial pressure of carbon dioxide gas is equal to 387 x 10^{-6} atm. Therefore, the value of [H_2CO_3] is:

$$11)\ [H_2CO_3] = [CO_2\ (g)] = PCO_2 \times K0$$

H2CO3 is decomposed in water according to the following equations:

$$12)\ H_2CO_3 \leftrightarrow H^+ + HCO_{3-}$$

$$13)\ HCO_{3-} \leftrightarrow H^+ + CO_{3-2}$$

Where the equilibrium constant or acidity constant in pure water is equal to:

$$14)\ K_1 = \frac{[H^+][H_{CO3}^-]}{[H_2CO_3]}$$

$$15)\ K_2 = \frac{[H^+][CO_3^{2-}]}{[HCO_3^-]}$$

Total dissolved inorganic carbon (DIC) concentration is defined as follows:

$$16)\ CT = [CO_2\ (aq)] + [H_2CO_3] + [HCO_{3-}] + [CO_{32-}] = a + b + c$$

$$17)\ a = [H_2CO_3] + [CO_2\ (aq)]$$

$$18)\ b = [HCO_{3-}]$$

$$19)\ c = [CO_3^{-2}]$$

The total concentration of dissolved inorganic carbon can be rewritten in terms of separation constants and concentrations of carbon components as follows:

$$20)\ C_T = \left(\frac{[H^+]}{K_1} + 1 + \frac{K^2}{[H^+]}\right)[HCO_3^-]$$

Therefore, the concentration of carbon components in water can be obtained based on the concentration of total dissolved inorganic carbon:

$$21)\quad [HCO_3^-] = \frac{[H^+]K_1}{[H^+]^2 + [H^+]K_1 + K_1.K_2} \times C_T$$

$$22)\ [H_2CO_3] = [CO_2(aq)] = \frac{[H^+]^2}{[H^+]^2 + [H^+]K_1 + K_1.K_2} \times C_T$$

$$23)\ [CO_3^{-2}] = \frac{K_1.K_2}{[H^+]^2 + [H^+]K_1 + K_1.K_2} \times C_T$$

The relative contribution of $[H_2CO_3]$, $[HCO_3\text{-}]$ and $[CO_3^{2-}]$ to the total carbon content in terms of pH of pure water is shown in Figure 2.

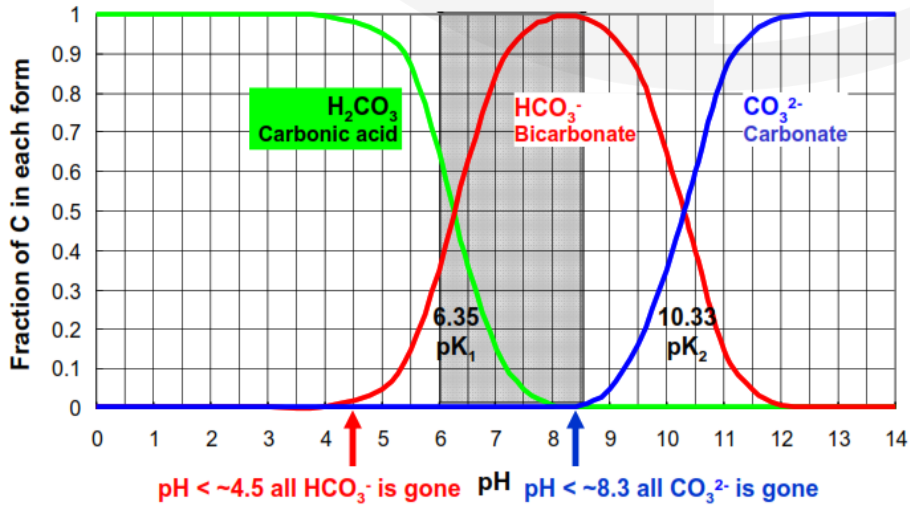

Figure 5. Relative contribution of $[H_2CO_3]$, $[HCO_3\text{-}]$ and $[CO_3^{2-}]$ to the total carbon content in terms of pure water pH

Separation constants are functions of temperature. Since pure water can often be considered as an ideal solution, the relationship between its dissociation constants at 0% salinity is as follows:

24) pK_0=-2622.38/T-0.0178471T+15.5873 (Harned and Davis, 1943)

25) pK_1= 3404.71/T+0.032786T-14.8435 (Harned and Davis, 1943)

26) pK_2= 2902.39/T+0.02379T-6.4980 (Harned and Scholes, 1941)

27) $\ln K_w$ = 148.9802-13847.26/T-23.6521 lnT (Dickson and Riley, 1979)

Where T is the absolute temperature in Kelvin.

Impure Water

The values of K also depend on the concentration of the solute (impurity) in the water, because the formation of a mixture of soluble ions between the ions and the carbon molecules in the solution prevents the molecules and carbon ions from fully forming. Therefore, in thermodynamic equations, concentrations must be replaced by their activity, which is slightly less than the concentration. The thermodynamic solubility of carbon dioxide in water is equal to:

28) $$K_0 = \frac{aH_2CO_3}{P_{CO2}} = \frac{\gamma_a[H_2CO_3]}{P_{CO2}}$$

Where, in general, the activity factor, γ, is less than one. However, in an ideal solution with zero soluble concentration or zero ionic strength (I), the coefficient of activity is one. In non-ideal T solutions, the thermodynamic and acidity constants of the first and second dissociation of carbonic acid are:

29) $$K_1 = \frac{a_H . a_{HCO_3}}{a_{H_2CO_3}} = \frac{\gamma_H[H^+].\gamma_b[HCO_3^-]}{\gamma_a[H_2CO_3]}$$

and

30) $$K_2 = \frac{a_H . a_{CO_3}}{a_{HCO_3}} = \frac{\gamma_H[H^+].\gamma_C[CO_3^{2-}]}{\gamma_b[HCO_3^-]}$$

In practice, pH is measured instead of $[H^+]$, so in high relationships, 10-pH is used instead of $[H^+]$. In addition, the dissociation constants are usually given as follows:

31) $pK = -\log_{10}K$ or $K = 10^{-pK}$

At low salt concentrations (less than 400 mg/L), the values of pure water dissociation constants can be corrected with the help of Debye-Huckel theory and saline water dissociation constants can be obtained. Approximate values of water dissociation constants with S salinity in mg/L are:

$$32)\quad pK_1' = pK_1 - \frac{0.5\sqrt{1}}{1 + 1.4\sqrt{1}}$$

$$33)\quad pK_2' = pK_2 - \frac{2\sqrt{1}}{1 + 1.4\sqrt{1}}$$

Where I is the ionic strength of water and its relation to the salinity of the water is obtained from the following approximate relation:

$$34)\ I \approx 2.5 \times 10^{-5}\ S$$

Thermodynamics of chemical reactions

Any chemical change with the capture or delivery of energy is usually accompanied by heat. Therefore, the study of these energy changes in the realm of chemical thermodynamics is a powerful tool for predicting the progress and rate of progress of a reaction. Since these predictions are information about the energy properties of reactions and their products, it is not necessary to address the reaction itself. In other words, these are the mass properties of matter, and chemical thermodynamics is a purely macroscopic perspective.

In most chemical reactions performed in the laboratory, the system usually enters the atmosphere (pressure is constant), and the test is performed at room temperature (relatively constant temperature / dispersed heat). Under such conditions (temperature and constant pressure), two useful state functions can be defined as enthalpy and Gibbs free energy. An enthalpy equals heat (qp) given or taken at a constant pressure in a process. Gibbs free energy determines whether a chemical change is thermodynamically possible. In addition, it determines the direction and magnitude of the chemical change.

Gibbs free energy function is defined as follows:

$$35)\ G = H - T.S$$

Where H is the enthalpy, S is the entropy, and T is the system temperature. Gibbs free energy is a state function. Therefore, for any change of state, the following important relation can be written:

$$36)\ \Delta G = \Delta H - T.\ \Delta S$$

In spontaneous reactions, Gibbs energy changes are always less than zero ($\Delta G < 0$). Gibbs free energy for normal reactions is calculated under standard conditions (pressure of one atmosphere, temperature of 25 °C and effective concentration of one mole per liter) and is available in different tables. The standard Gibbs free energy for a chemical reaction is calculated as follows:

$$37)\ \Delta G^\circ = \Sigma \Delta Gf^\circ\ (\text{products}) - \Sigma \Delta Gf^\circ\ (\text{reactants})$$

Where

$$38)\ \Delta Gf^\circ = \Delta Hf^\circ - T.\Delta Sf^\circ$$

The standard Gibbs energy of a reaction is one of the properties of a reaction and does not change as that reaction continues.

It should be noted that ΔG is the maximum amount of energy that can be released from the system and do a useful job or cause a chemical reaction. One of the serious problems with the Gibbs function, especially in chemistry, is that although G has energy units, it does not have one of the most important energy properties, which is survival. Therefore, although it may decrease, energy does not need to increase elsewhere. Quantity -ΔG associated with a process represents the amount of energy that is "shared and distributed", which means increasing the total entropy. Gibbs energy has no physical reality as a property of matter, while enthalpy and entropy can be related to the quantity and distribution of energy in a set of molecules.

Relationship between Gibbs free energy and chemical reaction equilibrium constant

Each chemical reaction has a characteristic equilibrium constant (Keq) under a set of conditions. The equilibrium constant of any chemical reaction is constant and changes only with temperature. The equilibrium constant is defined as the ratio of the effective product multiplier to the effective concentrator product of the reactants:

$$39)\ aA + bB \leftrightarrow cC + dD$$

$$40)\quad K_{eq} = \frac{[C]^c[D]^d}{[A]^a[B]^b}$$

Unlike the standard equilibrium constant and Gibbs energy of a reaction that is part of the reaction properties and does not change as the reaction continues, the Gibbs free energy of the reaction changes as the reaction continues and reaches zero if the reaction reaches equilibrium. The amount of Gibbs free energy of a reaction is related to the standard Gibbs energy and the product of the effective concentration of the products and reactants in that reaction (Q) through the following relationship:

$$41)\ \Delta G = \Delta G^\circ + RT \ln Q$$

Somewhere R is the constant of gases and T is the temperature in Kelvin. In the case where the reaction is in equilibrium (ΔG = 0), the above relation is rewritten as follows:

$$42)\ \Delta G^\circ rxn = - RT \ln K_{eq}$$

Enthalpy

Since most of the processes that take place in the laboratory, on the surface of the earth, and in living things are under the pressure of an atmosphere, the enthalpy relationship is written as the first law of thermodynamics. Enthalpy changes are a process equal to:

$$43)\ \Delta H \equiv qp = \Delta U + P\Delta V$$

When a substance absorbs heat, its temperature rises. The enthalpy of a system increases through the following relation to temperature:

$$44)\ \Delta H = CP.\Delta T$$

Because the increase in temperature causes the material to expand, the increase in enthalpy is slightly greater than the increase in the internal energy of the material. The difference between the enthalpy dependence and the internal energy to temperature is significant only for gases. Because the coefficients of thermal expansion of liquids and solids are very small. Using the Gibbs-Helmholtz relation, the enthalpy of a reaction can be attributed to the Gibbs free energy and the equilibrium constant of the reaction and can be calculated:

$$45)\quad \left(\frac{\partial\left(\frac{G}{G}\right)}{\partial T}\right)P = -\frac{H}{T^2}$$

According to the model developed by Joback et al., to estimate the equilibrium of the reactions associated with carbon dioxide entrapment in water in terms of temperature and using the Gibbs-Helmholtz relation, the enthalpy of the following reactions can be obtained:

$$46)\ 2H_2O\ (l) \leftrightarrow H_3O^+ + OH^-$$

$$47)\ CO_2\ (aq) + 2\ H_2O\ (l) \leftrightarrow H_3O^+ + HCO3^-$$

$$48)\ \Delta H^\circ_{rxn,\ i} = R.\ (BiT - Ci + DiT^2)$$

Where the coefficients in the above equation are extracted from Table 1.

Table 1- Constant coefficients of chemical equilibria

Reaction	Ai	Bi	Ci	Di
Equation 6	1.3598E+02	-2.2937E+01	-1.3592E+04	0
Equation 7	2.3429E+02	-3.7203E+01	-1.2216E+04	0
Equation 8	1.6148E+02	-2.7397E+01	-9.9211E+03	0
Equation 10	1.7057E+01	0	0	-3.4860E-02

The enthalpy of dissolution of carbon dioxide in water can be estimated through the temperature-dependent relationship for Henry's constants using the following equation:

$$49) \quad [\partial \ln H/\partial(1/T)] = \Delta_{sin} H/R$$

Where the Henry's constants relationship with temperature is:

$$50) \ln (H/MPa) = -6.8346 + 1.2817 \times 10^4/T - 3.7668 \times 10^6/T^2 + 2.997 \times 10^8/T^3$$

So by derivation we have:

$$51) \Delta_{sin}H = 106.56 - 6.2634 \times 10^4/T + 7.475 \times 10^6/T^2$$

Where $\Delta_{sin}H$ is in kJ/mol.

Using the Clausius–Clapeyron relation enthalpy equation, Anderson reports the reaction of carbon dioxide hydrate to carbon dioxide vapor and water as follows:

$$52) \Delta H_I/(kJ.mol^{-1}) = \{62.9\text{-}0.53(T/K - 273.15)\}$$

Entropy

Entropy is one of the most basic concepts in physics. This quantity is generally mistaken for a measure of disorder. Entropy, on the other hand, is a measure of the distribution and sharing of thermal energy within a system. As a result of this diffusion and sharing, thermal energy is dissipated over a larger volume of space or in micro-states inaccessible to the system. The thermal energy distribution in a system is determined by the number of quantized microstates available. The greater the number of these states, the greater the entropy of the system. According to this definition:

$$53) S = k.\ln\Omega$$

Where k is the Boltzmann constant and Ω is the number of microstates associated with a given system macrostate.

The entropy of a perfectly regular solid at zero degrees Kelvin is zero. The absolute entropy of a substance at any temperature above zero Kelvin is determined by calculating the amount of heat required to bring the temperature of the substance from zero Kelvin to the desired temperature:

$$54) \ S_{0^\circ \to T^\circ} = \int_{0^\circ}^{T^\circ} \frac{Cp(T)}{T} dt$$

It should be noted that the criterion for the spontaneity of a change is the entropy of the system and the environment, or in other words, the total entropy:

$$55) \Delta S \text{ total} = \Delta S \text{ surr} + \Delta S \text{ sys}$$

The only way to affect the entropy of the environment is to exchange heat with the system:

$$56) \quad \Delta S_{surroundings} = \frac{q_{surr}}{T}$$

Because most reactions are either exothermic or endothermic, they cause heat to flow through the system boundary. The change in enthalpy of reaction is defined as the flow of heat from the environment into the system in such a way that the pressure is constant. Therefore, the heat flowing from the medium is equal to -qp, which changes the entropy of the medium as follows:

$$57) \quad \frac{-q_p}{T} = -\frac{\Delta H}{T}$$

So, we have:

$$58) \quad \Delta S_{total} = \frac{-\Delta H}{T} + \Delta S_{sys}$$

Multiplying (-T) on the sides:

$$59) \quad -T\Delta S_{total} = \Delta H - T\Delta S_{sys}$$

Compared to the ΔG relation, it can be said that:

$$60) \quad -T\Delta S_{total} = \Delta G$$