

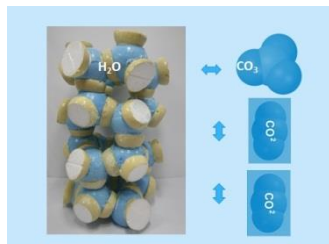
# Observations of the cluster of water at vicinity of ice in the carbonated water

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## [Why does carbonated water form a spiral structure?]



A helical structure of water is a state of the lowest energy. Solubility of  $\text{CO}_2$  for water is large. And 98.3% of the dissolved  $\text{CO}_2$  is the molecule of linear shape. It is stored in the hole of lattice structure. on the other hand, carbonic acid ( $-\text{CO}_3$ ) is a planer triangular structure.

Fig.1 An illustration: Carbonated water forms a spiral structure.

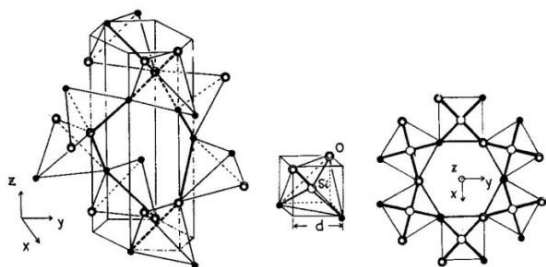


Fig.2 Arrangement of tetrahedrons in  $\beta$ -quartz. Tetrahedral units are arranged helically along the optical axis.

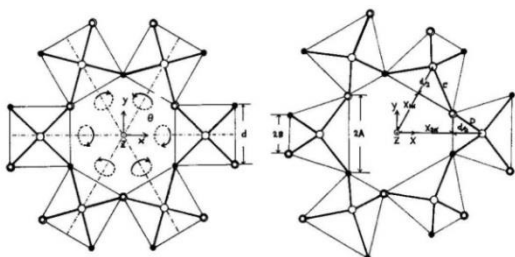
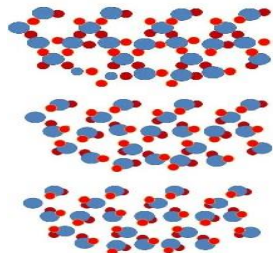


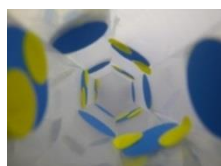
Fig.3 Each unit rotates alternately around their electric axes ( $\phi$ ) at the transition from  $\beta$ - to  $\alpha$ -quartz. It causes  $\cos(\phi)$  contraction.



The thermal vibration of water molecule with keeping helical structure accompanies with expanding and contracting.

The linkage of thermal motion is important for metabolism.

Fig.4 The thermal vibration of molecules in helical structure



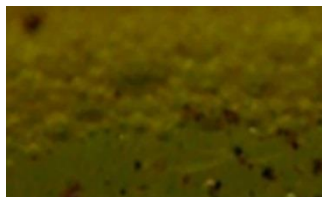
Each pair of hydrogen atoms facing the through-hole of spiral structure will rotate in the same direction.

The rotation causes a flow in one direction.

Fig.5 Through-hole along optical axis in structure of  $\alpha$ -quartz.

## [Observations of cluster of water in vicinity of ice of carbonated water]

By adding fine iron particles in carbonated water, we can observe the cluster of water as shown in Fig.6.



It was photographed at highest magnification of the digital camera PENTAX Optio-W90. Here, yellow color is caused by iron oxide. The transparent material is ice.

Fig.6 The surface of carbonated water with powder of iron.

## [The bubbles produced in the carbonated water with iron]

After mixing with iron powder to the carbonated water, bicarbonate ions and iron ions form inorganic membrane for the bubble. The carbon dioxide can be deoxygenated by oxidation of iron. The released carbon atom will generate carbohydrates. So, the membrane of bubble evolved.

## [Photochemical-reaction by oxidation of iron atom]

A chemical reactions will occur in the vicinity of the water surface by the light energy from the sun. The intermolecular bond of the membrane becomes robust by the compounds. The carbohydrate was produced by the carbon atom released from carbonated water by the oxidation of iron atom.

## [Observations of thermal motion of cluster in vicinity of the ice]



Clusters of water are recognized through interlocks with the ice of carbonated water, and individual cluster sometimes makes its own motion.

Fig.7 The cluster of water in the carbonated water.

## [Thermal motion of a system of intermolecular bond]

The system of creature is organized by intermolecular bond, and it repeats renewing. The repeat of systematic motion of the molecule may improve the device to support the chain reaction.

## [The origin of metabolism]

The defect of a part in a system of molecules occurs frequently. However, recover of the defect is possible by means of frequent updates of components.

## [Simultaneous synthesis of 2 types of filamentous molecules]

Molecules of the tetrahedral water have been arranged through the Coulomb force in three directions intersecting with the surface of the water. A helical structure is formed along the vertical direction from this planar structure.

## [Conclusions]

The hypothesis that the surface of the carbonated water containing iron is the environment in which the first life was born was supported by these observations.

[Reference] S. Karasawa, "Observations of cluster of water in the vicinity of ice of carbonated water", 2015, [http://www.youtube.com/watch?v=y\\_jTliH36rU](http://www.youtube.com/watch?v=y_jTliH36rU).