

Temperature and pressure environment of the air in the bubble of ice

*Kohei Usui¹, *Keiichirou Adachi¹, Kenta Hojo¹, Taichi Koshimae¹, Koki Okamoto¹, Mutsuki Shinoda¹, Taku Hatanaka¹, Mina Fujiwara¹, Riku Moriyama¹

1.Hyogo Prefectural Nishiwaki Senior High School, Biology Club

1. Motivation and purpose

Ice does not enter the bubble is a good texture for fine grain. May began the experiment is already severely considerable heat, was trying to make the texture of good ice bubble does not turn on. But we could not make the ice that just do not fit bubbles. One day, the bubble of ice is very similar to the bubble of remaining to defective material of the solidification process of the metal, and the hole of the degassing in the cooling process of magma of northern Hyogo prefecture. Revealing the temperature and pressure environment of bubbles ice, a clue to consider the environment in which the bubble holes of the metal and rock holes are formed. Therefore, we created the ice entered many bubble, and began to study with the aim to clarify the temperature and pressure of the bubbles.

2. Experimental result

Cooling rate variously varied cooling pure water, made the air bubbles are often ice or small ice. It does not inject air into pure water. Moreover, not boiled pure. (1) Change in temperature of the air bubbles trapped in the ice Contrary to the hypothesis, the temperature of the air bubbles that could be inside the ice, reached equilibrium at 1 °C ~ 3 °C about a temperature higher than in the freezer. (2) Density and expansion rate of ice Be different volume of the bubble, significant difference in the density of the entire ice is not observed. Expansion rate of the bubbles is often ice, sometimes slightly smaller than the little ice. (3) The volume of air that has been trapped in the bubble of ice Quenched by crystallized ice is not significantly be differed to a change in the expansion rate and density, it contains many air as bubbles. Despite the large number of air are trapped, who quenched ice the expansion rate is in the rather small trend.

3. The entire Summary and Discussion

Since made ice the same pure water is cooled, the bubble is somewhat not due the amount of air contained in the original pure water, the difference in cooling rate is the cause. And that the amount is often in spite of the entire ice expansion rate of the air it does not change to be encapsulated, from the fact that the bubble is not a significant difference was observed in the change in density in many ice, crystallized ice and quenched the bubbles, it is possible that under high pressure towards the interior of the air. When the bubbles enter in the process of metal is solidified, not a commodity. When the magma deep underground causes the bubble to solidify, in a large felsic magma chamber, the volume cannot be expanded. As of these, the environment caused a large number of bubbles in a state in which the volume cannot be inflated, but such as temperature and pressure there is several orders of magnitude, the environment and the similarities of this experiment many.

4. Future tasks

Fine bubbles invisible to be encapsulated in the ice, which may have affected the temperature in the bubbles of the quenching and slow cooling. Since it is necessary to capture the phase equilibrium relationships dynamically, in the present stage, it is impossible to link immediately with this experiment bubbles environments metals and rocks.

Keywords: air bubble, density, expansion rate

