

## Crystallographic Portrait of Water

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Journal of Water Chemistry and Technology volume 43, pages277–280 (2021)

### Abstract

Water has a complex structure and contains impurities, the chemical composition of which is determined not only by the natural content, but also by the conditions of processing and preparation for consumption. It is known that water can crystallize into ice at low temperatures and form crystals and snowflakes with different patterns. But such crystals are not stable at higher temperatures because of melting. Therefore, it is quite difficult to study crystallized water without special equipment. With the aim of elucidating the possibility of visual morphological integral registration of the crystallographic pattern, three specimens of drinking water were crystallized with addition of a crystal-forming substance. This method is based on changing the crystal formation process after addition of another substance or a solution to the crystal-forming substance. Copper dichloride  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  can serve as such a sensitive crystal-forming substance. This method is called thesiography. Drinking water samples with different chemical compositions—in particular, water from a well for domestic use, water supplied centrally for human consumption in accordance with DSTU 7525 : 2014 (State Standard of Ukraine), and natural mineral table water not subjected to technical treatment—are studied. The crystallographic patterns are visually inspected for the morphology after their formation with use of temperature contrasting for better visualization. It is found that a crystallographic portrait of water can be obtained by crystallizing water with a crystal-forming substance. The constituent components of water are embedded in the crystal lattice of the crystal-forming substance, i.e., copper dichloride  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ . Therefore, thesiography of water is a promising method to obtain portrayal characteristics of various drinking water samples and can be used to assess water quality. Different water samples have different crystallographic patterns due to the different chemical compositions.

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