

Mass, Size and Crystallizing Velocity of Skeleton-shaped Depth Hoar

by

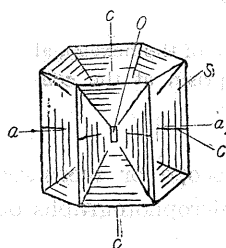
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1. Introduction

In this report the mass, the size and the crystallizing velocity of skeleton-shaped depth hoar which was microphotographically observed at Hailar, North Manchuria,



cc: The principle axis,
aa: the lateral axis,
O: the initial minute crystal,
S: the skeletal wall,
C: the composition plane.

Fig. 1 The fundamental type of the depth hoar crystal. This type is the hexagonal skeletal twin prism.

hair was brought into a cold room and the depth hoar crystals were melted by approaching our fingers. Then we could get a rosary of frozen ice-spheres, as shown in Fig. 2.

2. The Mass and the Size

The mass of the depth hoar crystal was calculated from the microphotographs of the crystals obtained through the above-described process.

The mass of single depth hoar crystal = 6.30×10^{-6} g. This value of mass is comparable with the water drop whose radius is 0.1 mm.

The skeleton-shaped depth hoar crystal is constructed of twelve small triangular ice plates and six large ones. The total area of these triangles was calculated from the microphotographs of the crystals.

The total area (A) = 141×10^{-2} cm².

In a similar way, the axial ratio (*c/a*) of the hexagonal depth hoar was calculated to be

$$c/a = 1.38.$$

are calculated. By the author's previous works unpublished, the fundamental type of the depth hoar crystal was known to be a hexagonal skeleton-like twin prism (Fig. 1).

Individual depth hoar crystals were made by sublimation on a hair which was exposed in the upper part of a well. The

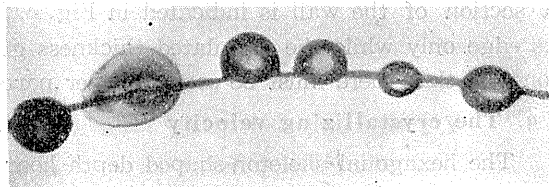


Fig. 2 The freezed spheres on the hair.

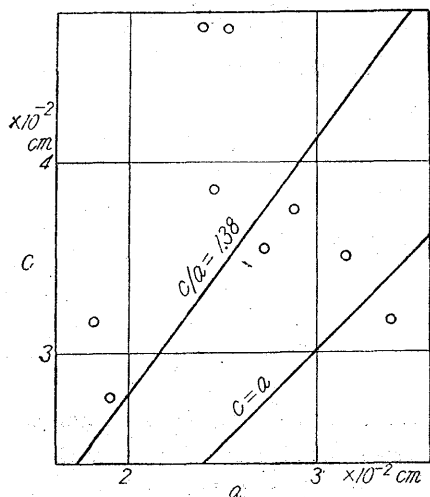


Fig. 3 The relation between the length of c-axis and a-axis. The points indicate unsystematical distribution, while the mean value of the axial ratio is 1.38.

wall of the depth hoar was observed visually through a microscope or measured directly on its microphotographs, and was calculated from its microphotographs on the other hand.

The observed thickness: $d_{ob} = 34\mu$,

The calculated thickness: $d_{ca} = 4.5\mu$,

In nature, the surface of the skeleton-shaped wall is not smooth, but uneven. A section of the wall is indicated in Fig. 4. The thickness should be observed at its edge only while the calculated thickness gives the mean thickness, so we can consider that there must be some thinner parts in the wall.

4. The crystallizing velocity

The hexagonal skeleton-shaped depth hoar grows in the upper part of a well with a certain crystallizing velocity. The velocity was calculated as follows.

The crystallizing velocity along the principal axis: $34 \mu/h$

The crystallizing velocity along the lateral axis : $25 \mu/h$

5. The mass of each stage

Since the section of the wall of the skeleton-shaped crystal is uneven as shown in Fig. 4, we can consider that the depth hoar grows discontinuously or undulatingly. We can calculate the mass of each stage of undulating skeleton-shaped wall.

The mass of each stage = 0.7×10^{-6} g.

c: The length of the principal axis.

a: The length of the lateral axis.

The relation between c and a is shown in Fig. 3, in which their values are distributed unsystematically.

3. The thickness of the ice-wall

The thickness (d) of the skeleton-shaped

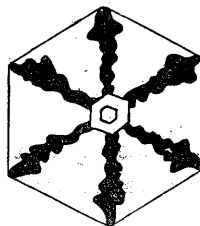


Fig. 4 The section of the hexagonal skeletal twin prism at the construction plane.