Method of estimating humidity control capacity of materials

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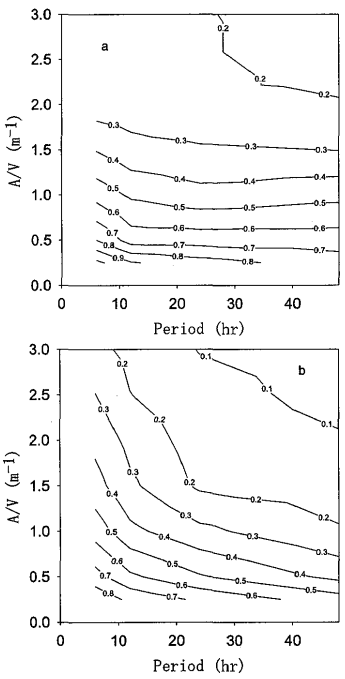
In Japan, to lower the influence of muggy weather on the living environment of a house, we have so far spent a lot of energy through air-conditioning. However, cutting down such energy consumption is desirable to cope with global warming: a house should be built in such a way that humidity can be controlled by the house itself and with as little artificial air-conditioning as possible. For this purpose, materials that can control humidity have been used in applications like interior wall materials, material for making closets, and materials under floors. However, before using these materials we have to understand their capability to control humidity precisely so that we can use them in a proper way. As a measure of estimating humidity control capacity of materials in an airtight room under sinusoidal temperature variation, we proposed the Cb value, which was the ratio of the range of variation of relative humidity in a steel box lined with material to the range in a steel box only. It was found that the Cb-value was affected by both the temperature variation over one period and the lined area in the box. From this, we could draw Cb-value contour diagrams of the period and the lined area for materials to understand the whole view of humidity control capacity of materials. They are exemplified in Figs. a and b for Japanese cedar and porous ceramics, respectively. Here, in order to show the extent of the lined area, the ratio of lined area (A) to the volume of steel box (V) , "A/V", is used. The overall impression of these two curves differed greatly. Noting the patterns of the contour lines, we saw that those for porous ceramics ran almost parallel to the horizontal axis. On the other hand, those for Japanese cedar ran from the top-left to the bottom-right, indicating that the map was symmetrical to the line passing through the origin, inclining at 45 degrees. From these results, we could conclude that humidity control capacity was higher for Japanese cedar than for porous ceramics in the range examined. In this way, in order to understand the material's humidity control capacity as a whole, we found that it was effective to draw each Cb-value contour map of each period and A/V covering their wide ranges.



Figs. a and b : C-value contour diagrams of each period and A/V for porous ceramics (a) and sugi(b)