A DEMONSTRATION EXPERIMENT ON THE SUB-COOLING OF WATER.

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The sub-cooling and subsequent freezing of water is an experiment which always arouses great interest on the part of the student, but as ordinarily performed it is a matter of some trouble and more uncertainty, since the water has a habit of often freezing at 0° instead of remaining in the liquid form at a lower temperature. The following method has proved all that could be desired of a demonstration experiment:

A glass bulb from one to two inches in diameter having a stem attached is half filled with distilled water. The water is thoroughly boiled to expel the air and the stem is sealed off, leaving the bulb filled only with water and water vapor. The bulb may now be placed in a freezing mixture of salt, ice, and water, whose temperature is ten degrees below zero and allowed to remain indefinitely without danger of freezing. On removing the bulb and giving it a sudden shake the water is instantly transformed to a mass of ice. The bulb, when once prepared, is always ready for use, and the experiment can be shown to a class in a moment and repeated several times if desired by simply warming the bulb till the last trace of ice is melted. The experiment is readily adapted to projection in the lantern.

For those who have not had experience in sealing a bulb filled with water vapor, the following statement of the writer's method may be helpful: Before the water is placed in the bulb, the stem is drawn down at one point to an inside diameter of a millimeter or less. A glass stop cock is sealed to the end of the stem. Instead of this, a piece of soft rubber tubing tightly wired on, which may be closed by a pinch-cock may be used. While the water in the bulb is boiling vigorously the stem is closed by turning the stop-cock or compressing the rubber tubing. The bulb is allowed to cool to room temperature. The possibility of leakage at this stage is avoided by inverting bulb so that the stop-cock is under pure water. After the bulb has cooled, the stem may be sealed off at the narrow part and the bulb is ready for use.