Eutectic point operation

1. Overview

The eutectic point refers to the temperature when the water in the material is completely frozen into ice crystals. During the sublimation process, the material temperature should be maintained at a temperature lower than but close to the eutectic point. It also refers to the temperature when the free water in the material is completely frozen into ice crystals. The eutectic point can be simply determined by the resistance method because fresh food raw materials contain water. The eutectic point tester is used to determine the eutectic point of the solution. During the freeze-drying process of the solution, it is very necessary to know the eutectic point of the solution because it will help control the pre-freezing and sublimation process. The pre-freezing temperature of the material should be 5-10℃ lower than the eutectic point of the material to ensure that the material is completely frozen. If the pre-freezing temperature is too low, the freezing time will be extended, the production cost will increase, and time and energy will be wasted.

2. Measurement principle

Resistance measurement method: When there are impurities in the water, some impurities will decompose into ions. At this time, the water is conductive. When the temperature drops, the resistance of the solution will gradually increase. When the solution is completely solidified into a solid, the ions in the

solution will completely lose their ability to move freely, and the resistance will suddenly increase. At this time, the temperature is the eutectic point.

3. Usage method

1. First, do the preparation work before starting the machine.

2. After starting up, we set the pre-freezing temperature to -40℃ (the eutectic point temperature of most materials is within -40℃, of course we can also choose -50℃) and set the time to 4 hours to ensure sufficient time (the actual time to reach the eutectic point is less than 4 hours).

3. Put the material to be tested, and put the eutectic point probe (eutectic point probe 5 lines, sample probe 2 lines) into the material, and make sure it is in full contact with the material.

Note: The material can be put in before starting the machine, or it can be put in after the machine is pre-cooled.

4. Start the machine to pre-freeze and cool down. During the process, you can observe the eutectic point temperature trend chart (click "System Menu" -> "Manual Operation" -> "Eutectic Point Trend" on the main interface to view the status of the two curves of "Eutectic Point Resistance" and "Eutectic Point Temperature". You can also export data in "Data Query" for viewing. (It is recommended to view the eutectic point trend chart here)

Note: When the solution is completely solidified into a solid, the resistance will suddenly increase. At this time, the temperature corresponding to the sudden

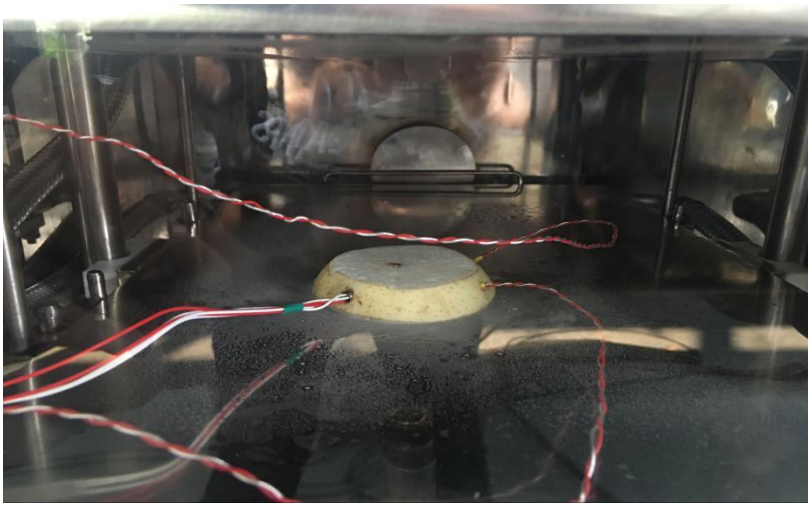
change of the resistance value of the "Eutectic Point Resistance" curve, which has been rising steadily before, is the eutectic point temperature of the material. (The curve is displayed as the first point where the slope begins to steepen)

5. Export data or record the eutectic point temperature value of this material by yourself.

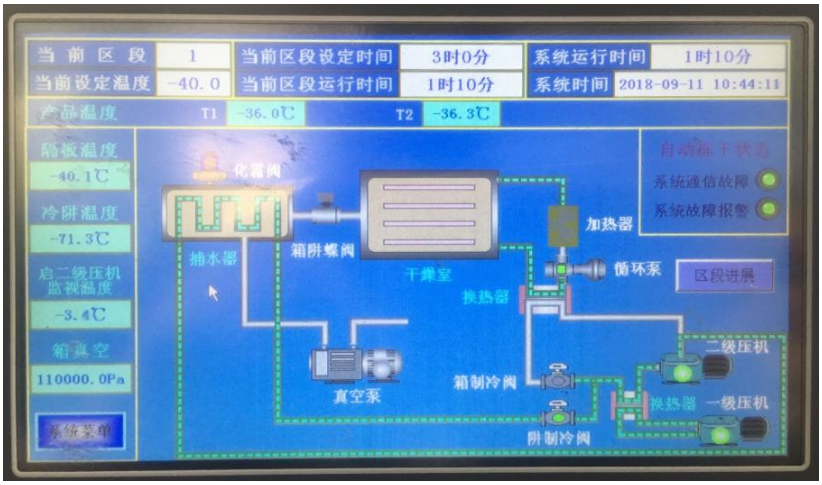
6. End shutdown

4. Example

Take a 10mm thick piece of pear as the sample



Set to pre-freeze at -40°C for 3 hours



Eutectic point trend chart

In this eutectic point trend graph, the point indicated by the vertical black line is close to the eutectic point of this material -12°C. (This point is the first point where the slope of the resistance curve becomes steeper)