

Product Information

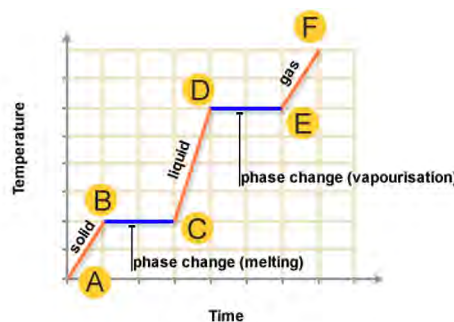
Checking a thermometer using an ice bath

When thermometers are used, many things can cause the accuracy of the device to change. A bath using a slurry of crushed ice in water is a simple and reliable way to check a thermometer at 0°C.

A bit of theory

When you add heat to something it warms up. Conversely, when you take heat away from something, it cools down. So when you mix ice and water, the water cools and the ice heats up through conduction as the mixture tries to reach equilibrium (an equal temperature throughout).

Ice is a solid and water is a liquid, and 0°C is the point at which ice melts and water freezes. Melting and freezing are both changes of state i.e. solid to liquid and liquid to solid. When a substance changes state, bonds between molecules have to be made or broken. This process requires energy, so the temperature of the substance remains the same while this takes place.

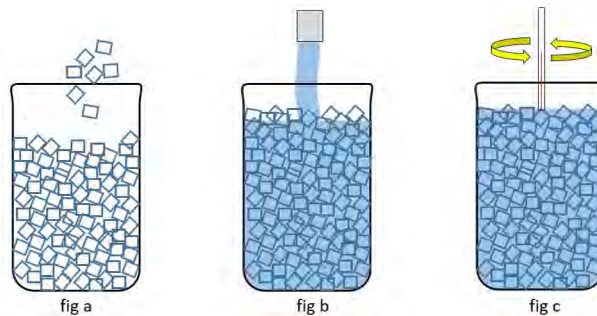


Therefore, a crushed ice and water mix that has a slurry consistency will give a uniform temperature of 0°C. It is also important to stir the slurry as this will help to maintain a consistent temperature throughout and avoid temperature gradients.

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Making up the ice bath

1. Fill a vessel like a glass or a mug almost to the top with crushed ice. (fig a)
2. Slowly add water to fill the spaces between the ice. Fill about 10mm below the top of the ice. (fig b)
3. Stir the ice / water mix to allow it to reach equilibrium. The ice will then start to melt into the water and stay at 0°C due to changing state.
4. Insert your probe (or thermometer stem) into the mixture and keep stirring in the vertical centre of the ice slurry to keep the temperature constant. (fig c)
5. The thermometer should read 0°C (32°F) in the ice bath.



Things to consider

It is important to know the manufacturer's accuracy specification when performing a thermometer accuracy test. Your thermometer might not read exactly 0°C but might be within specification.

If the probe touches a big chunk of ice, it might read below zero, if it is in just the water then it could read slightly above. The more homogenous the mix, the closer the temperature will be to zero.

Infrared thermometers read only surface temperature and the top of the slurry may be slightly higher than zero due to the temperature of the air at its surface. Also, make sure the spot size of the IR thermometer is smaller than the surface of the bath to avoid the instrument reading the temperature of surrounding objects.

If you are using a liquid in glass thermometer, be careful to immerse the thermometer to the correct depth as incorrect immersions will cause errors.