

Thermal beads look like a great alternative to water – what are the differences?

Thermal beads are a great alternative to water in certain situations. Beads are very convenient for use without racks or for odd-shaped vessels. Beads offer better resistance to contamination and bio-growth. Additionally, beads do not evaporate or spill like water. While beads provide a lot of benefits, water still has better thermal properties.

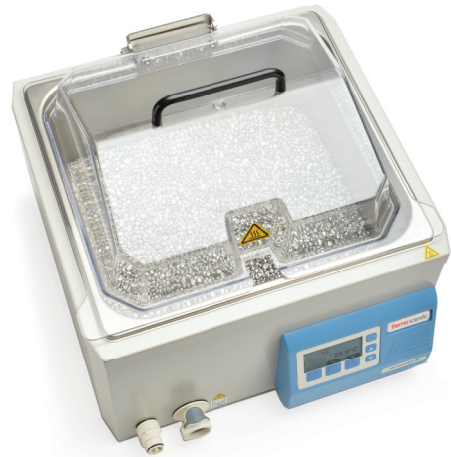
Benefits of thermal beads

Thermal beads are small aluminum alloy beads that act as a thermal conductor. Because of the size, shape and density of the beads, vessels of any size or shape that fit into the bath can be held in place by the beads without floating. The beads reduce the risk of contamination because there is no liquid to circulate the contamination to the other vessels or promote biogrowth and they can be sterilized chemically.

How do I know when to use thermal beads versus water in a general-purpose bath?

Limitations of thermal beads

When compared to water, the advantages of thermal beads come with temperature variance, stability, uniformity and time to temperature limitations, some of which can be improved upon with proper pre-use setup. Temperature variance is the difference between the reported temperature on the controller versus the actual temperature in the vessel. The thermal properties of water are such that the temperature variance is small enough to not require any adjustment.



Thermo Scientific™ Precision™ General Purpose Water Bath TSGP10

Uniformity is the homogeneity of the temperature within the bath. It's the measure of how similar the temperature inside the bath is at different points. The smaller the uniformity number the more similar temperature conditions your samples experience in the bath. What this means is with beads you will see greater temperature variations depending on where you place your vessel (Figure 1).

To get an accurate reading of the temperature, the reference temperature device (thermometer, RTD or thermocouple) needs to be in the water-filled vessel. This is true whether utilizing water or thermal beads. However, because of the greater temperature variance it is more important when using thermal beads. Thermal beads only have partial contact with thermometers or probes due to their shape and shifting the thermometer even slightly may produce large variations in readings. For accurate results when using thermal beads, always measure temperature within your sample vessel.

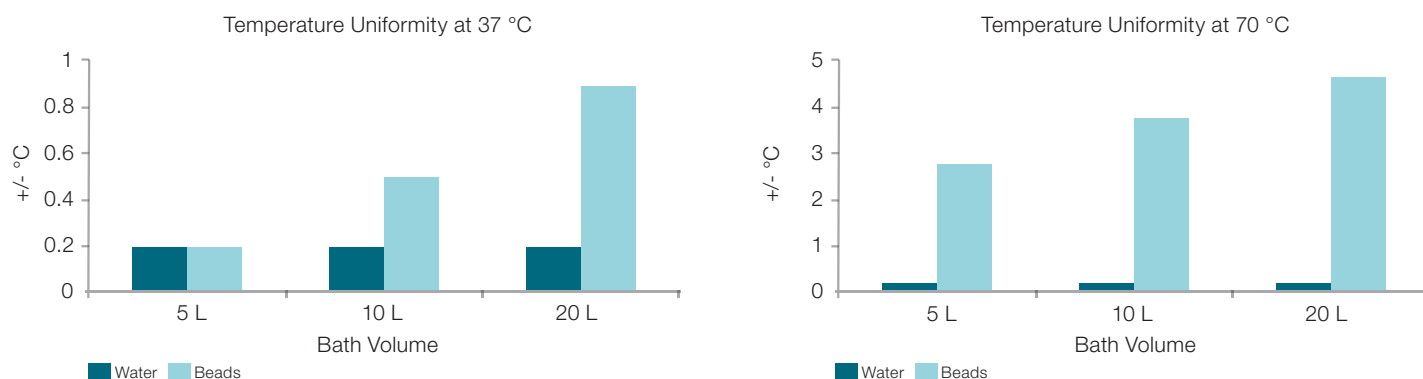


Figure 1. Temperature variations for water vs. thermal beads

Summary

Thermal beads are a convenient way to heat samples with non-critical temperature requirements. For best performance the bath should be calibrated to the operating temperature using water-filled vessels placed in the beads and temperature measured inside the vessel. For critical applications with more rigid requirements for temperature stability, uniformity, or variance using water will give you the best performance.

Find out more at thermofisher.com/waterbath