

Eppendorf ThermoTop[®] – *condens.protect*[®]

Effective protection against sample condensation

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Executive Summary

Eppendorf ThermoTop[®] is a heatable lid, equipped with *condens.protect*[®] technology, which is available exclusively for the new generation of Eppendorf ThermoMixers™ - Eppendorf ThermoMixer™ C, Eppendorf ThermoMixer F1.5, Eppendorf ThermoMixer™ FP and Eppendorf ThermoStat™ C – in combination with the Eppendorf SmartBlocks™ 0.5 mL–2 mL, plates and PCR. The document explains the mechanism of action of the Eppendorf ThermoTop and shows that it effectively prevents the formation of condensation.



Area of application and mechanism of action

Especially when working with small volumes it is imperative to prevent the formation of condensation droplets inside the lid, alongside the tube walls or on sealing foils. For this reason, the Eppendorf ThermoTop is primarily employed in these areas. Heat is radiated onto the lid and the upper part of the reaction tubes, by means of which these surfaces adopt a slightly higher temperature than the sample itself (fig. 1). If the Eppendorf ThermoTop is placed on the instrument at the initiation of temperature control, formation of condensation will be prevented effectively from the very beginning.

Furthermore, the Eppendorf ThermoTop improves temperature homogeneity across the entire block.

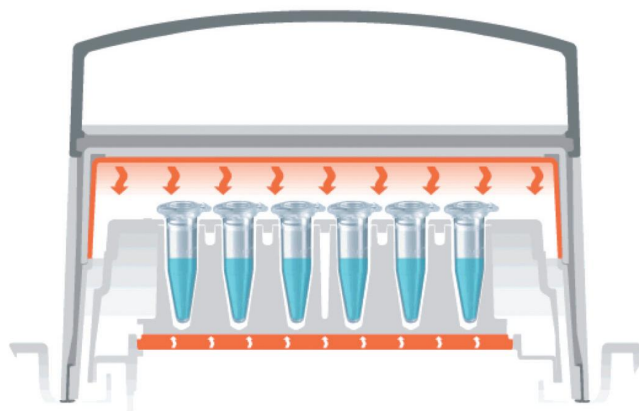


Fig. 1: Cross section Eppendorf ThermoTop

Without the use of a heated lid, solvent molecules will evaporate to the gaseous phase during the heating process of a liquid sample and subsequently condensate against the cooler surfaces of lid and container wall. Hence, the volume of the sample is reduced while its concentration increases (fig. 2 A). Sensitive reactions may be influenced by this change in reaction conditions. In the case of very small sample volumes, the condensation process can leave such a small residual sample volume inside the reaction tube that the sample is no longer mixable. Under such conditions the biochemical reaction will be neither optimal nor reproducible.

When using the Eppendorf ThermoTop, the surfaces of the tube lids and upper tube walls are warmed in such a way as to prevent the formation of condensation effectively. Thus, sample concentration remains stable, reaction conditions are strictly adhered to, and reproducibility of experiments is improved (fig. 2 B).

Simplification and reduction of workflow

The use of the Eppendorf ThermoTop renders redundant any additional centrifugation steps to “pull down” condensation droplets.

Easiest handling

The Eppendorf ThermoTop does not require an additional cable connection; it is recognized and activated simply by placing it on the instrument. Further adjustments are not required. The heated lid is initiated completely automatically.

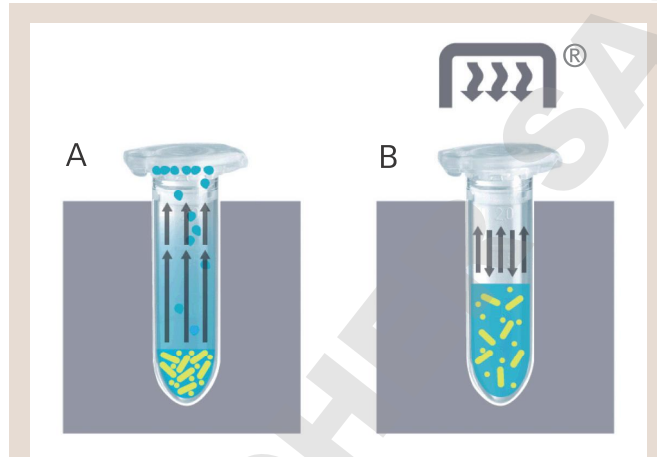


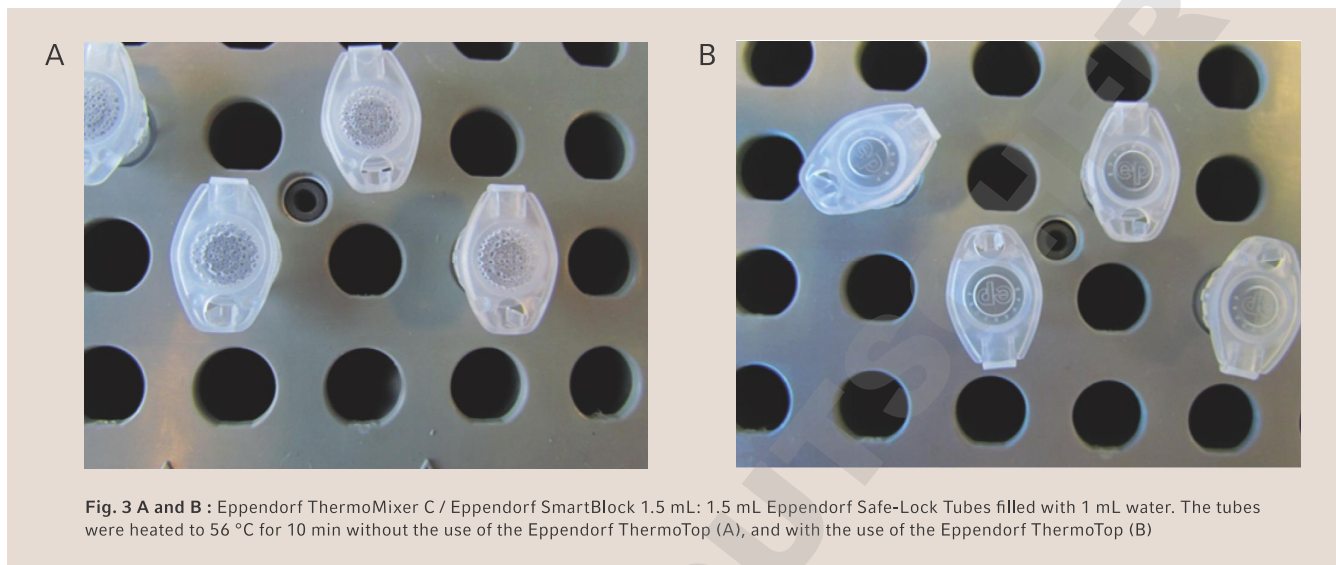
Fig. 2: Heating of a liquid sample
 A) without the use of a heated lid
 B) with the use of the Eppendorf ThermoTop

Optimal sample protection

Sample temperature is not adversely influenced by the Eppendorf ThermoTop, as the temperature of the heated lid is continually adapted to the temperature selected on the instrument. The automatic Eppendorf SmartBlock recognition also considers different vessel sizes, and the temperature of the lid is adapted to the height of Deepwell plates, PCR plates or microtiter plates in a fully automated fashion.



Fig. 3 shows that the Eppendorf ThermoTop effectively prevents the formation of condensation. 1 mL of water in 1.5 mL Eppendorf Safe-Lock tubes was heated for 10 min at 56 °C in the Eppendorf SmartBlock 1.5 mL (Eppendorf ThermoMixer C). Without the use of the Eppendorf ThermoTop, condensation droplets were visible inside the lid within a short period of time (fig. 3 A), whereas fig. 3 B demonstrates the absence of condensation inside the tube lids when the Eppendorf ThermoTop was employed.



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