

Providing temperature uniformity and minimizing evaporation from agar plates and liquid cultures using a Thermo Scientific Heratherm microbiological incubator

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Key Words

Microbiological incubators, condensation, temperature uniformity, evaporation, culturing, Thermo Scientific, Heratherm

Abstract

The Thermo Scientific™ Heratherm™ IGS and IMH microbiological incubators are broadly applicable for a range of culturing applications. Because of their gas tight design, evaporation from cultures is minimized, allowing longer culturing and cultures that remain viable for extended periods without desiccation. When culturing large volumes of samples, some adaptations of the incubators are recommended to eliminate condensation that could occur as a result of minimizing evaporation. This application note describes the conditions for condensation appearance in a Heratherm microbiological incubator and gives suggestions on how to avoid them, based on results from internal testing under different conditions. The results demonstrate that Heratherm microbiological incubators are easily modified by users to allow culturing under widely varying conditions.

Introduction

The Thermo Scientific Heratherm microbiological incubators are designed to provide precise temperature uniformity and to minimize evaporation from agar plates and liquid cultures. Evaporation is bad because water leaving the growth agar results in concentrated nutrients and drying of the agar. This can mean that cultures do not grow quickly, or colonies desiccate such that viability is seriously compromised.

With this in mind, Heratherm incubators are designed very tightly so the samples are secure and can be cultured over multiple days without evaporation.

However, for high volume laboratories that culture a large number of samples (as shown in Figure 1), the Heratherm incubators offer modifications that allow venting to eliminate condensation that can occur. This application note explains how these modifications work and provide guidance for their routine use in laboratories. With this information, the Heratherm microbiological incubators provide flexible solutions for a range of different culture applications in academic research laboratories as well as larger scale commercial organizations.

Options for increasing airflow that allows large scale culturing

Heratherm units offer several possible options for users who want to incubate a large number of samples.

- Use of the standard access port of the units: leaving the access port open during incubation allows the humidity to escape from the instrument.
- Using an IMH unit (dual convection incubator) with 100% fan speed: this allows higher air circulation inside the chamber and avoids condensation formation.
- Replacement of standard gasket with a modified one comprising 2 special cut outs (Fig. 2, next page) that enable better air circulation and avoid more condensation formation inside the chamber.

To confirm the applicability and effectiveness of these approaches in minimizing condensation resulting from large scale culturing, several experiments were conducted.



Figure 1: Thermo Scientific Heratherm IGS microbiological incubator and large numbers of culture dishes filled with sterile distilled water, for evaporation tests.



Figure 2: A modified door gasket with a cut out to allow better airflow, thus minimizing condensation in the incubator chamber.



Materials used

Instruments and consumables

Thermo Scientific Heratherm IMH 180 and IGS 180 microbiological incubators were tested under different load conditions and multiple air circulation options as indicated in Methods. Vented, covered plastic Thermo Scientific™ Nunc™ Petri dishes (60/15 mm) were filled with 15 mL water and incubated at 37°C for the times indicated in Methods.

Methods and results

Using the Thermo Scientific Heratherm models and under the conditions indicated, the incubators were loaded with 25 to 400 sample dishes, each containing 15 mL water and incubated at 37°C without opening the door for 12 hours to 5 days. At the end of the period, the incubator chambers were opened and the amount of condensation assessed. Results for model IGS 180 are shown in Table 1 and model IMH 180 in Table 2. In all cases, the incubators showed that they were easily adapted to allow different numbers of samples for varying culture periods, without condensation.

Table 1: Different Culturing Conditions and Results in a Heratherm IGS 180*

Access Port	Gasket	Sample Number	Culture Period	Amount of Condensation
Closed	Standard	25	24 hr.	None
Closed	Standard	50	12 hr.	None
Open	Standard	50	24 hr.	None
Closed	Modified	400	120 hr. (5 days)	None

*Experimental conditions: petri dishes filled with 15 mL water and incubated at 37°C.
Ambient temperature: 22°C

Table 2: Different Culturing Conditions and Results in a Heratherm IMH 180*

Access Port	Fan	Gasket	Sample Number	Culture Period	Amount of Condensation
Closed	100%	Standard	100	120 hr. (5 days)	None
Open	100%	Standard	200	12 hr.	None
Closed	100%	Modified	500	120 hr. (5 days)	None

*Experimental conditions: petri dishes filled with 15 mL water and incubated at 37°C.
Ambient temperature: 22°C

Discussion and conclusions

The experiments were performed using varying numbers of plates filled with water. In each case, the different Heratherm models can be adapted to allow minimal evaporation with no condensation. The results demonstrate that these optional approaches offer good choices that avoid condensation in the chamber.

In case avoiding sample dessication is more important than condensation concerns, the best possible option is the use of an IGS unit with closed access port and standard gasket.

In case the condensation issue is more important for the user, the best option is the use of an IMH unit with 100% fan speed and, as needed, the use of the special gasket with cut outs (Fig. 2).

While there is a nearly infinite number of possible conditions under which any microbiological incubator may be used, these results show that the Heratherm incubators are uniquely adaptable to a wide range of changing environmental and culture situations.

Order number for the gasket with cut out

50134906	Vent gasket for 60L Heratherm models
50134907	Vent gasket for 100L Heratherm models
50134908	Vent gasket for 180L Heratherm models

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