

Preventing Cell Culture Contamination with Copper CO₂ Incubators

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Introduction

A CO₂ incubator provides an excellent growth environment for cell cultures. However, the same warm, humid conditions can also sustain the growth of contaminating microorganisms. From easy-to-clean design to external water reservoirs and heat decontamination cycles, Thermo Scientific HERAcell® CO₂ incubators are proven to prevent and eliminate contamination¹⁻³.

Antimicrobial action of copper

Records from early civilizations demonstrate that copper can inhibit the growth of many different microorganisms. Reviews of modern literature⁴ indicate that copper slows or stops growth of many organisms, including bacteria, fungi, algae and yeast. Copper ions bond to contaminants and then disrupt key proteins and processes that are critical to microbial life. For instance, the suppression of bacterial colonization by solid copper was recently demonstrated in Porton Down, England by the Centre for Applied Microbiology and Research (CAMR)⁵.



Our HERAcell® CO₂ Incubator, available with a microcidal solid copper interior

In that study, CAMR showed that copper piping reduces the growth of *Legionella pneumophila*, causative agent of Legionnaire's Disease. This is the same testing facility that certifies many Thermo Scientific centrifuge rotors for biocontainment. CAMR also clearly documented that the Thermo Scientific HERAcell ContraCon heat cycle effectively kills fungus and bacteria².

There are many examples of copper acting as a microcide in everyday products, for example:

- Incorporated into cement or paint, it prevents bacterial and fungal growth (for example, in humid basements)
- It reduces bacteria and algae in cooling systems and towers
- Copper plumbing pipes reduce the threat from the bacteria *Legionella pneumophila*
- Brass (copper/zinc alloy) used in machining coolant filters removes bacteria and algae
- Copper-sulfate and -chelate aquacides control aquatic pests in ponds and municipal water supplies
- Copper-based pesticides control nematodes and fungi

Copper in incubators

Copper reduces microbes in a wide variety of equipment, including medical and scientific devices such as incubators.

Years of experience show that copper wire, copper sulfate or even pennies added to water reservoirs of CO₂ incubators significantly inhibit microbial growth. Even better, solid copper surfaces clearly reduce the proliferation of contaminants⁴.

Thermo Scientific Heraeus CO₂ incubators are available with interiors made from solid copper. Copper, in scientific instruments, has proven antimicrobial properties.

Because the copper ions do not become airborne, they pose no threat to precious cells incubated in culture flasks on copper shelves.

Dr. Imam El-Danasouri, a long-time user of copper incubators was recently interviewed:

“In addition to your position at California Reproductive Laboratories, what other positions have you held?”

Dr. Danasouri “Professor of OB/GYN, Chieti University, Italy, Scientific Director of the European Institute of Reproductive Endocrinology and Infertility, Chieti, Italy, and Scientific Director at the Institute of Reproductive Endocrinology, Ulm, Germany.”

“Please describe your experience with CO₂ incubators”

Dr. Danasouri “I have used CO₂ incubators for research as well as for the culture of cells from different species for more than 25 years.”

“What is your experience of using HERAcell Copper incubators?”

Dr. Danasouri “I first used copper CO₂ incubators in 1989 at Stanford University Medical School. Since then, I have been using only copper incubators in all the laboratories I supervise in the USA, Germany and Italy.

Recently, I ordered two new copper incubators for the Egypt Air Hospital in Cairo, Egypt.”

“Why did you choose copper incubators?”

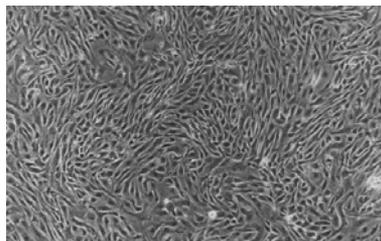
Dr. Danasouri “Infection within the incubator is detrimental to the cells. Since copper inhibits bacteria or fungus growth on copper surfaces, copper incubators reduce the possibility for infection in the humidification water or on the incubator walls. Studies on the contamination of cell culture media with heavy metals have shown that there are no traces of copper in media from the copper incubator.”

“What types of cells have you used with copper incubators?”

Dr. Danasouri “I have used copper incubators for human and mouse cultures. I have also cultured many other cell types in the copper incubators, such as endometrial, epithelial and stromal cells, and tubal epithelial cells from monkeys, cows and humans. Many other cell lines have been cultured successfully in the incubators.”



4-cell animal embryo (x 200)



Endometrial epithelial cell culture (x 200)

References

- 1) Incubators with Thermal Disinfection Cycles (2000). *Genetic Engineering News*. 20:37.
- 2) Eliminate Incubator Contamination with Thermo Scientific HERAcell. Application Note AN-LECO2ELIMCON-1107
- 3) Decontamination Cycles in Heraeus BBD 6220 and HERAcell Incubators Completely Eliminate Mycoplasma. Application Note AN-LECO2DECONCYC-1107
- 4) Copper Development Association, 260 Madison Avenue, New York, NY 10016, 212-251-7200 Ph, 212-251-7234 Fax, Staff@cda.copper.org, www.copper.org
- 5) The Influence of Plumbing Material, Water Chemistry and Temperature on Biofouling of Plumbing Circuits with Particular Reference to the Colonization of *LegionellaPneumophila* (1993). ICA Project 437B

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