



# Technical Bulletin

North Carolina State Laboratory of Public Health | Laboratory Improvement Unit

## Equipment Maintenance – Incubators

A wish and a prayer is not something you want to rely on before opening your incubator door - each time hoping that your culture(s) grew or did NOT grow according to your expectations. Incubators, if not taken care of properly, can leave us with a “plate” full of undesirables and frustrations.

All incubators, heated or cooled, are designed to be environmentally stable chambers. Whether you’re working with small table-top incubators or a large room-sized one, they all require basic cleaning and maintenance practices to achieve maximum stability. The more variables within a system, the higher the probability something will go wrong if the incubator is not properly maintained.

In the 1960’s, laboratorians began using carbon dioxide (CO<sub>2</sub>) incubators in order to achieve optimal conditions for growth of capnophilic bacteria such as *Neisseria meningitidis* and *Neisseria gonorrhoea*. The CO<sub>2</sub> incubator is one of the more complex incubators; it is designed to replicate the mammalian environment outside its natural state at a temperature of 37°C, 95% relative humidity and CO<sub>2</sub> level of 5%.

The CO<sub>2</sub> incubators of today have been specially designed to minimize contamination. The water or air jacket that surrounds the main growth chamber and the filter is partially composed of copper, which is known to have antimicrobial properties. Some incubators have a “disinfecting cycle” that increases the temperature to greater than 90°C for several hours. Both of these factors help to inhibit the growth of bacteria and fungi.

You cannot rely on technology alone to keep your incubator free of contaminants. High humidity and warm temperatures is a bacteria’s best friend. Here are some recommendations that will help you prevent contamination:

- Always check your manufacturer’s manual; it will supply you with a plethora of maintenance tips specific for your incubator. Keep in mind the location of the incubator; place it away from windows and air intakes. Make sure you have a consistent power source; surge protectors are strongly recommended to prevent voltage spikes from damaging the electronics. A back-up power source or generator may also be a good idea.
- Planning trips in and out of the incubator is another good idea. The more times you open and close the door and the longer the door is open, the more likely you are to introduce contaminants.
- Maintain a regular cleaning and maintenance schedule. Contamination prevention is the key to a happy laboratorian. Prepare and keep a maintenance log to record daily, weekly, monthly and other maintenance performed.

Daily checks should be made on CO<sub>2</sub> levels. If your incubator does not have an external monitoring system, a fyrite gas analyzer or gas chromatograph will be necessary to monitor levels. Some manufacturers may require weekly or monthly checks to verify external monitors; check your manual to ensure you are following the proper schedule. When confirming CO<sub>2</sub> levels, you should take two readings. If the reading is  $\pm 0.5\%$  from the set point, wait an hour and retake two more readings (MW Labs, LLC).

As with all incubators and refrigerators, temperature should also be monitored daily. Be sure it is set within the limits.

Clean – clean – clean: the only way to prevent contamination and provide the best environment for reliable growth is to maintain a clean incubator. This may be performed weekly, monthly or biannually depending on the complexity of the cleaning. If your incubator requires a water pan to maintain humidity, make sure to change the water weekly. The stainless steel pan should be disinfected, dried and refilled with distilled, autoclaved water to achieve optimal results.

Wipe down the chamber with a low pH or non-corrosive disinfectant. Some disinfectants may need to be diluted; follow manufacturer's recommendations. Remove shelves and side panels, and autoclave to reduce hiding places for spores. Clean and disinfect all ports, air bleeds and holes. Carefully clean sensors and probes. Remove the door gasket and gasket guards. *Note: These parts may not be autoclavable; refer to manual.* Finally, keep extra air filters on hand, and replace them regularly.

Note: You may want to modify your cleaning schedule depending on frequency of use. The more you go into and out of the incubator the more frequently and thoroughly you should cleaning.

If you have a problem with contamination, you may want to perform quality control on your cleaning. You can easily accomplish this by placing a couple of blood agar plates (on various shelves) uncovered with the door closed for ten minutes. After ten minutes, recover the plate and incubate for 24 hours. If there is no growth – chances are you have done a great job on cleaning. If you notice growth, especially fungal, you will want to repeat the process or consult with the manufacturer's technical service.

Prevention is the key to prolonging the life of your incubator and eliminating contamination. Maintain your log and keep up with a regular cleaning schedule and you will never have to rely on a wish and a prayer.

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#### References:

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