SmartNotes

Why is a HEPA filtration system a more reliable choice than ultraviolet (UV) light for controlling contamination in your incubated/refrigerated orbital shaker?

A HEPA filtration system is always working, even while culturing. It will capture airborne particles of all sizes, from 0.1-0.2 µm viruses and mycoplasmas all the way up to 5-10 µm fungi and larger. A HEPA filter generally needs to be changed only once per year and the efficiency actually improves as the filter loads over time.

In contrast, UV light can only be applied when the shaker is not in use. UV light intensity decreases exponentially as distance increases. This means intensity is not always enough to reach far corners. Sufficient exposure duration is also required for microbial inactivation, and different microorganisms have different susceptibilities. The intensity of the UV light decreases as the bulb ages, and the efficiency is poor in humidity >70%.[1]

UV can only inactivate cells, nucleic acids, and proteins if it directly reaches them. Areas in shadow – not reached by the light – or microorganisms hidden by dust, dirt, glass, plastic, etc. are not decontaminated. For all these reasons, HEPA filtration is a more reliable choice than UV light for decontaminating orbital shakers.

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orbital shaker

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Why use HEPA filtration instead of UV light for decontaminating orbital shakers?

UV light is ineffective when blocked in an orbital shaker

UV light may be used to decontaminate the flat work surface in biological safety cabinets (BSCs), but anything that blocks the light from directly shining on an area negates efficacy. The American Biological Safety Association (ABSA) no longer recommends use of UV in BSCs.[1] So anything in a laboratory shaker that blocks the light, including dust or dirt, flasks or tubes, racks, clamps, and the shaker platform, will keep areas in shadow from being decontaminated (Figure 1).

Figure 1: UV light is blocked by clamps, glass, plastic, etc. and will not decontaminate areas that it does not reach. The areas shown in shadow can continue to harbor microorganisms.

HEPA filtration continuously cleans the air in an orbital shaker

Normal indoor room air contains 30-700 microbes/m^3.[2] Powered by active airflow, a HEPA filtration system will capture all airborne particles. HEPA filters are rated for efficiency of capturing 0.3 µm particles because, due to the physics involved, these are the most difficult to capture. Smaller and larger particles are captured with even higher efficiency. All air in the incubated/refrigerated shaker is continuously circulated through the HEPA filter, cleaning the air of microorganisms, which cannot escape. Because a HEPA filter is hydrophobic, it holds no moisture nor nutrients in the filter and the microorganisms die over time. The filter can be discarded in the usual laboratory biohazardous waste.

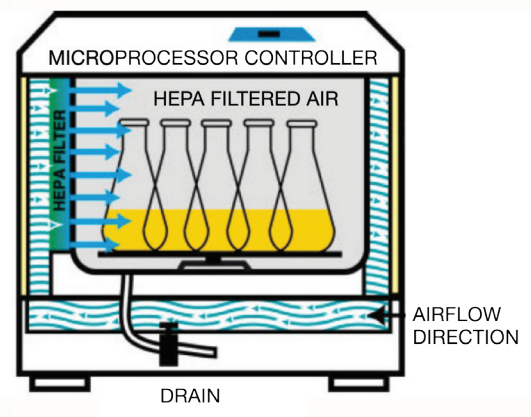

Figure 2: In an incubated/refrigerated orbital shaker with gentle active airflow, an incorporated HEPA filtration system continuously cleans the air of all particles.

References:
[1] Burgener J. Position paper on the use of ultraviolet lights in biological safety cabinets. Appl Biosafety 11(4), 2006.
[2] Stryjakowska-Sekulska M et al. Microbiological quality of indoor air in university rooms. Polish J Environ Stud 16(4), 2007.

Conclusion: A HEPA filtration system will capture all airborne particles that could contaminate cultures – whereas UV light can be easily blocked or the light degraded, eliminating efficacy.

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