

ISO 14698-1: SHORT STUDY ON IMPACT SPEED IN AIR SAMPLING

Impact speed is a critical aspect for collection efficiency in microbiological air monitoring. In order to have a good recovery of microorganisms, the velocity should be high enough to sample small particles without killing the microorganism during impact.

Impact speeds too low may not be suitable for small microorganisms that are blown away even if big microorganisms are collected correctly. (Picture 1)

On the other hand, high impact speed is OK for small microorganisms, but can kill bigger ones. (Picture 2).

Nevertheless the speed of the air sampler is not the only factor that comes into play in this complex phenomenon. In fact another overlooked factor is the radius of the intake nozzles; small nozzles tend to increase impact efficiency.

The distance between the agar surface and the bottom of the sampler head is critical as well; the smaller the distance, the harder the impact is on the agar.

Composition of the agar itself can influence impact force as different compositions have different hardness. In addition, microorganisms in the air are normally clustered in bigger aggregates or carried by other big particles, so it's hard to predict the aspect and dimension of such aggregates.

ISO 14698-1 norm, which is the most important norm regarding air sampling, states that the device selected for use should have the following characteristics:

"Impact velocity of the air hitting the medium that is a compromise between 1) being high enough to allow the entrapment of viable particles down to approximately 1 μm and 2) being low enough to ensure viability of viable particles by avoiding mechanical damage or the break-up of clumps of bacteria or micromycetes."

So, there's no specific value specified, not even the percentage of microorganisms down to 1 μm that has to be recovered.

In conclusion, although impact speed is a very critical aspect in air sampling, the perfect value is still not known and probably it doesn't even exist.

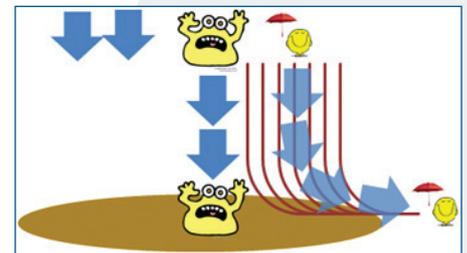
For this reason is not so important to know this value, but you should always refer to the collection efficiency value declared by the producer of the air sampler and ensure that the instrument is calibrated.

Bibliography:

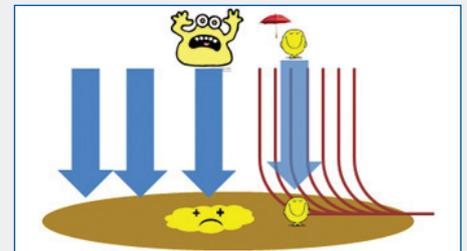
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Picture 1: In this example the air speed is quite low, which is fine for the collection of big microorganisms (left). Smaller ones (right) instead, float and follow the pattern of the air (red).



Picture 2: In this example the air speed is quite high, which is fine for the collection of small microorganisms (right). Bigger ones (left) instead, are killed by the high impact speed.

