

Healthy Environment



Virus Guide

Viruses and heat inactivation

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October 4, 2005

While viruses are not considered living organisms they depend upon living cells to replicate. The structure of the virus includes an envelope constituted by proteins and genetic material of DNA or RNA. All of these components are thermo-sensible. The genetic material and the proteins have complex structures regulating their function, and change in this structure may result in a loss of function known as denaturizing. There are two basic means by which denaturing occurs: a change in PH or temperature.



Some examples: viruses and heat inactivation

Numerous studies have focused on virus inactivation through heat application. For example, HIV virus in the blood will die when exposed to 77 degrees C¹ for as little as 0.006 seconds¹. In another study, parvovirus and phage phiX174 were completely inactivated when exposed to 103 degrees C for 90 seconds². In the case of the Herpes virus, high

temperatures inhibit the release of proteins necessary for the success of the infection³.

Airborne viruses are no different. One study of respiratory syncytial virus (the major cause of wheezing in children less than 2 years old) showed that when the virus is exposed to 65 degrees C for 45 minutes, the infection capacity is diminished and conformational proteins are transformed, resulting in a reduction of substances responsible for the inflammation, hyper-responsiveness and damage to airpassages⁴. The SARS virus (causative agent of severe acute respiratory syndrome) has thermo-sensible proteins in its envelope, which can be totally denaturated at 55 degrees C, the same temperature at which SARS virus was also reported to be inactivated⁵. The influenza virus (the following information is redundant I believe) contains proteins essential for infectious transmission that are sensible to variations of pH and temperature between 55-70 degrees C⁶.

The avian flu

The virus, responsible for the bird flu, can be spread from the poultry to humans and until now, about 20 millions of chickens have been slaughtered in order to control the spread of the virus¹⁰. Since 1997, it has been reported more than 100 cases of the disease in humans, resulting in more than 50 deaths⁸. Experts are very concerned about the rising of a pandemic new strain of the virus because of the mixing between avian and human viruses. It's suspected that the virus could infect someone who is already infected with a human flu virus like A, resulting in genetic rearrangement and a novel pathogen that could be highly virulent¹¹ and easily transmitted human-to-human¹³.



Transmission and symptoms.

All birds are susceptible to the avian virus and some types of wild birds are natural reservoir of influenza type A virus. They have a large amount of avian virus in their secretion, saliva and feces that can contaminate domestic poultry when in contact. Furthermore, their dropping or saliva may contaminate water, rivers, feed and even human shoes⁸. Infected droplets may settle on conjunctival, nasopharyngeal or other respiratory mucosal epithelium in humans¹² leading to symptoms ranged from typical influenza-like symptoms (e.g., fever, cough, sore throat, and muscle aches) to eye infections (conjunctivitis), pneumonia, acute respiratory distress, viral pneumonia, and other severe and life-threatening complications¹³.

Avian Flu characteristics and your heat instability.

The avian virus, H5N1, is a negative-sense, single-stranded RNA virus¹², which has two types of proteins in its surface: hemagglutinin (HA) and neuraminidase (NA)¹³. It is known from the literature that the virus can be inactivated by 56°C in 3 hours and 60°C in 30 minutes⁸. Thus, only four degrees of temperature elevation reduced the time of inactivation exposure about 85%.

Airfree[®] and its HETD Ceramic Core internal temperature.

Here, we have listed only few examples of viruses' inactivation by heating and in all those cases, the temperatures were below the Airfree's HETD ceramic core internal temperature of 200 degrees Celsius. Since 1977, studies have showed that the higher the temperature, the faster the proteins get denatured⁷. Therefore, we may infer that the Airfree purifier may be efficient in the inactivation of the virus proteins in most cases, resulting in the loss of the infection ability.

Airfree[®] Products

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OzoneReduction: no other airpurifying device matches Airfree's exclusive TSS[™] technology which both reduces ozone, while simultaneously destroying microorganisms.

Economic: Airfree's electric consumption is lower than a 50W light bulb. No replacement parts required such as filters that may cost hundreds of dollars a year.

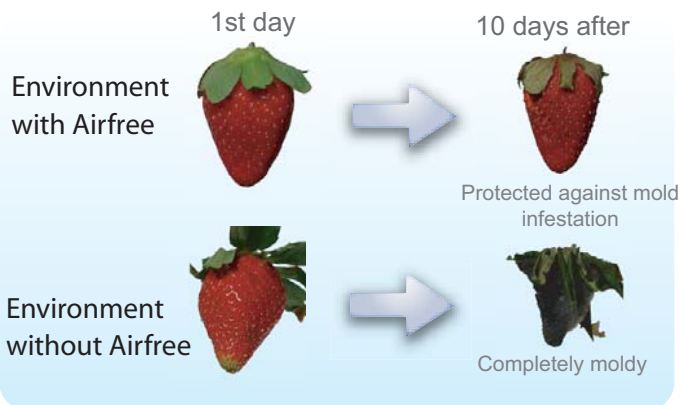
Easy Installation: Just place Airfree on the floor and plug it into the nearest electric outlet. No need for maintenance or special cleaning.



Bibliographical References:

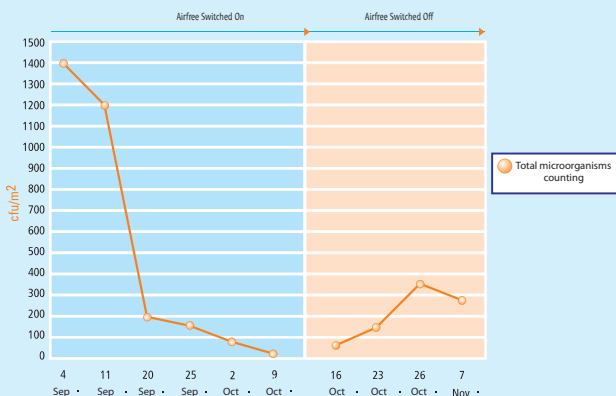
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See the strawberries 10 day test*:



*test made in two separated closed chambers

Efficiency Test: microorganism reduction



Test realized by SGS Natec - Germany - Test M00-4990
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See the complete list of test reports at:
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This guide had Cristiane Minussi's collaboration, USP biologist professional responsible for the microbiological nature information.