

CLARUS

Background
information:
Applications



Hydrogen Peroxide
Efficacy

Research has shown that hydrogen peroxide vapour (H_2O_2) can be used to provide rapid effective and residue-free surface bio-decontamination. And it has a number of advantages over traditional techniques e.g. formaldehyde fogging.

H_2O_2 vapour is non-carcinogenic and environmentally friendly. In addition no further neutralisation is required after an aeration phase.



Clean rooms

Isolators

Filling lines

Lock chambers

Pass through
hatches

Freeze dryers

CO₂ incubators

Safety cabinets

Lab equipment

Bio-deactivation studies using hydrogen peroxide performed on a wide variety of bacteria, viruses and fungi show that the D-values, which indicate the length of time required to kill a pre-determined number of micro-organisms, are extremely short - and can be measured in seconds. BIOQUELL Pharma typically validates the bio-decontamination efficacy of its Clarus™ technology using *B. Stearothermophilus* or *B. Subtilis*.

Patented Clarus™ 'Dual Circuit' technology provides rapid cycle times, achieving a million times ($6\log_{10}$) reduction in bio-burden with extremely low hydrogen peroxide usage. Attractive operating costs combined with readily available aqueous H_2O_2 make BIOQUELL Pharma's Clarus™ gas generators uniquely attractive.

Low temperature

Residue-free

Gas phase

Fast kills

Fully validated

Pharmaceutical

Biopharma

Biotech

Biomedical

Laboratory

R&D

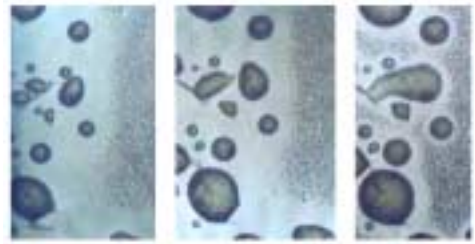
Pilot plant

Clinical trials

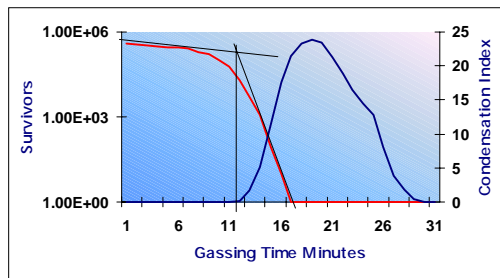
Production

The adjacent images highlight the growth and combination of H₂O₂ droplets around the target micro-organisms. Preferential condensation occurs on the hydrophilic nuclei of the micro-organisms. The micro-organisms are only a few microns in size. Hence, the size of the droplets forming on the substrate - appearing as a haze in this image - are just fractions of a micron. At this level the 'micro-condensation' necessary for bio-decontamination will be invisible to the naked eye.

The Growth of Condensation with Time



MICRO CONDENSATION ONLY A FRACTION OF A MICRON



The condensation and kill data have been plotted on the same graph to show their relationship. The first part of the survivor curve shows a slow kill rate which suddenly changes at about 12 minutes (in line with theoretical calculations).

This graph clearly demonstrates that once condensation has started then the kill rate dramatically increases. It should be noted that the kill was completed before the condensation index had reached 15, well before visible condensation occurred.

Gaseous bio-decontamination properties of hydrogen peroxide:

Efficacious	Bactericidal, sporicidal, tuberculocidal, fungicidal and virucidal
Safety	Presents no health risks to personnel. Should leave no residues or be capable of being reduced to safe levels
Verifiable	Easily monitored and controlled by physical measurement allowing reliable verification / validation with chemical and biological indicators
Material	Should produce no by-products and cause no significant changes in the appearance or function of materials
Fast	Short processing time, including set-up, gassing, aeration and room/equipment re-entry
Environmentally friendly	Naturally decomposing to water and oxygen

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