

PROJECT TITLE: EFFICACY OF STERI-7™ AGAINST VIRUS MODEL
CLIENT: STERI-7 WORLDWIDE Ltd
SUBMISSION DATE: 20 APRIL 2007

Background

- The use of bacterial virus as a preliminary test model has many advantages: rapidity of testing (i.e. 24 h results), safety (non pathogenic) and lower costs
- The coliphage (i.e. bacterial virus infecting *Escherichia coli* bacteria) MS2 has the same size than the poliovirus. In addition, it has been shown to have a similar susceptibility than the poliovirus (Jones et al. 1991; Maillard et al. 1994,; Maillard 1996) to a wide range of biocidal products with the exception of the oxidising agent ozone (Finch and Fairbairn 1991).

References

Jones MV, Bellamy K, Alcock R and Hudson R. *J Hosp Infect* 1991; 17: 279-85
Finch GR and Fairbairn N. *Appl Environ Microbiol* 1991, 57: 3121-6.
Maillard J-Y, Beggs TS, Day MJ, Hudson RA and Russell AD. *Appl Environ Microbiol* 1994, 60: 2205-6.
Maillard J-Y 1996 *Lett Appl Bacteriol* 1996, 23: 273-4.

Objectives

- To test the efficacy of Steri-7 in a suspension efficacy test against the bacterial virus MS2

Materials and methods

The bacterial host cell *E. coli* NCIMB9481 was grown overnight at 37°C in tryptone soya broth. The coliphage MS2 was propagated in *E. coli* NCIMB9481, filtered through a 0.22µm membrane filter and store at 4C. The coliphage suspension was brought to room temperature 30 min before the suspension test.

The suspension test consisted in adding 1 ml of phage suspension in 9 ml of the disinfectant (1 sachet in 1 L of sterilised tap water). After 10 min contact time at room

temperature, 1 ml of the test suspension was removed and added to 1ml of a neutralising solution (azolectin in tween). This neutraliser was shown not to be toxic to the host cell, to coliphage and to quench effectively similar disinfectant (data not shown). As a control, 1 ml of phage was added to 9 ml of sterilised tap water. Likewise, after a 10 min contact time, 1 ml was added in 9 ml of neutraliser. The neutralised suspension was then serially diluted and 0.1 ml of appropriate dilution mixed with 0.1 ml of the host cell (overnight suspension) in 4.8 ml of molten agar (65% agar at 45°C). The mixed molten agar was then gently poured onto the surface of a tryptone soya agar plates. After 24h incubation at 37°C, plaques (clear zone resulting from the infection of one phage) were counted. The reduction if PFU was then calculated. The experiment was conducted 5 times and the Minitab® software used to establish the statistical significance of the results.

Results and discussion

The Steri-7 at 1:50 dilution reconstituted in sterile tap water showed no contamination after 24 h incubation on TSA plate at 37°C.

The initial coliphage MS2 suspension used for the test was 9.859 ± 0.057 PFU/ml. The suspension test was repeated five separate times. Following MS2 exposure to Steri-7 (1:50 dilution in sterile tap water) for 10 min at room temperature the Log_{10} reduction in MS2 viability was 3.002 ± 0.066 PFU/ml.

Product	Dilution	Virus	Contact time	Temperature	Activity Log_{10} reduction in PFU/ml
Steri-7	1:50 in tap water	MS2	10 min	20-25°C	3.002 ± 0.066

These results are encouraging as they show virucidal activity of the product at 1:50 dilution following exposure for 10 min.

Before deciding whether or not you want to commission virucidal tests against adenovirus and poliovirus, you might want to complete further testing with MS2 by exploring a 5 min contact time at a 1:50 dilution.

Dr J-Y Maillard
Welsh School of Pharmacy
Cardiff University

Cardiff 20 April 2007