INFLUENCE OF (ETHOXY)$_5$ OCTYL PHENOL ON THE ANTIBACTERIAL PROPERTIES OF PRESERVATIVES

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(Ethoxy)$_5$*p*-octyl phenol (Triton X45, Rohm & Haas Ltd., Lennig House, Masons Avenue, Croydon) and other members of the polyethoxyalkyl phenol group of non-ionic surfactants possess antibacterial activity (Lamikanra & Allwood, 1976). These compounds also enhance the antimicrobial activity of *p*-hydroxybenzoate esters, in contrast to other non-ionic surfactants (Allwood, 1973). The influence of Triton X45 on the antistaphylococcal action of other common preservatives was therefore studied. Bactericidal activity was assessed in 0.167 moles/l phosphate buffer pH 7.2 against washed suspensions of *Staphylococcus aureus* NCTC 3761, containing *c.* 10^7 viable cells/ml. The recovery medium (Lamikanra & Allwood, 1976) contained 3% Tween 80, 0.2% Lecithin and 0.1% sodium thioglycollate. Time/log survivor curves for 0.001% benzalkonium chloride, chlorhexidine gluconate and thiomersal were initially linear but the slopes were reduced after 2-4 log cycles, except in the case of thiomersal which was considerably less active. The addition of 0.0005% or 0.005% Triton X45 increased the initial slopes of the curves and delayed the onset of the reductions in inactivation rates, particularly with chlorhexidine and thiomersal. The times required to reduce viable counts by 2 log cycles for combinations of preservatives and Triton X45 are shown in the table.

	Concentration of Triton X45		
Preservative	None	0.0005%	0.005%
None	-	>300 m	22 m
Benzalkonium chloride 0.001%	5.4 m	1.75 m	<1 m
Chlorhexidine gluconate 0.001%	30 m	11.5 m	2.5 m
Thiomersal 0.001%	>300 m	100 m	20 m

The influence of Triton X45 on the effects of chlorhexidine on cell suspensions was further studied. Triton X45 increases cell permeability (Lamikanra & Allwood, 1977). Therefore, the influence of surfactant on chlorhexidine-induced K^+ loss was measured. There was an increased leakage of K^+ when Triton X45 was present with equimolar concentrations of chlorhexidine. This occurred at concentrations of Triton X45 which alone caused negligible K^+ loss. The uptake of chlorhexidine was also increased in the presence of Triton X45. Therefore, Triton X45 appears to increase penetration of chlorhexidine into cells and enhances drug-induced membrane damage. The surfactant may also contribute independently to membrane damage. This provides evidence for the possible mode of action of Triton X45-induced enhancement of preservative activity.

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