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SOME EFFECTS OF A NON-IONIC SURFACTANT ON TOPICAL AVAILABILITY

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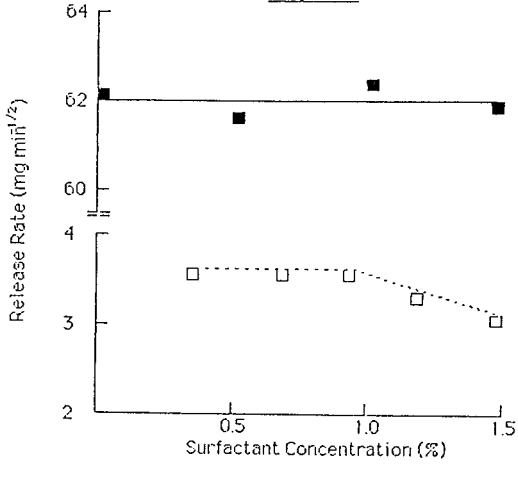
The effect of the nonionic surfactant Brij 36T on the release of two esters of nicotinic acid (methyl and hexyl) from aqueous carbopol gels was studied in-vitro using the apparatus described by Billups and Patel (1970). The two nicotinates used each cause vasodilatation when applied to the skin and the time of onset of erythema (E_t) determined by laser doppler velocimetry (LDV) is indicative of the speed with which they penetrate the skin.
1% carbopol gels were prepared containing 0.5% methyl nicotinate (MN) and up to 1.5% Brij 36T and it was found that neither the in-vitro release rate nor the thermodynamic activity, measured by head space analysis, were affected by surfactant concentration. Similarly release from gels containing 0.25% hexyl nicotinate (HN) was unaffected by up to 0.9% Brij 36T. At this surfactant concentration however, the highly insoluble HN was just fully solubilised and increasing the surfactant concentration beyond this caused a reduction in thermodynamic activity with a consequent decrease in release rate (figure 1). MN is readily soluble in water and does not partition into micelles to a significant extent thus its thermodynamic activity and in-vitro release are not influenced by surfactant concentration.
E_t values obtained with MN containing gels decreased as the Brij 36T concentration was increased while those obtained from HN containing gels were independent of surfactant concentration. DSC analysis of stratum corneum obtained at autopsy showed that the three lipid transitions occurring in untreated skin were absent in skin that had been pretreated with a 1.5% solution of Brij 36T.
The results obtained here indicate that Brij 36T interacts with the skin, destructuring lipids and causing an increase in its permeability. This enables MN to penetrate more readily although when HN gels are used this effect is masked by a reduction in the thermodynamic activity of HN, due to its partitioning into surfactant micelles.

Figure 1



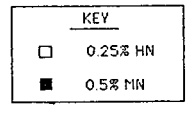
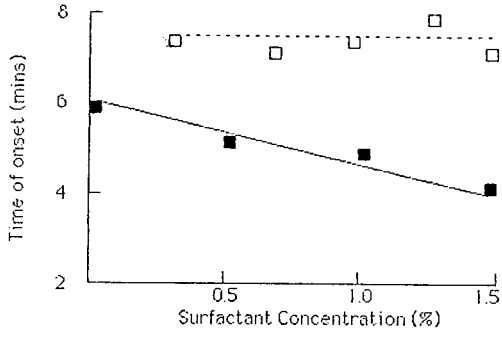


Figure 2



Billups N.F. and Patel N.K., J.Pharm.Ed. (1970) 34 : 190-196.