THE INFLUENCE OF PRECOMPRESSION PRESSURE ON CAPPING

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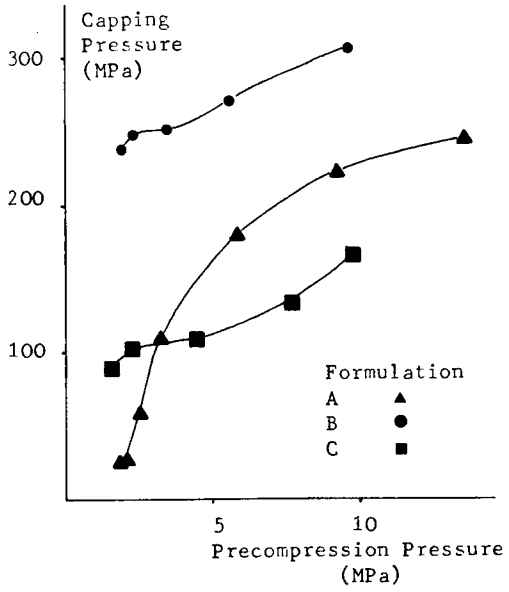
Although it has become widely accepted by tablet formulators that precompression can be utilised to reduce the incidence of capping and lamination of poorly compressing formulations, comparatively little work has been carried out on this aspect of tabletting technology. Heistand et al (1977) demonstrated that precompression could be used over a range of compression speeds and precompression pressures to elevate the pressure at which lamination occurred. Two mechanisms have been suggested to explain the role of precompression; removal of entrapped air (Gunsel and Kanig 1976) and extension of the time the compact is under load allowing stress relaxation and formation of interparticle bonds (Rees 1981 ; Heistand et al 1977).

This work investigates the relationship between precompression pressure and the capping pressure of three formulations prepared by conventional wet granulation techniques. Each formulation was compressed using the ICI High Speed Compression Simulator (Hunter et al 1976) utilising a stylised punch time—displacement profile based on the Fette P1000 tablet press incorporating precompression and compression stages. Tablets were manufactured at a compression speed equivalent to 56,700 tab/hour (die table speed 34 rpm). The Diametral Breaking Strength of each tablet was determined, plotted against compression pressure, and the pressure at which capping occurred estimated. Repeat runs were carried out at different precompression pressures. The results for each formulation were plotted as graphs of precompression pressure against pressure at which capping occurs. (Fig.1).



The data obtained for all three formulations indicated that increasing the precompression pressure elevated the capping pressure. The increase in capping pressure of Formulation A when precompressed at 10 MPa was much greater than that of Formulation B or C at the same precompression pressure. However, when the precompression pressure was raised to 15 MPa Formulation A capped on precompression resulting in capped tablets. Formulation B and C continued to exhibit increases in capping pressure at higher precompression pressures.

These findings can be correlated with the initial granule bed porosity and hence the tendency of the formulation towards air entrapment and suggest that at least in the case of the formulations studied, this mechanism and that of stress relaxation are important in precompression.

Fig.1. The effect of precompression pressure on capping pressure for Formulations A, B and C at 56,700 tab/hour.

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