The effect of the specific surface area of primidone on its tableting properties

B. M. HUNTER

I.C.I. Pharmaceuticals Division, Alderley Park, Cheshire, U.K.

To assess the influence of particle size on the tableting properties of a drug, two batches of primidone B.P. were milled separately to produce four batches with specific surface areas (ssa) ranging from 11000 to 18600 cm^2 cm^{-3} (air permeability method). 500 g of each milled batch was massed and force screened using a planetary mixer and oscillating granulator. All conditions during dry/wet mixing, screening and drying were kept constant as were the amounts and quality of the excipients and binder solutions used. The median diameter of the dry screened granules was independent of ssa but the granules prepared from the coarser drug were more friable (Hunter, 1973).

Initial compression properties were determined on unlubricated granules using 10 mm flat faced punches. This and subsequent compression runs produced tablets weighing 280 mg which contained 250 mg of primidone. The granules were weighed into the die of an instrumented F3 single punch compressor which was turned by hand. The force applied in successive compressions was adjusted by small increments until the compacts first showed lamination lines when broken. The highest pressure which each granulation could withstand without lamination is called the 'capping pressure'. The capping pressure was directly related to drug ssa.

The granules were then lubricated and compressed on 9·5 mm normal concave punches with the F3 running at 60 strokes min^{-1}. The capping pressure and the maximum tablet hardness before capping were both directly proportional to drug ssa.

Finally the granules were compressed on a RB3 rotary compressor running at 36 or 64 rev min^{-1}. A direct relation was again obtained between maximum tablet hardness and drug ssa. The strongest tablets were produced at the slower tableting speed but these were still weaker than corresponding tablets produced on the single punch machine.

The results are summarized in Table 1. This brief study shows that variation in drug ssa causes variation in compression properties and this could be critical on high speed rotary compressors especially if, as in this case, the drug forms a high proportion of the formulation.

Table 1

Initial drug batch	A	B	A	B
Milled batch ssa (cm^2 cm^{-3})	11000	14100	17300	18600
Granule moisture content (% dry wt)	0·5	0·5	0·5	0·5
Median granule diameter (μm)	320	280	310	300
Granule friability (%)	45	39	33	33
Hand compression				
capping pressure (MPa)	350	370	400	510
Single punch compressor				
capping pressure (MPa)	220	230	250	270
max tab hardness (S.C. units)*	16·5	20·1	22·4	25·6
Rotary compressor				
36 rev min^{-1}—max tab hardness (S.C. units)*	9·8	12·2	12·5	13·0
64 rev min^{-1}—max tab hardness (S.C. units)*	9·6	10·4	10·6	11·9

* mean of 10 tablets on the Strong Cobb tester

REFERENCE

HUNTER, B. M. (1973). *J. Pharm. Pharmac.*, **25**, 111P.