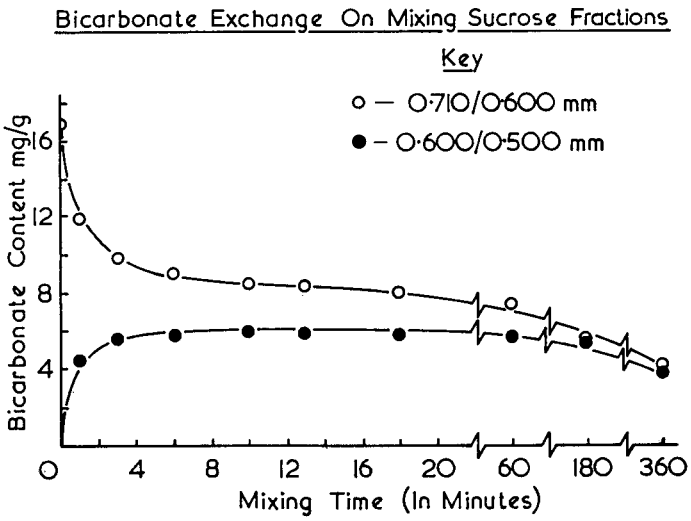
sucrose fraction (○) with a larger or smaller sized fraction of pure sucrose (●). Samples were withdrawn at intervals and the bicarbonate estimated. A typical result is shown below.



The initial rapid exchange between the two fractions suggests the existence of strong and weak sites on each crystal. The strong sites on the pure fraction then rob the weak sites on the rich fraction when interfacial contact occurs on mixing. The increase in interfacial contact follows an exponential law (Coulson & Maitra, 1950) consistent with the initial shape of the plots.

A study of the bicarbonate distribution on 0·710/0·600 mm crystals was made by analysing several series of up to 30 samples of the same weight taken from a bulk mix. The coefficient of variation was 1·49% for 1·0 g and 2·82% for 0·1 g samples (30 of each). The value for the smaller weight is below that predicted from mixing theory (circa $\sqrt{10} \times 1{\cdot}49\% = 4{\cdot}7\%$, Lacey, 1943). Uniform distribution and absence of segregation may make this type of mix useful in practical tabletting.

REFERENCES

COULSON, J. M. & MAITRA, N. K. (1950). *Indust. Chem. Mfr*, **26**, 55–60.
JONES, T. M. & PILPEL, N. (1965). *J. Pharm. Pharmac.*, **17**, 440–448.
LACEY, P. M. C. (1943). *Trans. Instn chem. Engrs, Lond.*, **21**, 53–59.

An evaluation of five commercially available tablet disintegrants for possible use in insoluble direct compression systems

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An investigation has been made of the properties of five disintegrants; corn starch, sodium starch glycolate (Primogel), calcium sodium alginate (the recently introduced alginate F417), a cation exchange resin (Amberlite IRP88), and sodium carboxymethyl cellulose. Evaluation was made in insoluble tablet matrices since this area had not apparently been fully investigated previously. The excipients used were: dicalcium phosphate dihydrate and a calcium-phosphato-carbonate complex (Calfos, edible bone powder), both with the same original particle size distribution. Disintegrants used were below 100 mesh size and were studied over the concentration range of 2·5% to 20% w/w. The following tests were employed: disintegration test using the B.P. method, dissolution rate measurement using amaranth as a tracer as previously described by the present authors (1971), hardness and friability determinations, apparent tablet density and particle size distribution from tablets after disintegration. Some of the results obtained are shown overleaf.

Disintegrant 10% w/w	Dicalcium phosphate dihydrate system		Calcium-phosphato-carbonate complex system	
	Dist. time min	Dissolution time min*	Dist. time min	Dissolution time min*
Corn starch	30	15	>120	>30
Sodium carboxyl methyl cellulose	56	>30	90	>30
Calcium sodium alginate	5	10	42	>30
Cation exchange resin	1·4	15	2·5	25
Sodium starch glycolate	0·4	4·5	26	>30

* 50% dissolution.

The effect of concentration of disintegrants on disintegration times of different systems is interpreted in terms of the differing mechanisms by which these substances act as disintegrants. It is suggested that tablet hardness and density measurements may provide some indication of the mechanism by which different disintegrants modify the compression process. It is concluded that any pharmaceutical scientist developing a new direct compression tablet system should seriously consider the possibility of using either sodium starch glycolate or the cation exchange resin as disintegrants.

REFERENCE

KHAN, K. A. & RHODES, C. T. (1971). *Pharm. Acta Helv.*, In the press.

Effect of compaction pressure on dissolution times of some direct compression systems

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The effect of compaction pressure upon the dissolution profiles obtained from a variety of direct compression tablet systems has been investigated. Two techniques have been used for compaction; compacts were prepared using a laboratory hydraulic press and tablets were made using a Manesty single punch machine type F3. The systems were kept as simple as possible, 1% w/w amaranth was included as tracer in all systems (Manudhane, Contractor & others, 1969) and 1% magnesium stearate was used as a lubricant. A cation exchange resin (Amberlite IRP88) was added as a disintegrant for dicalcium phosphate dihydrate and similar systems. Microcrystalline cellulose (Avicel) systems, however, did not require any disintegrant. Tablet hardness was measured using an Erweka tablet hardness tester, disintegraton time was determined using the B.P. method. Apparent tablet densities were obtained from thickness and weight measurements. The compaction process has also been examined by photomicrographic technique. Some of the results are shown in the following Table.

Dicalcium phosphate tablets (containing 2% w/w Amberlite).

Table pressure increasing 1 to 4 units machine setting	Tablet hardness Erweka	Apparent tablet density g cm³	Disintegration time (min)	Dissolution time (min)		
				t50%	t75%	t90%
P1	1·5	1·812	>120	>30	>30	>30
P2	7·0	1·930	15	8	29	>30
P3	9·0	1·954	10	4	13·5	>30
P4	9·5	1·955	8	4	8	15

The results for the effect of compaction pressure on dissolution for dicalcium phosphate dihydrate systems showed that increase in the pressure and the hardness of tablets enhanced the dissolution rate. The results obtained with the microcyrstalline cellulose systems were quite different from those shown in the above Table. Increase in pressure for the Avicel systems caused a significant decrease in the dissolution rate.

REFERENCE

MANUDHANE, K. S., CONTRACTOR, A. M., KIM, H. Y. & SHANGRAW, R. F. (1969). *J. pharm. Sci.*, **58**, 616–620.