Table 4. Disintegration of tablets produced from various mcc products compressed at four different forces

	Compression force (10^3 kg)			
	0.25 (48.74 MPa)	0.50 (97.48 MPa)	0.75 (146.22 MPa)	1.00 (194.97 MPa)
PH101	VI	V	IV	IV
PH102	VI	V	IV	VII
PH301	I (0.72 ± 0.29)[b]	II (1.31 ± 1.02)	II (2.03 ± 1.08)	II (3.65 ± 2.35)
PH302	II (2.56 ± 0.74)[b]	II (3.98 ± 1.54)	VI	V
1L	II (4.27 ± 0.93)	III (5.13 ± 2.17)	V	V
2L	I (0.77 ± 0.18)	II (1.09 ± 0.2)	III (8.59 ± 6.02)	V
3L	I (0.35 ± 0.04)	II (1.20 ± 0.89)	II (2.62 ± 1.55)	III (9.99 ± 8.52)
4L	I (0.80 ± 0.26)	II (1.36 ± 0.57)	II (3.54 ± 1.41)	III (9.73 ± 2.52)
1S	V	V	IV	IV
2S	VI	VI	V	IV
3S	II (3.73 ± 0.95)	III (8.62 ± 3.50)	VI	V
4S	I (1.68 ± 0.42)	II (5.28 ± 2.12)	VI	VI

Criteria: I. Completely disappears within 30 min. II. Disintegrates into more than 5 pieces by 30 min. III. Disintegrates into ≤ 4 pieces by 30 min. IV. Disintegrates into 2 pieces within 30 min. V. One or two small pieces separate from tablet within 30 min. VI. Intact tablet within 30 min. *Figures in parentheses indicate the time (min, mean ± SD) required for the tablet to disintegrate completely.

pendent on the porosity of the tablets, which counteracts with increased compression force. This explains why the extent of deterioration in the disintegration of Avicel PH101 and 102 was greater than that for PH301 and 302 due to the higher tensile strength of the former resulting in a less-porous structure for water penetration to induce tablet disintegration.

Although tablet disintegration of the codried products worsened with the increasing tensile strength of tablets irregardless of whether this was due to increasing compression force or deceasing particle size, the addition of β-CD to the codried products seemed to improve tablet disintegration compared to that produced from Avicel at the same compression forces, and its effect was also concentration dependent. The porosity of MCC tablets as listed in Table 4 decreased with increasing compression force which was accompanied by an increase in tensile strength. However, disintegration of tablets should deteriorate with a decrease in porosity if the wicking mechanism is responsible for tablet disintegration of MCC products, including codried products. This conflicts with the phenomena observed for those codried MCC products at the same compression force, which showed an improvement in tablet disintegration with decreasing porosity as a result of the greater amount of β-CD added. Since β-CD is more soluble than MCC in water, one can say that β-CD might be more hydrophilic than MCC fibers for absorbing water into tablets and inducing disintegration.

In conclusion, the amount of β-CD added plays an important role in improving the mechanical performance of MCC tablets produced with particles prepared from a codried process. The rounded shape of codried particles with a less-fiberlike structure is responsible for closer packing during tablet compression to produce more-intimate contact among particles resulting in larger values of both D_0 and D_a than corresponding values for the Avicel products. Addition of β-CD to the codried products produced particles with a rounded shape and a less-fiberlike structure, and this was further responsible for the lower extent of movement or rearrangement of particles during compression. This effect was also due to the rounded shape of the codried particles with a less-fiberlike structure on the surface which caused the yield pressure to increase with a greater amount of added β-CD, as well as with the increasing size of the codried particles. Overall, although codrying an MCC slurry with β-CD leads to loss of the contribution of the mechanical interlocking of the MCC fibers to tablet strength, it is still an efficient process to modify MCC particles with the ability