THE INFLUENCE OF CELLULOSE ON GRANULAR PRODUCT PROPERTIES

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Cellulose microfibrils are insoluble cable-like structures that are typically composed of approximately 36 hydrogen-bonded chains containing 500 to 14,000 β-1,4-linked glucose molecules. Cellulose microfibrils comprise the core component of the cell walls that surround each cell. Roughly one-third of the total mass of many plants is cellulose. The long, inelastic, microfibrils wrap around cells in spatially oriented overlapping layers that provide resistance to osmotic pressures that are similar in magnitude to the air pressure in a car tire. The pressure of the plasma membrane against the cell wall rigidifies the cell walls, providing the turgor that allows plants to adopt an erect growth habit [1, 2].

In order to determine the optimal parameters of the granular product (the composition of the raw material, the particle size distribution, the granules strength, the moisture content) using microcrystalline cellulose, various mixtures of raw materials were granulated in laboratory conditions. Crystalline potassium dihydrogen phosphate was granulated by using a drum granulator. Potassium phosphate granulation was performed by using only different amount of water (Fig. 1), and other way - by adding water and binder i.e. cellulose (Fig. 2). Microcrystalline cellulose (commonly used in pharmaceutical applications) was used for granulation. Pellet properties were investigated by standard methods, and surface uniformity assessment was made by scanning electron microscopy techniques.

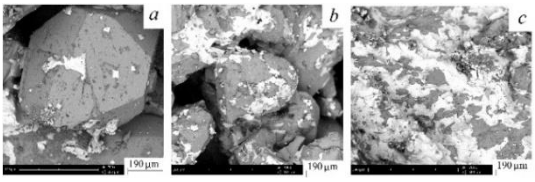

Fig. 1. SEM photos of a product, granulated only with water (no microcrystalline cellulose) with different magnifications:
a – ×500; *b* – ×700; *c* – ×2000

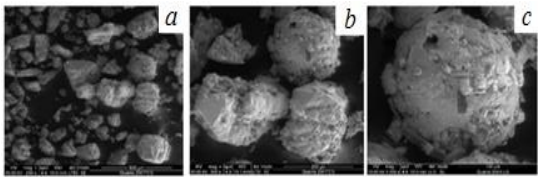

Fig. 2. SEM photos of product granulated with cellulose and water with different magnifications:
a – ×200; *b* – ×500; *c* – ×1000

Figure 2, it is evident that when pharmaceutical grade cellulose was used for granulation, more spherical-shaped pellets were formed in comparison to the pellets formed when granulating with water only.

References

1. D.J. Cosgrove. Nat. Rev. Mol. Cell Biol. **850** (2005) 61.
2. F. Marga, M. Grandbois, D. J. Cosgrove, T. I. Baskin. Plant J. **181** (2005) 90.