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Study of parameters important in the spheronisation process

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Summary

An experimental design was used to determine the influence of parameters that are important in the extrusion-spheronisation process. The parameters tested were water content of binary mixtures of Avicel PH 101[®]/water, spheroniser speed and spheronisation time. They appeared to have a significant influence on the quality of the spheres. By using a Pareto analysis, optimal parameter settings for water content, spheroniser speed and spheronising time were obtained.

Introduction

Several authors have reported on the application of experimental design for the extrusion-spheronisation process (Malinowski and Smith, 1975; Chariot et al., 1987; Hasznos et al., 1992). In these studies factors that have been included in the experimental designs are: rate of extrusion, water content, screen size, spheroniser speed, spheronisation time and spheroniser load. All the factors were tested at two levels. In this work, water content, spheroniser speed and spheronisation time were tested at three levels at least. The spheres were evaluated according to two criteria: yield of spheres between 710 and 1400 μm and roundness of the spheres (*E* value). Mathematical modeling was performed using stepwise multi-

ple regression and a Pareto analysis was carried out to determine the optimal conditions.

Materials and Methods

Materials

Microcrystalline cellulose (Avicel PH 101[®], FMC, Wallingstown, Little Island, Cork, Ireland) was used as pellet forming agent and demineralised water was used as the granulating fluid.

Composition of the mixtures and granulation procedure

Three different mixtures of microcrystalline cellulose/water were used: 425 : 575, 475 : 525 and 525 : 475 w/w.

The microcrystalline cellulose was granulated with water for 2 min at 60 rpm using a planetary mixer (Kenwood Chef, Hampshire, U.K.) with a K-shaped mixing arm.

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