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بالرسالة صفحات لم ترد بالأصل

GRANULATION OF FINE POWDER BY FLUIDIZED - BED TECHNIQUE

THESIS
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ABSTRACT

Fluidized bed granulation process has attracted interest in recent years. One of the main advantages of this process over the conventional granulation methods is that different operations such as granulation, mixing, evaporation, and drying are performed in one vessel.

Batch of a mixture (4:1) of lactose and starch which is a common filler material in pharmaceutical industry is used as a raw material in our study.

In this study we investigate the effect of operating parameters on mean particle size, particle size distribution ,and physical properties of granules. Operating parameters are superficial gas velocity ranging from 1.5 to 3.5 U_{mf}, bed load ranging from 1 to 1.5 Kg, nozzle height above distributor ranging from 25 to 45 cm, inlet air temperature ranging from 30 to 60 ^{o}C. Two types of binder solution are used gelatine and sodium carboxy methyl cellulose with different concentration ranging from 2 % to 8 % w/w for gelatine and from 0.5 % to 1.25 % w/w for sodium carboxy methyl cellulose. Binder solution flow rate ranging from minimum and critical binder solution flow rate (3 to 5 ml/min) , with quantity of binder solution ranging from 110 to 213 ml, and air atomization mass flow rate ranging from 19.75 to 27.2 g/min are used.

In this study it was found that the mean particle size increases with increasing concentration, flow rate, and quantity of binder solution,and decreases with increasing air fluidization

velocity, bed load, and inlet air temperature, but there is no change in mean particle size with the change in atomization air mass flow rate. Type of binder solution has a significant effect on mean particle size and particle size distribution. It was found also that the cumulative weight percent under size decreases with increase of concentration, flow rate, and quantity of binder solution, and with decrease in atomization air mass flow rate. The amount of particles not granulated decreases with increasing of quantity of binder solution,where % < 90 μm reaches to 0.6 % at 4% w/w gelatine solution with 3 ml/min flow rate, 213 ml quantity of binder solution, and 27.2 g/min air nozzle mass flow rate. The cumulative weight percent > 300 μm reach to 51.71 % w/w at the same condition.

The investigation of the physical properties of granule product shows that the granule friability decrease with increasing concentration, flow rate, and quantiy of binder solution, and increases with increasing superficial gas velocity, bed load, inlet air temperature, and atomization air mass flow rate. An increase in granule porosity achieved with increasing concentration, and quantity of binder solution, and air nozzle mass flow rate. The granule flowability decreases with increasing granule size.

The optimum binder solution flow rate ranging from 3 to 5 ml/min, nozzle height is 35 cm, and bed height is the height at which there is no channelling and slugging. The maximum viscosity of binder solution to give good atomization of binder is 25 Cp.

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