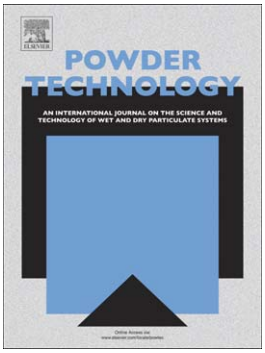


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# Use of experimental design to investigate the coating process of sodium bicarbonate in a conical fluidized bed

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**Abstracts**

Sodium bicarbonate is a white crystalline powder that is used as the active chemical compound in industrial processes. To maintain its properties against environmental effects, it must be coated. Thus, the spray coating of sodium bicarbonate in a pilot plant conical fluidized bed was studied to determine the effect of the operating conditions on the process performance and product quality. A $2^{(5-1)}$fractional factorial design was developed with the following independent variables: fluidization air flow rate (100-140 $m^3$/hr), spray pressure (4-6 bar), drying air temperature(40-60 ˚C), maltodextrin concentration (10-30 % w/v) and hydroxyethylcellulose concentration (0-0.2 % w/v). The bulk porosity, flowability, moisture content, dissolution time, volume of carbon dioxide release and powder morphology were evaluated. The results show that a fluidization air flow rate of 100 $m^3$/hr, spray pressure of 4 bar, inlet temperature of 60˚C, maltodextrin concentration of 30 % and hydroxyethylcellulose concentration of 0.1 % led to higher flowability and, a lower dissolution time, moisture content and $CO_2$ release. The proposed conditions were shown to be efficient for the coating process evaluated in this study, reducing $CO_2$ release from 8 % for raw materials to 2 % for coated powder.

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