Proceedings International
Platinum Open Access Journal (ISSN 2668-6384)

Proceedings, Abstract
Volume 4, Issue 2, 2022, 42
https://doi.org/10.33263/Proceedings42.042

Ammonium Bicarbonate as a Pore-forming Agent for the Production of Porous Inhalable Particles †

Marcos Andrés Serain [2,*], Verónica Bucalá [2,3], Loreana Gallo [1,2]

[1] Departamento de Biología, Bioquímica y Farmacia, Universidad Nacional del Sur (UNS), 8000 Bahía Blanca, Argentina; lgallo@plapiqui.edu.ar (L.G.)
[2] Planta Piloto de Ingeniería Química, PLAPIQUI (UNS-CONICET), 8000 Bahía Blanca, Argentina; mserain@plapiqui.edu.ar (M.A.S.); vbucala@plapiqui.edu,ar (V.B.); lgallo@plapiqui.edu.ar (L.G.)
[3] Departamento de Ingeniería Química, Universidad Nacional del Sur (UNS), 8000 Bahía Blanca, Argentina; vbucala@plapiqui.edu.ar (V.B.)
* Correspondence: mserain@plapiqui.edu.ar (M.A.S.);
† Presented at The Sixth International Meeting of Pharmaceutical Sciences (RICiFa), November 10-12, 2021, Córdoba, Argentina

Received: 26.04.2022; Revised: 4.05.2022; Accepted: 6.05.2022; Published: 8.05.2022

Abstract: Recently, ammonium bicarbonate (AB) has begun to be used to produce porous particles of drugs (sodium cromoglycate and meloxicam) and excipients (mannitol) for inhalatory administration. AB decomposes in carbon dioxide and ammonia gas at 36 °C, producing pores; this temperature is low and can be overcome in spray drying (SD) processes. In the present work, an aqueous solution containing AB and salbutamol sulfate (SS) is used. Solutions of SS and mixtures SS+AB were SD using different ratios: SS:AB = 1:0 (A), 1:0.5 (B), 1:0.125 (C), and 1:0.0625 (D) (the SS content was kept constant). The process yield (PY), moisture content (MC), bulk and tap densities, and morphology of the particles were evaluated. All the samples showed high PY (~70 %), except sample B (~ 15%). The MC values were satisfactory (~ 3 %) for all the powders. Samples dried with AB presented densities lower than the SS, suggesting the presence of porous. SS particles showed a spherical shape and smooth surface. Instead, samples dried with AB exhibited a more irregular shape, rough surface, and some pores. In conclusion, AB affects the morphology of the particles in a particular way for each drug. Further investigations should be done to understand the effect of AB on SS drying.

Keywords: ammonium bicarbonate; pore-forming agent; salbutamol sulfate; spray drying.

Funding

This research was funded by Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) [grant number PIP 11220150100704CO], Agencia Nacional de Promoción Científica y Tecnológica (ANPCyT) [grant number PICT-2016-1827] and Universidad Nacional del Sur [grant number PGI 24M/163].

Acknowledgments

The authors thank Lic. Fernanda Cabrera for her technical assistance.

Conflicts of Interest

The authors declare no conflict of interest.