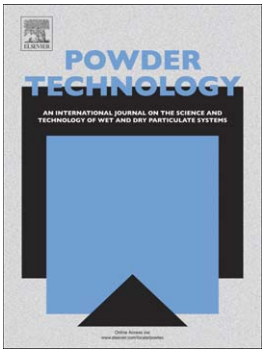
Accepted Manuscript



Relationship between surface area coverage of flow-aids and flowability of cohesive particles

Fabio Fulchini, Umair Zafar, Colin Hare, Mojtaba Ghadiri, Hossam Tantawy, Hossein Ahmadian, Massimo Poletto

PII: S0032-5910(17)30738-6
DOI: doi:10.1016/j.powtec.2017.09.013
Reference: PTEC 12818

To appear in: *Powder Technology*

Received date: 23 February 2017
Revised date: 8 August 2017
Accepted date: 6 September 2017

Please cite this article as: Fabio Fulchini, Umair Zafar, Colin Hare, Mojtaba Ghadiri, Hossam Tantawy, Hossein Ahmadian, Massimo Poletto, Relationship between surface area coverage of flow-aids and flowability of cohesive particles, *Powder Technology* (2017), doi:10.1016/j.powtec.2017.09.013

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Relationship between Surface Area Coverage of Flow-Aids and Flowability of Cohesive Particles

Fabio Fulchini[1,3], Umair Zafar[1], Colin Hare[1§], Mojtaba Ghadiri[1*], Hossam Tantawy[2], Hossein Ahmadian[2], and Massimo Poletto[3]

[1]Institute of Particle Science and Engineering, School of Chemical and Process Engineering, University of Leeds, Leeds LS2 9JT, UK
[2]Procter and Gamble, Newcastle Innovation Centre, Longbenton, Newcastle upon Tyne, NE12 9TS, UK
[3]Department of Industrial Engineering, University of Salerno
[*]Corresponding Author Tel: +44 (0) 113 343 2406 , Email: m.ghadiri@leeds.ac.uk

Abstract

Poor and inconsistent flow of cohesive powders is a major issue in powder processing. A common solution is to coat the surfaces of the cohesive particles with finer particles, referred to as flow-aids. Such particles adhere to sticky surfaces and act as spacers preventing them from contacting each other and thus reducing the inter-particle forces and bulk powder cohesion. A question which naturally arises is how much flow-aid is needed to enhance the flowability to an optimum level. This work aims to establish a relationship between the degree of Surface Area Coverage (SAC) of flow-aids and the flowability, the latter as determined by a quasi-static shear cell method, as well as the angle of repose test and the FT4 powder rheometer. Glass beads of 90-150 μm sieve cut are made cohesive by silanising their surfaces with a commercial chemical reagent, Sigmacote® and are used as host particles. Two types of zeolite particles are used as flow aids. The mass fraction of the flow aids required to achieve a theoretical SAC of 1, 5, 10, 20, 50 and 100% is first estimated and then the host particles are coated in a pan mixer. The SAC is measured by Scanning Electron Microscopy, coupled with image analysis, and found to correlate well with the estimated value. The optimum surface coverage is found to be when SAC is 10-20%, as this provides the greatest flowability. An increase in SAC beyond this range leads to a gradual reduction in flowability.

§ Department of Chemical and Process Engineering, University of Surrey, Guildford, GU2 7XH, UK

Download English Version:

https://daneshyari.com/en/article/4914884

Download Persian Version:

https://daneshyari.com/article/4914884

Daneshyari.com