A generic multi-dimensional model-based system for batch cooling crystallization processes
- DTU Orbit (23/01/2019)

A generic multi-dimensional model-based system for batch cooling crystallization processes

Highly porous deposits of flame-made aerosol nanoparticles were formed by filtration through a porous substrate (α-alumina, average pore diameter 3.7 μm). The aerosol was characterized by transmission electron microscopy (TEM) and scanning mobility particle sizer (SMPS) showing average primary and agglomerate particle sizes of 4.1 and 30 nm, respectively. The analysis of the cake structure (determination of pore-size, dec, and porosity, εc) was carried out by two non-destructive permeance methods. The first (“method I”) was based solely on the dusty gas model (DGM) for mass-transfer. Thereafter, an expression ("method II") for the calculation of the cake porosity was derived for Knudsen numbers N10. Permeance analysis revealed poresizes (equivalent cylindrical diameter) of the deposited cakes of approximately 200 nm, independent of mass deposited (wd=0.7–36.8 mg). Calculation of the porosity by method I was prone to large errors due to any anisotropy of the porosity and resulted in unrealistically high εc values at low deposited mass (e.g. εc=0.99 at wd=0.7 mg). In contrast, the porosities (average εc=0.947–0.949) calculated by method II were independent of deposited mass and in excellent agreement to scanning electron microscopy (SEM) analysis (εc=0.94–0.97), as well as to previous studies at comparable experimental conditions (εc=0.95).

General information
State: Published
Organisations: Computer Aided Process Engineering Center, Department of Chemical and Biochemical Engineering
Contributors: Abdul Samad, N. A. F., Singh, R., Sin, G., Gernaey, K., Gani, R.
Pages: 828-843
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Computers & Chemical Engineering
Volume: 35
Issue number: 5
ISSN (Print): 0098-1354
Ratings:
  BFI (2019): BFI-level 2
  Web of Science (2019): Indexed yes
  BFI (2018): BFI-level 2
  Web of Science (2018): Indexed yes
  BFI (2017): BFI-level 2
  Scopus rating (2017): CiteScore 3.65 SJR 1.024 SNIP 1.613
  Web of Science (2017): Impact factor 3.113
  Web of Science (2017): Indexed yes
  BFI (2016): BFI-level 2
  Scopus rating (2016): CiteScore 3.39 SJR 1 SNIP 1.631
  Web of Science (2016): Impact factor 3.024
  Web of Science (2016): Indexed yes
  BFI (2015): BFI-level 2
  Scopus rating (2015): CiteScore 3.04 SJR 1.108 SNIP 1.713
  Web of Science (2015): Impact factor 2.581
  Web of Science (2015): Indexed yes
  BFI (2014): BFI-level 2
  Scopus rating (2014): CiteScore 3.22 SJR 1.168 SNIP 1.728
  Web of Science (2014): Impact factor 2.784
  Web of Science (2014): Indexed yes
  BFI (2013): BFI-level 2
  Scopus rating (2013): CiteScore 3.06 SJR 1.21 SNIP 1.744
  Web of Science (2013): Impact factor 2.452
  ISI indexed (2013): ISI indexed yes
  Web of Science (2013): Indexed yes
  BFI (2012): BFI-level 2
  Scopus rating (2012): CiteScore 3.05 SJR 1.138 SNIP 1.897
  Web of Science (2012): Impact factor 2.091