Monitoring lipase-catalyzed interesterification for bulky fats modification with FT-IR/NIR spectroscopy - DTU Orbit (13/12/2018)

Monitoring lipase-catalyzed interesterification for bulky fats modification with FT-IR/NIR spectroscopy

This work demonstrates the application of FT-IR and FT-NIR spectroscopy to monitor the enzymatic interesterification process for bulky fat modification. The reaction was conducted between palm stearin and coconut oil (70/30, w/w) with the catalysis of Lipozyme TL IM at 70°C in a batch reactor. The blends and interesterified fats samples in liquid form were measured by attenuated total reflectance (ATR) based FT-IR (spectra region: 1516-781 cm⁻¹) and transmission mode based FT-NIR (spectra region: 5369-4752 cm⁻¹) with temperature both controlled at 70°C. The samples in solid form were also measured by reflectance based FT-NIR (spectra region: 7037-6039 & 5995-5612 cm⁻¹) at room temperature. Calibrations of FT-IR and FT-NIR for conversion degrees (evaluated by triglyceride profile), solid fat contents (SFC), and dropping points (DP) of interesterified products were carried out by using partial least squares (PLS) regression. High correlations (r > 0.96) were obtained from cross validations of the data estimated by FT-IR, FT-NIR and above-mentioned conventional analytical methods, except for correlations (r = 0.90-0.95) between FT-IR and SFC profiles. Overall, FT-NIR spectroscopy coupled with transmission mode measured at 70 °C had the highest correlations which also had the most close conditions to the sampled products in the process, indicating a big potential to implement as online control for monitoring enzymatic interesterification process.

General information
State: Published
Organisations: Department of Systems Biology, Enzyme and Protein Chemistry, Food Production Engineering
Contributors: Chang, T., Lai, X., Zhang, H., Søndergaard, I., Xu, X.
Pages: 9841 – 9847
Publication date: 2005
Peer-reviewed: Yes

Publication information
Journal: Journal of Agricultural and Food Chemistry
Volume: 52
Issue number: 26
ISSN (Print): 0021-8561
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.64 SJR 1.269 SNIP 1.343
Web of Science (2017): Impact factor 3.412
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.45 SJR 1.305 SNIP 1.343
Web of Science (2016): Impact factor 3.154
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.23 SJR 1.224 SNIP 1.245
Web of Science (2015): Impact factor 2.857
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.25 SJR 1.267 SNIP 1.413
Web of Science (2014): Impact factor 2.912
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.44 SJR 1.43 SNIP 1.47
Web of Science (2013): Impact factor 3.107
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.2 SJR 1.408 SNIP 1.464
Web of Science (2012): Impact factor 2.906
ISI indexed (2012): ISI indexed yes