Lignin Sulfonation - A different Approach

Lignin Sulfonation - A different Approach

The research on sulfite pulping has been characterized by the attempts to explain its chemistry. The different approach presented is incited by perceptions about the (still) unsolved problem of the ultrastructural features of lignin in wood. A simple kinetic model has been chosen to describe the reaction order of lignin as “concentration” (weight) in the dissolution kinetics, the cooking liquor being used in substantial excess. Three states of lignin were used: in wood as sawdust (W), in milled wood (MW) and as milled wood lignin (MWL). Cooks were performed at pH 1.5, and 6. (measured at room temperature). The lignin was also modified chemically in two ways: alkaline borohydride reduction and diazomethane methylation. The reaction order (with the kinetics used) was found to be about 2/3, which is the value to be expected for particles of equal size reacting, at the particle surface. The cooks were carried onto completion, defined as the maximum amount of dissolved lignin. Depending on the state of lignin, apart dissolved more or less “immediately”. The kinetic results are presented in dissolution/time and Arrhenius diagrams. Some experiments were made to ensure that counterfeit results were evaded. It was found that lignin is very reactive, that is why the sulfonation chemistry alone does not necessarily determine its dissolution rate. It became evident that the ultrastructure dispersion of lignin in wood is beneficial for its dissolution. For W, the rate was much higher at pH 1.5 than at 6. MW lignin and MWL dissolved (after extraction of the “immediate” lignin) at higher rates than W lignin. For MWL, the rate difference between pH 1.5 and 6 was moderate, compared to W lignin. Borohydride reduction did not affect the lignin dissolution from W, but gave a large decrease of sulfonation rate for MWL. Methylation had also a small rate effect for W, but again a large decrease for MWL.

General information
State: Published
Organisations: CHEC Research Centre, Department of Chemical and Biochemical Engineering
Contributors: Bjørkmann, A.
Pages: 113-133
Publication date: 2001
Peer-reviewed: Yes

Publication information
Journal: Cellulose Chemistry and Technology
Volume: 35
Issue number: 1-2
ISSN (Print): 0576-9787
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 0.92 SJR 0.303 SNIP 0.628
Web of Science (2017): Impact factor 0.764
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.85 SJR 0.33 SNIP 0.606
Web of Science (2016): Impact factor 0.763
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.84 SJR 0.366 SNIP 0.525
Web of Science (2015): Impact factor 0.562
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.15 SJR 0.462 SNIP 0.829
Web of Science (2014): Impact factor 0.675
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.26 SJR 0.459 SNIP 0.673
Web of Science (2013): Impact factor 0.833
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.78 SJR 0.363 SNIP 0.542
Web of Science (2012): Impact factor 0.825
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 0.53 SJR 0.274 SNIP 0.343
Web of Science (2011): Impact factor 0.55
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.171 SNIP 0.309
Web of Science (2010): Impact factor 0.292
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.269 SNIP 0.257
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.239 SNIP 0.407
Scopus rating (2007): SJR 0.383 SNIP 0.292
Scopus rating (2006): SJR 0.193 SNIP 0.238
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.176 SNIP 0.292
Scopus rating (2004): SJR 0.202 SNIP 0.339
Scopus rating (2003): SJR 0.208 SNIP 0.581
Scopus rating (2002): SJR 0.228 SNIP 0.639
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.32 SNIP 0.165
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.197 SNIP 0.506
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.193 SNIP 0.141
Original language: English
Source: orbit
Source-ID: 58799
Research output: Research - peer-review › Journal article – Annual report year: 2001