

HYGROTHERMAL PERFORMANCE OF BUILDINGS AND THEIR MATERIALS

**Poznan
Poland**

**30-31
August
2016**

Joint Conference:

COST Action FP 1303

„Performance of bio-based building materials”

DURAWOOD Project

„Superior bio-friendly systems for enhanced
wood durability”



schattdecor



TARNAK 1948
GORA

STEICO
Spółka s.o.o.



oszynakameble



Sponsors:



wytwórnia parkietów

schattdecor



STEICO
— Spółka z o.o. —



szynakameble



Regionalna Dyrekcja
Lasów Państwowych
w Poznaniu



HYGROTHERMAL PERFORMANCE OF BUILDINGS AND THEIR MATERIALS

Joint Conference: COST Action FP 1303 „Performance of bio-based building materials” & DURAWOOD Project „Superior bio-friendly systems for enhanced wood durability”

August 30-31, 2016

Poznan, Poland

Poznan University of Life Sciences
Faculty of Wood Technology

Editors: Bartłomiej Mazela, Waldemar Perdoch, Magdalena Broda, Wojciech Grześkowiak and Dennis Jones

Poznan University of Life Sciences
Faculty of Wood Technology

Title

Hygrothermal performance of buildings and their materials

Joint Conference: COST Action FP 1303 „Performance of bio-based building materials” & DURAWOOD Project „Superior bio-friendly systems for enhanced wood durability”

August 30-31, 2016

Poznan University of Life Sciences, Poland

Editors

Prof. Bartłomiej Mazela

Waldemar Perdoch

Dr Magdalena Broda

Dr Wojciech Grześkowiak

Dr Dennis Jones

Organizing Committee

Prof. Bartłomiej Mazela

Dr Magdalena Broda

Dr Wojciech Grześkowiak

Waldemar Perdoch

Cover Design & Publisher

Piotr Gomułka

info@najswear.pl

Poznan, 2016

Edition: 80 copies

ISBN 978-83-943494-1-7

LIGNOCELLULOSIC MULTILAYER SELF-BONDED COMPOSITES WITH MODIFIED CELLULOSE NANOPARTICLES FOR ENHANCED WATER PERFORMANCE	
Eduardo Robles, Ewelina Czubak, Grzegorz Kowaluk, Jalel Labidi	48
PERFORMANCE OF WAX TREATED WOOD IN LABORATORY AND OUTDOOR CONDITIONS	
Miha Humar, Boštjan Lesar, Nejc Thaler	50
ENZYMATICALLY MODIFIED ALKYD FOR BIO-BASED COATING SYSTEM	
Anne Christine Steenkjær Hastrup, Jonas Stenbæk, Hiep Nguyen and Anders E. Daugaard	52
INFLUENCE OF REACTION CONDITIONS OF LIQUEFACTION IN THE VISCOSITY OF KRAFT LIGNIN-BASED POLYOLS	
Silvia H. Fuentes da Silva, Patrícia S. Bilhalva dos Santos, Darci Alberto Gatto, Jalel Labidi	54
SOLID RESIDUE CHARACTERIZATION OCCURRED FROM ORGANOSOLV BLACK LIQUOR DEPOLYMERIZATION	
Patrícia Soares Bilhalva dos Santos, Silvia H. Fuentes da Silva, Darci Alberto Gatto, Jalel Labidi	56
PHYSICO-CHEMICAL PROPERTIES OF RIGID FOAMS BASED ON TANNINS AND LIGNINS: PRELIMINARY RESULTS	
Merle Juliette, Moïsa Feilles, Melissa Durrieu, Fatima Charrier – El Bouhtoury	58
CHANGES IN THE MODULUS OF ELASTICITY OF BEESWAX IMPREGNATED WOOD DURING SOIL CONTACT	
Róbert Németh, Dimitrios Tsalagkas, Miklós Bak	61
CHEMICALLY MODIFIED LAMPANTE OIL AS A WOOD PRESERVATION TREATMENT	
Matthew Schwarzkopf, Viacheslav Tverezovskiy, Andreas Treu, Courtney Williamson, Michael Burnard, Andreja Kutnar	63
SYNTHESIS, SPECTROSCOPIC STUDIES AND ANTIFUNGAL ACTIVITY OF 1,10-DI(3-HYDROXYMETHYLPYRIDINIUM)DECANE DIBROMIDE	
Anna Komasa, Piotr Barczyński, Patrycja Kwaśniewska-Sip, Grzegorz Cofta, Bartłomiej Mazela	66
BIO-FRIENDLY PRESERVATIVE SYSTEMS FOR ENHANCED WOOD DURABILITY - THE DURAWOOD PROJECT	
Anna Komasa, Anna Klementyna Przybył, Piotr Barczyński, Izabela Ratajczak, Kinga Szentner, Magdalena Woźniak, Paweł Kowalewski, Waldemar Perdoch, Grzegorz Cofta, Patrycja Kwaśniewska-Sip, Joanna Siuda., Wojciech Grześkowiak, Tomasz Krystofiak, Lone Ross Gobakken, Janka Dibdiakova, Magdalena Broda, Bartłomiej Mazela	68

Influence of reaction conditions of liquefaction in the viscosity of kraft lignin-based polyols

Silvia H. Fuentes da Silva¹, Patrícia S. Bilhalva dos Santos², Darci Alberto Gatto³, Jalel Labidi⁴

¹ Plaza Europa 1, Spain, University of Basque Country, silviahfuente@hotmail.com

² Félix da Cunha 809, Federal University of Pelotas, patricia.bilhalva@hotmail.com

³ Félix da Cunha 809, Federal University of Pelotas, darcigatto@yahoo.com

⁴ Plaza Europa 1, Spain, University of Basque Country, jalel.labidi@ehu.es

Keywords: hardwood, renewable resource, thermochemical conversion

One of the most important properties of a polyol is the viscosity and is in many situations used as a parameter for use. The Kraft lignin-based polyol is a strong candidate to replace those of petrochemical source in formulations such as phenolic resin and polyurethane. Here, it was studied the influence of reaction conditions (Catalyst, time, mass) liquefaction in the viscosity of the liquefied Kraft lignin. Reaction temperature and solvent:solvent ratio (polyethylene glycol:glycerol) were fixed at 160 °C and 80:20 (w:w). Independent variables such as catalyst:solvent ratio (0, 3, 6% H₂SO₄), mass:solvent ratio (15, 20, 25%) and reaction time (60, 80, 100 min) followed an experimental design. Response surface methodology was used to show the influence of independent variables in viscosity of the Kraft lignin-based polyols.

Statistical results showed that only the catalyst is significantly different ($p > 0.05$) in viscosity of the polyols (Table 1).

Table 1: Viscosity variance analysis (ANOVA) of liquefied Kraft lignins

Source	Sum of squares	Df	Average square	F Rate ^(a)	P value
Main effect					
A: Catalyst	1.74765	2	0.873825	13.27	0.0029 ^(b)
B: Mass	0.155493	2	0.0777467	1.18	0.3553
C: Time	0.473254	2	0.236627	3.59	0.0770
Interactions					
AB	0.114637	4	0.0286594	0.44	0.7801
AC	0.697839	4	0.17446	2.65	0.1122
BC	0.0280752	4	0.0070188	0.11	0.9769
Residue	0.526674	8	0.0658343		
Corrected total	3.74362	26			

^a Are based on average square residual error, ^b Significant at 95% confidence level

The viscosity ranged from 0.136 to 1.846 Pa.s. Kurimoto et al. (2001) reported values ranging from 0.33 to 31.00 Pa.s in Sugi wood liquefaction. Analysing the viscosity as a catalyst function the lower and higher results were observed without H₂SO₄ and with 6% respectively. The increasing of viscosity due to increase of catalyst can be attributed the condensation and re-polymerization reactions (Hassan and Shukry 2008).

In the interaction of the variables, the highest viscosity were observed as: 6% catalyst and 25% of lignin, and 6% catalyst in 80 min.

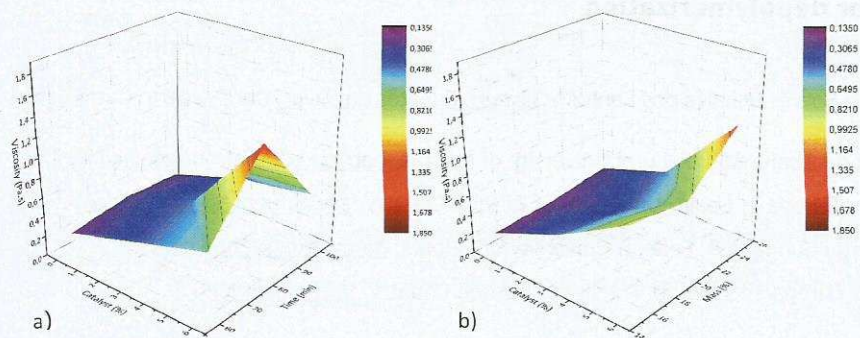


Figure 1: Interaction between independent variables a) catalyst/time and b) catalyst/mass

References

- Hassan E., Shukry N.U. 2008. Polyhydric alcohol liquefaction of some lignocellulosic agricultural residues. *Industrial Crops and Products*, 27, 1: 33-38
- Kurimoto Y. et al. 2001. Network structures and thermal properties of polyurethane films prepared from liquefied wood. *Bioresource technology*, 77, 1: 33-40

Acknowledgments: The authors would like to thanks to CNPq-Brazil for PhD scholarship DGE (246018/2012-7) and (207525/2014-9) and the Department of Education, Universities and Investigation of the Basque Government (IT672-13) for supporting financially this research.