

Wood-Based Composite Science and Technology Online Distance Education Series

Course Module: Practical Wood Adhesives Technology

Course Access:

For information and online registration go to: <https://workspace.oregonstate.edu/>

Instructor:

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Course Description:

This course intends to help students develop a an understanding of the basic chemistry of resins, resin manufacturing, resin options for wood bonding, practical aspects of resin use, resin performance, and green aspects of resins. In addition, the course is designed to improve your effectiveness solving production problems and working with resin suppliers.

Prerequisites:

No prior knowledge of adhesive chemistry is necessary. A general knowledge of chemistry and wood composite manufacturing processes would be helpful, but not required.

Course Lectures:

Lecture	Title
1	Introduction and Chemical Foundation
2	Resin Basics (Resins 101)
3a	Resin Manufacturing - Formaldehyde Based Resins
3b	Resin Manufacturing -Formaldehyde Free Resins
4	Resin Quality Control and Analysis
5	Resin Applications - Oriented Strand Board
6	Resin Applications - PB and MDF
7	Resin Applications - Veneered Composites
8	Structural Assemblies
9	Final Thoughts

Approximate Time:

10 hours of asynchronous online instruction. Each of 10 lectures requires approximately 60 minutes.

Learning Assessment:

Each lecture contains a quiz. Quizzes are not graded and may be retaken. A one-hour final examination is required for completion. Course is graded on a pass or fail basis, with 70% score on final examination to pass. The exam may be retaken multiple times.

References:

About.com. Titration Basics. <http://chemistry.about.com/od/acidsbases/a/aa082304a.htm>. Accessed May 1, 2015.

American Chemical Society. Sustainability Alliance Web site. <http://www.acs.org/content/acs/en/pressroom/podcasts/globalchallenges/acs-and-rsc-sustainability-alliance.html>.

Broline, B.M. and Adams, R.A. “A Practical Overview of Resin Systems for Oriented Strand Board, Technical Workshop Proceedings of the 40th International Wood Composites Symposium, (2006)

Broline, B.M. “Resin Choices for a New Paradigm”, Proceedings of the 44th International Wood Composites Symposium”, (2010)

Chapman, K.M. “Wood-Based Panels: Particleboard, Fibreboards and Oriented Stand Board”, in Primary Wood Processing: Principle and Practice, J.C.F. Walker editor, Springer, 2006

Cribb, A.T. 2009. Impact of Green Building on Wood Adhesives presented at the International Conference on Wood Adhesives 2009.

Ford, Kenneth W., “The Quantum World: Quantum Physics for Everyone”, Harvard University Press, 2004

Frihart, C.R., “Wood Adhesion and Adhesives” in “Handbook of Wood Chemistry and Wood Composites”, Edited by Roger M. Rowell, CRC Press, Boca Raton FL, 2005

Hermann, B.G.; Blok,K.; Patel, M.K. Producing Bio-Based Chemicals Using Industrial Biotechnology Saves Energy and Combats Climate Change. Environ. Sci. Technol. 2007, 41, 7915-7921.

Kahn Academy 2015. Chemistry. <https://www.khanacademy.org/science/chemistry>. Accessed May 1, 2015.

Kahn Academy. Chromatography. <https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/v/basics-of-chromatography>. Accessed May 1, 2015.

Kahn Academy. Infrared Spectroscopy. <https://www.khanacademy.org/science/organic-chemistry/spectroscopy-jay>. Accessed May 1, 2015.

Knop, A. and L.A. Pilato, “Phenolic Resins”, Springer-Verlag, New York, NY 1985

Maloney, T.M. “Modern Particleboard & Dry Process Fiberboard Manufacturing”, Miller Freeman, Inc. San Francisco, CA 1993.

Pizzi, A., “Advanced Wood Adhesives Technology”, CRC press, 1994

Pizzi, A. (Ed). “Wood Adhesives”, Marcel Dekker, Inc., New York, NY 1989

Prasittisopin, L. “A New Method of Making Particleboard with a Formaldehyde-Free Soy-Based Adhesive”, MS Thesis, Oregon State University, 2009

Stokke, D.D., Q. Wu, and G. Han, “Wood and Natural Fiber Composites”, John Wiley & Sons, Ltd. West Sussex, UK 2014

Sellers, T.J. “Plywood and Adhesive Technology”, Mercel Dekker, Inc., New York, NY, 1985

Technical Data Sheets accessed online May 1, 2015:

Radio Frequency Curing, see <http://www.macrowave.com/rftech.html>

RF/PRF resins Cascophen® G1260-A, Cascophen® G118-A, Cascophen® LT-75C, and Cascophen® LT5210,
see <http://www.chempoint.com/products/catalog/momentive/momentive-performance-adhesives>

MF resin Cascomel ® W-216S
see https://www.google.com/?gws_rd=ssl#q=Cascomel+%C2%AE+W-216S+

PUR resins Isoset ® UX-100,
see <http://www.ashland.com/Ashland/Static/Documents/APM/ISOSET%20UX-100%20%20tds.pdf> ;
Purbond® HB S309, and Purbond® HB S109
see <http://www.henkelna.com/industrial/tech-data-sheet-search-5118.htm>