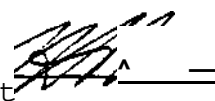


SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: PULP TESTING II
CODE NO.: PPE 220-4 SEMESTER:
PROGRAM: PULP & PAPER ENGINEERING TECHNOLOGY
AUTHOR: KEVIN PEVATO
Date: DECEMBER 1990 PREVIOUS OUTLINE DATED: JANUARY 1984

APPROVED:


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PULP TESTING II

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TOTAL CREDIT HOURS: 45

PREREQUISITE(S): Pulp Testing I - (PPE120-4)

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I. PHILOSOPHY/GOALS:

The overall objective of this course is to educate and train the student in the theory and practice of chemical testing of cooking liquors, raw pulps, and waste liquors.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will:

1. Accurately analyze sodium sulphite liquor used in the production of full chemical, semi-chemical, and chemimechanical pulps.
2. Accurately analyze soluble base bisulphite liquors used in the production of full chemical, semichemical, and chemimechanical pulps.
3. Accurately analyze kraft green liquor for sodium carbonate, sodium sulphide, and sodium sulphate using the ABC titration.
4. Accurately analyze kraft white liquor for sodium hydroxide, sodium sulphide, sodium carbonate, and sodium sulphate using the ABC titration.
5. Reproducibly determine the degree of cooking and residual lignin content of a kraft brownstock pulp by means of both KAPPA Number test and the Permanganate Number test.
6. Accurately determine the suspended solids, total solids, ignition residue (ash content), organic content and specific gravity of kraft black liquor.
7. Accurately determine the total sulphate ion concentration in pulping liquor or in papermakers' alum solutions.

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III. TOPICS TO BE COVERED:

Each laboratory period is three hours in length. A part of each lab period will be devoted to the theoretical aspects of the work while the remainder will be spent in carrying out one of the six laboratory exercises.

It should be noted that this course is given in the same semester as PPE230 (Pulp Technology I). That course deals with the science and technology of full chemical pulping and covers aspects of liquor penetration, chemical recovery, recausticizing, heat recovery, pulping, and testing. Wherever possible, topics from the two courses will be dealt with at the same time so that the student's learning is constantly reinforced.

Laboratory Topics:

Determine total sulphur dioxide (SO₂) content of sodium sulphite (Na₂SO₃) liquor.

Determine the relationship between sodium sulphite liquor strength and specific gravity.

Determine total, free and combined sulphur dioxide (SO₂) content in bisulphite liquor using an adaptation of the Palmrose method.

Determine the contents of sodium hydroxide (NaOH), sodium sulphide (Na₂S), sodium carbonate (Na₂CO₃), total titratable alkali (TTA), effective alkalinity, and sulphidity of samples of kraft green and white liquors.

Determine KAPPA and Permanganate numbers and from them determine residual lignin content of kraft brownstock pulp samples.

Determine the suspended solids, total solids, ignition residue, organic content and specific gravity of a sample of concentrated kraft black liquor.

Determine the total sulphate ion (SO₄²⁻) content of an unknown solution such as kraft green, white, or black liquor or papermakers' alum.

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IV. EVALUATION METHODS:

Students will be graded by their performance on six laboratory tests (each one worth 10%) and two tests (each one worth 20%). At the instructor's discretion, a problem exercise may be included. If so, it will have equal value with each lab exercise and reduce the value of each lab test to 15%.

The final letter grade for the course will be awarded on the following percentage basis:

A+	=	90-100%
A	=	80- 89%
B	=	70- 79%
C	=	60- 69%
R	=	<60%

Students having a cumulative final percentage of 55-59% may be permitted to write a supplemental exam based on the theory part only. Successful completion of a supplemental exam can only result in a grade of C.

V. REQUIRED STUDENT RESOURCES:

Laboratory Manual for PPE220 (Pulp Testing II), 3rd Edition, 1990.

VI. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

1. Rydholm, S.A. (1965). *Pulping Processes*, Interscience, New York.
2. MacDonald, R.G. & Franklin, J.N. eds, (1969). *Pulp and Paper Manufacture, Vol. 1. The Pulping of Wood*. McGraw-Hill, New York.
3. Ingruber, O., Kocurek, M.J. & Wong, A. Eds. (1985?) *Pulp & Paper Manufacture, 3rd Edition, Vol. 4. Sulphite Science and Technology*, Joint Textbook Committee of the Paper Industry, Atlanta.
4. Britt, K.W. (1964), *Handbook of Pulp and Paper Technology*, Reinhold, New York.
5. Casey, J.P. (1981), *Pulp and Paper Chemistry and Chemical Technical Technology*, 3rd. edition, Interscience, New York.

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**VI. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY
BOOK SECTION: (cont'd)**

6. Sjostrom, E. (1981), Wood Chemistry: Fundamentals and Application, Academic Press, New York.
7. TAPPI Journal (1983 - present)
8. Pulp & Paper Canada (1983 - present)
9. Pulp & Paper (1983 - present)
10. Canadian Pulp & Paper Journal (1983 - present)
11. Hough, G. Ed. (1985), Chemical recovery in the Alkaline Pulping Process, TAPPI Press, Atlanta.
12. Kocurek, M.J., Grace T.m., Malcolm, E.W. Eds, (1989), Pulp and Paper Manufacture, Vol. 5. Alkaline Pulping. Joint Textbook Committee of the Paper Industry, Atlanta.
13. Adams, Terry N. and Frederick, Wm. James, (1988), Kraft Recovery boiler Physical and Chemical Processes. The American Paper Institute, Inc., New York.
14. Hermann, F.J. Wenzl (1965), Sulphite Pulping Technology, Lockwood Trade Journal Co., Inc., New York.
15. Libby, C. Earl Ed. (1962), Pulp and Paper Science Technology, Vol. I Pulp Joint Textbook Committee of the Paper Industry, New York.
16. Browning, B. J. Ed. (1963), The Chemistry of Wood, Robert E. Krieger Publishing Company, Florida.

VII. SPECIAL NOTES

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.