SYSTEMS ANALYSIS PROJECT ADVISORY COMMITTEE

and

MAPPS USERS GROUP

SLIDE MATERIAL

October 24-25, 1985

STATUS

VERSION 2.0 ISSUED IN SEPTEMBER

INCLUDES C, E, AND D BLEACH MODULES

IMPLEMENTS IMPROVED FILE HANDLING

STATUS

VERSION 2.0 AVAILABLE FOR SEVERAL SYSTEMS:

- IBM MAINFRAMES
- DEC 11/7xx SERIES MACHINES
- MASSCOMP
- IBM PERSONAL COMPUTERS
- IBM PC COMPATIBLES
  - COMPAQ
  - HP 150 AND VECTRA
  - ZENITH
  - TANDY

STATUS

14 USERS

- 8 PULP AND PAPER COMPANIES
- 1 CONSULTING ENGINEERING FIRM
- 5 UNIVERSITIES

STATUS

GOOD PROSPECTS

3 PULP AND PAPER COMPANIES

2 CONSULTING ENGINEERING FIRMS

3 UNIVERSITIES

COURSE UTILIZATION

PROCESS DESIGN
Dr. Dave Clay

PULPING AND BLEACHING
Dr. Earl Malcolm

SYSTEMS ENGINEERING
Dr. Peter Parker

STUDENT WORK

BROWN STOCK WASHER
Frank Harper

DISC SAVEALL
Doug Crane

RECOVERY FURNACE CHAR BED
Dan Sumnicht

FLUIDIZED BED CLACINER
Nancy Sell

MARKETING STRATEGIES

NEED TO REACH SMALLER COMPANIES

NEED TO REACH MILL SITES

MARKETING STRATEGIES

NEW BROCHURE

TECHNICAL PRESENTATIONS

MARKET HARDWARE/SOFTWARE PACKAGE

MORE "DIRECT" SALES APPROACH

MARKETING STRATEGIES

PRICING STRUCTURE

DEMONSTRATION PROGRAM

TIME-SHARING SERVICE

MICRO CUSTOMIZATION

USERS DESIRE "MENU" ORIENTED DISPLAYS

VIRTUALLY ALL MICRO USERS HAVE MS DOS MACHINES

MENU DATA ALREADY AVAILABLE IN MAPPS

INCREASED EASE OF USE

MICRO CUSTOMIZATION

MAINFRAME AND MICRO CODES WOULD REQUIRE SEPARATE MAINTENANCE

TRANSPORTABILITY DECREASED

DOCUMENTATION DIFFICULTIES

EXTRA COST OPTION?

QUALITY MODELING

GOAL IS TO RELATE QUALITY PARAMETERS TO PROCESSING CONDITIONS

QUALITY MODELING

BROWN PULP

BLEACHED PULP

PAPER

BROWN PULP QUALITY

VISCOSITY

KAPPA

SHIVES

BLEACHED PULP QUALITY

VISCOSITY

BRIGHTNESS

SHIVES

DIRT

PAPER QUALITY

END PRODUCT DEMANDS SUCH AS:

STRENGTH (MD, CD, ZD)

OPACITY

BRIGHTNESS

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.
.

MODELING PRIORITIES

BREADTH VS. DEPTH

IMMEDIATE VS. FUTURE NEEDS

MODELS FOR BROADER COVERAGE

MECHANICAL PULPING

TMP
CTMP
PGW
.
.

CHEMICAL PULPING

HIGH YIELD KRAFT

SODA

SULFITE

SOLVENT

BLEACHING

C/D AND D/C SUBSTITUTIONS

OXYGEN

PEROXIDE

OZONE

E(O)

RECOVERY

PRECIPITATOR

SCRUBBER

FLUID BED COMBUSTERS

PAPERMAKING

IMPROVED COVERAGE NEEDED
IN ALL AREAS

MORE DETAILED MODELS

EVAPORATORS

DIGESTERS

BROWN STOCK WASHERS

LIME KILN

RECOVERY FURNACE

SLAKER/CAUSTICIZER

EVAPORATOR DEVELOPMENT FOR MAPPS

G. L. JONES

BACKGROUND

- EXISTING MAPPS MULTIEFFECT MODEL (EVAP01)
  - SIMPLE AND USEFUL
  - LACKS CAPABILITIES FOR DESIGN AND PREDICTION
- SINGLE EFFECT MODELS IN LITERATURE
  - COMPREHENSIVE
  - CUMBERSOME OR UNREALISTIC
- MULTIEFFECT ALGORITHMS LIMIT PIPING ARRANGEMENTS

OBJECTIVE

- IMPROVE MAPPS CAPABILITY IN SIMULATING SINGLE AND MULTIEFFECT UNITS

REQUIREMENTS

- FLEXIBLE AND EASY TO USE
  - PARAMETER SPECIFICATIONS
  - PIPING ARRANGEMENTS

REQUIREMENTS

- PREDICTIVE AND REALISTIC
  - HEAT TRANSFER COEFFICIENT
  - SCALING AND PRECIPITATION
  - LIQUOR ENTRAINMENT
  - LIQUOR SIDE PHYSICAL PROPERTIES AND FLOW

REQUIREMENTS

- STABLE, READILY CONVERGED
- COMPATIBLE WITH EXISTING MAPPS MODELS

STATUS

- PRELIMINARY SINGLE EFFECT MODEL
  - FLEXIBLE PARAMETER AND FEED SPECS
  - COMPUTES OUTLET STREAMS, STEAM ECONOMY, HEAT LOSS, DUTY AND COMBINATIONS OF U, A, UA, OR PVAP

STATUS

- PRELIMINARY MODEL EQUATIONS FOR MULTIEFFECT SYSTEM
  - SIMULTANEOUS EQUATIONS SOLVED INTERNALLY
  - VARIETY OF PIPING AND FEED ARRANGEMENTS

STATUS

- HEAT TRANSFER COEFFICIENT MODEL
  - PHYSICAL PROPERTIES
  - FLOW REGIME
  - ELECTROLYTE EQUILIBRIUM (SCALING)
  - ENTRAINMENT

E(O) BLEACHING

Use of Oxygen in the First
Alkaline Extraction Stage

van Lierop, B.; Liebergott, N.; Teodorescu, G.; Kubes, G. J.
"Using oxygen in the first extraction stage of a bleaching sequence."
International Pulp Bleaching Conference Proceedings CPPA, 83-91, June 1985.

STOICHIOMETRIC MODEL

$$\frac{d(PK)}{d(X)} = A1 \cdot (PK - PKMIN)$$

$$PKI - PK = (PKI - PKMIN) \cdot [1 - \exp(-A1.X)]$$

$$DK = DKMAX\ [1 - \exp(-A1.X)]$$

$$DK = PKI - PK$$

$$DKMAX = PKI - PKMIN$$

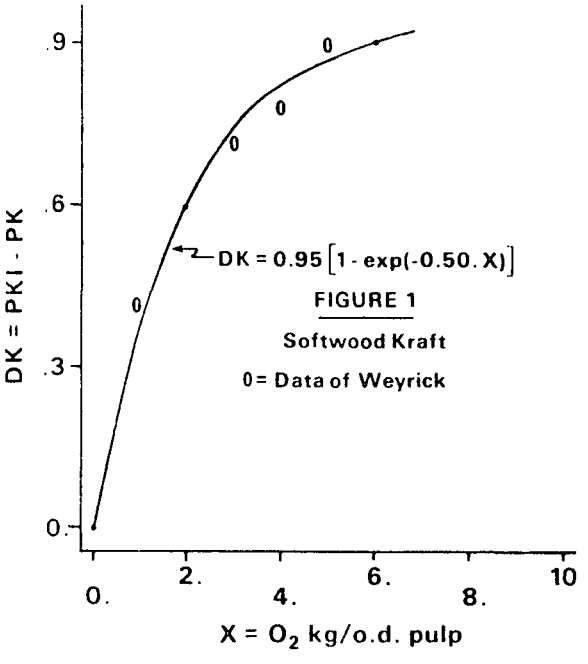


FIGURE 1

Softwood Kraft

0 = Data of Weyrick

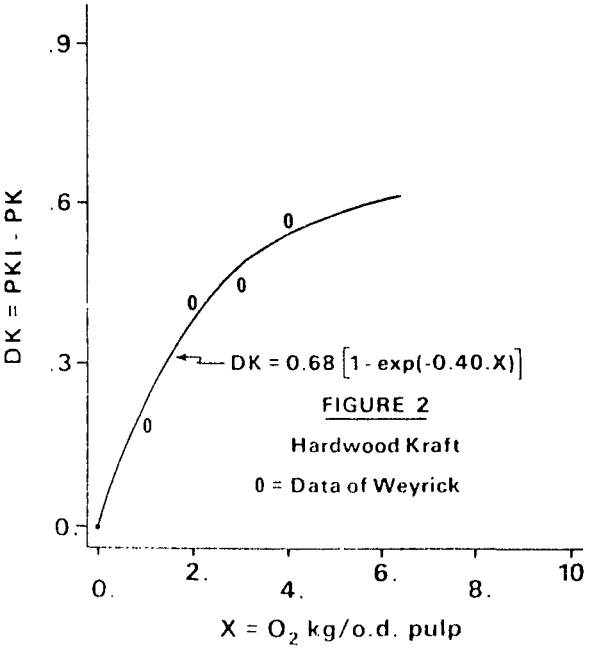


FIGURE 2

Hardwood Kraft

0 = Data of Weyrick

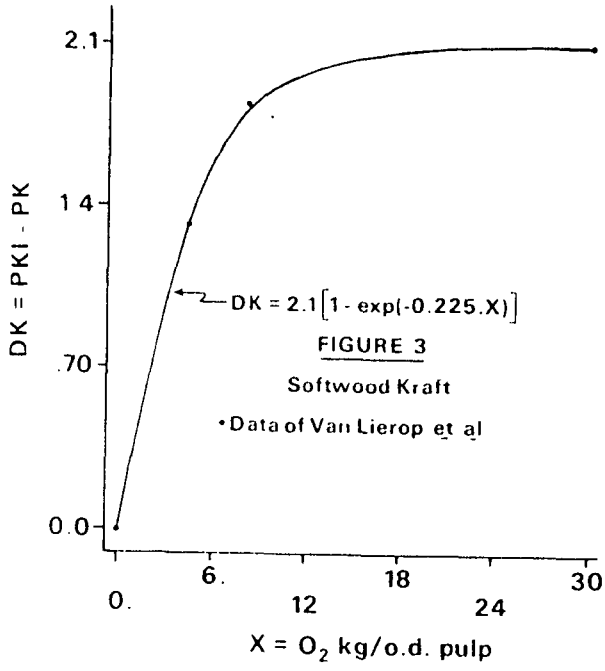
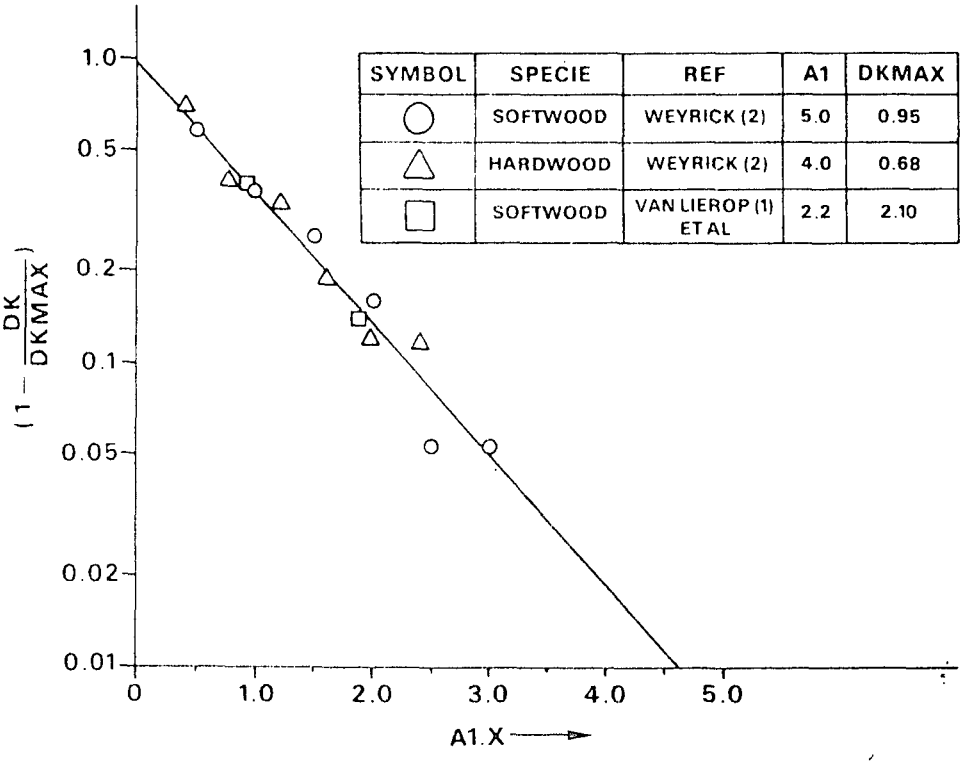


FIGURE 3

Softwood Kraft

•Data of Van Lierop et al



SYMBOL	SPECIE	REF	A1	DKMAX
○	SOFTWOOD	WEYRICK (2)	5.0	0.95
△	HARDWOOD	WEYRICK (2)	4.0	0.68
□	SOFTWOOD	VAN LIEROP (1) ET AL	2.2	2.10

ALKALI CONSUMED

ALKALI CONSUMED, % OD PULP = B1 . X

CHLORINE DIOXIDE SAVED

REFERENCE	ClO2(kg/o.d. pulp)/O2(kg/o.d. pulp)	
	SOFTWOOD	HARDWOOD
van Lierop et al. (3)	0.80	0.89
Weyrick, H. W. (4)	0.56	0.34
Kortelainen et al.(5)	1.00	1.00
Robitaille, M. A. (6)	-	0.60
Lindstrom et al. (7)	0.86	-
Schleinkofer, R.W.(8)	0.40	-
Enz & Hallenbeck (9)	0.70	0.67
AVERAGE (std.)	0.72 (0.22)	0.70 (0.26)

PHYSICAL PROPERTIES

EXPANDED PHYSICAL PROPERTY DATABASE REQUIRED

LIQUID DENSITY = F(T,C)

GAS DENSITY = F(T,P,C,Z)

ATOMIC COMPOSITION OF COMPOUNDS

FIBER PROPERTIES

RAW MATERIAL PROPERTIES

IMPLEMENTATION QUESTIONS

ASPEN "PLEX" TYPE STRUCTURE

TABLE LOOKUP

TRUE DATABASE

LANGUAGE STRUCTURE

COMPATIBILITY