

Handbook For Pulp & Paper Technologists, Fourth Edition

Table of Contents

PREFACE TO 4 TH EDITION ACKNOWLEDGEMENTS		vii	7.3 Description of Kraft Process	77
			7.4 Chemistry of Kraft Pulping	78
		ix	7.5 Operation and Control 7.6 Process Modifications	82
1.	INTRODUCTION	1	7.6 Process Modifications	85
	1.1 Importance of Paper	1	8. COOKING EQUIPMENT	88
	1.2 Definitions of Pulp, Paper, Paperboard	1	8.1 Batch Digesters	89
	1.3 Chronology of Technological Developmen	nt 1	8.2 Modifications to Conventional Batch Kra	ıft
	1.4 Modern Pulp and Paper Operations	2	Cooking	92
	1.5 Requirements and Sources of Papermaking	9	8.3 Continuous Digesters	94
	Fibers	5	8.4 'Sawdust' Cooking	102
	1.6 Introduction to Fiber Chemistry	5	8.5 Batch Digester Blow Heat Recovery	103
	1.7 Behavior of Cellulosic Fibers	8		
_	CUADA CTEDICTICS OF WOOD AND		9. PROCESSING OF PULP	105
2.	CHARACTERISTICS OF WOOD AND		9.1 Defiberizing	105
	WOOD PULP FIBERS	10	9.2 Deknotting	105
	2.1 Tree Structure	10	9.3 Brown Stock Washing	107
	2.2 Characteristics of Wood	11		115
	2.3 Effect of Fiber Structure (Morphology) or		9.5 Centrifugal Cleaning	120
	Fiber and Paper Properties	17	9.6 Thickening	123
	2.4 Wood Species Identification	19	9.7 Stock Pumping & Handling	125
2	WOOD AND CHIP HANDLING	20	1 0	129
٥.	3.1 The Wood Resource	20	9.9 Preparing Pulp for Shipment	130
	3.2 Wood Harvesting Techniques	21	10. CHEMICAL RECOVERY	137
	3.3 Pulpwood Measurement	25	10.1 Evaporation	137
	3.4 Wood Preparation	26	10.2 Recovery Boiler	144
	3.5 Chip Handling and Storage	31	10.3 Black Liquor Gasification	153
	3.6 Chip Quality Control	34		154
	3.0 Cmp Quanty Control	<i>3</i> I		157
4.	OVERVIEW OF PULPING METHODOLOGY	36	10.6 Spent Sulfite Liquor Chemical Recovery	
	4.1 Introduction to various Pulping Methods	37	10.7 NSSC Chemical Recovery	162
	4.2 Market Pulps	41	10.8 By-Product Recovery	163
	4.3 Trends in Pulping	43	10.9 The Forest Biorefinery	165
	4.4 Comparison of Pulp Properties and		101) The Total Biotomery	100
	Applications	44	11. BLEACHING	167
	**		11.1 Bleaching Sequences	168
5.	MECHANICAL PULPING	46	11.2 Preparation of Bleach Chemicals	169
	5.1 Mechanical Pulping Nomenclature	47	11.3 Defining a Bleaching Stage	173
	5.2 Stone Groundwood Process	47	11.4 Oxygen Delignification	176
	5.3 Refiner Mechanical Pulping Methods	53	11.5 Chlorine Dioxide Delignification	177
	5.4 Thermomechanical Pulping	58	11.6 Caustic Extraction	178
	5.5 Chemically Modified Mechanical Pulps	64	11.7 Hot Acid Stage	178
	5.6 Heat Recovery	66	11.8 Chlorine Dioxide Bleaching	179
_				179
6.	SULFITE PULPING	68	11.10 Ozone Bleaching	180
	6.1 Brief History of Development	68	11.11 Enzymes	181
	6.2 Nomenclature and Definition of Terms	69	1 0	181
	6.3 Process Description	69	11.13 Pulp Brightening (Mechanical Pulp	
	6.4 Chemistry of Sulfite Pulping	72	Bleaching)	181
	6.5 Chemistry of Cooking Liquor Preparation			
	6.6 Operation and Control of Cooking	73	12. PULP MILL OPERATING STRATEGY AND	
	6.7 Two-Stage Sulfite Pulping	74 74	ECONOMICS	185
	6.8 Alkaline Sulfite	74	12.1 Selection of a Mill Site	186
7	KRAFT PULPING	76	,	186
٠.	7.1 Brief History of Development	7 6	12.5 Floduction Control	187
	7.1 Kraft Process Nomenclature	70		189
	and Definitions	76		190
	and Deminions	70	12.6 Cost Control	191

13.	PREPARATION OF STOCK FOR PAPERMAKING	193	20. MANUFACTURING TECHNIQUES FOR	
	13.1 Repulping (Dispersion)	193	SPECIFIC PAPER AND BOARD GRADES	321
	13.2 Refining	194	20.1 Newsprint	322
	13.3 Metering and Blending of Furnishes	205	20.2 Other Printing and Writing Papers	324
	DECYCLED FIRED	200	20.3 Paperboard and Industrial Papers	326
14.	RECYCLED FIBER	208	20.4 Tissue and Toweling	329
	14.1 Introduction	208		
	14.2 Repulping	211	21. ECONOMICS OF PAPER MACHINE	
	14.3 Screening, Cleaning, Dispersion, Stickie		OPERATION	337
	Control	213	21.1 Factors Affecting Machine Efficiency	338
	14.4 Deinking	215 220	21.2 Lost Time Analysis	339
	14.5 Recycle Fiber Bleaching 14.6 Recycled Fiber Quality	221	21.3 Grade Mix vs. Profitability	341
	14.0 Recycled Fiber Quanty	221	22. PROPERTIES AND TESTING OF PULP AND PAPER	2/12
15.	NON-FIBROUS ADDITIVES TO		22. PROPERTIES AND TESTING OF POLIP AND PAPER 22.1 Objectives of Testing	343
	PAPERMAKING STOCK	223		344
	15.1 Alkaline Papermaking	223	22.3 Pulp Testing	346
	15.2 Retention on the Paper Machine	224	22.4 Paper Testing	351
	15.3 Wet End Chemistry Basics	225	22.5 Automated Paper Testing	356
	15.4 Retention Aids	227	22.5 Tutomated Laper Testing	330
	15.5 Sizing	227	23. INTRODUCTION TO PAPER END USES	358
	15.6 Internal Dry Strength Additives	229	23.1 Sheet Finishing	358
	15.7 Fillers, Dyes, Optical Brighteners	230	23.2 Converting	361
	15.8 Foam and Deposit Control	232	23.3 Contact Printing	364
	15.9 Wet End Optimization Measurements	232	23.4 Digital Imaging and Printing	369
	242524444454554455			
16.	PAPER MANUFACTURE - WET END		24. PROCESS CONTROL	371
	OPERATIONS	234	24.1 Measurement and Control	371
	16.1 Introduction to the Paper Machine	234	24.2 Process Control Computers	376
	16.2 Approach System	235	25. MILL SERVICES	381
	16.3 Headboxes	238 245	25.1 Water Supply	381
	16.4 Sheet Forming Process16.5 Fourdrinier Forming and Dewatering	245	25.1 water supply 25.2 Boiler Feedwater	382
	16.6 Twin-Wire Gap Forming	252	25.3 Boiler Operation	383
	16.7 Forming Fabrics	254	25.4 Steam Utilization	388
	16.8 White Water System	255	25.5 Electrical Distribution	390
	16.9 Broke System	258	25.6 Energy Management	390
	16.10 Pressing	259	25.7 Corrosion Control	392
	16.11 Vacuum System	269	2017 Correction Control	· -
	Total vacuum oyotom		26. WATER POLLUTION ABATEMENT	394
17.	PAPER MANUFACTURE - DRY END		26.1 Introduction	394
	OPERATIONS	272	26.2 Sources of Pollutants and In-Plant	
	17.1 Paper Drying	272	Abatement	398
	17.2 Calendering	282	26.3 Standards and Regulations	398
	17.3 Profile Control	285	26.4 Environmental Monitoring	400
	17.4 Reeling	288	26.5 Primary Treatment	401
	17.5 Paper Machine Drives	288	26.6 Secondary Treatment	403
	17.6 Winding	290	26.7 Color Removal	407
	17.7 Roll Finishing	292	26.8 Zero-Effluent Technologies	408
10	CURTACETREATMENTS	202	26.9 Solids Handling	408
18.	SURFACE TREATMENTS	293	27. AIR POLLUTION ABATEMENT	412
	18.1 Sizing	293 297	27.1 Standards and Regulations	412
	18.2 Pigmented Coating 18.3 Supercalendering	307	27.1 Standards and Regulations 27.2 Sources of Air Pollutants	413
	10.5 Supercateflucting	307	27.2 Sources of All Foliations 27.3 Monitoring and Testing	414
19.	MULTIPLY PAPERBOARD MANUFACTURE	310	27.4 In-Process Abatement	417
•	19.1 Multiply Formers	311	27.5 Control Equipment	419
	19.2 Water Removal	315		/
	19.3 Sheet Finishing	318	INDEX	429
	19.4 Plybonding	319		
	19.5 Board Properties	320		
	±			