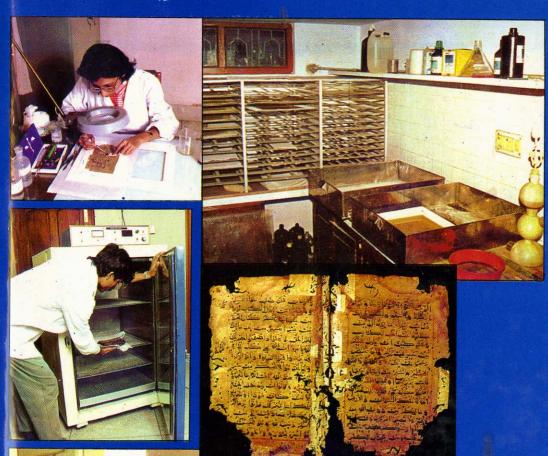
Conservation of Books, Manuscripts and Paper Documents



O.P. AGRAWAIL and MANDANA BARKESHILI



Conservation of Books, Manuscripts and Paper Documents

O.P. Agrawal and Mandana Barkeshli



INTACH
Indian Council of Conservation Institutes
Lucknow

Copyright : Authors

Published: 1997

Price: Ps 1500/-Abroad: Revisedrate

Layout : Mamta Misra

Cover Design: Mamta Misra

Photographs : Ram Sagar Prasad

Contents

PK	EFACE	
PA	RT I : WRITING MATERIALS	•
1.	History and nature of writing materials	3
-1.1	Introduction	3
1.2	History of paper	4
1.3	Writing materials	5
	1.3.1 Paper	5
	1.3.1.1 Raw Materials of Paper	5
	1.3.1.2 Paper-making Processes	5 7
	A. Hånd-made Process	7
	B. Machine-made Process	12
	1.3.1.3 Properties of Paper Sheets	15
	1.3.2 Inks	16
	a. Ancient Inks	16
	b. Modern Inks	18
	1.3.3 Pencil	20
	1.3.4 Pigments	20
PAI	RT II : PREVENTIVE CONSERVATION	
2.	Deterioration factors of paper	25
2.1	Introduction	25
2.2	Biological Deterioration	31
	2.2.1 Micro-organisms	31
	2.2.1.1 Types of Micro-organisms	32
	a. Fungi	32
	n Yeasts	35

c. Algaed. Foxing

35 35

	2.2.1.2 Effect of Micro-organisms	36
	on Materials	
	a. Effect on Paper	36
	b. Effect on Adhesive	37
	c. Effect on Ink	37
	d. Effect on Paints	38
	2.2.2 Insects	38
	2.2.3 Rodents	41
2.3	Physical deterioration	43
	2.3.1 Light	43
	2.3.2 Heat	44
	2.3.3 Moisture content	44
	2.3.4 Mechanical damage	45
2.4	Chemical deterioration	45
	2.4.1 Acidity	45
	2.4.2 Browning of Paper	46
	2.4.3 Action of inks	47
	2.4.4 Action of pigments	48
3.	Care and maintenance of documents	49
3.1	Introduction	49
3.2	Properties of paper	50
3.3	Factors of deterioration	51
3.4	Control of climate and environment	51
3.5	Control of light	57
3.6	Control of insects	58
3.7	Control of micro-organisms	66
3.8	Control of atmospheric pollution	67
3.9	Prevention of physical damage	68
3.10	Book-containers	70
3.11	Standards for permanent records	78
3.12	Standards for folders	80
3.13	Conclusion	81

PART III: CONSERVATION TREATMENT

Introduction to Part III		85
4.	Examination for conservation	87
4.1	Introduction	87
4.2	Examination tools	88
43		88
	4.3.1 Nature of the material	89
	4.3.2 Extent and type of damage	90
	4 3 3 Type of lnk	94
	4.3 4 Nature of the paint	94
	4.3.5 Acidny	99
	4.3.6 Presence of old repairs	100
	4.3.7 Numbering	101
	Pattern of examination	102
44	Conclusion	102
5.	Cleaning and stain removal	105
5 I	Introduction	105
5.2	Cleaning	106
	5.2.1 Dry cleaning methods	106
	5.2.2 Solvent cleaning	111
	5.2 3 Aqueous cleaning	116
5.3		125
	5.3.1 Introduction	125
	5.3.2 Methods of bleaching	126
	5 3.2 1 Oxidising agents	126
	5 3.2.2 Acids	139
	5.3.2.3 Reducing agents	140
	5 3.2.4 Light	143
6.	Deacidification of documents	147
5.1	Introduction	147
5.2	Sources of paper acidity	147
5 3	Types of acidity	148
54	Washing	149

!

6.5	Deacidification by alkaline treatment	151
6.6	Considerations for deacidification	151
6.7	Deacidification processes	152
	6.7.1 Aqueous deacidification	153
	i. Calcium hydroxide-	
	Calcium bicarbonate process	154
	ii. Magnesium Bicarbonate process	155
	iii. Sodium carboxymethyl cellulose	156
	6.7.2 Non-aqueous deacidification	157
	i. Barium hydroxide process	157
	ii. Wei T'o process	159
	iii. The French process	160
	iv. Bartelle process	161
	v. The British Library process	161
	vi. Magnesium acetate process	163
	6.7.3 Vapour phase deacidification	163
	i. Ammonium hydroxide	163
	ii. Morpholine	164
	iii. Cyclohexylamine	165
	Carbonate process	
	6.7.4 Mass deacidification	166
	i. Diethyl Zinc process	166
	ii. The booksaver process	168
	iii. FMC mass preservation system	169
	iv. Bookkeeper process	170
	v. Wei-T'o process	172
	6.7.5 Solid state deacidification	173
6.8	Effect of deacidification on materials	174
	6.8.1 Effect of deacidification on pigments	174
	6.8.2. Effect of deacidification on paper	174
6.9	Deacidification of Iron-Gall Ink Documents	174
7.	Restoration and repair	177
7.1	Introduction	177
7.2	Steps of repair	178
	7.2.1 Flattening	178
	7.2.2 Resizing	181
	-	

	7.2.3 Minor repairs	187
	a. Mending of tears	187
	b. Mending of corners	190
	c. Filling of holes	192
	i. Manual method	192
	ii. Leaf-casting method	194
	iii. Dry leaf-casting	196
	7.2.4 Re-inforcement of weak paper	197
	7.2.4.1 Introduction	197
	7.2.4.2 Preparation of the document	
	before re-inforcement	198
	7.2.4.3 Removal of previous repairs	198
	. 7.2.4.4 Use of enzymes to remove old repairs	201
	7.2.4.5 Re-inforcement by	
	full lining	203
	7.2.4.6 Process for lining ink drawings	213
	7.2.4.7 Both sides lamination by pasting	217
	7.2.4.8 Inlay process	219
	7.2.4.9 Lamination with cellulose acetate	222
	7.2.4.10 Encapsulation with plastic coated	
	tissue paper	229
	7.2.4.11 Lamination with plastic coated	
	tissue paper	232
	7.2.4.12 Parylene reinforcement	235
	7.2.4.13 Paper-splitting technique	236
7.3	Removal of backings	238
	7.3.1 Introduction	238
	7.3.2 Removal Technique	239
PAR	T IV : SPECIAL SITUATIONS	
8.	Conservation of water damaged	
	paper objects	245
8.1	Introduction	245
8.2	Treatment	246
8.3	Formaldehyde as disinfectant	247

9.	Conservation	n of tracing papers	249
9.1 9.2	Introduction Types of tracir	ag daders	249 249
9.3	• •	esinous tracing papers	252
9.4		non-resinous tracing papers	253
9.5		ome tracing papers	255
PAR	T V : SOME	CASE STUDIES	
10.	Restoration (of paper objects —	
	some case st	udies	259
10.1	Cáse-study - 1	: Restoration of a badly damaged	
10.2	Paper Docume		259
10.4	13th Century I	: Restoration of a paper leaf of	266
10.3	•	: Restoration of a Paper Document	200
,	with window-c	*	267
PART VI			
App	endices		271
Appe	ndix I - M	ethods of analysis of paper fibres	273
Appe	ndix II - Id	entification of sizing materials	278
Appe	ndix III - Tr	reatment record for paper materials	281
Appe	ndix IV - Pr	eparation of pulp for leaf-casting	286
Appe	ndix V - St	iitable papers for restoration	290
Appe	ndix VI - Ad	dhesives used for Reinforcement of	
	Do	ocuments.	293
Appe	ndix VII - Pr	operties of mount boards used.	
	fo	r mounting paper objects.	298
Refe	rences		300