

Synthetic Fibre Dyeing

Edited by Chris Hawkyard PhD FSDC CCol

Formerly lecturer in colour science and printing, Department of Textiles, UMIST, Manchester, UK

2004

Society of Dyers and Colourists

Contents

Contributors		viii
Preface		ix
CHAPTER 1	Fibre production by <i>J E McIntyre</i>	1
1.1	General introduction	1
1.2	Principles of polymerisation	1
1.3	Intermediates for synthetic fibres	8
1.4	Principles of fibre production	13
1.5	Fibre structure	19
1.6	Polyester fibres	22
1.7	Polyamide fibres	30
1.8	Acrylic and modacrylic fibres	33
1.9	Elastane fibres	38
1.10	Cellulose acetate and triacetate	41
1.11	Polyolefin fibres	43
	References	44
CHAPTER 2	Dyeing of polyester fibres by <i>G Mock</i>	45
2.1	Introduction	45
2.2	Preparation of polyester fibres for dyeing	48
2.3	Disperse dyes	49
2.4	Exhaust dyeing	58
2.5	Continuous dyeing of 100% polyester	66
2.6	Solvent and solvent-assisted dyeing	66
2.7	Fastness properties of disperse dyes on polyester	68
2.8	Correction of faults in dyed materials	70
2.9	Finishing processes	72
2.10	Thermofixation	73
2.11	Disperse dyes for the automotive industry	76
2.12	New polyester fibres	77
	References	80

CHAPTER 3	Nylon dyeing by <i>D M Lewis and D J Marfell</i>	82
3.1	Introduction	82
3.2	Dyeing nylon with acid dyes	85
3.3	Dyeing nylon with disperse dyes	96
3.4	Nylons with modified dyeing properties	96
3.5	Dyeing nylon with reactive dyes	98
3.6	Crosslinking dyes on nylon	107
3.7	Photodegradation and photostabilisation of synthetic polyamide fibres	111
3.8	Practical coloration processes for polyamide fibres	114
3.9	Stain-blocking treatments	117
3.10	Concluding comments	119
	References	119
CHAPTER 4	Acrylic and modacrylic fibres by <i>R Cox</i>	122
4.1	Introduction	122
4.2	Preparation of acrylic and modacrylic fibres for dyeing	125
4.3	Physical and chemical properties in relation to dyeing	128
4.4	Basic dyes	131
4.5	Dyeing acrylic fibres with basic dyes	140
4.6	Dyeing modacrylic fibres with basic dyes	155
4.7	Disperse dyes	157
4.8	Dyeing acrylic fibres with disperse dyes	158
4.9	Dyeing modacrylic fibres with disperse dyes	160
4.10	Finishing processes	160
4.11	Correction of faults in dyed materials	160
4.12	Gel dyeing	161
	References	162
CHAPTER 5	Dyeing of acetate and triacetate fibres by <i>P Mears</i>	164
5.1	Introduction	164
5.2	Preparation before dyeing	170
5.3	Dyeing of acetate and triacetate	174
5.4	Dyeing with disperse dyes	175
5.5	Dyeing with other dye classes	193
5.6	Dyeing procedures	196
5.7	Fastness properties	207
5.8	Finishing processes	212
5.9	Correction of faults in dyed materials	214
	References	216

HAPTER 6	Mass pigmentation and solution dyeing of synthetic fibres by B L Kaul	218
	Introduction 218	
	Solution dyeing production technology 219	
	Physical form of colorants 219	
	Solution dyeing of polyester 220	
	Solution dyeing of nylons 220	
	Solution dyeing of polyolefin fibres 224	
	Solution dyeing of polyacrylonitrile 230	
	Solution dyeing of aramids 230	
	Solution dyeing of acetate fibres 233	
	Future 234	
	References 234	
HAPTER 7	Dyeing of microfibres by M Bide	235
	Introduction 235	
	Methods of production 242	
	Coloration of microfibres 245	
	Polyester 252	
	Polyamide 258	
	Acrylic fibres 261	
	Blends 262	
	References 264	
HAPTER 8	Dyeing and finishing of fabrics containing elastane by M O Hunt	266
	Introduction 266	
	Elastane end-uses 268	
	Dyeing and finishing 269	
	Conclusions 274	
	References 275	
Subject index		276

Contributors

Prof J E McIntyre

Consultant in textile industries, Harrogate, UK

Dr G Mock

Professor of textile engineering, Department of Textile Engineering, Chemistry and Science, College of Textiles, North Carolina State University, Raleigh, North Carolina, USA

Prof D M Lewis

Head of department, Department of Colour Chemistry, University of Leeds, Leeds, UK

Dr D J Marfell

Formerly research associate, Invista, Gloucester, UK

Mr R Cox

Amicor technical marketing manager, Acordis Acrylic Fibres, Bradford, UK

Mr P Mears

Formerly technical development manager, Novaceta Ltd (formerly Courtaulds plc), Spondon, Derby, UK

Dr B L Kaul

Managing director, MCA Technologies GmbH, Biel-Benken, Switzerland

Prof M Bide

Head of department, Department of Textiles, University of Rhode Island, Kingston, Rhode Island, USA

Dr M O Hunt

Senior research chemist, Technical and Marketing Development, Invista (formerly DuPont Text Interiors), High Point, North Carolina, USA

