

Contents

Preface to the second edition — V

Preface to the first edition — VII

1 Fundamentals, general aspects, color, application — 1

- 1.1 Definitions and classification — 1
- 1.2 History and economic aspects — 5
- 1.3 Uses — 12
- 1.4 General chemical and physical properties — 13
- 1.5 Color properties of inorganic pigments — 22
- 1.6 Application technical behavior — 36
- 1.7 Conclusions — 40
- Bibliography — 42

2 General methods of manufacture — 46

- 2.1 Mechanical preparation processes — 47
- 2.2 Precipitation reactions — 51
- 2.3 Calcination processes — 53
- 2.4 Other methods — 54
- 2.5 Conclusions — 55
- Bibliography — 56

3 White pigments — 57

- 3.1 Introduction — 57
- 3.2 Titanium dioxide pigments — 58
- 3.3 Zinc sulfide pigments — 86
- 3.4 Zinc oxide pigments — 94
- 3.5 Other white pigments — 101
- 3.6 Conclusions — 103
- Bibliography — 104

4 Colored pigments — 107

- 4.1 Introduction — 107
- 4.2 Iron oxide pigments — 112
- 4.3 Chromium oxide pigments — 127
- 4.4 Mixed metal oxide pigments — 133
- 4.5 Chromate and molybdate pigments — 146
- 4.6 Bismuth vanadate pigments — 153
- 4.7 Ultramarine pigments — 157
- 4.8 Iron blue pigments — 165

4.9	Cadmium sulfide/selenide pigments —	171
4.10	Cerium sulfide pigments —	179
4.11	Oxonitride pigments —	182
4.12	Yttrium indium manganese oxide pigments —	185
4.13	New approaches for the development of inorganic colored pigments —	187
4.14	Conclusions —	190
	Bibliography —	191
5	Black pigments (carbon black) —	197
5.1	Fundamentals and properties —	197
5.2	Production of carbon black pigments —	199
5.3	Pigment properties and uses —	209
5.4	Toxicology and occupational health —	220
5.5	Conclusions —	221
	Bibliography —	222
6	Ceramic colors —	224
6.1	Fundamentals and properties —	224
6.2	Types and applications of ceramic colors —	225
6.3	Toxicology and occupational health —	230
6.4	Conclusions —	231
	Bibliography —	231
7	Transparent pigments —	233
7.1	Fundamentals and properties —	233
7.2	Transparent iron oxides —	234
7.3	Transparent cobalt blue —	236
7.4	Transparent iron blue —	237
7.5	Transparent titanium dioxide —	237
7.6	Transparent zinc oxide —	239
7.7	Toxicology and occupational health —	239
7.8	Conclusions —	240
	Bibliography —	241
8	Effect pigments —	242
8.1	Fundamentals and properties —	242
8.2	Metal effect pigments —	244
8.3	Special effect pigments —	257
8.4	Conclusions —	281
	Bibliography —	282

9	Functional pigments — 285
9.1	Magnetic pigments — 285
9.2	Anticorrosive pigments — 294
9.3	Conclusions — 310
	Bibliography — 311
10	Luminescent pigments — 314
10.1	Fundamentals and properties — 314
10.2	Luminescence mechanisms — 316
10.3	Excitation mechanisms — 318
10.4	Production of luminescent pigments — 320
10.5	Pigment properties and uses — 321
10.6	Toxicology and occupational health — 325
10.7	Conclusions — 326
	Bibliography — 327
11	Fillers — 328
11.1	Fundamentals and properties — 328
11.2	Production of fillers — 331
11.3	Filler properties and uses — 334
11.4	Toxicology and occupational health — 338
11.5	Conclusions — 338
	Bibliography — 339
12	Application systems for pigments — 340
12.1	Coatings — 340
12.2	Plastics — 345
12.3	Printing inks — 348
12.4	Cosmetic formulations — 351
12.5	Building materials — 353
12.6	Conclusions — 354
	Bibliography — 355

Answers to the study questions — 359

Index — 373