

CONTENTS

Section 1 Resins Preparations

1.1	One-stage phenol-formaldehyde resin (ammonia catalysed)	1
1.2	One-stage phenol-formaldehyde resin (soda catalysed)	3
1.3	Novolak phenol-formaldehyde resin	4
1.4	Cast phenol-formaldehyde resin	5
1.5	Cold setting phenol-formaldehyde adhesive	6
1.6	Novolak phenol-formaldehyde resin (2 gallon model plant scale)	7
1.7	Urea-formaldehyde resin (1U: 2.1F ratio)	9
1.8	Urea-formaldehyde resin (1U: 1.45F ratio)	10
1.9	Cold setting gap-filling urea-formaldehyde adhesive	11
1.10	Melamine-formaldehyde resin	12
1.11	Cellulose acetate (primary and secondary)	14
1.12	Polystyrene (pearl polymerisation)	16
1.13	Polymethyl methacrylate (pearl polymerisation)	18
1.14	Polymethyl methacrylate (mass polymerisation)	19
1.15	Polymethyl acetate (emulsion polymerisation)	21
1.16	Polyethylene (polythene) (solution polymerisation, Ziegler method)	23
1.17	Epoxide resin	26
1.18	Saturated polyester resin (plasticiser)	28
1.19	Saturated polyester resin (for polyurethane foam)	29
1.20	Unsaturated polyester resin	30
	Appendix 1 Exercise on the functionality theory	32
	Appendix 2 Reactivities of various phenols	33

Section 2 Compounding

2.1	Phenol-formaldehyde moulding material, general type (roller mill method)	35
2.2	Phenol-formaldehyde moulding material, heat-resistant type (internal mixer method)	37
2.3	Phenol-formaldehyde moulding material, electrical low loss type (roller mill method)	39
2.4	Phenol-formaldehyde moulding material, medium shock resistant type, from one-stage resin (internal mixer method)	40
2.5	Phenol-formaldehyde moulding material medium shock resistant type, from novolak resin (roller mill method)	41
2.6	Urea-formaldehyde moulding material (roller mill method)	42
2.7	Urea-formaldehyde moulding material (ball mill method)	43
2.8	Melamine-formaldehyde moulding material, general type	44
2.9	Melamine-formaldehyde moulding material, electrical type	46

2.10	Polyester (alkyd) moulding material, electrical type	47
2.11	Polyester (alkyd) moulding material, decorative grade	49
2.12	Polyester (alkyd) dough moulding material	50
2.13	Cellulose acetate cast film	51
2.14	Cellulose acetate moulding material	53
2.15	Toughened polystyrene moulding material	54
2.16	Dry-coloured thermoplastics	56
2.17	Bituminous moulding material	57
2.18	PVC general extrusion compound (roller mill method)	58
2.19	PVC general extrusion compound (internal mixer method)	59
2.20	Rigid and unplasticised PVC compounds	62
2.21	PVC paste	64
2.22	Efficiency of stabilisers for PVC compounds	65
Section 3 Fabrication		
3.1	Compression moulding of thermosetting materials	67
3.2	High frequency preheating in compression moulding of thermosetting materials	71
3.3	Laminating paper and cloth with phenolic resin	73
3.4	Laminating chopped strand glass mat and glass cloth with unsaturated polyester resin and epoxide resin	75
3.5	Injection and compression moulding of thermoplastic materials	77
3.6	Extrusion moulding of bituminous material	79
3.7	Extrusion of thermoplastic materials	80
3.8	Extrusion of casein (knitting pins)	82
3.9	Fabrication with PVC paste (leathercloth production, slush moulding, dipping, compression moulding and expanding of PVC)	83
3.10	Moulding of thermoplastic sheet (blow moulding and vacuum forming)	87
3.11	Bonding and welding of thermoplastic sheet (solvent bonding, heat sealing, high frequency heat sealing and hot gas welding)	89
3.12	Casting of resins (phenolic, polyester and epoxide)	93
3.13	Production of polyurethane foam from polyester resin	95
3.14	Production of polyurethane foam from polyether	97
Section 4 Testing		
4.1	Identification of plastic materials	99
4.2	Solids content of resin solution	102
4.3	Viscosity of a resin solution (Works control methods)	103
4.4	Melting point, stoving time and gel time of phenolic resins	105
4.5	Acid value polyester resin	106
4.6	Apparent powder density and bulk factor of thermosetting moulding material	107

4.7	Control tests for phenolic moulding material (cup flow time B.S. 2782 : Part 1 : 1956, flow discs and blister free cure time tests)	109
4.8	Control tests for amino moulding material (flow and cure tests)	113
4.9	Degree of a phenolic moulding (percentage acetone soluble mater, B.S. 2782 : Part 4 : 1958; B.S. 2907 : 1957)	115
4.10	Tensile strength of moulded thermosetting material (B.S. 771 : 1959 ; B.S. 1322 : 1956; B.S. 2782 : Part 3 : 1957)	117
4.11	Crossbreaking strength of moulded thermosetting material (B.S. 771 : 1959 ; B.S. 1322 : 1956 B.S. 2782 : Part 3 : 1957)	119
4.12	Impact strength of moulded thermosetting material (B.S. 771 : 1959 ; B.S. 1322 : 1956 ; B.S. 2782 : Part 3 : 1957)	121
4.13	Tensile strength and elongation at break of flexible PVC compound (B.S. 2571 : 1955 ; B.S. 2782 : Part 3 : 1957)	124
4.14	Flow temperature of thermoplastic material (B.S. 1524: 1955 ; B.S. 2782 : Part 1 : 1956)	126
4.15	Softening point of thermoplastic material (bending test, B.S. 1524 : 1955 ; B.S. 1493 : 1958 ; B.S. 2782 : Part 1 : 1956)	128
4.16	Softness number of flexible PVC compound (B.S. 2571 : 1955 ; B.S. 2782 : Part 3 : 1957)	131
4.17	Cold flex temperature of PVC (adapted from B.S. 2571 : 1957 ; B.S. 2782 : Part 1 : 1956)	133
4.18	Volume resistivity of plastic material (B.S. 771: 1959 ; B.S. 1322 : 1956 ; B.S. 2571 : 1955 ; Part 2 : 1957)	136
4.19	Power-factor and permittivity of plastic material at one megacycle per second (B.S. 771 : 1959 ; B.S. 1493 : 1958 ; B.S. 2782 : Part 2 : 1957 ; B.S. 2067 : 1953)	138
4.20	Power-factor and permittivity of phenolic resin bonded paper sheet at one kilocycle per second (B.S. 1137 : 1949 ; B.S. 2782 : Part 2 : 1957)	139