LIST OF FIGURES

Fig. No.	Title	Page
Fig 1.1	Simplified Representation of Fractionation of Petroleum	4
Fig 1.2	Structure of Wax Crystal	5
Fig.1.3	Hypothetical ashphaltene molecules	7
Fig.1.4	Model of an Ashphaltene aggregate stabilized by resin molecules	8
Fig 1.5	Fractional Distillation	11
Fig.1.6	Simple Distillation	11
Fig.1.7	Flow sheet diagram for Continuous Distillation	11
Fig.1.8	Laboratory set up for Vacuum Distillation	12
Fig.1.9	Azeotropic Distillations	13
Fig.1.10	Water content determination using Dean and Stark Adaptor	14
Fig.1.11	Shear Stress and Shear Rate based on shearing between plates	17
Fig.1.12	Hypothetical layers in Shear Flow	18
Fig.1.13	Time Dependent and Time Independent Flow Behavior of Fluid	18
Fig.1.14	Newtonian Flows	19
Fig.1.15	Shear Thinning Flow	19
Fig.1.16	Bingham Body Flow	20
Fig.1.17	Shear Thickening Flow	21
Fig.1.18	Thixotropic Fluids	21
Fig.1.19	Crude Oil Transportation	22
Fig.1.20	Reduction in pipeline diameter due to wax deposition	22
Fig.1.21	Blocked pipelines	23
Fig.1.22	Gibb's Theory: Discontinuous Layer Addition	23
Fig.1.23	Frank's Theory: Continuous Growth via dislocation	24
Fig.1.24	Different Methods for Wax Deposition Control	25
Fig.1.25	Mechanism of wax crystal growth without and with additives	27
Fig.1.26	Mechanism of Pour Point Depression	28
Fig.1.27	Mechanism of formation of Dendrite Crystals	29
Fig.1.28	Stages of Crystal Size Modification	30
Fig. 2.1	Structure of Polyalkyl Acrylate and Polyalkyl Methacrylate	35
Fig. 2.2	Homolytic Fission of Benzoyl Peroxide	36
Fig. 2.3	Propagation Stage	37
Fig. 2.4(a)	Termination Stage by way of combination	37
Fig. 2.4(b)	Termination stage by way of disproportion	37
Fig. 2.5	FTIR spectrum of 8RA	39
Fig. 2.6	FTIR spectrum of 818 RA (Terpolymer)	42
Fig. 2.7	FTIR spectrum of 818RA18N	44
Fig. 2.8	FTIR spectrum of 80A	46
Fig. 2.9	FTIR spectrum of 812OA (Terpolymer)	49
Fig. 2.10	FTIR spectrum of 812OA18N	51
Fig. 2.11	FTIR spectrum of 8CA	53
Fig. 2.12	FTIR spectrum of 812CA (Terpolymer)	56
Fig. 2.12	FTIR spectrum of 812CA18N	58
Fig. 2.13	FTIR spectrum of 10UA	60
1 15. 2.14	i in spectrum of 1007	00

E: 0.15		\mathcal{C}^{2}
Fig. 2.15	FTIR spectrum of 810UA (Terpolymer)	63 65
Fig. 2.16	FTIR spectrum of 810UA18N	69
Fig. 3.1 Fig. 3.2	Apparatus for Pour Point Determination	09 71
0	TA AR 1500ex Rheometer Rheogram of Virgin Kosembe 47 emula ail at 20°C	
Fig. 3.3	Rheogram of Virgin Kosamba-47 crude oil at 30°C	76 76
Fig. 3.4	Rheogram of Virgin Kosamba-47 crude oil at 33° C	76 77
Fig. 3.5	Rheogram of Virgin Kosamba-47 crude oil at 36° C	77
Fig. 3.6	Rheogram of Virgin Kosamba-47 crude oil at 39°C	77 79
Fig. 3.7	Rheogram of Kosamba-47 crude oil with 500 ppm of 814UA18N at 30°C	78 79
Fig. 3.8	Rheogram of Kosamba-47 crude oil with 500 ppm of 814UA18N at 33°C	78 70
Fig. 3.9	Rheogram of Kosamba-47 crude oil with 500 ppm of 814UA18N at 36°C	79
Fig. 3.10	Rheogram of Kosamba-47 crude oil with 500 ppm of 814UA18N at 39°C	79
Fig. 3.11	Rheogram of Kosamba-47 crude oil with 1000 ppm of 814UA18N at 30°C	80
Fig. 3.12	Rheogram of Kosamba-47 crude oil with 1000 ppm of 814UA18N at 33°C	80
Fig. 3.13	Rheogram of Kosamba-47 crude oil with 1000 ppm of 814UA18N at 36°C	81
Fig. 3.14	Rheogram of Kosamba-47 crude oil with 1000 ppm of 814UA18N at 39°C	81
Fig. 3.15	Rheogram of Kosamba-47 crude oil with 500 ppm of 816UA18N at 30°C	82
Fig. 3.16	Rheogram of Kosamba-47 crude oil with 500 ppm of 816UA18N at 33°C	82
Fig. 3.17	Rheogram of Kosamba-47 crude oil with 500 ppm of 816UA18N at 36°C	83
Fig. 3.18	Rheogram of Kosamba-47 crude oil with 500 ppm of 816UA18N at 39°C	83
Fig. 3.19	Rheogram of Kosamba-47 crude oil with 1000 ppm of 816UA18N at 30°C	84
Fig. 3.20	Rheogram of Kosamba-47 crude oil with 1000 ppm of 816UA18N at 33°C	84
Fig. 3.21	Rheogram of Kosamba-47 crude oil with 1000 ppm of 816UA18N at 36°C	85
Fig. 3.22	Rheogram of Kosamba-47 crude oil with 1000 ppm of 816UA18N at 39°C	85
Fig. 3.23	Rheogram of Kosamba-47 crude oil with 500 ppm of 86CA18N at 30°C	86
Fig. 3.24	Rheogram of Kosamba-47 crude oil with 500 ppm of 86CA18N at 33°C	86
Fig. 3.25	Rheogram of Kosamba-47 crude oil with 500 ppm of 86CA18N at 36°C	87
Fig. 3.26	Rheogram of Kosamba-47 crude oil with 500 ppm of 86CA18N at 39°C	87
Fig. 3.27	Rheogram of Kosamba-47 crude oil with 1000 ppm of 86CA18N at 30°C	88
Fig. 3.28	Rheogram of Kosamba-47 crude oil with 1000 ppm of 86CA18N at 33°C	88
Fig. 3.29	Rheogram of Kosamba-47 crude oil with 1000 ppm of 86CA18N at 36°C	89
Fig. 3.30	Rheogram of Kosamba-47 crude oil with 1000 ppm of 86CA18N at 39°C	89
Fig. 3.31	Rheogram of Kosamba-47 crude oil with 500 ppm of 818CA18N at 30°C	90
Fig. 3.32	Rheogram of Kosamba-47 crude oil with 500 ppm of 818CA18N at 33°C	90
Fig. 3.33	Rheogram of Kosamba-47 crude oil with 500 ppm of 818CA18N at 36°C	91
Fig. 3.34	Rheogram of Kosamba-47 crude oil with 500 ppm of 818CA18N at 39°C	91
Fig. 3.35	Rheogram of Kosamba-47 crude oil with 1000 ppm of 818CA18N at 30°C	92
Fig. 3.36	Rheogram of Kosamba-47 crude oil with 1000 ppm of 818CA18N at 33°C	92
Fig. 3.37	Rheogram of Kosamba-47 crude oil with 1000 ppm of 818CA18N at 36°C	93
Fig. 3.38	Rheogram of Kosamba-47 crude oil with 1000 ppm of 818CA18N at 39°C	93
Fig. 3.39	Rheogram of Kosamba-47 crude oil with 500 ppm of 814RA18N at 30°C	94
Fig. 3.40	Rheogram of Kosamba-47 crude oil with 500 ppm of 814RA18N at 33°C	94
Fig. 3.41	Rheogram of Kosamba-47 crude oil with 500 ppm of 814RA18N at 36°C	95
Fig. 3.42	Rheogram of Kosamba-47 crude oil with 500 ppm of 814RA18N at 39°C	95
Fig. 3.43	Rheogram of Kosamba-47 crude oil with 1000 ppm of 814RA18N at 30°C	96
Fig. 3.44	Rheogram of Kosamba-47 crude oil with 1000 ppm of 814RA18N at 33°C	96
0		

97 Fig. 3.45 Rheogram of Kosamba-47 crude oil with 1000 ppm of 814RA18N at 36°C Fig. 3.46 Rheogram of Kosamba-47 crude oil with 1000 ppm of 814RA18N at 39°C 97 Fig. 3.47 Rheogram of Kosamba-47 crude oil with 500 ppm of 816RA18N at 30°C 98 Fig. 3.48 Rheogram of Kosamba-47 crude oil with 500 ppm of 816RA18N at 33°C 98 Fig. 3.49 Rheogram of Kosamba-47 crude oil with 500 ppm of 816RA18N at 36°C 99 Fig. 3.50 Rheogram of Kosamba-47 crude oil with 500 ppm of 816RA18N at 39°C 99 Fig. 3.51 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816RA18N at 30°C 100 Fig. 3.52 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816RA18N at 33°C 100 Fig. 3.53 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816RA18N at 36°C 101 Fig. 3.54 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816RA18N at 39°C 101 Fig. 3.55 Rheogram of Kosamba-47 crude oil with 500 ppm of 814OA18N at 30°C 102 Fig. 3.56 Rheogram of Kosamba-47 crude oil with 500 ppm of 814OA18N at 33°C 102 Fig. 3.57 Rheogram of Kosamba-47 crude oil with 500 ppm of 814OA18N at 36°C 103 Fig. 3.58 Rheogram of Kosamba-47 crude oil with 500 ppm of 814OA18N at 39°C 103 Fig. 3.59 Rheogram of Kosamba-47 crude oil with 1000 ppm of 814OA18N at 30°C 104 Fig. 3.60 Rheogram of Kosamba-47 crude oil with 1000 ppm of 814OA18N at 33°C 104 Fig. 3.61 Rheogram of Kosamba-47 crude oil with 1000 ppm of 814OA18N at 36°C 105 Fig. 3.62 Rheogram of Kosamba-47 crude oil with 1000 ppm of 814OA18N at 39°C 105 Fig. 3.63 Rheogram of Kosamba-47 crude oil with 500 ppm of 816OA18N at 30°C 106 Fig. 3.64 Rheogram of Kosamba-47 crude oil with 500 ppm of 816OA18N at 33°C 106 Fig. 3.65 Rheogram of Kosamba-47 crude oil with 500 ppm of 816OA18N at 36°C 107 Fig. 3.66 Rheogram of Kosamba-47 crude oil with 500 ppm of 816OA18N at 39°C 107 Fig. 3.67 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816OA18N at 30°C 108 Fig. 3.68 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816OA18N at 33°C 108 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816OA18N at 36°C Fig. 3.69 109 Fig. 3.70 Rheogram of Kosamba-47 crude oil with 1000 ppm of 816OA18N at 39°C 109 Fig. 3.71 Rheogram of Virgin Kosamba-33 crude oil at 33°C 120 Fig. 3.72 Rheogram of Virgin Kosamba-33 crude oil at 36°C 120 Fig. 3.73 Rheogram of Virgin Kosamba-33 crude oil at 39°C 121 Fig. 3.74 Rheogram of Kosamba-33 crude oil with 100 ppm of 86UA18N at 39°C 121 Fig. 3.75 Rheogram of Kosamba-33 crude oil with 500 ppm of 86UA18N at 33°C 122 Fig. 3.76 Rheogram of Kosamba-33 crude oil with 1000 ppm of 86UA18N at 33°C 122 Fig. 3.77 Rheogram of Kosamba-33 crude oil with 100 ppm of 86UA18N at 36°C 123 Fig. 3.78 Rheogram of Kosamba-33 crude oil with 500 ppm of 86UA18N at 36°C 123 Fig. 3.79 Rheogram of Kosamba-33 crude oil with 1000 ppm of 86UA18N at 36°C 124 Fig. 3.80 Rheogram of Kosamba-33 crude oil with 100 ppm of 814UA18N at 33°C 124 Rheogram of Kosamba-33 crude oil with 500 ppm of 814UA18N at 33°C Fig. 3.81 125 Fig. 3.82 Rheogram of Kosamba-33 crude oil with 1000 ppm of 814UA18N at 33°C 125 Fig. 3.83 Rheogram of Kosamba-33 crude oil with 100 ppm of 814UA18N at 36°C 126 Fig. 3.84 Rheogram of Kosamba-33 crude oil with 500 ppm of 814UA18N at 36°C 126 Fig. 3.85 Rheogram of Kosamba-33 crude oil with 1000 ppm of 814UA18N at 36°C 127 Fig. 3.86 Rheogram of Kosamba-33 crude oil with 100 ppm of 822UA18N at 33°C 127 Fig. 3.87 Rheogram of Kosamba-33 crude oil with 500 ppm of 822UA18N at 33°C 128 Fig. 3.88 Rheogram of Kosamba-33 crude oil with 1000 ppm of 822UA18N at 33°C 128 Fig. 3.89 Rheogram of Kosamba-33 crude oil with 100 ppm of 822UA18N at 36°C 129 Fig. 3.90 Rheogram of Kosamba-33 crude oil with 500 ppm of 822UA18N at 36°C 129 Fig. 3.91 Rheogram of Kosamba-33 crude oil with 1000 ppm of 822UA18N at 36°C 130 Fig. 3.92 Rheogram of Kosamba-33 crude oil with 500 ppm of 810RA18N at 30°C 130 Fig. 3.93 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810RA18N at 30°C 131 Fig. 3.94 Rheogram of Kosamba-33 crude oil with 500 ppm of 810RA18N at 33°C 131 Fig. 3.95 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810RA18N at 33°C 132 Fig. 3.96 Rheogram of Kosamba-33 crude oil with 500 ppm of 810RA18N at 36°C 132 Fig. 3.97 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810RA18N at 36°C 133 Rheogram of Kosamba-33 crude oil with 500 ppm of 810RA18N at 39°C Fig. 3.98 133 Fig. 3.99 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810RA18N at 39°C 134 Fig. 3.100 Rheogram of Kosamba-33 crude oil with 500 ppm of 812RA18N at 30°C 134 Fig. 3.101 Rheogram of Kosamba-33 crude oil with 1000 ppm of 812RA18N at 30°C 135 Fig. 3.102 Rheogram of Kosamba-33 crude oil with 500 ppm of 812RA18N at 33°C 135 Fig. 3.103 Rheogram of Kosamba-33 crude oil with 1000 ppm of 812RA18N at 33°C 136 Fig. 3.104 Rheogram of Kosamba-33 crude oil with 500 ppm of 812RA18N at 36°C 136 Fig. 3.105 Rheogram of Kosamba-33 crude oil with 1000 ppm of 812RA18N at 36°C 137 Fig. 3.106 Rheogram of Kosamba-33 crude oil with 500 ppm of 812RA18N at 39°C 137 Fig. 3.107 Rheogram of Kosamba-33 crude oil with 1000 ppm of 812RA18N at 39°C 138 Fig. 3.108 Rheogram of Kosamba-33 crude oil with 500 ppm of 810CA18N at 30°C 138 Fig. 3.109 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810CA18N at 30°C 139 Fig. 3.110 Rheogram of Kosamba-33 crude oil with 500 ppm of 810CA18N at 33°C 139 Fig. 3.111 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810CA18N at 33°C 140 Fig. 3.112 Rheogram of Kosamba-33 crude oil with 500 ppm of 810CA18N at 36°C 140 Fig. 3.113 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810CA18N at 36°C 141 Fig. 3.114 Rheogram of Kosamba-33 crude oil with 500 ppm of 810CA18N at 39°C 141 Fig. 3.115 Rheogram of Kosamba-33 crude oil with 1000 ppm of 810CA18N at 39°C 142 Fig. 3.116 Rheogram of Kosamba-33 crude oil with 500 ppm of 814CA18N at 30°C 142 Fig. 3.117 Rheogram of Kosamba-33 crude oil with 1000 ppm of 814CA18N at 30°C 143 Fig. 3.118 Rheogram of Kosamba-33 crude oil with 500 ppm of 814CA18N at 33°C 143 Rheogram of Kosamba-33 crude oil with 1000 ppm of 814CA18N at 33°C Fig. 3.119 144 Fig. 3.120 Rheogram of Kosamba-33 crude oil with 500 ppm of 814CA18N at 36°C 144 Fig. 3.121 Rheogram of Kosamba-33 crude oil with 1000 ppm of 814CA18N at 36°C 145 Fig. 3.122 Rheogram of Kosamba-33 crude oil with 500 ppm of 814CA18N at 39°C 145 Fig. 3.123 Rheogram of Kosamba-33 crude oil with 1000 ppm of 814CA18N at 39°C 146 Fig. 3.124 Rheogram of Kosamba-33 crude oil with 500 ppm of 816OA18N at 30°C 146 Fig. 3.125 Rheogram of Kosamba-33 crude oil with 1000 ppm of 816OA18N at 30°C 147 Fig. 3.126 Rheogram of Kosamba-33 crude oil with 500 ppm of 816OA18N at 33°C 147 Fig. 3.127 Rheogram of Kosamba-33 crude oil with 1000 ppm of 816OA18N at 33°C 148 Fig. 3.128 Rheogram of Kosamba-33 crude oil with 500 ppm of 816OA18N at 36°C 148 Fig. 3.129 Rheogram of Kosamba-33 crude oil with 1000 ppm of 816OA18N at 36°C 149 Fig. 3.130 Rheogram of Kosamba-33 crude oil with 500 ppm of 816OA18N at 39°C 149 Fig. 3.131 Rheogram of Kosamba-33 crude oil with 1000 ppm of 816OA18N at 39°C 150 Fig. 3.132 Rheogram of Kosamba-33 crude oil with 1000 ppm of 816OA18N at 39°C 150 Fig. 3.133 Rheogram of Kosamba-33 crude oil with 1000 ppm of 818OA18N at 30°C 151 Fig. 3.134 Rheogram of Kosamba-33 crude oil with 1000 ppm of 818OA18N at 30°C 151 Fig. 3.135 Rheogram of Kosamba-33 crude oil with 1000 ppm of 818OA18N at 33°C 152 Fig. 3.136 Rheogram of Kosamba-33 crude oil with 500 ppm of 818OA18N at 36°C 152 Fig. 3.137 Rheogram of Kosamba-33 crude oil with 1000 ppm of 818OA18N at 36°C 153 Fig. 3.138 Rheogram of Kosamba-33 crude oil with 500 ppm of 818OA18N at 39°C 153 Fig. 3.139 Rheogram of Kosamba-33 crude oil with 1000 ppm of 818OA18N at 39°C 154 Fig. 3.140 Rheogram of Bombay High Virgin Crude oil at 13°C 162 Fig. 3.141 Rheogram of Bombay High Virgin Crude oil at 16°C 162 Fig. 3.142 Rheogram of Bombay High Virgin Crude oil at 19°C 163 Fig. 3.143 Rheogram of Bombay High Virgin Crude oil at 22°C 163 Fig. 3.144 Rheogram of Bombay High Crude oil with 500 ppm of 86UA18N at 10°C 164 Fig. 3.145 Rheogram of Bombay High Crude oil with 500 ppm of 86UA18N at 13°C 164 Fig. 3.146 Rheogram of Bombay High Crude oil with 500 ppm of 86UA18N at 16°C 165 Fig. 3.147 Rheogram of Bombay High Crude oil with 500 ppm of 86UA18N at 19°C 165 Fig. 3.148 Rheogram of Bombay High Crude oil with 500 ppm of 86UA18N at 22°C 166 Fig. 3.149 Rheogram of Bombay High Crude oil with 1000 ppm of 86UA18N at 10°C 166 Fig. 3.150 Rheogram of Bombay High Crude oil with 1000 ppm of 86UA18N at 13°C 167 Fig. 3.151 Rheogram of Bombay High Crude oil with 1000 ppm of 86UA18N at 16°C 167 Fig. 3.152 Rheogram of Bombay High Crude oil with 1000 ppm of 86UA18N at 19°C 168 Fig. 3.153 Rheogram of Bombay High Crude oil with 1000 ppm of 86UA18N at 22°C 168 Fig. 3.154 Rheogram of Bombay High Crude oil with 500 ppm of 814UA18N at 10°C 169 Fig. 3.155 Rheogram of Bombay High Crude oil with 500 ppm of 814UA18N at 13°C 169 Fig. 3.156 Rheogram of Bombay High Crude oil with 500 ppm of 814UA18N at 16°C 170 Fig. 3.157 Rheogram of Bombay High Crude oil with 500 ppm of 814UA18N at 19°C 170 Fig. 3.158 Rheogram of Bombay High Crude oil with 500 ppm of 814UA18N at 22°C 171 Fig. 3.159 Rheogram of Bombay High Crude oil with 1000 ppm of 814UA18N at 10°C 171 Fig. 3.160 Rheogram of Bombay High Crude oil with 1000 ppm of 814UA18N at 13°C 172 Fig. 3.161 Rheogram of Bombay High Crude oil with 1000 ppm of 814UA18N at 16°C 172 Fig. 3.162 Rheogram of Bombay High Crude oil with 1000 ppm of 814UA18N at 19°C 173 Fig. 3.163 Rheogram of Bombay High Crude oil with 1000 ppm of 814UA18N at 22°C 173 Fig. 3.164 Rheogram of Bombay High Crude oil with 500 ppm of 814CA18N at 10°C 174 Rheogram of Bombay High Crude oil with 500 ppm of 814CA18N at 13°C Fig. 3.165 174 Fig. 3.166 Rheogram of Bombay High Crude oil with 500 ppm of 814CA18N at 16°C 175 Fig. 3.167 Rheogram of Bombay High Crude oil with 500 ppm of 814CA18N at 19°C 175 Fig. 3.168 Rheogram of Bombay High Crude oil with 500 ppm of 814CA18N at 22°C 176 Fig. 3.169 Rheogram of Bombay High Crude oil with 1000 ppm of 814CA18N at 10°C 176 Fig. 3.170 Rheogram of Bombay High Crude oil with 1000 ppm of 814CA18N at 13°C 177 Fig. 3.171 Rheogram of Bombay High Crude oil with 1000 ppm of 814CA18N at 16°C 177 Fig. 3.172 Rheogram of Bombay High Crude oil with 1000 ppm of 814CA18N at 19°C 178 Fig. 3.173 Rheogram of Bombay High Crude oil with 1000 ppm of 814CA18N at 22°C 178 Fig. 3.174 Rheogram of Bombay High Crude oil with 500 ppm of 816CA18N at 10°C 179 Fig. 3.175 Rheogram of Bombay High Crude oil with 500 ppm of 816CA18N at 13°C 179 Fig. 3.176 Rheogram of Bombay High Crude oil with 500 ppm of 816CA18N at 16°C 180 Fig. 3.177 Rheogram of Bombay High Crude oil with 500 ppm of 816CA18N at 19°C 180 Fig. 3.178 Rheogram of Bombay High Crude oil with 500 ppm of 816CA18N at 22°C 181 Fig. 3.179 Rheogram of Bombay High Crude oil with 1000 ppm of 816CA18N at 10°C 181 Fig. 3.180 Rheogram of Bombay High Crude oil with 1000 ppm of 816CA18N at 13°C 182 Fig. 3.181 Rheogram of Bombay High Crude oil with 1000 ppm of 816CA18N at 19°C 182 Fig. 3.182 Rheogram of Bombay High Crude oil with 1000 ppm of 816CA18N at 22°C 183 Fig. 3.183 Rheogram of Bombay High Crude oil with 500 ppm of 814RA18N at 10°C 183 Fig. 3.184 Rheogram of Bombay High Crude oil with 500 ppm of 814RA18N at 13°C 184 Fig. 3.185 Rheogram of Bombay High Crude oil with 500 ppm of 814RA18N at 16°C 184 Fig. 3.186 Rheogram of Bombay High Crude oil with 500 ppm of 814RA18N at 19°C 185 Fig. 3.187 Rheogram of Bombay High Crude oil with 500 ppm of 814RA18N at 22°C 185 Fig. 3.188 Rheogram of Bombay High Crude oil with 1000 ppm of 814RA18N at 10°C 186 Fig. 3.189 Rheogram of Bombay High Crude oil with 1000 ppm of 814RA18N at 13°C 186 Fig. 3.190 Rheogram of Bombay High Crude oil with 1000 ppm of 814RA18N at 16°C 187 Fig. 3.191 Rheogram of Bombay High Crude oil with 1000 ppm of 814RA18N at 19°C 187 Fig. 3.192 Rheogram of Bombay High Crude oil with 1000 ppm of 814RA18N at 22°C 188 Fig. 3.193 Rheogram of Bombay High Crude oil with 500 ppm of 816RA18N at 10°C 188 Fig. 3.194 Rheogram of Bombay High Crude oil with 500 ppm of 816RA18N at 13°C 189 Fig. 3.195 Rheogram of Bombay High Crude oil with 500 ppm of 816RA18N at 16°C 189 Fig. 3.196 Rheogram of Bombay High Crude oil with 500 ppm of 816RA18N at 19°C 190 Fig. 3.197 Rheogram of Bombay High Crude oil with 500 ppm of 816RA18N at 22°C 190 Fig. 3.198 Rheogram of Bombay High Crude oil with 1000 ppm of 816RA18N at 10°C 191 Fig. 3.199 Rheogram of Bombay High Crude oil with 1000 ppm of 816RA18N at 13°C 191 Fig. 3.200 Rheogram of Bombay High Crude oil with 1000 ppm of 816RA18N at 16°C 192 Fig. 3.201 Rheogram of Bombay High Crude oil with 1000 ppm of 816RA18N at 19°C 192 Fig. 3.202 Rheogram of Bombay High Crude oil with 1000 ppm of 816RA18N at 22°C 193 Fig. 3.203 Rheogram of Bombay High Crude oil with 500 ppm of 814OA18N at 10°C 193 Fig. 3.204 Rheogram of Bombay High Crude oil with 500 ppm of 814OA18N at 13°C 194 194 Fig. 3.205 Rheogram of Bombay High Crude oil with 500 ppm of 814OA18N at 16°C Fig. 3.206 Rheogram of Bombay High Crude oil with 500 ppm of 814OA18N at 19°C 195 Fig. 3.207 Rheogram of Bombay High Crude oil with 500 ppm of 814OA18N at 22°C 195 Fig. 3.208 Rheogram of Bombay High Crude oil with 1000 ppm of 814OA18N at 10°C 196 Fig. 3.209 Rheogram of Bombay High Crude oil with 1000 ppm of 814OA18N at 13°C 196 Fig. 3.210 Rheogram of Bombay High Crude oil with 1000 ppm of 814OA18N at 16°C 197 Rheogram of Bombay High Crude oil with 1000 ppm of 814OA18N at 19°C Fig. 3.211 197 Fig. 3.212 Rheogram of Bombay High Crude oil with 1000 ppm of 814OA18N at 22°C 198 Fig. 3.213 Rheogram of Bombay High Crude oil with 500 ppm of 816OA18N at 10°C 198 Fig. 3.214 Rheogram of Bombay High Crude oil with 500 ppm of 816OA18N at 13°C 199 Fig. 3.215 Rheogram of Bombay High Crude oil with 500 ppm of 816OA18N at 16°C 199 Fig. 3.216 Rheogram of Bombay High Crude oil with 500 ppm of 816OA18N at 19°C 200 Fig. 3.217 Rheogram of Bombay High Crude oil with 500 ppm of 816OA18N at 22°C 200 Fig. 3.218 Rheogram of Bombay High Crude oil with 1000 ppm of 816OA18N at 10°C 201 Fig. 3.219 Rheogram of Bombay High Crude oil with 1000 ppm of 816OA18N at 13°C 201 Fig. 3.220 Rheogram of Bombay High Crude oil with 1000 ppm of 816OA18N at 16°C 202 Fig. 3.221 Rheogram of Bombay High Crude oil with 1000 ppm of 816OA18N at 19°C 202 Fig. 3.222 Rheogram of Bombay High Crude oil with 1000 ppm of 816OA18N at 22°C 203