

Annexure-I
List of Products

Sr. No	Name of Products	Total MTPM
(A)	Dyes Intermediates	
1.	CHLORANIL	150
2.	OAP	
3.	PAP	
4.	MAP	
5.	OAPSA	
6.	Metanilic Acid	
7.	6 Chloro Metanilic Acid	
8.	4 CAP	
9.	4 CAPSA	
10.	4 NAP	
11.	5 NAP (5 NITRO 2 AMINO PHENOL)	
12.	6 NAPSA	
13.	4 NAPSA	
14.	6 CAPSA	
15.	2 PYRIDONE	
16.	1:3 Phenyl Methyl 5 Pyrazolone (PMP)	
17.	1 : 4 Sulpho Phenyl 3 Methyl 5 Pyrazolone (1:4 SPMP)	
18.	2:5 Dichloro 4 Sulpho Phenyl 3 Methyl 5 Pyrazolone (2:5 DCSPMP)	
19.	2 Chloro 5 Sulphophenyl 3 Methyl 5 Pyrazolone (2, 5 C	
20.	1,3 Sulpho Phenyl 3 Methyl 5 Pyrazolone (1:3 SPMP)	
21.	2 Chloro Phenyl Methyl 5 Pyrazolone	
22.	P.T. Phenyl Methyl 5 Pyrazolone	
(B)	Dyes	
❖	Acid Dyes	100
1.	Acid Yellow 79	
2.	Acid Yellow 151	
3.	Acid Yellow 49	
4.	Acid Yellow 99	
5.	Acid Yellow 194	
6.	Acid Yellow 220	
7.	Acid Yellow 232	
8.	Acid Brown 75	
9.	Acid Brown 165	
10.	Acid Brown 161	
11.	Acid Brown 282	
12.	Acid Brown 432	
13.	Acid Brown 425	
14.	Acid Brown 432	

Sr. No	Name of Products	Total MTPM	
15.	Acid Green 16		
16.	Acid Blue 9		
17.	Acid Blue 15		
18.	Acid Blue 7		
19.	Acid Blue 113		
20.	Acid Blue 193		
21.	Acid Red 315		
22.	Acid Black 107		
❖	Direct Dyes		
23.	Direct Black 80		
24.	Direct Yellow 11		
25.	Direct Brown 44		
26.	Direct Blue 71		
27.	Direct Orange 118		
28.	Direct Red 239		
29.	Direct Red 254		
30.	Direct Violet 35		
31.	Direct Red 81		
32.	Direct Violet 9		
33.	Direct Yellow 99		
34.	Direct Black 19		
❖	Reactive Dyes		
35.	Reactive Blue 198		
36.	Reactive Blue 187		
37.	Reactive Blue 220		
38.	Reactive Blue 221		
❖	Basic Dyes		50
39.	Basic Brown 1		
40.	Basic Yellow 2		
41.	Basic Violet 1 Crystal		
42.	Basic Green 4 Crystal		
43.	Basic Green 1 Crystal		
44.	Basic Blue 26 Crystal		
❖	Basic Dyes Liquid		100
45.	Basic Yellow 2		
46.	Basic Violet 1		
47.	Basic Green 4		
48.	Basic Green 1		
49.	Basic Blue 26		
	Total	400	

List of Raw Material

Sr. no	Product name	Raw Material Name	Quantity MT/MT
Dyes Intermediates			
1	Chloranil	HCl 30% (SPENT)	1.000
		Hydro quinone	0.450
		Chlorine Gas	1.136
2	OAP (Ortho Amino Phenol)	ONCB	1.480
		Caustic Lye	0.850
		H2 Gas	0.060
		Catalyst	0.004
		HCl	0.040
3	PAP (Para Amino Phenol)	PNCB	1.480
		Caustic Lye	0.850
		H2 Gas	0.060
		Catalyst	0.004
		HCl	0.040
4	MAP (Meta Amino Phenol)	Metanilic Acid	1.590
		NaOH	0.750
		Catalyst	0.004
5	Ortho Amino Phenol Sulphonic Acid (OAPSA)	OAP	0.580
		H2SO4	0.520
		Oleum 23%	0.425
6	Metanilic Acid	Nitro benzene	0.720
		Oleum (25%)	0.425
		H ₂ SO ₄	0.520
		HCl (30%)	0.100
		Iron Powder	0.125
7	6 Chloro Metanilic Acid	ONCB	0.920
		H ₂ SO ₄	0.520
		Oleum	0.425
		Iron Powder	0.125
		HCl	0.100
8	4-Chloro 2-Amino Phenol (4 CAP)	2:5 DCNB	1.350
		Caustic	0.300
		Iron powder	0.125
		HCl	0.100
9	4 Chloro-2-Amino Phenol 5-Sulphonic Acid (4 CAPSA)	4 CAP	0.650
		Sulphuric Acid	0.520
		Oleum	0.425
10	4 NAP	NaSH	0.515
		Lime	0.220
		2:4 DNCB	1.400
		NaOH	0.300
11	5 NAP	OAP	0.725
		Acetic Anhydride	0.675

		HNO ₃	0.450
		H ₂ SO ₄	0.850
		H ₂ Gas	0.080
12	6 NAPSA	OAP	0.470
		Oleum (23%)	0.800
		HNO ₃	0.270
		H ₂ SO ₄	0.550
13	4 NAPSA	Lime	0.220
		NaSH	0.515
		4 Nitro Chloro Benzene	0.700
		Oleum	0.800
		HNO ₃	0.270
		H ₂ SO ₄	0.550
14	6 CAPSA	2 Chloro Phenol	0.580
		Oleum	0.800
		HNO ₃	0.270
		H ₂ SO ₄	0.550
		Iron Powder	0.125
		HCl	0.100
15	2 Pyridone	Mono Ethyl Amine	0.400
		Methyl Cyno Acetate	0.525
		Methyl Aceto Acetate Ester	0.660
		H ₂ SO ₄	3.600
16	1:3 Phenyl Methyl 5 Pyrazolone (PMP)	Aniline	0.435
		HCl	4.700
		NaNO ₂	0.330
		Sodium Bi Sulphite	1.160
		Soda Ash	1.550
		Methyl Aceto acetate ester	0.525
17	1,4 Sulpho Phenyl-3-Methyl-5-Pyrazolone (1:4 SPMP)	Sulfanlic Acid	0.536
		HCl	3.142
		NaNO ₂	0.218
		SBS	0.804
		Soda Ash	1.035
		Methyl Aceto Acetate Ester	0.347
18	2,5 Dichloro 4 Sulfo Phenyl 3 Methyl 5 Pyrazolone (DCSPMP)	2,5 Dichloro Aniline	0.500
		HCl	1.607
		NaNO ₂	0.221
		SBS	0.696
		Soda Ash	0.500
		Caustic Soda Lye	0.714
		Methyl Aceto Acetate Ester	0.339
19	2 Chloro 5 Sulphophenyl 3 Methyl 5 Pyrazolone	6 Chloro Metanilic Acid	0.750
		HCl	2.400
		NaNO ₂	0.265
		SBS	1.150

		Soda Ash	0.850
		Caustic Soda Lye	0.450
		Methyl Aceto Acetate Ester	0.420
20	1, 3 Sulpho Phenyl 3 Methyl 5 Pyrazolone (1:3 SPMP)	Metanilic Acid	0.536
		HCl	2.140
		NaNO ₂	0.217
		SBS	0.800
		Soda Ash	1.035
		Methyl Aceto Acetate Ester	0.346
21	2 Chloro Phenyl 3 Methyl 5 Pyrazolone	Ortho Chloro Aniline	0.500
		HCl	2.980
		Sodium nitrite	0.275
		Sodium Bi Sulphite	0.972
		Soda Ash	1.311
		Methyl Acetoacetic Ester	0.410
22	Para Toluene Phenyl Methyl 5 Pyrazolone	Para Toludine	0.415
		HCl	2.950
		NaNO ₂	0.270
		Sodium Bi Sulphite	0.965
		Soda Ash	1.300
		Methyl Acetoacetic Ester	0.435
Acid Dyes			
1	Acid Yellow 79	DAP ESTER	0.400
		H ₂ SO ₄	0.540
		Soda ash	0.250
		5-Amino-3- methyl-1-(3-sulfophenyl) pyrazole	0.390
		Caustic flakes	0.060
		Common Salt	0.650
2	Acid Yellow 151	OPSAmide	0.500
		Hydrochloric Acid	0.112
		Sodium Nitrite	0.184
		Aceto Acetanilide	0.483
		Caustic Lye	0.210
		Soda Ash	0.250
		Cobalt Sulphate	0.415
		Common Salt	0.650
3	Acid Yellow 49	2, 5 Dichloro Sulfanilic Acid	0.500
		HCl	0.800
		Sodium Nitrite	0.155
		5-Amino PMP	0.400
		Common Salt	0.775
4	Acid Yellow 99	4 NAPSA	0.285
		HCl	0.110
		Nitrite	0.085
		Acetoacetinilide	0.222
		Caustic Flakes	0.052

		Soda Ash	0.135
		Salicylic Acid	0.185
		BCS	0.380
		Caustic Flakes	0.145
		Common Salt	0.550
5	Acid Yellow 194	4-NAPSA diazo	0.550
		HCl	0.430
		sodium nitrite	0.165
		Acetoacetanilide	0.435
		Caustic Lye	0.100
		Cobalt Sulphate, 20%	0.325
6	Acid Yellow 220	Anthranilic OAPSA	0.500
		HCl	0.087
		Nitrite	0.112
		O Cl Acetoacetinilide	0.350
		Caustic Flakes	0.070
		Soda Ash	0.240
		Cobalt Sulfate	0.230
		BCS	0.050
7	Acid Yellow 232	5 Sulfo Anthranilic Acid	0.233
		Hydrochloric Acid	0.125
		Sodium Nitrite	0.160
		1-Phenyl 3 Methyl 5 Pyrozone	0.410
		Soda Ash	0.250
		Salicylic Acid	0.040
		Basic Chromium Sulfate	0.400
		Sulphuric Acid	0.136
8	Acid Brown 75	Picramic acid	0.192
		Hydrochloric acid	0.675
		Sodium Nitrite	0.095
		Caustic lye	0.090
		Resorcinol	0.096
		H-Acid	0.278
		Soda ash	0.346
		Sodium nitrite	0.170
		PNA	0.113
		Common Salt	0.550
9	Acid Brown 165	Picramic acid	0.192
		Hydrochloric acid	0.675
		Sodium Nitrite	0.265
		Caustic lye	0.090
		Resorcinol	0.096
		H-Acid	0.278
		Soda ash	0.346
		PNA	0.113
		Ferrous Sulphate	0.260

		Common Salt	0.550
10	Acid Brown 161	Anthranilic acid	0.190
		Sulphuric acid	0.190
		Formaldehyde	0.080
		Nitrite	0.100
		Resorcinol	0.170
		Caustic Flakes	0.200
		Aniline 2,4 SO ₃ H	0.190
		HCl	0.180
		Sodium Nitrite	0.090
		Soda Ash	0.350
		Salicylic Acid	0.050
		B.C.S	0.200
		11	Acid Brown 282
Beta Naphthol	0.100		
Caustik Flakes	0.100		
Salicylic Acid	0.065		
B.C.S.	0.180		
4NAP	0.175		
HCl	0.033		
Nitrite	0.095		
PMP	0.200		
12	Acid Brown - 432	Anthranilic Acid	0.180
		HCl	0.210
		Nitrite	0.180
		Resorcinol	0.150
		Soda Ash	0.330
		Laurent Acid	0.300
		Salicylic Acid	0.160
		Chromium Fluoride	0.160
		Liquid Ammonia	0.300
		Caustic Flakes	0.030
13	Acid Brown 425	Anthranilic acid	0.149
		HCl	0.115
		Nitrite	0.150
		Resorcinol	0.117
		Soda Ash	0.330
		O.T. 5 SA.	0.220
		Salicylic Acid	0.105
		B.C.S.	0.320
		Caustic Flakes	0.035
14	Acid Brown - 434	Sodium Picramate	0.267
		HCl	0.645
		Nitrite	0.070
		Resorcinol	0.096
		1,6 cleave acid	0.205
		Sodium Nitrite	0.060

		Caustic Lye	0.135
		Ferrous Sulphate	0.260
		Common Salt	0.550
15	Acid Green 16	Di Methyl Aniline	0.600
		Formaldehyde	0.220
		Sulphanilic Acid	0.010
		Soda Ash	1.030
		MnO ₂	0.400
		Napthaline	0.400
		Sulphuric Acid	1.050
		Oleum	0.450
		NapthaleneDisulphonic Acid	0.750
		Sodium dichromate	0.110
		Oxalic Acid	0.160
		Common Salt	0.650
16	Acid Blue 9	Ethyl Benzyl Aniline Sulphonic Acid	0.750
		Ortho Benzaldehyde sulphonic Acid	0.275
		H ₂ SO ₄	0.600
		Soda Ash	0.400
		HCl	0.750
		MNO ₂	0.150
		Acetic Acid	0.300
		Common Salt	0.800
17	Acid Blue 15	Ethyl Benzyl Aniline Sulphonic Acid	1.090
		Di Ethyl meta Toludine	0.210
		H ₂ SO ₄	0.600
		SODA ASH	0.400
		HCl	0.750
		MNO ₂	0.150
		Acetic Acid	0.300
		Common Salt	0.800
18	Acid Blue 7	Benzaldehyde Disulfonic Acid	0.330
		Ethyl benzyl aniline	0.380
		H ₂ SO ₄	0.600
		Soda Ash	0.150
		HCl	0.350
		MNO ₂	0.150
		Soda Ash	0.250
		HCl	0.400
		Acetic Acid	0.300
		Common Salt	0.800
19	Acid Blue 113	Metanillic Acid	0.300
		HCl	0.120
		Sodium Nitrite	0.070

		Alpha Naphthyl Amine	0.240
		Nitrite	0.050
		H2SO4	0.250
		Caustic Flakes	0.200
		Phenyl peri Acid	0.490
		Soda Ash	0.200
		Sodium Acetate	0.300
		Common Salt	0.800
20	Acid Blue 193	B Naphthol	0.350
		Caustic Lye	0.245
		1,2,4 Diazo	0.690
		Salicylic Acid	0.050
		BCS	0.240
21	Acid Red 315	4 NAPSA	0.225
		HCl	0.250
		Nitrite	0.136
		PMP	0.320
		Caustic Flakes	0.200
		Salacylic Acid	0.040
		BCS	0.350
		5 NAP	0.138
22	Acid Black 107	6 Nitro	0.480
		Beta Naphthol	0.120
		Caustic Flakes	0.300
		Salacylic Acid	0.045
		ChromuimFormate	0.400
		Sodium Picramate	0.200
		HCl	0.250
		Nitrite	0.080
		Beta Naphthol	0.245
Direct Dyes			
23	Direct Black 80	P- amino acetanilide	0.145
		Sodium Nitrite	0.315
		HCl	0.750
		Gamma Acid	0.430
		Soda Ash	0.790
		Caustic soda	0.215
		Mixed cleves acid	0.195
		Common Salt	0.550
24	Direct Yellow 11	PNTOSA	0.600
		Caustic lye	0.215
		Spent H2SO4 (70%)	0.500
		Common Salt	0.650
25	Direct Brown 44	MPD	0.405
		Sodium Nitrite	0.258
		HCl	0.400
		Sulphanilic Acid	0.300

		CS Lye	0.220
26	Direct Blue 71	C-Acid	0.165
		HCl	0.700
		Sodium Nitrite	0.445
		Alpha Naphthyl Amine	0.170
		Caustic Flake	0.080
		Mix Cleave Acid	0.330
		J acid	0.250
		Caustic Lye	0.060
27	Direct Orange 118	O - Toludine 5 Sulphonic Acid	0.250
		HCl	0.375
		Sodium Nitrite	0.095
		Sodium bi-carbonate	0.050
		J-Acid Urea	0.350
		Common Salt	0.650
28	Direct Red 239	Browner's acid	0.250
		caustic lye	0.100
		Sodium Nitrite	0.095
		HCl	0.550
		J-Acid Urea	0.292
		Sodium Bi Carbonate	0.250
29	Direct Red 254	PAABSA	0.400
		Sodium Nitrite	0.100
		Soda ash	0.300
		HCl	0.550
		J-Acid	0.350
		caustic soda lye	0.150
30	Direct Violet 35	C-Acid	0.330
		HCl	0.700
		Sodium Nitrite	0.294
		p-Cresidine	0.150
		Soda Ash	0.100
		n-Phenyl J-Acid	0.327
		Caustic lye, 48%	0.300
31	Direct Red 81	PAABSA	0.350
		HCl	0.300
		Caustic lye 48%	0.260
		Na ₂ CO ₃	0.100
		Benzyl Chloride	0.150
		Sodium Acetate	0.160
		J acid	0.280
		Common Salt	0.650
32	Direct Violet 9	Sulphanilic acid	0.180
		HCl	1.000
		Sodium Nitrite	0.294
		p-Cresidine	0.150
		SodaAsh	0.075

		n-Phenyl J-Acid	0.327
		Caustic lye, 48%	0.148
33	Direct Yellow 99	DNSDA	0.550
		Para anisidine	0.245
		Caustic lye	0.157
		HCl	0.260
		Salt	0.500
34	Direct Black 19	PNA	0.210
		HCl	1.080
		Sodium Nitrite	0.180
		H acid	0.245
		Soda Ash	0.185
		Sodium Nitrite	0.180
		MPD	0.155
		SD-40	0.020
Reactive Dyes			
35	Reactive Blue 198	Cyanuric Chloride	0.220
		Soda ash	0.150
		Tamol	0.010
		Aniline 2:4 DSA	0.320
		Soda Bi Carb	0.120
		Blue HEGN-Base	0.400
		HCl	0.120
		Dicamol	0.045
36	REACTIVE BLUE 187	EthyleneDiamine	0.250
		PNCBOSA	0.230
		HCl	0.800
		HCl	0.315
		Sodium sulphite	0.085
		Chloronail	0.175
		Sodium bicarbonate	0.160
		Sulphuric Acid	0.650
		Oleum	0.300
		Ammonium persulphate	0.150
		Cyanuric Chloride	0.200
		Aniline 2,5 disulphuric acid	0.260
		Nicotinic acid	0.250
		Dicamol	0.055
		Dedusting Oil	0.025
37	Reactive blue 220	Sulpho OAVS	0.650
		HCl	0.325
		Sodium Nitrite	0.130
		CS Lye	0.125
		Sulphamic acid	0.004
		Soda Ash	0.275
		4-Sulpho Hydrazone	0.450
		Copper sulphate	0.350

		Soda Bi Carbonate	0.195
		Dicamol	0.070
		SD-40	0.030
38	REACTIVE BLUE 221	6-Acetyl OAPSA	0.250
		CS Lye	0.055
		HCl	0.800
		Sodium nitrite	0.070
		Sulphamic acid	0.002
		Sodium acetate	0.120
		soda ash	0.335
		4-Sulpho Hydrazone	0.350
		Copper sulphate	0.250
		CS Flakes	0.350
		Salt	0.120
		Cyanuric Chloride	0.150
		Tamol	0.020
		N-Ethyl MBE	0.220
		Soda Bi Carb	0.130
		Dicamol	0.055
Basic Dyes			
39	Basic Brown 1	MPD	0.215
		HCl	0.750
		Nitrite	0.300
		MPD	0.430
		Caustic Flakes	0.050
		Common Salt	0.450
40	Basic Yellow 2	Di Methyl Aniline	0.833
		Formaline	0.313
		H ₂ SO ₄	0.100
		T G UREA	1.030
		SULPHUR	0.110
		Common Salt	0.450
41	Basic Violet 1 Crystal	Di Methyl Aniline	0.670
		Para Formaldehyde	0.110
		Mono Ethyl Aniline	0.330
		Catalyst	0.050
		Acetic Acid	0.800
		Caustic Soda	1.000
		HCl	0.330
42	Basic Green 4 Crystal	Di Methyl Aniline	0.800
		Benzaldehyde	0.360
		HCl	0.360
		Acetic Acid	0.600
		Catalyst	0.040
		Ethyl Cellulose	0.080
		Caustic Soda	0.750
		Oxalic Acid	0.600

43	Basic Green 1 Crystal	Di Ethylaniline	1.000
		Benzaldehyde	0.330
		Acetic Acid	1.460
		Catalyst	0.050
		Caustic Soda	0.800
		H ₂ SO ₄	0.600
44	Basic Blue 26 Crystal	Di Methyl Aniline	0.450
		Para Formaldehyde	0.075
		Phenyl Alpha naphthalamine	0.415
		Acetic Acid	0.750
		Catalyst	0.020
		Caustic Soda	1.000
		H ₂ SO ₄	0.600
45	Basic Yellow 2 Liquid	Di Methyl Aniline	0.270
		Formaline	0.100
		H ₂ SO ₄	0.050
		Acetic Acid	0.225
		Glycerine	0.033
		T G Urea	0.335
		Sulphur	0.035
			0.000
46	Basic Violet 1 Liquid	Di Methyl Aniline	0.330
		Para Formaldehyde	0.050
		Mono Ethyl Aniline	0.170
		Catalyst	0.020
		Acetic Acid	0.450
47	Basic Green 4 Liquid	Di Methyl Aniline	0.330
		Benzaldehyde	0.150
		HCl	0.150
		Acetic Acid	0.300
		Catalyst	0.020
		Ethyl Cellulose	0.030
48	Basic Green 1 Liquid	Di Ethylaniline	0.330
		Benzaldehyde	0.110
		Urea	0.040
		Acetic Acid	0.500
		Catalyst	0.020
49	Basic Blue 26 Liquid	Di Methyl Aniline	0.240
		Para Formaldehyde	0.040
		Phenyl Alpha naphthalamine	0.220
		Acetic Acid	0.500
		Catalyst	0.020

Annexure-II
Manufacturing Process

(A) Dye Intermediates

1. Chloranil

Manufacturing Process:

Hydroquinone and HCL (30%) are charged in the reactor, Mixture is heated up to 70⁰C. Reaction mixture is cooled down to the 30⁰C, and sent to Agitated Notch filter, filtered mass is washed by water, mother liquor sent ETP. Wet Cake is dried to obtain finished product.

Chemical Reaction:



Mass Balance:

Mass Balance of Chloranil						
INPUT	KG			OUTPUT	KG	
HCl 30% (SPENT)	1000	→	Chlorination	→		
Hydro quinone	450	→		→	HCl Gas	370
Chlorin Gas	1136	→		↓		
				→		
Water	250	→	Nutch Filter	→	Effluent	616
				↓		
			Drying	→	Drying loss	850
				→	Chloranil	1000
Total	2836					2836

2. ORTHO AMINO PHENOL (OAP)

Manufacturing Process:

Take Ortho Nitro Chloro Benzene (ONCB), water, caustic flakes and heat the mass to bring the pressure up to 3 atmospheres. ONCB gets converted into Ortho Nitro Phenol (ONP). Remove the product by layer separation. Take ONP in hydrogenator, remove oxygen through flushing of N₂ gas and after that pass H₂ gas at temperature 80°C and 8 to 10 kg pressure in presence of Catalyst. ONP gets converted into Para Amino Phenol (PAP). Distill out the product and wash and centrifuge for final packing and dispatch.

Mass Balance:

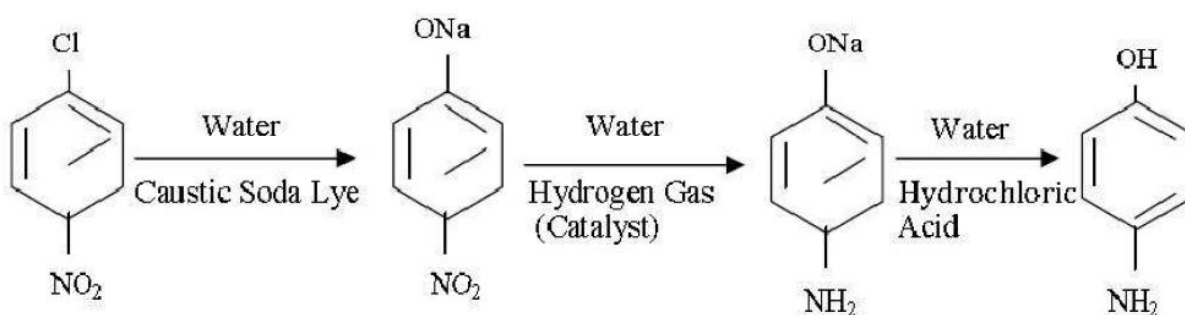
Mass Balance of OAP (Ortho Amino Phenol)					
INPUT	KG			OUTPUT	KG
ONCB	1480	→	Hydrolysis		
Caustic Lye	850	→			
Water	2500	→			
H2 Gas	60	→	Hydrogenation		
Catalyst	4	→			
			Clarification	→ Catalyst for reuse	4
HCl	40	→	Precipitation & Filtration	→ Waste Water	5070
Water	2030	→			
			Drying & packing	→ Drying loss	890
				→ Ortho Amino Phenol	1000
Total	6964				6964

3. PARA AMINO PHENOL (PAP)

Manufacturing Process:

Take Para Nitro Chloro Benzene (PNCB), water, caustic flakes and heat the mass to bring the pressure upto 3 atmospheres. PNCB gets converted into Para Nitro Phenol (PNP). Remove the product by layer separation. Take PNP in hydrogenator, remove oxygen through flushing of N₂ gas and after that pass H₂ gas at temperature 80°C and 8 to 10 kg pressure in presence of Catalyst. PNP gets converted into Para Amino Phenol (PAP). Distill out the product and wash and centrifuge for final packing and dispatch.

Chemical Reaction:



Mass Balance:

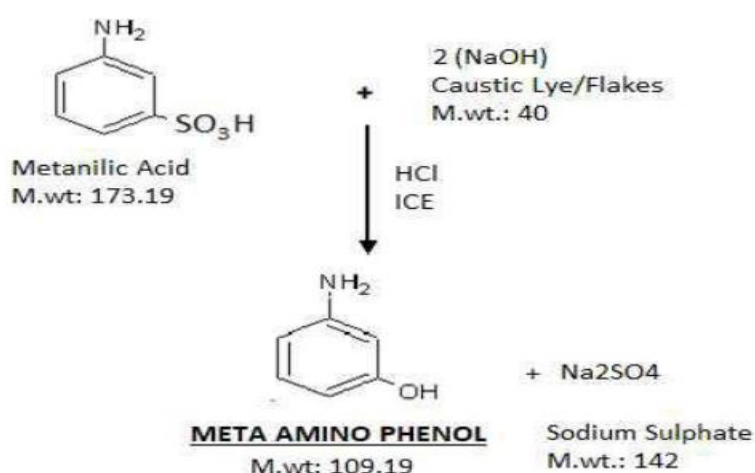
Mass Balance of PAP (Para Amino Phenol)					
INPUT	KG			OUTPUT	KG
PNCB	1480	→	Hydrolysis		
Caustic Lye	850	→			
Water	2500	→			
H ₂ Gas	60	→	Hydrogenation		
Catalyst	4	→			
			Clarification	Catalyst	4
HCl	40	→	Precipitation & Filtration		
Water	2030	→			Waste Water
			Drying & packing	Drying loss	940
				Para Amino Phenol	1000
Total	6964				6964

4. META AMINO PHENOL (MAP)

Manufacturing Process:

Charge in vessel caustic lye/flakes, Metanilic acid Powder/Liquid and heat up to 250 c to 260⁰ c under string and after complete reaction, charge water and make slurry of reaction mass and transfer to isolation vessel. Take slurry in isolation vessel and isolate material with Ice and slowly add Hydrochloric acid in it to isolate material, after complete isolation do centrifuge and then transfer for Drying. Take Centrifuge wet cake for Drying and pack Meta Amino Phenol. Generated waste water from centrifuge will transfer to ETP for treatment.

Chemical Reaction:



Mass Balance:

Mass Balance of MAP (Meta Amino Phenol)					
INPUT	KG			OUTPUT	KG
Metanilic Acid	1590	→	Fusion Reaction		
NaOH	750	→			
Catalyst	4	→			
Water	3000	→			
			↓		
			Clarification	→ Catalyst	4
			↓		
			Precipitation & Filtration	→ Waste water	3390
			↓		
			Drying & Packing	→ Drying loss	950
				→ Meta amino phenol	1000
Total	5344				5344

5. ORTHO AMINO PHENOL SULPHONIC ACID

Manufacturing Process:

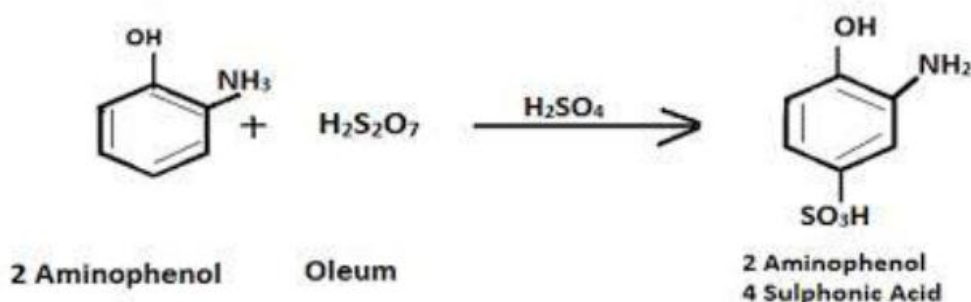
Sulphonation:-

Take H₂SO₄ - 98% then charge Oleum 23% and start chilling get temperature 40 to 45°C then charge OAP between 40 to 45°C with 6 hrs. After charging start heating and maintain 4 hrs. with temperature 90 to 95°C. Then check TLC with OAP and OAPSA and check Acidity (Range 79 to 82%). If TLC is not OK then 2 hrs. maintain temperature 90 to 95°C. Transfer in dumping vessel

Dumping:-

Take Water and charge ICE in 2 hrs. Then charge Sulpho mass slurry slowly addition with temperature 40 to 45°C Maintain with free string 2 hrs. Check filter loss (0.8% to 1%). After testing start nutch filter. Suck the M/L start centrifuge. Start crushing and packing.

Chemical Reaction:



Mass Balance:

Mass Balance of Ortho Amino Phenol Sulphonic Acid (OAPSA)					
INPUT	KG			OUTPUT	KG
OAP	580	→	Sulphonation		
H ₂ SO ₄	520	→			
Oleum 23%	425	→			
Water	4200	→	Filtration	Spent Acid(35-40%)	2125
				Waste water	1750
			Drying & Packing	Drying loss	850
				OAPSA	1000
Total	5725				5725

6. Metanalic Acid

Manufacturing Process:

Sulfonation: Nitrobenzene is sulfonated with 65% oleum at various temperatures to yield Nitrobenzene 2 Sulphonic Acid.

Drowning: Sulphonic Acid mass is drowned in water and excess acid is neutralized using lime stone and soda Ash to pH- 7.5-8.0.

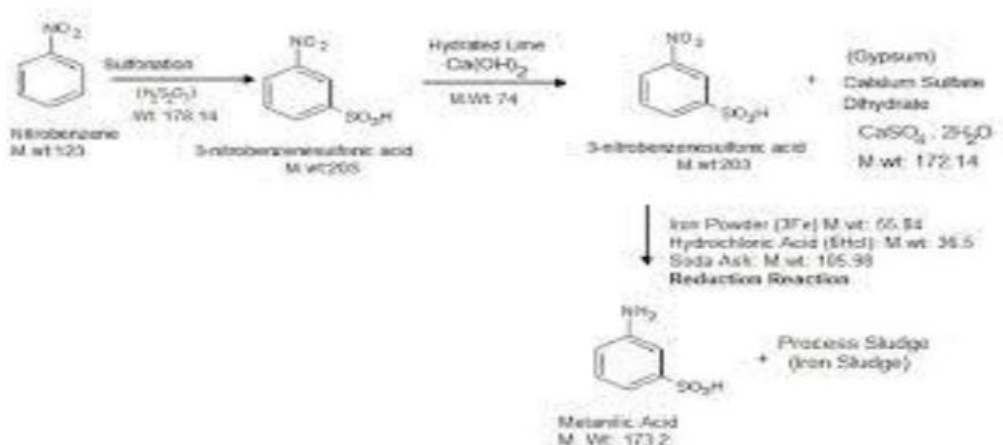
Filtration: The nitro mass is filtered and washed to get gypsum as byproduct and nitro solution.

Reduction: The nitrobenzene sulfonic acid is reduced using iron and hydrochloric Acid to yield metanilic Acid.

Filtration: The reduction mass is filtered to remove the iron sludge.

Isolation: The reduction mass is isolated using diluting sulfuric acid to yield Metanilic acid. This is then filtered, washed and dried.

Chemical Reaction:



Mass Balance:

Mass Balance of Metanilic Acid							
Input	KG				Output	KG	
Nitro benzene	720	→	Sulfonation				
Oleum (25%)	425	→					
H ₂ SO ₄	520	→					
Water	1500	→	Filtration		Spent Acid(40-42%)	1850	
HCl (30%)	100	→	Reduction & Clarification				
Iron Powder	125	→				Iron Sludge	350
Water	2000	→					
			Filtration		Waste water	1320	
			Drying		Drying loss	870	
						Metanilic Acid	1000
Total	5390					5390	

7. 6 CHLORO METANILIC ACID

Manufacturing Process:

Charge ONCB, Sulphuric acid and oleum are added into reactor then it is filtered. Then iron powder is added into vessel along with hydrochloric acid and mass is clarified then it is filtered and waste water is sent into ETP. And product is sent into dryer for drying.

Mass Balance:

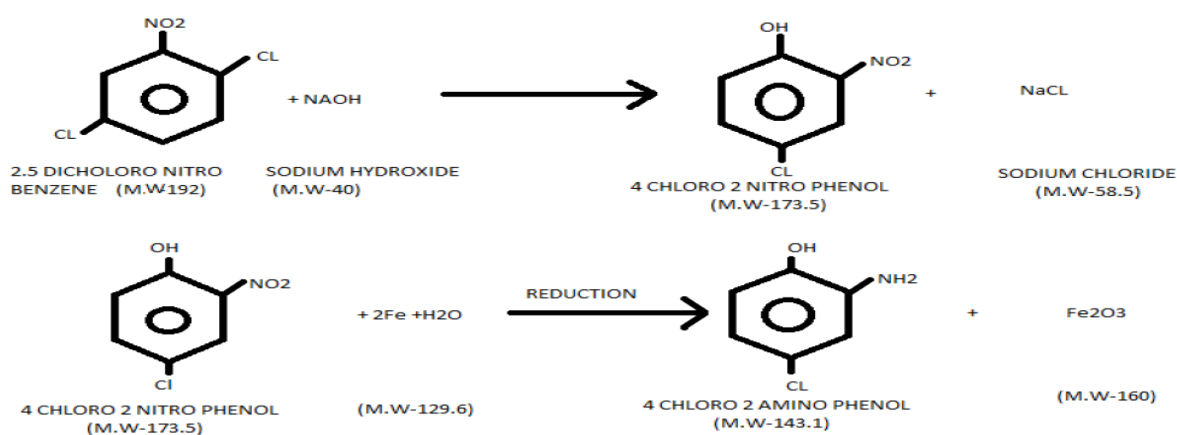
Mass Balance of 6 Chloro Metanilic Acid					
Input	KG		Output	KG	
ONCB	920	→	Sulfonation		
H ₂ SO ₄	520	→			
Oleum	425	→			
		↓			
Water	1500	→	Filtration	Spent Acid(45-46%)	1790
		↓			
Iron Powder	125	→	Reduction & Clarification		
HCl	100	→			
Water	2000	→			
		↓		Iron Sludge	350
		↓			
		↓	Filtration	Waste water	1525
		↓			
		↓	Drying	Drying Loss	925
				6 Chloro Metanilic Acid	1000

8. 4-CHLORO 2-AMINO PHENOL

Manufacturing Process:

2.5 Dichloro Nitro Benzene, Caustic soda flakes & Water is charged in the reactor. Reaction mass is charged along with Soda ash, Iron powder, HCl, Sodium Bicarbonate & Water in vessel after filtrate the reaction mass. HCl is added to reduce the pH of mass upto 2.5. Lime and caustic soda is added for the neutralization the mass. Iron sludge is separated from slurry during filtration. Isolation, Centrifuging and Drying steps are carried out to get the product.

Chemical Reaction:



Mass Balance:

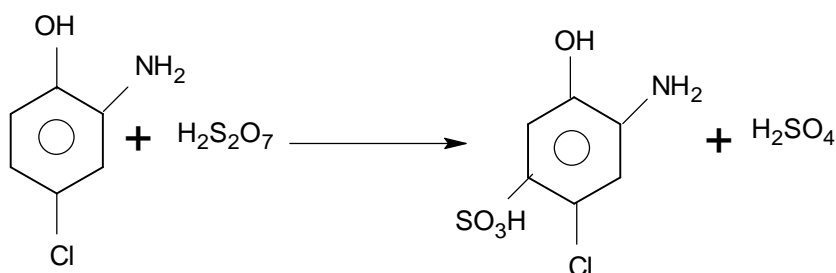
Mass balance of 4-Chloro 2-Amino Phenol (4 CAP)					
INPUT	KG			OUTPUT	KG
2:5 DCNB	1350	→	Hydrolysis		
Caustic	300	→			
Water	2000	→			
Iron powder	125	→	Reduction & Clarification	Iron Sludge	350
HCl	100	→			
			Nutch Filter	Waste Water	1775
			Drying & Packing	Drying Loss	750
				4 CAP	1000
Total	3875				3875

9. 4-CHLORO-2-AMINO PHENOL-5-SULPHONIC ACID

Manufacturing Process:

For manufacturing of 4-Chloro-2-Amino Phenol-5-Sulphonic Acid, the raw material, 4-Chloro-2-Amino Phenol is subjected to Sulphonation reaction by Sulphuric Acid and Oleum at desired reaction temperature. Sulphonated mass is then drowned in salt solution. Then the mass is filtered in nutch filter followed by centrifuge filter. Mother Liquor is collected in Mother Liquor Storage Tank and the product in the form of filtrate is packed for dispatch.

Chemical Reaction:



Mass Balance:

Mass balance of 4 Chloro-2-Amino Phenol 5-Sulphonic Acid (4 CAPSA)					
INPUT	KG			OUTPUT	KG
4 CAP	650	→	Sulphonation		
Sulphuric Acid	520	→			
Oleum	425	→			
Water	2500	→	Nutch Filter	Spent Acid(48-50%)	1420
					Waste Water
			Drying & Packing	Drying Loss	850
					4 CAPSA
Total	4095				4095

10. 4 NITRO 2 AMINO PHENOL

Manufacturing Process:

Step-I: Preparation of Calcium Polysulfide

Calcium oxide along with water is charged into M.S. jacketed reactor-I and heated up to 80⁰ C. Sodium Hydro sulfides & Sulphur powder are added & entire mass is known as Calcium Polysulfide.

Step-II: Preparation of Phenolate

Caustic soda lye and 2:4 Di Nitro Chloro Benzene is taken in the M.S. jacketed reactor-II & temperature is increase up to 70⁰ C. As entire process is being exothermic, temperature of the reaction mass is automatically up to 85-90°C. Sulphuric Acid is added for the neutralization of excess alkali. The neutralized mass is known as phenolate.

Step-III: Hydrolysis of 2:4 DNCB

Reduction of sodium Di Nitro Phenolate is carried out by Calcium Poly sulfide solution in brick lined reactor at 80⁰C & this temperature is maintained for 10 hrs.

Step-IV: Isolation & Filtration

After completion of the reaction, common salt is added for the isolation & mixture is cooled up to 30⁰C. Entire mass is Filtered into Nutch and centrifuged.

Mass Balance:

Mass balance of 4 NAP					
INPUT	KG			OUTPUT	KG
NaSH	515	→	Calcium Polysulphide		
Lime	220	→			
Water	500	→			
2:4 DNCB	1400	→	Hydrolysis		
NaOH	300	→			
Water	1000	→			
			↓		
				→	Calcium Thio Sulphite 635
				→	Waste Water 1500
				→	Drying Loss 800
				→	4 NAP 1000
Total	3935				3935

11. 5 NITRO 2 AMINO PHENOL(5 NAP)

Manufacturing Process:

OAP along with water is charged into M.S. jacketed reactor-I and Heated up To 80⁰ C. And Acetic Anhydride is added into vessel. The nitric acid is added. And further hydrolyzed by hydrogen gas. Then the wet product is goes into nutch filter and waste water is sent into ETP. And product is sent into spray dryer.

Mass Balance:

Mass balance of 5 NAP					
INPUT	KG			OUTPUT	KG
OAP	725	→	Acetylation		
Acetic Anhydride	675	→			
Water	1500	→			
			↓		
HNO ₃	450	→	Nitration		
H ₂ SO ₄	850	→			
			↓		
H ₂ Gas	80	→	Hydrolysis	→	Acetic Acid 800
			↓		
			Nutch Filter	→	Waste Water 1690
			↓		
			Drying & Packing	→	Drying Loss 790
				→	5 NAP 1000
Total	4280				4280

12. 6 NAPSA

Manufacturing Process:

Sulphonation :-

Take H₂SO₄ 98% then charge Oleum 23% and start chilling get temperature 20 to 30 °C check TLC with OAP and OAPSA and check Acidity (Range 79 to 82). If TLC is not OK then 2 hrs maintain temperature 100 to 105 °C. Transfer in nitration vessel.

Nitration:-

Collect Sulpho mass and start chilling get temperature 15 to 20 °C and 6 hrs. Then start WNA 68 % with addition between temperatures 15 to 20 °C 650 kg in 36 hrs. Maintain with free string 2 hrs then check AR/BR (0.3% to 0.55% different). If AR/BR different more than 0.55 % charge WNA and again check AR/BR different. Transfer in dumping vessel.

Dumping:-

Charge ICE approximately 4500 kg in 2 hrs. then charge Nitro mass slurry. Slowly addition with temperature 5 to 10°C. Maintain with free string 2 hrs. Check filter loss (1.5% to 2.5%). After testing start press filter / nutch filter. Suck the M/L start centrifuge. Start crushing and packing.

Mass Balance:

Mass balance of 6 NAPSA					
INPUT	KG			OUTPUT	KG
OAP	470	→	Sulphonation		
Oleum (23%)	800	→			
Water	1750	→			
			↓		
HNO ₃	270	→	Nitration		
H ₂ SO ₄	550	→			
			↓		
			Filtration	→ Waste Water	2030
				↓	
			Drying & Packing	→ Drying Loss	810
				→ 6 NAPSA	1000
Total	3840				3840

13. 4 NAPSA

Manufacturing Process:

p-nitroChlorobenzene is Sulphonated with oleum (23%) & Sulphuric acid followed by nitration with Nitric acid to get 2-chloro-3,5-dinitro benzene sulphonic acid. The above product is hydrolyzed in alkaline medium & partially reduced by adding NaHS to get 4-NAPSA (Na salt). Filter it and C/F. Dissolve the 4-NAPSA (Na salt) in sulphuric acid and clarify through filter press & isolated by Sulphuric acid, filter and centrifuge to get pure 4-NAPSA.

Mass Balance:

Mass balance of 4 NAPSA					
Input	KG			Output	KG
Lime	220	→	Calcium Polysulfide		
NaSH	515	→			
Water	800	→			
4 Nitro Chloro Benzene	700	→	Sulphonation		
Oleum	800	→			
HNO3	270	→	Nitration		
H2SO4	550	→			
			Reduction & Clarification	Calcium Thio Sulphide	635
			Nutch Filter	Waste Water	1350
			Drying & Packing	Drying Loss	870
				4 NAPSA	1000
Total	3855				3855

14. 6 CAPSA

Manufacturing Process:

2 Chloro phenol along with oleum is charged into reactor and Heated up To 80⁰ C. The nitric acid is added during nitration process. And then it goes into reduction where iron powder is added along with HCl. Then the wet product is goes for filtration and waste water is sent into ETP. And product is sent into for drying.

Mass Balance:

Mass balance of 6 CAPSA							
INPUT	KG				OUTPUT	KG	
2 Chloro Phenol	580	→	Sulphonation				
Oleum	800	→					
				↓			
HNO ₃	270	→	Nitration				
H ₂ SO ₄	550	→					
				↓			
Iron Powder	125	→	Reduction & Clarification		→	Iron Sludge	350
HCl	100	→					
Water	1000	→					
				↓			
			Filtration		→	Waste Water	1175
				↓			
			Drying & Packing		→	Drying Loss	900
					→	6 CAPSA	1000
Total	3425						3425

15. 2 PYRIDONE

Manufacturing Process:

In the reactor mono ethyl amine and methyl cyano acetate is added for condensation. Then mass is further condensate by Methyl Aceto Acetate Ester. Mass is sent for hydrolysis where it is hydrolyzed by Sulphuric acid. Then filter is sent into washing and filtration. Waste water is sent into ETP. And then product is charged into dryer.

Mass Balance:

Mass balance of 2 Pyridone					
INPUT	KG		OUTPUT	KG	
Mono Ethyl Amine	400	→	Condensation		
Methyl Cyno Acetate	525	→			
Methyl Aceto Acetate Ester	660	→	Condensation		
H ₂ SO ₄	3600	→	Hydrolysis		
Water	3450	→	Filtration & washing	Spent Acid(48-50%)	5000
					Waste Water
			Drying & Packing	Drying Loss	910
					2 pyridone
Total	8635				8635

16. 1:3 PHENYL METHYL 5 PYRAZOLONE (PMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly Aniline. Then diazotize it with sodium nitrite at 0°C. Pour diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then isolation with HCL. Then cool it down and filter out the material.

Mass Balance:

Mass balance of 1:3 Phenyl Methyl 5 Pyrazolone (PMP)					
INPUT	KG			OUTPUT	KG
Aniline	435	→	Diazotization		
HCl	700	→			
NaNO ₂	330	→			
Ice	500	→			
Water	500	→			
Sodium Bi Sulphite	1160	→	Reduction	SO ₂ Gas to Scrubber	700
Soda Ash	1550	→			
HCl	4000	→	Hydrolysis		
Methyl Aceto acetate ester	525	→	Condensation		
Water	1800	→	Washing		
			Filtation & Centrifuge	Waste water	9050
			Drying & Packing	Drying loss	750
				PMP	1000
Total	11500				11500

17. 1,4 Sulpho Phenyl 3 Methyl 5 Pyrazolone (1:4 SPMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly S. Acid. Then diazotize it with sodium nitrite at 0°C. Pour Diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then isolation with HCL. Then cool it down and filter out the material.

Mass Balance:

Mass Balance of 1,4 Sulpho Phenyl-3-Methyl-5-Pyrazolone (1:4 SPMP)					
INPUT	KG			OUTPUT	KG
Sulfanlic Acid	536	→	Diazotization		
HCl	500	→			
NaNO ₂	218	→			
Ice	500	→			
Water	500	→			
SBS	804	→	Reduction	SO ₂ Gas to scrubber	485
Soda Ash	1035	→			
HCl	2642	→	Hydrolysis		
Methyl Aceto Acetate Ester	347	→	Condensation		
Water	860	→	Washing		
			Filtation	Waste Water	5507
			Drying & Packing	Drying Loss	950
				1:4 SPMP	1000
Total	7942				7942

18. 2:5 Dichloro 4 Sulpho Phenyl 3 Methyl 5 Pyrazolone (2:5 DCSPMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly 2.5 DichloroAniline. Then diazotize it with sodium nitrite at 0°C. Pour diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then cool it down and filter out the material.

Mass Balance:

Mass Balance of 2,5 Dichloro 4 Sulfo Phenyl 3 Methyl 5 Pyrazolone(DCSPMP)					
INPUT	KG			OUTPUT	KG
2,5 Dichloro Aniline	500	→	Diazotization		
HCl	500	→			
NaNO ₂	221	→			
Ice	500	→			
Water	500	→			
SBS	696	→	Reduction	SO ₂ Gas	416
Soda Ash	500	→			
Caustic Soda Lye	714	→			
HCl	1107	→	Hydrolysis		
Methyl Aceto Acetate Este	339	→	Condensation		
Water	5739	→	Washing		
			Filtration	Waste water	8950
			Drying & Packing	Drying loss	950
				2,5 DCSPMP	1000
Total	11316				11316

19. 2 Chloro 5 Sulphophenyl 3 Methyl 5 Pyrazolone (2:5 CSMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly 6 Chloro Metanilic Acid. Then diazotize it with sodium nitrite at 0°C. Pour diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then isolation with HCL. Then cool it down and filter out the material.

Mass Balance:

Mass Balance of 2 Chloro 5 Sulphophenyl 3 Methyl 5 Pyrazolone					
INPUT	KG			OUTPUT	KG
6 Chloro Metanilic Acid	750	→	Diazotization		
HCl	600	→			
NaNO ₂	265	→			
Ice	500	→			
Water	500	→			
SBS	1150	→	Reduction		
Soda Ash	850	→		→ SO ₂ Gas	690
Caustic Soda Lye	450	→			
HCl	1800	→	Hydrolysis		
Methyl Aceto Acetate Ester	420	→	Condensation		
Water	1600	→	Washing		
			Filtration	→ Waste water	6315
			Drying & Packing	→ Drying loss	880
				→ 2,5 CSMP	1000
Total	8885				8885

20. 1,3 Sulpho Phenyl 3 Methyl 5 Pyrazolone (1:3 SPMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly Metanilic Acid. Then diazotize it with sodium nitrite at 0°C. Pour diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then isolation with HCl. Then cool it down and filter out the material.

Mass Balance:

Mass Balance of 1, 3 Sulpho Phenyl 3 Methyl 5 Pyrazolone (1:3 SPMP)					
INPUT	KG			OUTPUT	KG
Metanilic Acid	536	→	Diazotization		
HCl	600	→			
NaNO ₂	217	→			
Ice	500	→			
Water	500	→			
		↓			
SBS	800	→	Reduction	SO ₂ Gas	480
Soda Ash	1035	→			
		↓			
HCl	1540	→	Hydrolysis		
		↓			
Methyl Aceto Acetate Ester	346	→	Condensation		
		↓			
Water	850	→	Washing		
		↓			
		↓	Filtration	Waste water	4534
		↓			
		↓	Drying & Packing	Drying loss	910
		↓		1,3 SPMP	1000
Total	6924				6924

21. 2 Chloro Phenyl 3 Methyl 5 Pyrazolone (2 CPMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly Ortho Chloro Aniline. Then diazotize it with sodium nitrite at 0°C. Pour diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then isolation with HCL Then cool it down and filter out the material.

Mass Balance:

Mass Balance of 2 Chloro Phenyl 3 Methyl 5 Pyrazolone					
INPUT	KG			OUTPUT	KG
Ortho Chloro Aniline	500	→	Diazotization		
HCl	600	→			
Sodium nitrite	275	→			
Ice	500	→			
Water	500	→			
Sodium Bi Sulphite	972	→	Reduction	SO2 Gas	560
Soda Ash	1311	→			
HCl	2380	→	Hydrolysis		
Methyl Acetoacetic Ester	410	→	Condensation		
Water	1352	→	Washing		
			Filtation	Waste water	6400
			Drying & Packing	Drying loss	840
				2 CPMP	1000
Total	8800				8800

22. Para Toluene Phenyl Methyl 5 Pyrazolone (PTPMP)

Manufacturing Process:

Take water and oleum in the vessel and then add slowly Para Toludine. Then diazotize it with sodium nitrite at 0°C. Pour diazo for neutral reduction into solution of SBS and soda ash. Heat at 80°C and carry out hydrolysis by HCl. Then do formation of hydrazine with M.A.A Ester. Then isolation with HCL. Then cool it down and filter out the material.

Mass Balance:

Mass Balance of Para Toluene Phenyl Methyl 5 Pyrazolone					
INPUT	KG			OUTPUT	KG
Para Toludine	415	→	Diazotization		
HCl	600	→			
NaNO ₂	270	→			
Ice	500	→			
Water	500	→			
Sodium Bi Sulphite	965	→	Reduction	SO ₂ Gas to scrubber	570
Soda Ash	1300	→			
HCl	2350	→	Hydrolysis		
Methyl Acetoacetic Ester	435	→	Condensation		
Water	1335	→	Washing		
			Filtation	Waste water	6195
			Drying & Packing	Drying loss	905
					PTPMP
Total	8670				8670

(B)Dyes

1. Acid Yellow 79

Manufacturing Process:

Diazotization of DAP Ester in by Nitrosyl Sulphuric Acid, coupling with 5-Amino-3-methyl-1-(3-sulfophenyl) pyrazole, Filter the solution, collect wet cake and dry in oven.

Mass Balance:

Mass Balance of Acid Yellow 79						
INPUT	KG				OUTPUT	KG
DAP ESTER	400	→	Diazotization			
H ₂ SO ₄	540	→				
Soda ash	250	→				
Ice	1000	→				
Water	1500	→				
5-Amino-3- methyl-1-(3-sulfophenyl)	390	→	Coupling			
Caustic flakes	60	→				
Ice	1000	→				
Common Salt	650	→	Isolation & Filtration	→	Wastewater	3900
			Drying & packing	→	Drying Loss	890
					→	Acid Yellow 79
Total	5790					5790

2. Acid Yellow 151

Manufacturing Process:

Prepare Diazo of OAPSAAMIDE in vessel with sodium nitrite & HCl (Hydrochloric acid) After that charge Acetoacetanilide in the vessel for coupling. Metallize the mass by adding cobalt sulphate & sodium hydroxide. Now reaction mass transferred for spray drying to get finished product.

Mass Balance:

Mass Balance Acid Yellow 151						
Input	Kgs		Reaction		OutPut	Kgs
OPSAamide	500	→	Diazotization			
Hydrochloric Acid	112	→				
Sodium Nitrite	184	→				
Ice	1400	→				
Water	1000	→				
			↓			
Aceto Acetanilide	483	→	Coupling			
Caustic Lye	125	→				
Soda Ash	250	→				
Ice	500	→				
Water	1000	→				
			↓			
Cobalt Sulphate	415	→	Cobaltination			
Caustic Lye	85	→				
Steam	800	→				
			↓			
Common Salt	650	→	Isolation & Filtration	→	Wastewater	5594
			↓			
			Drying & packing	→	Drying Loss	910
				→	Acid Yellow 151	1000
Total	7504					7504

3. Acid Yellow 49

Manufacturing Process:

- Prepare diazo of 2, 5 Dichlorosulphanilic acid in vessel with sodium nitrite & HCl (Hydrochloric acid) & apply heating.
- After cooling, charge 5, amino-3-methyl-1-phenyl Pyrozolone in the vessel for coupling.
- Now reaction mass transferred for filtration & after that wet cake is dried to got Finished product.

Mass Balance:

Mass Balance of Acid Yellow 49					
INPUT	KG			OUTPUT	KG
2, 5 Dichloro Sulfanilic Acid	500	→	Diazotization		
HCl	325	→			
Sodium Nitrite	155	→			
Water	1200	→			
Ice	900	→			
		↓			
5-Amino PMP	400	→	Coupling		
HCl	475	→			
Ice	600	→			
Salt	125	→			
Water	800	→			
		↓			
Common Salt	650	→	Isolation & Filtration	→ Waste Water	4180
		↓			
			Drying & Packing	→ Drying Loss	950
				→ Acid Yellow 49	1000
Total	6130				6130

4. Acid Yellow 99

Manufacturing Process:

Diazotisation of 4-NAPSA, coupling with Acetoacetanilide, metallisation with Basic Chromium Sulphate. Filter it and collect wet cake and dry it.

Mass Balance:

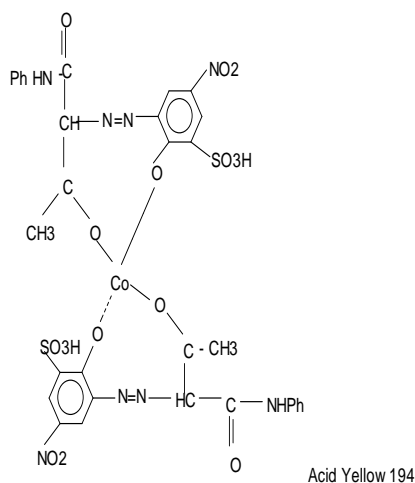
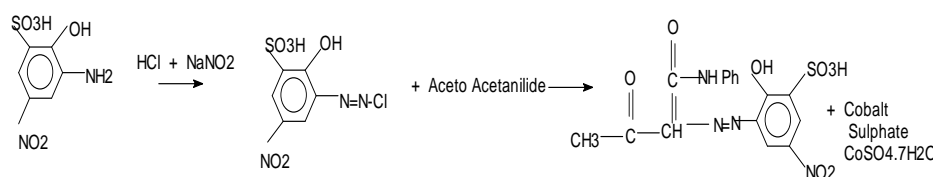
Mass Balance of Acid Yellow 99							
INPUT	KG				OUTPUT	KG	
4 NAPSA	285	→	Diazotization				
HCl	110	→					
Nitrite	85	→					
Ice	1400	→					
Water	1400	→					
Acetoacetinilide	222	→	Coupling				
Caustic Flakes	52	→					
Soda Ash	135	→					
Ice	500	→					
Water	1000	→					
Salicylic Acid	185	→	Chromination				
BCS	380	→					
Caustic Flakes	145	→					
Steam	800	→					
Common Salt	550	→	Isolation & Filtration		Waste Water	5189	
			Drying & Packing		Drying Loss	1060	
						Acid Yellow 99	1000
Total	7249					7249	

5. Acid Yellow 194

Manufacturing Process:

Prepare 4-NAPSA diazo with help of Hydrochloric acid and sodium nitrite in presence of iceto maintain temp. Make clear solution of AAA with help of caustic lye. 4-NAPSA diazo coupled with AAA in alkaline medium and then metallization with cobalt sulphate at 80-90 C for 3-4 hr. When test is OK. Spray dry the above reaction mass.

Chemical Reaction:



Mass Balance:

Mass Balance of Acid Yellow 194							
INPUT	KG					OUTPUT	KG
4-NAPSA diazo	550	→	Preparation of 4-NAPSA diazo				
HCl	430	→					
sodium nitrite	165	→					
Ice	1000	→					
water	1500	→					
Acetoacetanilide	435	→	Coupling in alkaline medium				
Water	700	→					
Ice	1000	→					
Caustik Lye	100	→					
Cobalt Sulphate, 20%	325	→	Metallization				
			Reverse Osmosis		→	Water reuse	2605
			Spray Drying		→	Drying Loss	2600
			Standardization & Packing		→	Acid Yellow 194	1000
Total	6205						6205

6. Acid Yellow 220

Manufacturing Process:

Diazotization of Anthranilic OPSAMIDE and Sodium Nitrite, coupling with O-Cl-Acetoacetanilide with Cobalt Sulphate. Clarify solution; FILTER and dry it.

Mass Balance:

Mass Balance Acid Yellow 220					
Input	Kgs		Reaction	OutPut	Kgs
Anthranilic OAPSA	500	→	Diazotization		
HCl	87	→			
Nitrite	112	→			
Ice	1600	→			
Water	1000	→			
			↓		
O Cl Acetoacetinilide	350	→	Coupler Solution		
Caustic Flakes	70	→			
Soda Ash	240	→			
Ice	500	→			
Water	1000	→			
			↓		
Cobalt Sulfate	230	→	Cobaltination		
BCS	50	→			
Steam	800	→			
			↓		
			Reverse Osmosis	→ Water reuse	2339
			↓		
			Spray Drying & Packing	→ Drying Loss	3200
				→ Acid Yellow 220	1000
Total	6539				6539

7. Acid Yellow 232

Manufacturing Process:

Diazotisation of 5-sulfo anthranilic acid, coupling with 1-phenyl-3-methyl-5 pyrazolone, metallisation with Basic Chromium Sulphate. Chelating with another monoazo dye produced from (Diazotisation of Anthranilic acid and coupling with 1-phenyl-3-methyl-5-pyrazolone) Clarify solution, filter and dry it.

Mass Balance:

Mass Balance of Acid Yellow 232						
INPUT	KG				OUTPUT	KG
5 Sulfo Anthranilic Acid	233	→	Diazotization			
Hydrochloric Acid	125	→				
Sodium Nitrite	160	→				
Ice	1000	→				
Water	900	→				
1-Phenyl 3 Methyl 5 Pyrozolon	410	→	Coupling			
Soda Ash	250	→				
Ice	1000	→				
Water	1000	→				
Salicylic Acid	40	→	Chromination			
Basic Chromium Sulfate	400	→				
Steam	800	→				
Sulphuric Acid	136	→				
			Reverse Osmosis	→	Water reuse	2554
			Spray Drying	→	Drying Loss	2900
				→	Acid Yellow 232	1000
Total	6454					6454

8. Acid Brown 75

Manufacturing Process:

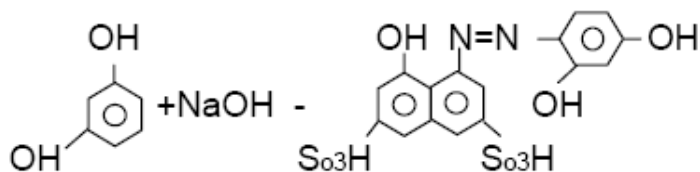
H - Acid Diazotized with HCl & Nitrite at 0°C temp. Stir 1-1/2" hours. Coupling with resorcinol in alkaline medium and stir. After 2 hours Na picramatediazo coupling with first coupling in alkaline medium stir 2 hours After 2 hours PNA Diazo coupled with second coupling at 6.5 pH, stir 6 hours then filter and dry it.

Chemical Reaction:

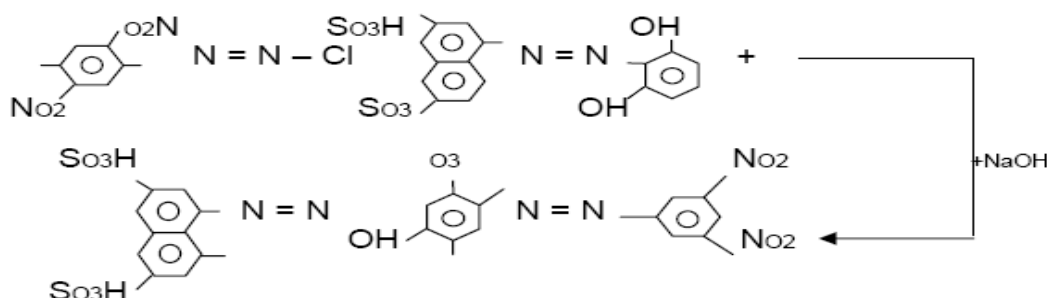
H-ACID DIAZO



DIAZO COUPLING WITH RESOURCINOL



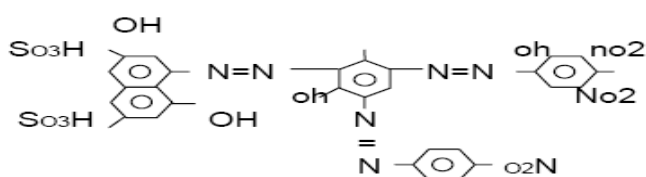
II COUPLING WITH NA PICRAMATE DIAZO



PNA DIAZO



III COUPLING



Mass Balance:

Mass Balance of Acid Brown 75					
INPUT	KG			OUTPUT	KG
Picramic acid	192	→	Preparation of Sodium Picramate diazo		
Hydrochloric acid	250	→			
Ice	500	→			
water	1000	→			
Sodium Nitrite	95	→			
			↓		
Caustic lye	50	→	1 st Coupling		
Resorcinol	96	→			
Ice	500	→			
			↓		
H-Acid	278	→	Preparation of H Acid diazo		
Soda ash	346	→			
Hydrochloric acid	300	→			
Ice	500	→			
Water	800	→			
Sodium nitrite	85	→			
			↓		
Ice	500	→	2 nd Coupling		
caustic lye	40	→			
			↓		
PNA	113	→	Preparation of PNA diazo		
Ice	500	→			
Water	750	→			
Sodium nitrite	85	→			
Hydrochloric acid	125	→			
			↓		
			Final Coupling		
			↓		
Common Salt	550	→	Isolation & Filtration	→ Effluent	5305
			↓		
			Drying & Packing	→ Drying Loss	1350
				→ Acid Brown 75	1000
Total	7655				7655

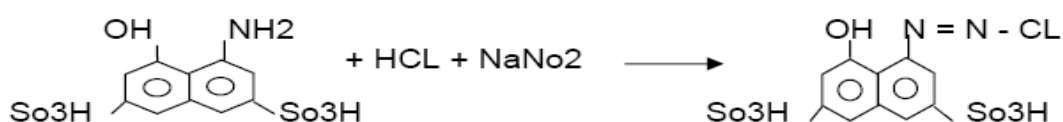
9. Acid Brown 165

Manufacturing Process:

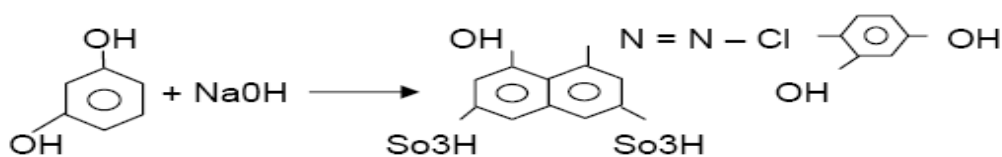
H. Acid Diazotized with HCl, Nitrite & Ice at 5°C temp. Stir for 1-½ hours. After 1-1/2 hour coupling with Resorcinol in alkaline Medium stirrer 2 hours Na picramate Diazo coupling with first coupling in alkaline medium stirrer. 2 hours After 2 hours PNA Diazo coupled with second coupling at 6.5 pH stirrer 6 hours. After 6 hours heat at 80°C. Above couple mass metalized with Ferrous Sulphate's solution at 5.5 pH. Stir for 3 hour after 3 hour, filter and collect W/C & dry it.

Chemical Reaction:

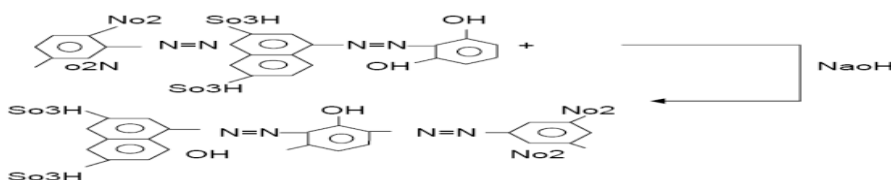
H ACID Diazo



H Acid diazo Coupling with resorcinol



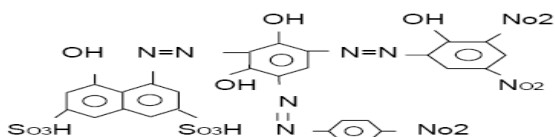
II Coupling with Na picramatediazo



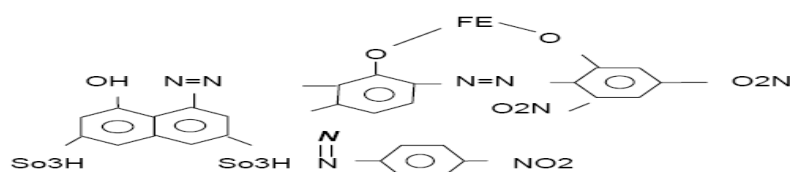
PNA DIAZO



III COUPLING



ABOVE DYE.METALISED WITH FRRROUS SULPHATE



Mass Balance:

Mass Balance of Acid Brown 165					
INPUT	KG			OUTPUT	KG
Picramic acid	192	→	Preparation of Sodium Picramate diazo		
Hydrochloric acid	250	→			
Ice	500	→			
water	800	→			
Sodium Nitrite	95	→			
		↓			
Caustic lye	50	→	1 st Coupling		
Resorcinol	96	→			
Ice	500	→			
		↓			
H-Acid	278	→	Preparation of H Acid diazo		
Soda ash	346	→			
Hydrochloric acid	300	→			
Ice	500	→			
Water	800	→			
Sodium nitrite	85	→			
		↓			
Ice	500	→	2 nd Coupling		
caustic lye	40	→			
		↓			
PNA	113	→	Preparation of PNA diazo		
Ice	500	→			
Water	750	→			
Sodium nitrite	85	→			
Hydrochloric acid	125	→			
		↓			
			Final Coupling		
		↓			
Water	450	→	Metalization		
Steam	600	→			
Ferrous Sulphate	260	→			
		↓			
Common Salt	550	→	Isolation & Filtration	→ Effluent	6405
		↓			
			Drying & Packing	→ Drying Loss	1360
				→ Acid Brown 165	1000
Total	8765				8765

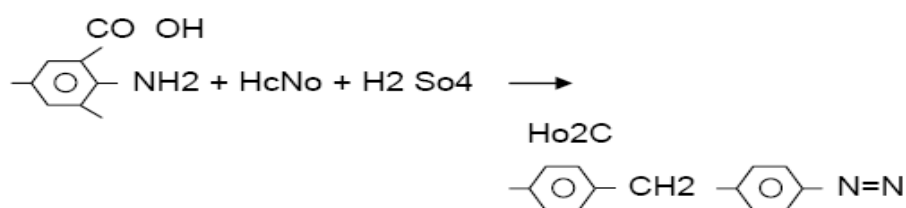
10. Acid Brown 161

Manufacturing Process:

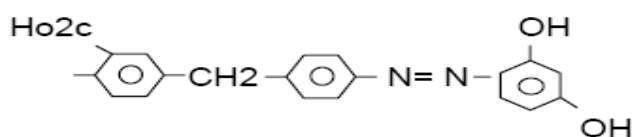
Anthranilic Acid diazotized with HCl, Nitrite at 0°C temp. Stir for 1 hour, and then couple with Resorcinol in alkaline medium at 50°C temp. Stir for 2 hours, then make diazo of Aniline 2:4 SO₂H with HCl, Nitrite & Ice at 50°C temp. Stir for 1 hour then coupled with first coupling in alkaline medium. Stir for 4 hours, Heat at 80°C then metalized with copper sulphate solution at 80°C in alkaline medium stir for 4 hours, filter and Dry it.

Chemical Reaction:

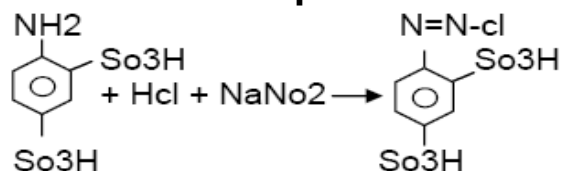
Anthranilic condensation with Formaldehyde & make Diazo



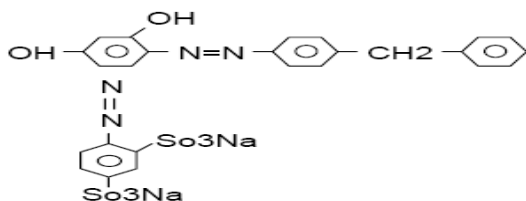
Anthranilic Acid Diazo Coupling with Resorcinol



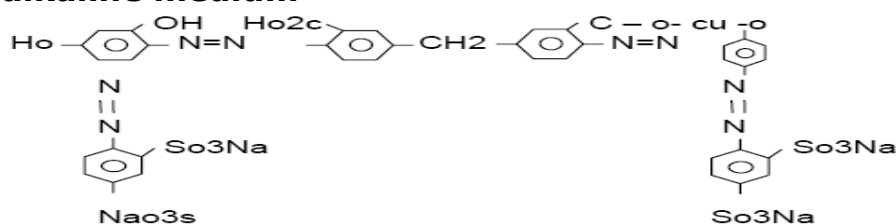
Aniline 2:4 Disulphonic Acid Diazo



II Coupling



Above Mono azo Metallized with copper Sulphate at 85°C temp at alkaline medium



Mass Balance:

Mass Balance of Acid Brown 161					
INPUT	KG			OUTPUT	KG
Anthranilic acid	190	→	Condensation & Diazotization		
Sulphuric acid	190	→			
Formaldehyde	80	→			
Nitrite	100	→			
Ice	1000	→			
Water	800	→			
Resorcinol	170	→	Ist coupling		
Caustic Flakes	200	→			
Ice	1000	→			
Water	600	→			
Aniline 2,4 SO3H	190	→	Diazotization of Aniline 2,4 SO3H		
HCl	180	→			
Sodium Nitrite	90	→			
Ice	800	→			
Soda Ash	350	→			
Water	800	→			
			Coupling		
Salicylic Acid	50	→	Chromination		
B.C.S	200	→			
Steam	800	→			
			RO/UF	→ Water reuse	3890
			Spray Drying	→ Drying loss	2900
				→ Acid Brown 161	1000
TOTAL	7790				7790

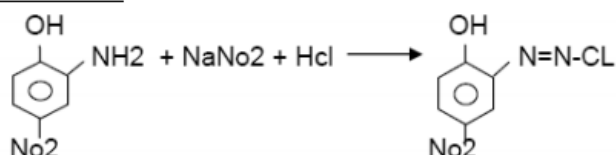
11. Acid Brown 282

Manufacturing Process:

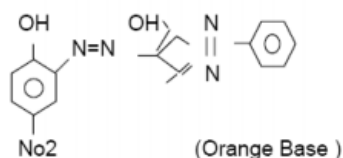
6 nitro solution with ice coupled with beta naphthol solution in alkaline medium stirrer for 2 hours, after 2 hours chromination with salicylic acid & BCS at 95°-100°C. Stir for 16 hours. Filter collect w/c. 4 Nitro Amino phenol diazotized with HCl, nitrite at 0°C temp and coupled with PMP clear solution at 5.5 pH and stir for 8 hours. In orange base solution charge black base w/c. Heat 90°C and take pH 5.5. Maintain for 4 hour at 90°C & pH +5.5. If test ok then isolated with salt, collect w/c. make slurry & spray dryer it.

Chemical Reaction:

1. 4NAP Diazo

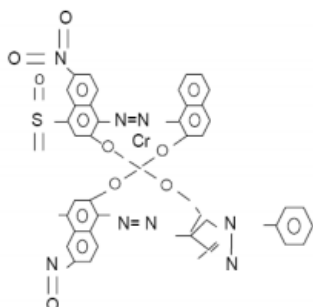


2. Diazo coupling with Parazolone (PMP)



3. 6 Nitro Coupling with Beta Naphthol and this couple mass chromination with B.C.S (1:1 Base).

4. Above product chelating with orange Base at 95°-100°C in Neutral Medium.



Mass Balance:

Mass Balance of Acid Brown 282					
INPUT	KG			OUTPUT	KG
Stage I					
6-Nitro	200	→	6 Nitro Slurry		
Ice	500	→			
Water	750	→			
Beta Naphthol	100	→	1st Coupling		
Water	750	→			
Ice	500	→			
Caustik Flakes	50	→			
Salicylic Acid	65	→	Chromination		
B.C.S.	180	→			
Steam	600	→			
			Filteration	→ Waste water	2575
			W/C	→	1120
Stage II					
4NAP	175	→	Diazotization		
Water	1200	→			
HCl	33	→			
Nitrite	95	→			
Ice	750	→			
Water	950	→	Ist Coupling		
PMP	200	→			
Caustik Flakes	50	→			
			Addition of W/C	←	
			Spray Drying	→ Drying Loss	3573
				→ Acid Brown 282	1000
Total	7148				7148

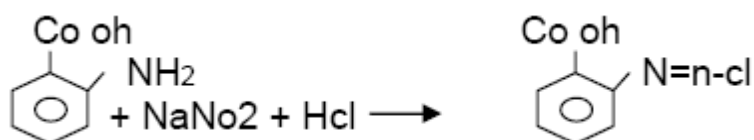
12. Acid Brown 432

Manufacturing Process:

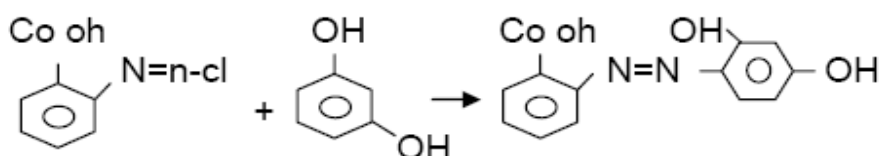
Anthranilic Diazotized with HCl, Nitrite & Ice at 0°C temp. Stir for 1-1/2 hours, Resorcinol Coupling with this Diazo in alkaline medium at 5°C temp. Laurent Acid Diazotized with HCl, Nitrite & Ice, at 5°C temp. stir for 2 hour, After 2 hour, this Diazole coupling with first coupling at Neutral pH at 7°C temp stirrer - 6 hour, After 6 hours, heat at 90°C temp metalized with salicylic acid chromium fluoride. If crimation tests ok, then clarify /R/o/ Spray Dryer it.

Chemical Reaction:

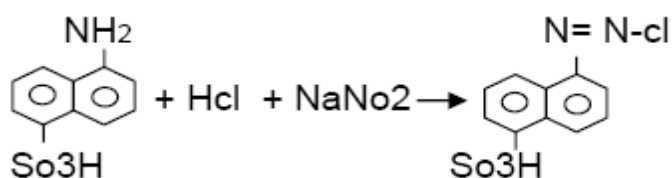
1. Anthranilic Acid Diazo



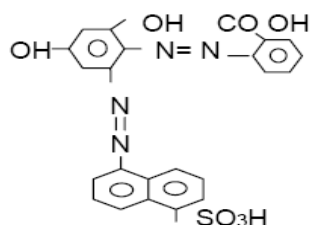
2. Ist Coupling with Resorcinol



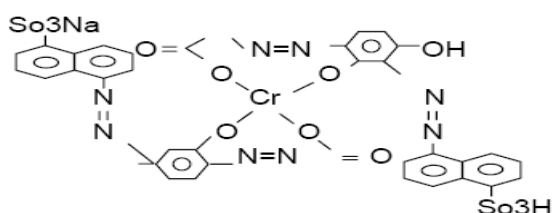
3. Laurent Acid Diazo



4. IInd Coupling



5. Above metalized with salicylic acid & chromium fluoride



Mass Balance:

Mass Balance of Acid Brown - 432					
Input	Kg			Output	Kg
Anthranilic Acid	180	→	Anthranilic Acid Diazo		
HCl	85	→			
Nitrite	85	→			
Ice	1200	→			
Water	2200	→			
			↓		
Resorcinol	150	→	Ist coupling		
Soda Ash	330	→			
Ice	1100	→			
			↓		
Laurent Acid	300	→	IInd Coupling		
HCl	125	→			
Nitrite	95	→			
Ice	700	→			
			↓		
Salicylic Acid	160	→	Chromination		
Chromium Fluoride	160	→			
Liquid Ammonia	300	→			
Steam	800	→			
Caustic Flakes	30	→			
			↓		
			RO/UF	Water reuse	4020
			↓		
			Spray Drying	Drying loss	2980
				Acid Brown - 432	1000
Total	8000				8000

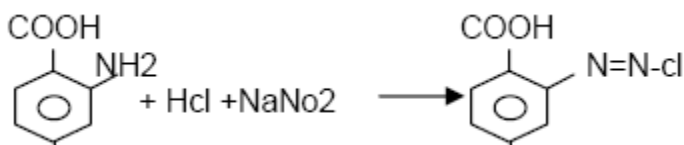
13. Acid Brown 425

Manufacturing Process:

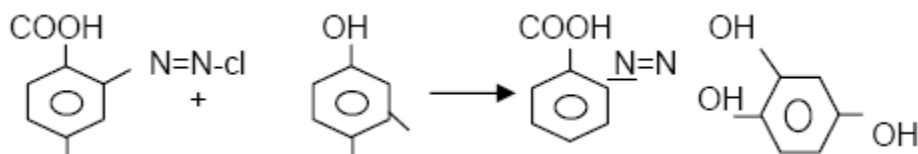
Anthranilic acid Diazotized with HCl Nitrite at 0°C temp with Ice Stirrer 1 hour, Resorcinol coupled with this Diazo in alkaline medium at 50°C Stirrer 2 hour, O.T. 5 SA Diazo with HCl Nitrite and Ice at 0°C temp. stirrer 1-1/2 hour this Diazo coupled with first coupling in alkaline pH at 50°C temp stirrer 6 hour. After 6 hour heat 90°C-95°C and metalized with salicylic acid and B.C.S at 5.5 pH maintain for 4 hour, After 4 hour test. If test is ok, then clarify, filter and Dry it.

Chemical Reaction:

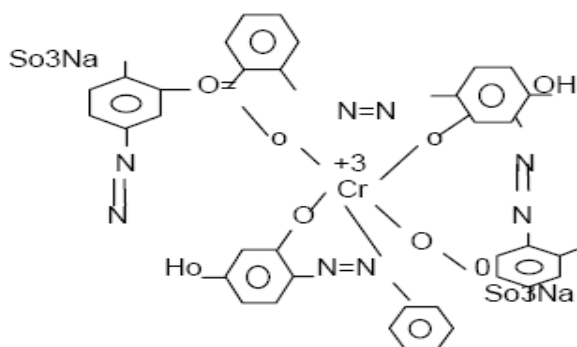
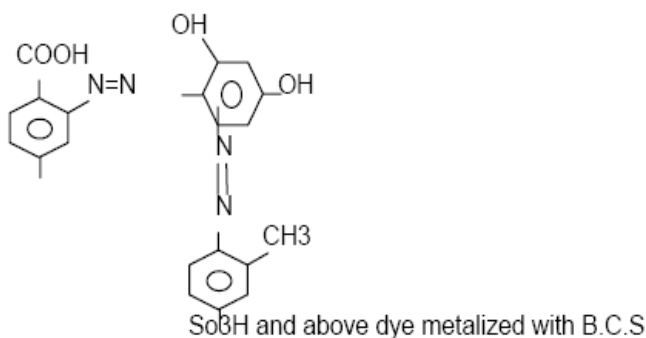
1. Anthranilic Acid Diazo



First Coupling with Resorcinol



2. II Coupling with Ortho Toludine 5. Sulphonic Acid



Mass Balance:

Mass balance of Acid Brown 425							
INPUT	KG				OUTPUT	KG	
Anthranilic acid	149	→	Anthranilic Acid Diazo				
HCl	60	→					
Nitrite	80	→					
Ice	800	→					
Water	1250	→					
			↓				
Resorcinol	117	→	1st COUPLING				
Soda Ash	330	→					
Ice	900	→					
Water	500	→					
			↓				
O.T. 5 SA.	220	→	2nd COUPLING				
HCl	55	→					
Nitrite	70	→					
Ice	750	→					
Water	1000	→					
			↓				
Salicylic Acid	105	→	Chromination				
B.C.S.	320	→					
Steam	800	→					
Caustic Flakes	35	→					
			↓				
			Clarification				
			↓				
			RO/UF	→	Water reuse	3421	
			↓				
			Spray Drying	→	Drying loss	3120	
				→	Acid Brown 425	1000	
TOTAL	7541						7541

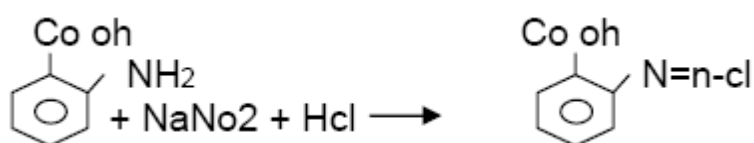
14. Acid Brown 434

Manufacturing Process:

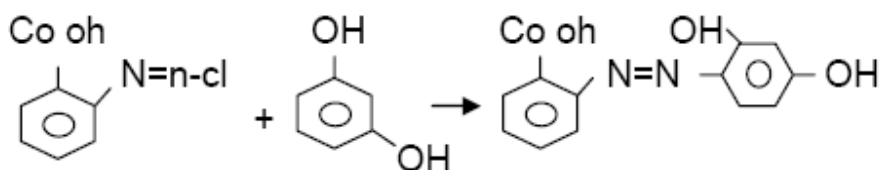
Sodium picramate Diazotized with HCl, Nitrite at 0°C temp stirrer – 1.5 hour then couple with picramatediazo in alkaline medium 1.6 cleave acid diazotized of, Nitrite & Ice at 0°C temp this diazo coupled with first coupling at 3°C temp. stir. 6 hrs. heat 80 temp. Metalized with ferrous sulphate solution in natural medium stir. 4 hrs. If test ok then isolated with common salt. Filter collect w/c, dry it.

Chemical Reaction:

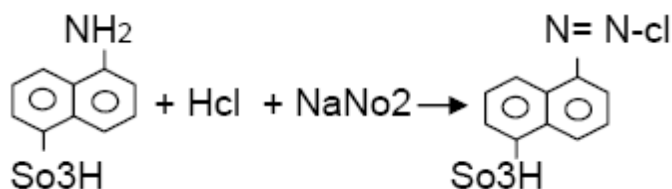
1. Anthranilic Acid Diazo



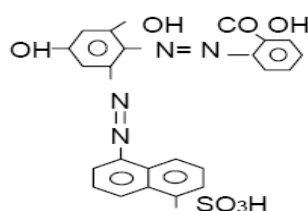
2. 1st Coupling with Resorcinol



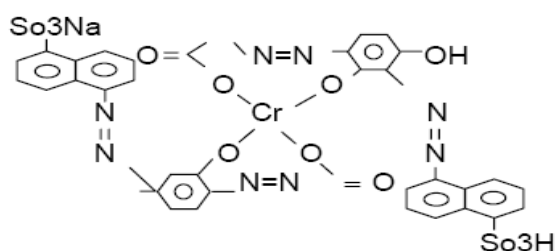
3. Laurent Acid Diazo



4. IIInd Coupling



5. Above metalized with salicylic acid & chromium fluoride



Mass Balance:

Mass Balance of Acid Brown - 434					
INPUT	KG			OUTPUT	KG
Sodium Picramate	267	→	Sodium picramate diazo		
HCl	300	→			
Nitrite	70	→			
Ice	600	→			
Water	1000	→			
Resorcinol	96	→	Coupler Vessel		
Ice	500	→			
Water	400	→			
1,6 cleave acid	205	→	Diazo of Mix Cleave		
HCl	345	→			
Ice	500	→			
Sodium Nitrite	60	→			
Ice	400	→	Coupling		
Caustic Lye	135	→			
Steam	600	→	Metallisation		
Ferrous Sulphate	260	→			
Common Salt	550	→	Isolation & Filtration	Waste Water	4298
			Spray Drying	Drying loss	990
					Acid Brown 434
Total	6288				6288

15. Acid Green 16

Manufacturing Process:

- In M.S. Reactor Naphthalene and Sulphuric Acid is mixed for reaction. Then add soda ash and filter it. Wet cake formed is Naphthalene Disulfonic Acid will be used for further procedure and effluent goes to ETP.
- Now in another M.S lead bonded jacketed Vessel take Dimethyl aniline, formaldehyde and Sulphanilic acid. Add soda ash to this mass and filter it. Effluent goes to ETP. Now mix this wet cake with previously prepared wet cake of Naphthalene Disulfonic Acid, also add water and sulphuric acid. Once this mass is oxidized using water, sodium dichromate, oxalic acid, sulphuric acid and soda ash; it is salted with common salt and filtered. Wet cake obtained now is dried in dryer, pulverized in ball mill as per required standard and packed for sale.

Mass Balance:

Mass Balance of Acid Green 16							
INPUT	KG				OUTPUT	KG	
Di Methyl Aniline	600	→	Condensation				
Formaldehyde	220	→					
Sulphanilic Acid	10	→					
Soda Ash	250	→	Oxidation & Filtration		Waste Water	1350	
MnO ₂	400	→			DMA W/C	1630	
Water	1500	→					
Napthaline	400	→	Sulphonation & Filtration		Waste Water	1230	
Sulphuric Acid	500	→			Napthaline di sulphonic Acid w/c	750	
Oleum	450	→					
Soda	630	→					
Napthalene Disulphonic Aci	750	→	Condantation & Oxidation				
DMA W/C	1630	→					
Sodium dichromate	110	→					
Sulphuric Acid	550	→					
Oxalic Acid	160	→					
Soda	150	→					
Water	1000	→					
Common Salt	650	→	Isolation & Filtration		Waste Water	2750	
			Drying & packig		Drying Loss	1250	
						Acid Green 16	1000
Total	9960					9960	

16. Acid Blue 9

Manufacturing Process:

Ortho-Benzaldehyde sulphonic acid and Ethyl benzyl aniline sulphonic acid (EBASA) condensation, oxidation with Manganese Oxide in presence of Acetic acid, and then the product into the Sodium salt, filter and dry it.

Mass Balance:

Mass Balance of Acid Blue 9					
INPUT	KG			OUTPUT	KG
Ethyl Benzyl Aniline Sulphonic Acid	750	→	Condensation		
Ortho Benzaldehyde sulphonic Acid	275	→			
H ₂ SO ₄	300	→			
Soda Ash	150	→			
HCl	350	→			
Water	1000	→			
		↓	Oxidation		
MNO ₂	150	→			
H ₂ SO ₄	300	→			
Soda Ash	250	→			
HCl	400	→			
Acetic Acid	300	→			
Water	1000	→			
		↓	Isolation & Filteration		
Common Salt	800	→		Waste Water	3900
		↓	Drying & packig		
				Drying Loss	1125
				Acid Blue 9	1000
Total	6025				6025

17. Acid Blue 15

Manufacturing Process:

Ethyl benzyl aniline sulfonic acid (EBASA) condensation, and then (a) oxidation as dimer water molecules (hydrol), again with N,N-diethyl meta toluidine condensation, oxidation with Manganese Oxide in presence of H_2SO_4 and translated into sodium salt, filter and dry it.

Mass Balance:

Mass Balance of Acid Blue 15					
INPUT	KG			OUTPUT	KG
Ethyl Benzyl Aniline Sulphonic Acid	1090	→	Condensation		
Di Ethyl meta toludine	210	→			
H ₂ SO ₄	300	→			
SODA ASH	150	→			
HCl	350	→			
WATER	1000	→			
MNO ₂	150	→	Oxidation		
H ₂ SO ₄	300	→			
Soda Ash	250	→			
HCl	400	→			
Acetic Acid	300	→			
Water	1000	→			
Common Salt	800	→	Isolation & Filtration	Waste Water	4120
			Drying & packig	Drying Loss	1180
				Acid Blue 15	1000
Total	6300				6300

18. Acid Blue 7

Manufacturing Process:

Benzaldehyde -1,3-disulfonic acid and N-benzyl-N-ethyl Aniline (2 More) condensation and oxidation with Manganese Dioxide in presence of acetic acid, convert into sodium salt, Filter and dry it.

Mass Balance:

Mass Balance of Acid Blue 7					
INPUT	KG			OUTPUT	KG
Benzaldehyde Disulfonic Acid	330	→	Condensation		
Ethyl benzyl aniline	380	→			
H ₂ SO ₄	300	→			
Soda Ash	150	→			
HCl	350	→			
Water	1100	→			
MNO ₂	150	→	Oxidation		
H ₂ SO ₄	300	→			
Soda Ash	250	→			
HCl	400	→			
Acetic Acid	300	→			
Water	1000	→			
Common Salt	800	→	Isolation & Filtration	→ Waste Water	3730
			Drying & packig	→ Drying Loss	1080
				→ Acid Blue 7	1000
Total	5810				5810

19. Acid Blue 113

Manufacturing Process:

Metanilic acid is diazotized with HCl, Nitrite and Ice at 0°C temp. Stir for 1 hour. Alpha Naphthyl amine coupled with Metanilic acid in acidic medium. Stir for 8 hours. After 8 hours ANA diazo with HCl & Nitrite at 18°C temp. Stirrer for 3 hours and then coupled with phenyl peril acid. At neutral pH, stir for 3 hours, then isolated & spray dryer it.

Mass Balance:

INPUT		Mass Balance of Acid Blue 113				OUTPUT	
	KG					KG	
Metanilic Acid	300	→	Diazotization				
HCl	65	→					
Sodium Nitrite	70	→					
Ice	1000	→					
Water	900	→					
HCl	55	→	1st Coupling				
Alpha Naphthyl Amine	240	→					
Ice	500	→					
Water	600	→					
Nitrite	50	→	IInd Diazotization				
H2SO4	250	→					
Caustic Flakes	200	→					
Ice	1000	→					
Phenyl peri Acid	490	→	IInd Coupling				
Soda Ash	200	→					
Sodium Acetate	300	→					
Ice	500	→					
Water	500	→					
Common Salt	800	→	Isolation & Filtration	→	Waste water	5640	
			Spray Drying	→	Drying Loss	1380	
				→	Acid Blue 113	1000	
Total	8020					8020	

20. Acid Blue 193

Manufacturing Process:

Solution of 2-Naphthol

Take water and 2-Naphthol Charge along with Caustic flacks Stir 3 hr, check clear solution.

Preparation of 1,2,4-diazo solution

Add 1,2,4-diazo, ice and water, to make a slurry. Temp should be less than 100c .Stir for 1 hr at 100 C

Diazo coupling

Charge coupler solution to diazo slurry at 25-350 C Stir 2 hr at 25-35⁰ C, then Heat to 70⁰ C.

Metal Complexation (Commination)

Add salicylic acid at 70⁰ C Charge basic chromium Sulphate. Adjust pH 4.0-4.5 by adding HCl. Heat to 95-100⁰ C and maintain temperature for 5 hr Clarify in filter press Adjust pH 7 by adding caustic flacks just before spray drying.

Mass Balance:

Mass Balance of Acid Blue 193					
INPUT	KG			OUTPUT	KG
B Naphthol	350	→	Preparation of B Naphthol Solution		
Caustic Lye	125	→			
ICE	800	→			
Water	1200	→			
		↓			
1,2,4 Diazo	690	→	Diazotization		
Ice	500	→			
Water	1000	→			
Caustic Lye	120	→			
		↓			
Salicylic Acid	50	→	Coupling & Chromination		
BCS	240	→			
Steam	700	→			
		↓			
			RO	→ Water reuse	2075
		↓			
			Spray Drying	→ Drying loss	2700
				→ Acid Blue 193	1000
TOTAL	5775				5775

21. Acid Red 315

Manufacturing Process:

Diazotisation of 4-NAPSA, coupling with 1-phenyl-3-methyl-5-pyrazolone, metallisation with Basic Chromium Sulphate. Chelating with another monoazo dye produced from (Diazotisation of 5-Nitro-2-aminophenol and coupling with 1-phenyl-3-methyl-5- pyrazolone) Clarify solution, filter and dry it.

Mass Balance:

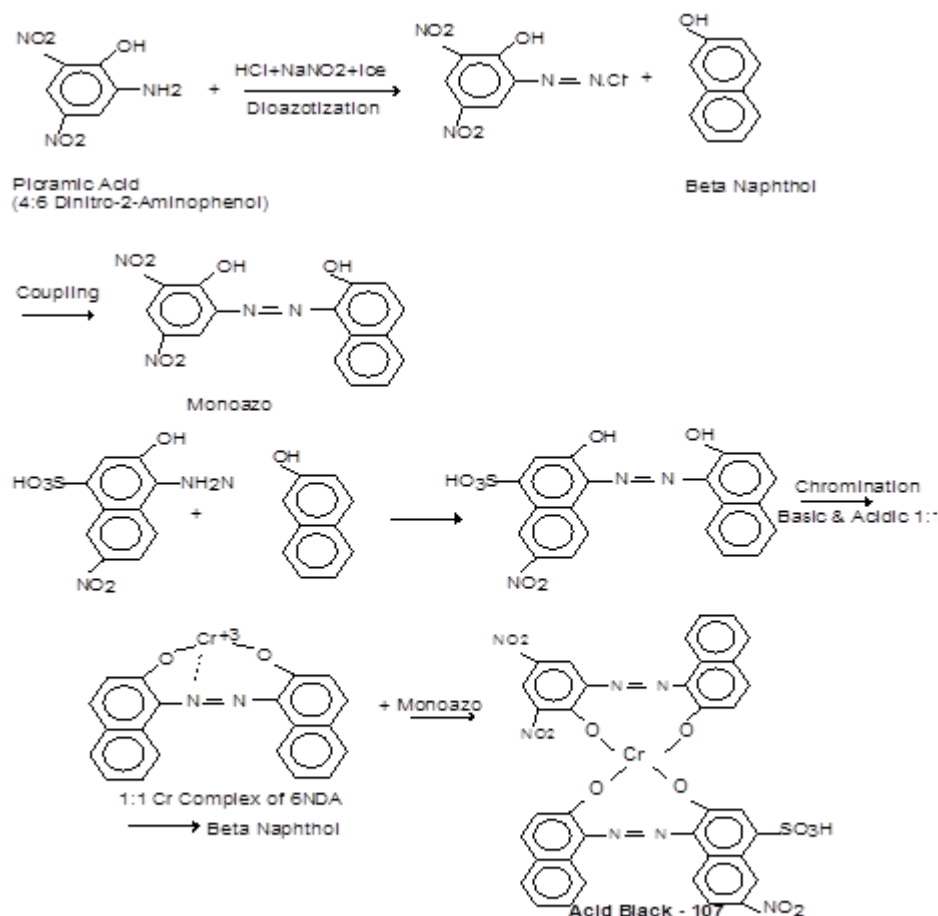
INPUT		Mass Balance Acid Red 315		OUTPUT	
	KG				KG
4 NAPSA	225	→	Diazotiazation		
HCL	125	→			
NITRITE	68	→			
ICE	750	→			
WATER	750	→			
PMP	160	→	COUPLING		
Ice	500	→			
CAUSTIC FLAX	50	→			
WATER	500	→			
SALASYLIC ACID	40	→	CHROMINATION		
BCS	350	→			
CAUSTIC FLEX	50	→			
STEAM	800	→			
			FILTER	→ EFFLUENT	2588
				→ WATE CAKE ORANGE	1780
5 NAP	138	→	Diazotiazation		
HCL	125	→			
NITRITE	68	→			
ICE	750	→			
WATER	750	→			
PMP	160	→	COUPLING		
Ice	500	→			
CAUSTIC FLAX	50	→			
WATER	700	→			
			FILTER	→ EFFLUENT	1851
				→ WATE CAKE RED	1390
WATE CAKE ORANGE	1780	→	Condensation		
WATE CAKE RED	1390	→			
CAUSTIC FLAX	50	→			
WATER	1000	→			
			SPRAY DRYING	→ Drying loss	3220
				→ ACID RED 315	1000
Total	11829				11829

22. Acid Black 107

Manufacturing Process:

6-nitro-1-diazo-2-naphthol-4-sulphonic acid coupling with Beta naphthol, metallisation with Basic Chromium Sulphate. Chelating with another monoazo dye produced from (Diazotisation of Sodium Picramate and coupling with Beta Naphthol) Spray dry the resulting dyestuff solution.

Chemical Reaction:



Mass Balance:

Mass Balance Acid Black 107					
INPUT	KG			OUTPUT	KG
6 Nitro	480	→	Diazotiazation		
Ice	500	→			
Water	750	→			
Beta Napthol	120	→	COUPLING		
Ice	500	→			
Caustic Flakes	50	→			
Water	500	→			
Salacylic Acid	45	→	CHROMINATION		
Chromuim Formate	400	→			
Caustic Flakes	50	→			
Steam	800	→			
			FILTER	→ EFFLUENT	2415
				→ WATE CAKE Black	1780
Sodium Picramate	200	→	Diazotiazation		
HCl	250	→			
Nitrite	80	→			
Ice	500	→			
Water	750	→			
Beta Napthol	245	→	COUPLING		
Ice	500	→			
Caustic Flakes	150	→			
Water	700	→			
			FILTER	→ EFFLUENT	1985
				→ WATE CAKE Blue	1390
Wate Cake Black	1780	→	Condensation		
Wate Cake Blue	1390	→			
Caustic Flekes	50	→			
Water	1000	→			
			SPRAY DRYING	→ Dryign loss	3220
				→ ACID Black 107	1000
Total	11790				11790

❖ **DIRECT DYES :**

23. Direct Black 80

Manufacturing Process:

Para amino acetamide diazotized and couple with Gamma acid in alkaline medium and deacylation with caustic soda at 95°C. Deacylation mass is again tetrazotized and couple first with Mixed Cleves acid and then with Gamma acid in an alkaline condition, Isolate with salt and pass through RO and finally spray dry it.

Mass Balance:

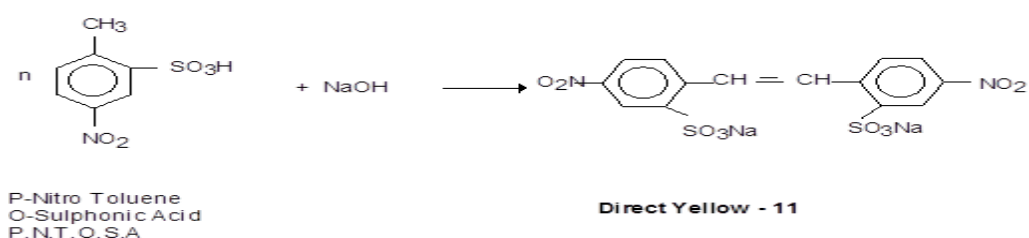
Mass Balance of Direct Black 80				
INPUT	KG		OUTPUT	KG
P- amino acetanilide	145	→	Diazotization	
Sodium Nitrite	105	→		
HCl	250	→		
Ice	500	→		
Water	750	→		
		↓		
Gamma Acid	430	→	1st Coupling	
Soda Ash	790	→		
Water	750	→		
Ice	500	→		
		↓		
Caustik soda	215	→	Hydrolysis	
Steam	500	→		
		↓		
HCl	500	→	Diazotization of 1st Copling Mass	
Sodium Nitrite	210	→		
Ice	500	→		
		↓		
Mixed cleves acid	195	→	2nd Coupling	
Water	400	→		
Ice	500	→		
		↓		
Common Salt	550	→	Isolation	
		↓		
		↓	Filtration	→ Waste Water 5330
		↓		
		↓	Drying & Packing	→ Drying Loss 1460 → Direct Black 80 1000
		↓		
Total	7790			7790

24. Direct Yellow 11

Manufacturing Process:

Take water in vessel and add caustic lye, then add PNTOSA slowly. And after complete charging check pH. Adjust pH 8.00 and temp to 55°C and maintain for 1 hr. Then charge caustic for condensation. After complete charging bring the temp to 66°C and maintain for 3 hr. Then add 50% Sulphuric acid for reduction, at pH 2.00, maintain for 2 hr. Take Nitrobenzene and Amine in vessel, then add above condensed mass slowly and after complete charging, complete the reduction by adding extra amine and check for separation. Then stop the stirrer and give 3.00 hr of settling time. Take DEA + water in vessel and add above mass (Dye+ NB + Amine) slowly in vessel and stop when water level is reached. Complete the reduction by adding extra DEA and adjust pH at 8.50. Stop the stirrer for 7.00 hr. Recover dye from bottom and send for packing. The balanced Nitrobenzene + Amine use in next batch.

Chemical Reaction:



Alkaline Condensation of 4-Nitro Toluene-2-Sulphonic Acid

Mass Balance:

Mass Balance of Direct Yellow 11							
INPUT	KG				OUTPUT	KG	
PNTOSA	600	→	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Condensation</div>				
caustic lye	215	→					
Water	2500	→					
Steam	1000	→					
Spent H2SO4 (70%)	500	→	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Neutralization</div>				
Common Salt	650	→	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Isolation & Filtration</div>	→	Wastewater	3005	
			<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Drying & Packing</div>	→	Drying loss	1460	
				→	Direct Yellow 11	1000	
Total	5465					5465	

25. Direct Brown 44

Manufacturing Process:

Preparation of MPD Solution: Charge MPD in the MSRL vessel with sodium nitrite. Add water and ice in it. It is coupled with hydrochloric acid and ice to keep the temperature 0 to 5°C.

Preparation of Sulphanilic Diazo: Charge Sulphanilic acid and Hydrochloric acid along with ice in the MSRL vessel with caustic lye. And mass is coupled

Coupling: Add Caustic lye in the in the mass and coupled.

Mass Balance:

Mass Balance of Direct Brown 44					
INPUT	KG			OUTPUT	KG
MPD	135	→	Preparation of MPD solution		
Water	1000	→			
Sodium Nitrite	158	→			
Ice	500	→			
HCl	180	→			
Ice	500	→	1st Coupling		
MPD	270	→			
HCl	220	→	Preparation of Sulphanilic Diazo		
Sulphanilic Acid	300	→			
Sodium Nitrite	100	→			
Water	1250	→			
Ice	750	→			
Ice	800	→	Iind Coupling		
CS Lye	220	→			
			Mixing		
			RO/UF	Water Reuse	2403
			Spray Drying	Drying loss	2980
			Standardization & Packing	Direct Brown 44	1000
Total	6383				6383

26. Direct Blue 71

Manufacturing Process:

C-Acid diazo solution: Prepare diazo of C-Acid with help of hydrochloric acid (30%) and Sodium Nitrite solution in presence of ice.

α -Naphthylamine solution: Prepare α -Naphthyl amine clear solution by heating with Hydrochloric acid (30%) and water. Clear pinkish solution is obtained.

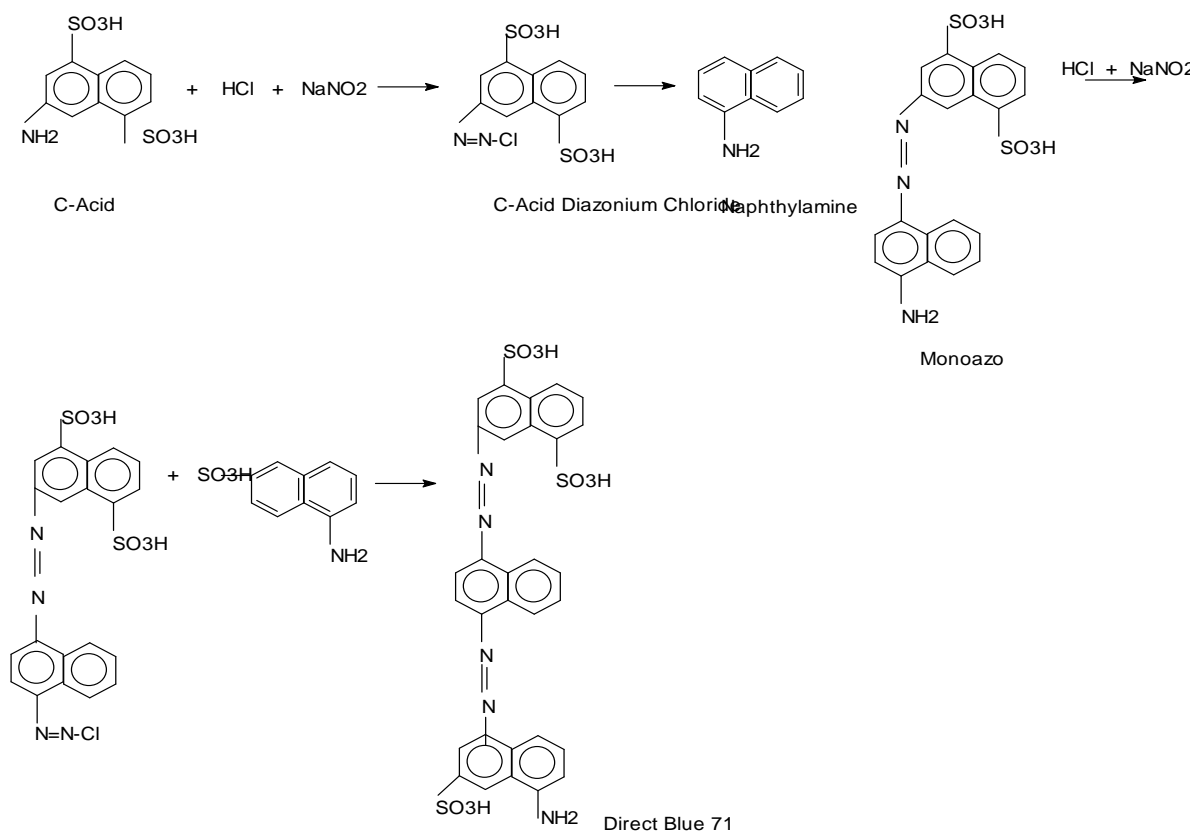
First coupling: Transfer α -Naphthyl amine solution to C-Acid Diazo keeping temp to 10°C under continuous stirring.

Mono azodiazo: Prepare diazo of first coupled mass with help of Sodiumnitrite and ice. When diazo is ready add to Mix cleave acid clear solution. When coupling is over, make diazo of aforesaid coupling mass with help of Hydrochloric acid, ice and Sodium Nitrite.

J-Acid solution: Prepare J-Acid solution in water, ice and caustic lye. Transfer diazo to J-Acid solution in alkali condition. Check the completion of reaction.

Drying: Spray dry the reaction mass.

Chemical Reaction:



Mass Balance:

Mass Balance of Direct Blue 71							
INPUT	KG				OUTPUT	KG	
C-Acid	165	→	Preparation of C-Acid diazo solution				
HCl	300	→					
Sodium Nitrite	155	→					
Ice	500	→					
Water	1000	→					
Alpha Naphthyl Amine	170	→	1st Coupling				
Caustik Flake	40	→					
Ice	500	→					
Sodium Nitrite	145	→	Diazotization of 1st Coupling Mass				
Ice	900	→					
HCl	200	→					
Mix Cleave Acid	330	→	2nd Coupling				
Caustik Flake	40	→					
Ice	500	→					
Water	750	→					
Sodium Nitrite	145	→	Diazotization of 2nd Coupling Mass				
Ice	900	→					
HCl	200	→					
J acid	250	→	3rd Coupling				
Caustic Lye	60	→					
Water	800	→					
Ice	600	→					
			RO/UF	→	Water Reuse	4270	
			Spray Drying	→	Drying Loss	3380	
			Standardization & Packing	→	Direct Blue 71	1000	
Total	8650					8650	

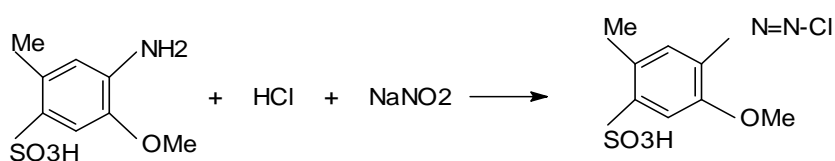
27. Direct Orange 118

Manufacturing Process:

Diazotization of p-Cresidine-o-Sulphonic acid: p-Cresidine-o-Sulphonic acid is diazotized in presence of Hydrochloric acid and Sodium Nitrite. Just before coupling make CR and SI -ve with sodium bicarbonate.

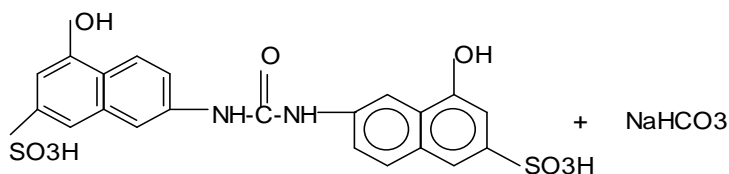
Coupler solution: Take water and add J-Acid Urea and make uniform solution. Add Sodium bi-carbonate. Receive above diazo mass in course of 45 min. Stir overnight. Heat up to 80°C & stir for 2hr. Spray dry the above reaction mass

Chemical Reaction:

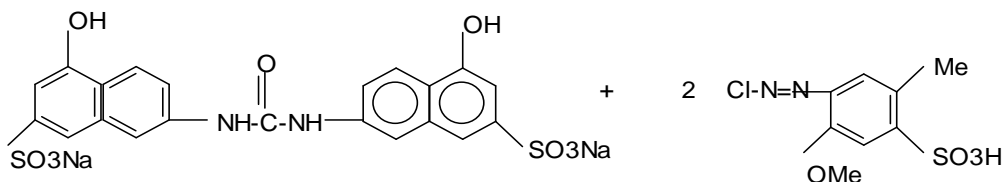


P-Cresidine O-Sulphonic Acid

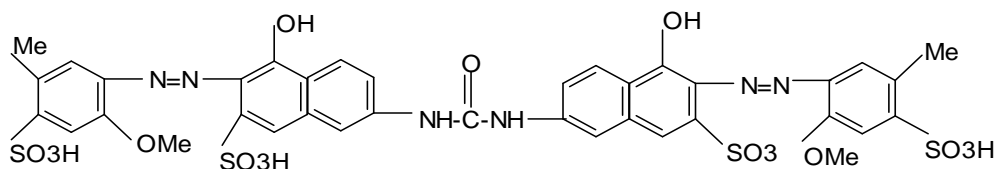
P-Cresidine O-Sulphonic Diazonium (



J Acid Urea



J Acid Urea Disodium Salt



Direct Orange 118

Mass Balance:

Mass Balance of Direct Orange 118							
INPUT	KG				OUTPUT	KG	
O - Toludine 5 Sulphonic Aci	250	→	Diazotization				
HCl	375	→					
Sodium Nitrite	95	→					
Ice	800	→					
Sodium bi-carbonate	50	→	Coupling				
Water	1200	→					
Ice	700	→					
J-Acid Urea	350	→					
Common Salt	650	→	Isolation & Filtration	→	Waste Water	2490	
			Standardization & Packing	→	Dryng Loss	980	
				→	Direct Orange 118	1000	
Total	4470						4470

28. Direct Red 239

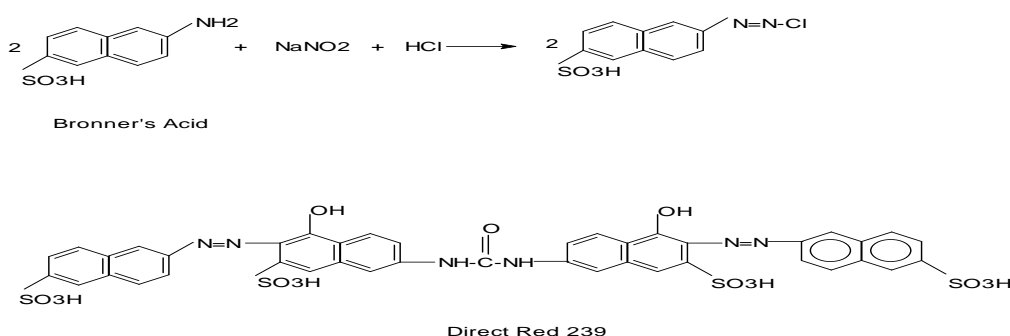
Manufacturing Process:

Bronner's Acid: Make clear solution of bronner's Acid with caustic lye. Add Sodium Nitrite in the solution and make reverse diazo in Hydrochloric acid and ice to maintain diazo at temp 5-7°C.

Coupler solution: Prepare J-Acid Urea solution in water, stir to form good slurry. Transfer diazo to coupler solution in alkali medium. When coupler is over, stir over night.

Drying: Spray dry the above reaction mass.

Chemical Reaction:



Mass Balance:

Mass Balance of Direct Red 239							
INPUT	KG				OUTPUT	KG	
Browner's acid	250	→	Diazotization				
Water	1500	→					
Ice	750	→					
caustic lye	100	→					
Sodium Nitrite	95	→					
HCl	550	→					
J-Acid Urea	292	→	Coupling				
Water	1250	→					
Ice	750	→					
Sodium Bi Carbonate	250	→					
			R/O	→	Water Reuse	1927	
			Spray Drying	→	Drying loss	2860	
			Standardization & Packing	→	Direct Red 239	1000	
Total	5787					5787	

29. Direct Red 254

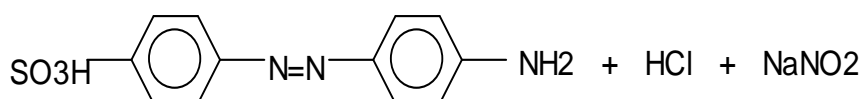
Manufacturing Process:

PAABSA solution: Prepare solution of PAABSA by caustic lye. Stir and add Sodium Nitrite in the solution and make reverse diazo in Hydrochloric acid and ice. Just before coupling destroy excess nitrite by sulfamic acid.

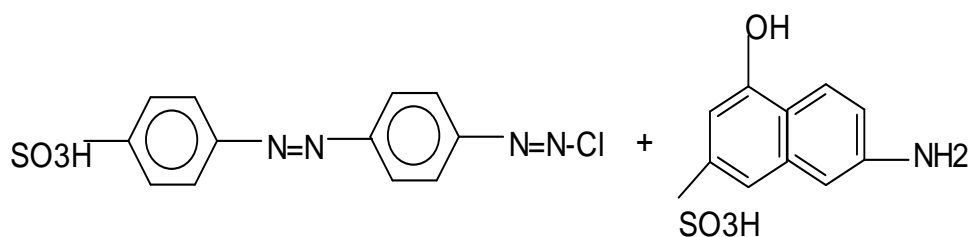
Coupler solution: Prepare J-Acid solution with help of caustic soda lye. Transfer the diazo to coupler solution in alkali medium. When coupling is over, heat the coupling mass.

Drying: Spray dry the above reaction mass.

Chemical Reaction:

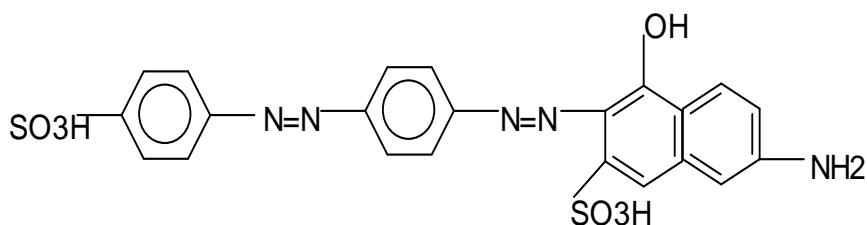


P-Aminoazo Benzene 4-Sulphonic Acid



P-Aminoazo Benzene 4-Sulphonic Acid

J Acid



Direct Red 254

Mass Balance:

Mass Balance of Direct Red 254							
INPUT	KG					OUTPUT	KG
PAABSA	400	→	Preparation of PAABSA Solution				
Sodium Nitrite	100	→					
WATER	1250	→					
Soda ash	300	→					
Ice	1000	→					
HCl	550	→					
J-Acid	350	→	Coupling				
caustic soda lye	150	→					
Water	1200	→					
Ice	700	→					
			R/O	→	Water reuse		2020
			Spray Drying	→	Drying Loss		2980
			Standardization & Packing	→	Direct Red 254		1000
Total	6000						6000

30. Direct Violet 35

Manufacturing Process:

C-Acid diazo: Prepare diazo of C-Acid in presence of Hydrochloric acid (30%) Sodium Nitrite and ice.

P-Cresidine: Make solution of p-Cresidine in water. Then couple with C-Acid diazo. Stir continuously. When coupling is over, make mono azodiazo by adding Hydrochloric acid and Sodium nitrite solution in presence of ice. Stir mono azodiazo for 4-5 hr. Then destroy excess sodium nitrite adding sulfamic acid. Final coupling will take place with n-Phenyl J-Acid solution in alkaline condition. After completion of final coupling, heat to 70°C. Spray Dry the above reaction mass.

Mass Balance:

Mass Balance of Direct Violet 35							
INPUT	KG				OUTPUT	KG	
C-Acid	330	→	Preparation of C Acid diazo				
HCl	350	→					
Sodium Nitrite	147	→					
Water	800	→					
Ice	500	→					
p-Cresidine	150	→	Preparation of p Cresidine				
Water	1000	→					
Soda Ash	100	→	I st Coupling				
Ice	500	→					
HCl	350	→	Diazotization of 1st Coupling Mass				
Sodium Nitrite	147	→					
Ice	1100	→					
n-Phenyl J-Acid	327	→	Final Coupling				
Water	750	→					
Ice	500	→					
Caustic lye, 48%	300	→					
			RO	→	Water reuse	3251	
			Spray Drying	→	Drying Loss	3100	
			Standardization & Packing	→	Direct Violet 35	1000	
Total	7351					7351	

31. Direct Red 81

Manufacturing Process:

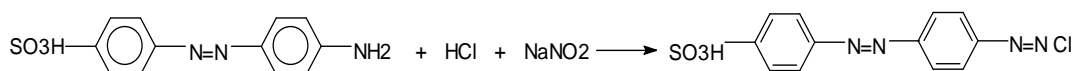
Diazotization: - PAABSA is charged to a M.S.R.L reaction vessel along with water and ice to maintain temperature between 0 to 5°C. Then Hydrochloric Acid will be added followed by Sodium Nitrite powder gradually till diazotization completed, which can be confirmed by starch iodide paper. Any excess nitrite will be removed by adding Sulfamic Acid just before coupling. Keep temperature between 0 to 5°C throughout the diazotization reaction.

Preparation of coupling component: - Charge J acid in the MSRL vessel and make clear solution with caustic lye. Add ice with water the coupler solution. Take water in which add sodium Acetate and benzyl chloride.

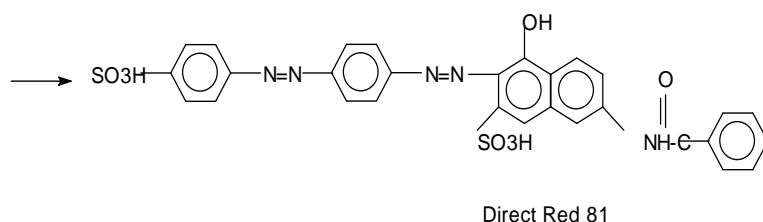
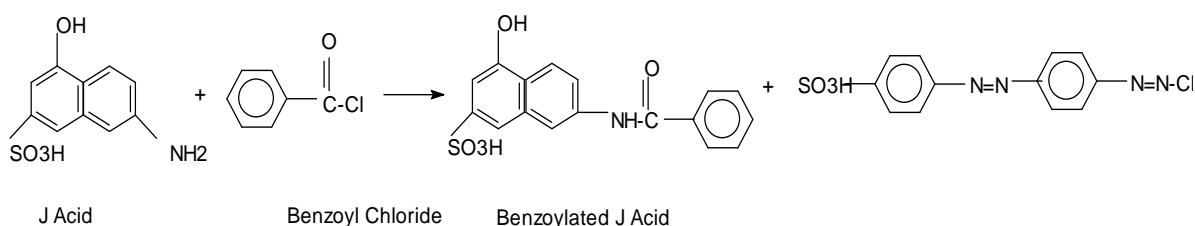
Coupling: - Charge coupler solution to the diazotized PAABSA keeping the temperature between 0 to 5°C by adding of ice.

Isolation: - Add salt for the Isolation of the product and then send the product for further filtration following by tray drying.

Chemical Reaction:



4,4'-p-Amino Azo Benzene Sulphonic Acid



Mass Balance:

		Mass Balance of Direct Red 81					
INPUT	KG				OUTPUT	KG	
PAABSA	350	→	Diazotization				
HCl	300	→					
Water	1000	→					
Ice	1000	→					
Caustic lye 48%	260	→					
Na ₂ CO ₃	100	→					
Benzyl Chloride	150	→	Benzoylation of J Acid				
Sodium Acetate	160	→					
J acid	280	→					
Water	750	→					
Ice	500	→	Coupling				
Common Salt	650	→	Isolation & Filtration		Wastewater	3120	
			Drying		Drying loss	1380	
			Standardized & Packing		Direct Red 81	1000	
Total	5500					5500	

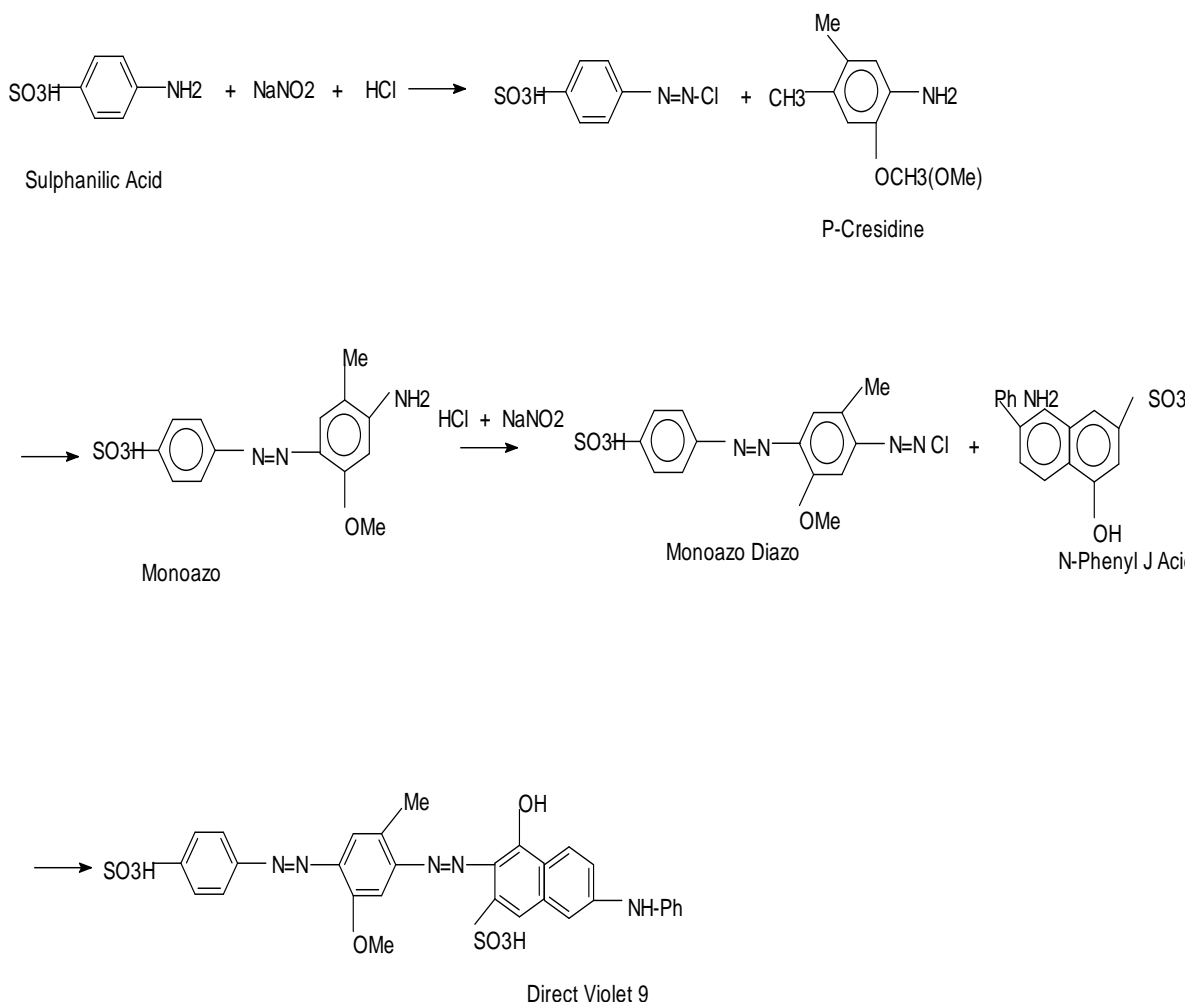
32. Direct Violet 9

Manufacturing Process:

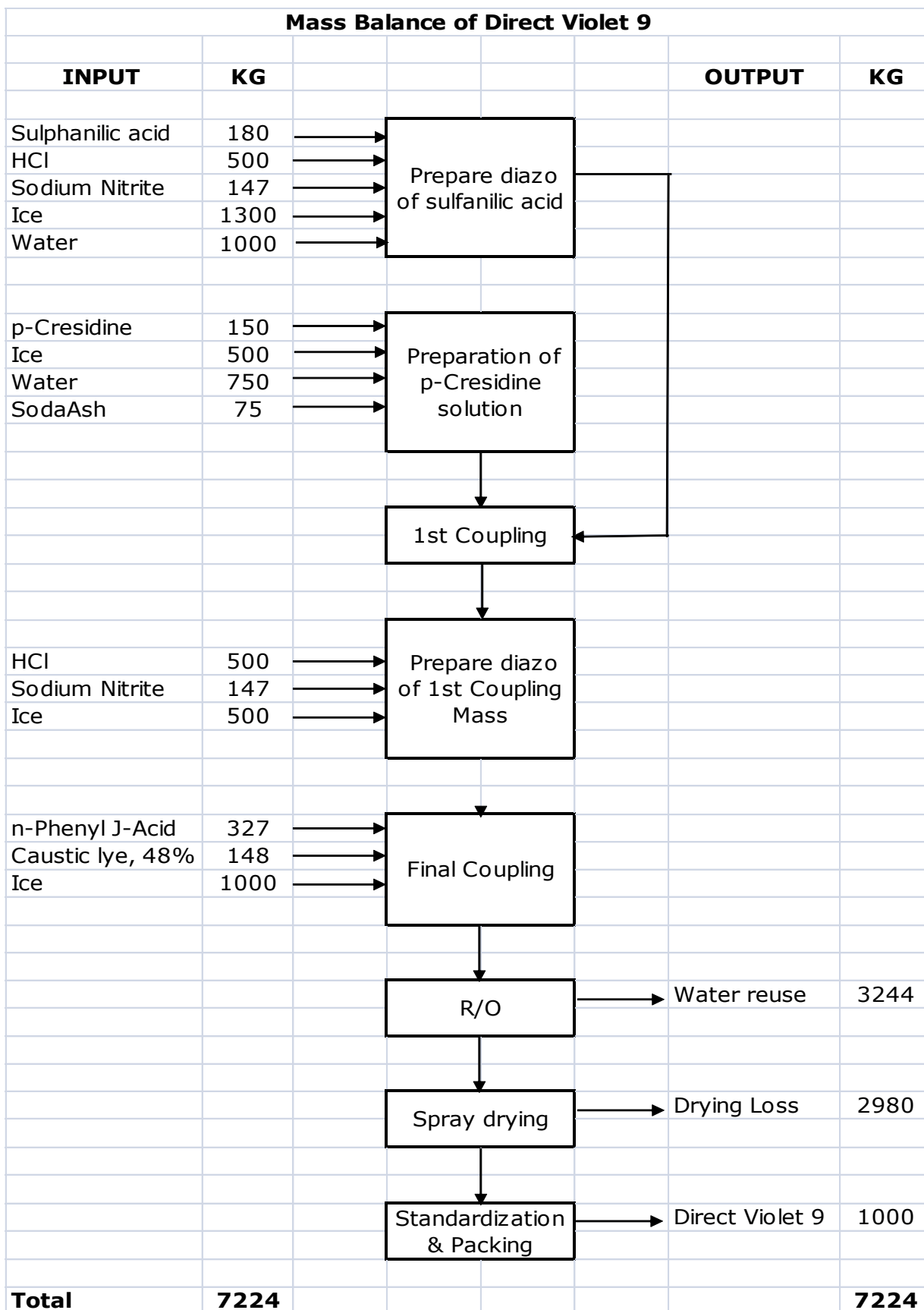
Sulfanilic acid diazo: Prepare diazo of sulfanilic acid in presence of Hydrochloric acid, Sodium Nitrite and ice.

p-Cresidine solution: Prepare solution of p-Cresidine in water. Couple with Sulfanilic acid diazo. Stir continuously. When coupling is over make monoazodiazo by adding Hydrochloric acid and Sodium Nitrite solution in presence of ice. Stir monoazodiazo for 4-5 hr to consume sodium nitrite. After that destroy excess nitrite by adding sulfamic acid. Final coupling will take place with n-Phenyl J-Acid in alkaline medium. After completion of coupling, heat to 70°C. Spray dry the above reaction mass.

Chemical Reaction:



Mass Balance:



33. Direct Yellow 99

Manufacturing Process:

Condensation: DNSDA, Para anisidine and water is charged into vessel. And caustic flakes are added to the vessel to maintain the pH 5.5-6.3.

Isolation: The mass is isolated by HCl and steam is injected into vessel.

Filtration: The mass is filtered and then sent to the drying.

Standardization: The spray dried powder is then charged to the Ball – Mill and standardize by adding Gabber salt and anti – dusted by anti-dusting oil.

Packing: The final product is then packed in HDPE bags / M.S. Drums / Plastic Carboys / Paper cartoon boxes.

Mass Balance:

Mass Balance of Direct Yellow 99							
INPUT	KG				OUTPUT	KG	
DNSDA	550	→	Condensation				
Para anisidine	245	→					
Caustic lye	157	→					
Water	2200	→					
HCl	260	→	Isolation				
steam	750	→					
Salt	500	→					
Water	1000	→					
			R/O	→	Water reuse	1822	
			Spray Drying	→	Drying Loss	2840	
			Standardization & Packing	→	Direct Yellow 99	1000	
Total	5662						5662

34. Direct Black 19

Manufacturing Process:

Diazotization: Charge PNA along with HCl in the MSRL vessel. Add water and ice in it.

Preparation of Gamma Acid Solution: Charge H Acid in the MSRL vessel with HCl, water and soda ash.

Coupling: Above mass is coupled with MPD and ice. Keeping the temperature 0 to 5°C by adding of ice and by adding water wet cake slurry is generated at the end.

Spray Drying: Wet cake slurry is spray dried and product is generated.

Mass Balance:

Mass Balance of Direct Black 19					
INPUT	KG			OUTPUT	KG
PNA	210	→	Diazotization		
Water	750	→			
HCl	540	→			
Sodium Nitrite	180	→			
Ice	1000	→			
		↓			
H acid	245	→	1st Coupling		
Water	700	→			
Ice	500	→			
Soda Ash	75	→			
		↓			
HCl	540	→	Diazotization of 1st Coupling Mass		
Sodium Nitrite	180	→			
Ice	1000	→			
		↓			
MPD	155	→	Coupling		
Water	750	→			
Ice	500	→			
Soda Ash	110	→			
		↓			
			R/O	→ Water reuse	3065
		↓			
			Spray Drying	→ Drying Loss	3390
SD-40	20	→			
		↓			
			Standardization & Packing	→ Direct Black 19	1000
Total	7455				7455

❖ Reactive Dyes

35. Reactive Blue 198:

Manufacturing process:

Cynuration: Cynuric Chloride is charge into a clear solution of Aniline 2:4 Disulphonic Acid in Cold. Stir well to complete the cynuration.

Condensation: Cynurated mass is added in the slurry of Blue 198 base and slowly heated to 50°C – 55°C maintaining pH: 7.0 and stir well to get complete reaction.

Clarification: Final product dye solution is clarified to remove any insoluble foreign particles in clarifier.

Spray Drying: Final product clarified dye solution is spray dried

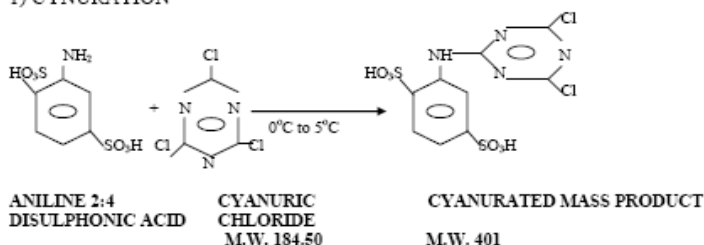
Standardization: The spray dried powder is then charged to the Ball – Mill and standardize by adding Glauber salt and anti – dusted by anti-dusting oil.

Packing: The final product is then packed in HDPE bags / M.S. Drums / Plastic Carboys / Paper cartoon boxes.

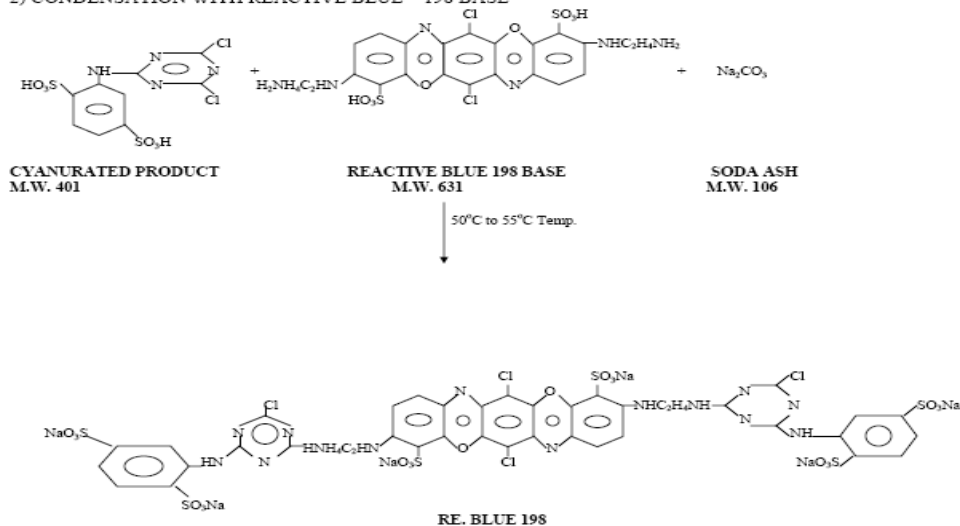
Chemical Reaction:

CHEMICAL REACTION : Reactive Blue 198

1) CYNURATION



2) CONDENSATION WITH REACTIVE BLUE – 198 BASE



Mass Balance:

INPUT		Mass Balance of Reactive Blue 198				OUTPUT	
	KG					KG	
Cyanuric Chloride	220	→	Cyanuration of Aniline 2:4 DSA				
Soda ash	150	→					
Tamol	10	→					
Aniline 2:4 DSA	320	→					
Soda Bi Carb	120	→					
Water	800	→					
Ice	1000	→					
			↓				
Blue HEGN-Base	400	→	Condensation				
HCl	120	→					
Water	800	→					
			↓				
Dicamol	45	→	Clarification	→ Solid waste	50		
				↓			
			RO/UF	→ wastewater	1735		
				↓			
			Spray Drying	→ Drying loss	1200		
				↓			
			Standardization & Packing	→ Reactive Blue 198	1000		
Total	3985					3985	

36. Reactive Blue 187:

Manufacturing Process:

First condensation: In the first stage of process P-nitro chloro Benzene ortho sulfonic acid is added with ethylene diamine to give condensed product and salt.

Second condensation: Reduced product is charged with sodium carbonate and chloronil to form brown base condensed product along with salt, liberating water.

Cyclization: In this stage brown base condensed product is reacted with oleum to produce cyclized product liberating sulphuric acid.

Cyanuration: Sodium salt of aniline 2,5 DSA is charged with cyanuric chloride for cyanuration process to get cyanurated aniline 2,5 DSA.

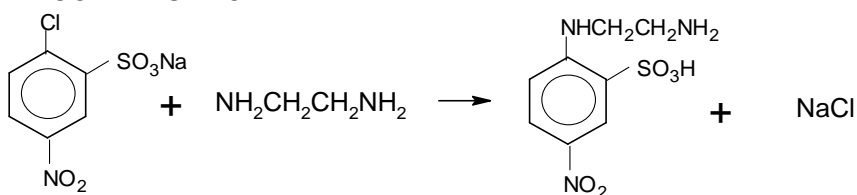
Isolation: Mass is isolated by nicotinic acid. And then further clarified.

Spray Drying: The liquid will be transferred to the spray drying holding tank and spray dry.

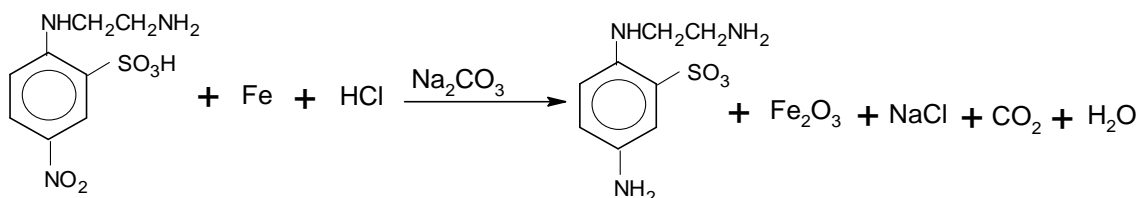
Packing: The final product is then packed in HDPE bags/M.S. Drums/Plastic Carboys/Paper cartoon boxes.

Chemical Reaction:

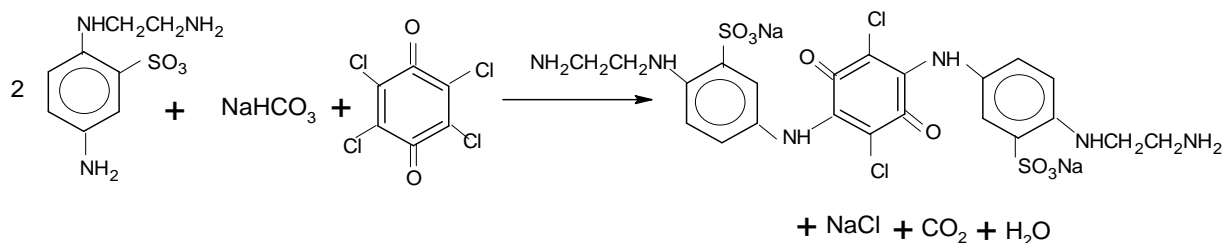
1. 1st CONDENSATION



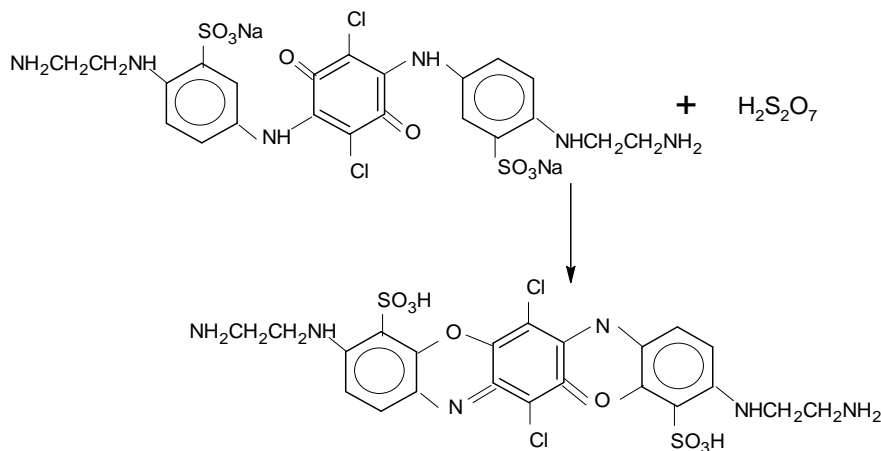
2. REDUCTION



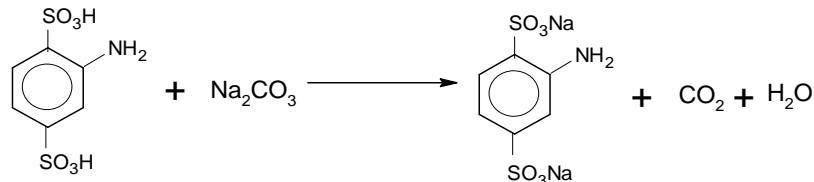
3. 2nd CONDENSATION



4. CYCLIZATION

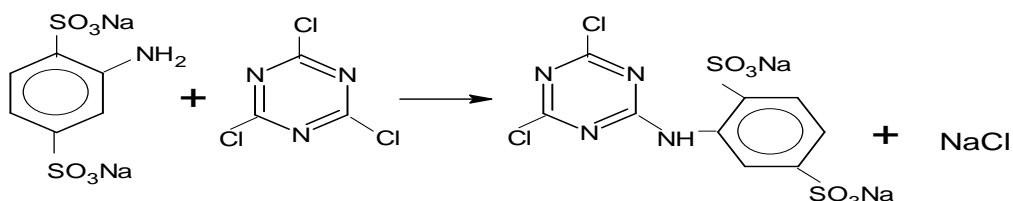


5. DISSOLUTION

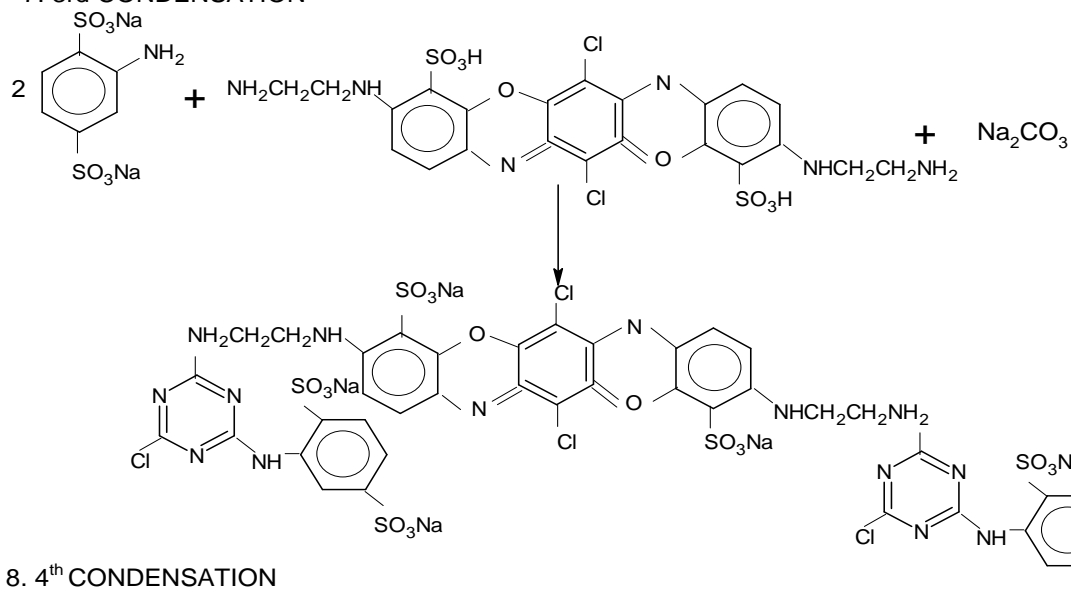


sodium salt of aniline 2:5 DSA

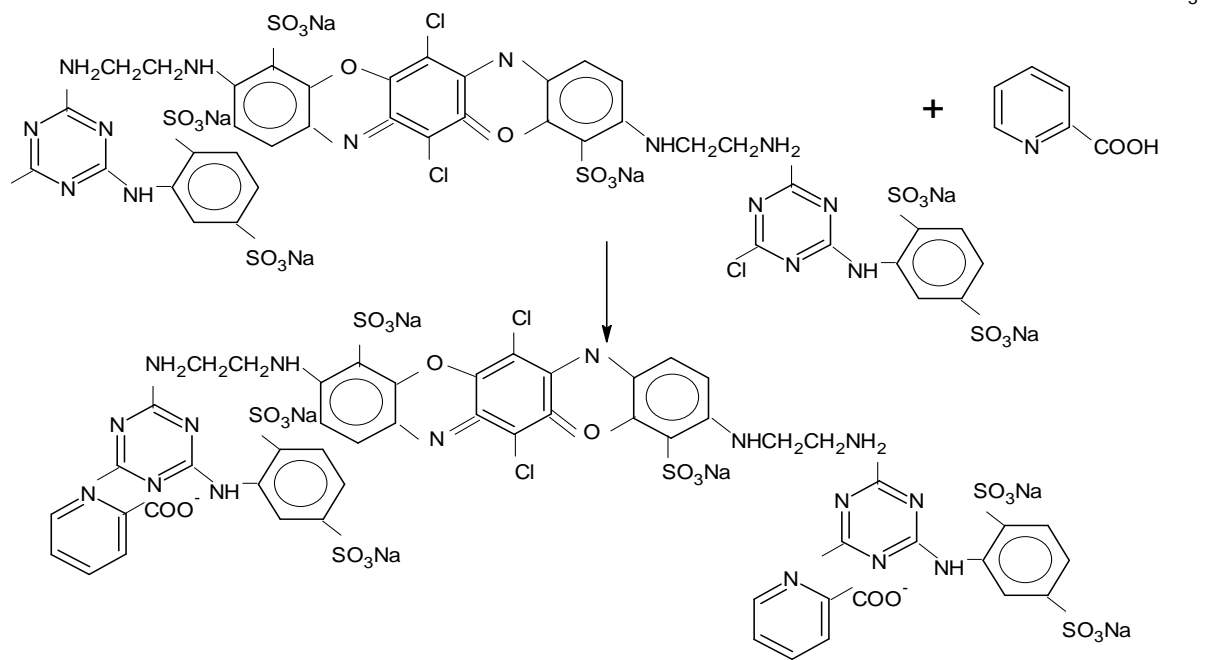
6. CYANURATION



7. 3rd CONDENSATION



8. 4th CONDENSATION



reactive blue 187

Mass Balance:

Mass Balance of REACTIVE BLUE 187				
INPUT	KG		OUTPUT	KG
Ethylene Diamine	250	→	Condensation	
PNCBOSA	230			
Water	1500			
HCl	800	→	Isolation and filtration	
Ice	2100			
			↓	
HCl	315	→	Reduction and condensation	
Sodium sulphite	85			
Chloronail	175			
Sodium bicarbonate	160			
Water	800			
			↓	
Sulphuric Acid	650	→	Cyclization	
Oleum	300			
Ammonium persulphate	150			
			↓	
wash water	800	→	Filtration	
				↓
			Cyanuration	
Cyanuric Chloride	200	→		
Aniline 2,5 disulphuric acid	260	→		
			↓	
Nicotinic acid	250	→	Isolation	
		→		
			↓	
Dicamol	55	→	Clarification	
			↓	
Dedusting Oil	25	→	Spray Drying	
				↓
			Standardization & Packing	
				↓
			REACTIVE BLUE 187	1000

37. Reactive Blue 220:

Manufacturing Process:

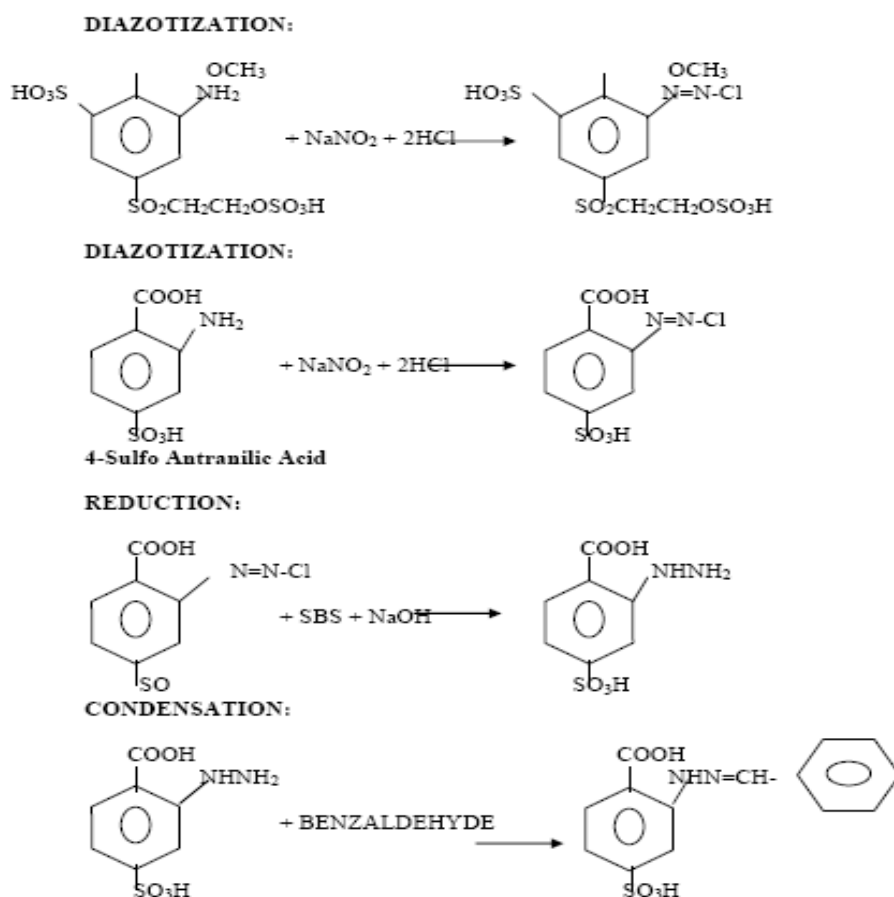
Diazotisation: Sulfo OAVS is diazotised with HCl and sodium Nitrite at 0°C temperature and stirred well to complete diazo.

Coupling: Sulfo OAVS diazo is coupled with 4-Sulfo Hydrazone in alkaline condition in presence of Copper sulfate to form the final dye is called Reactive Blue BB.

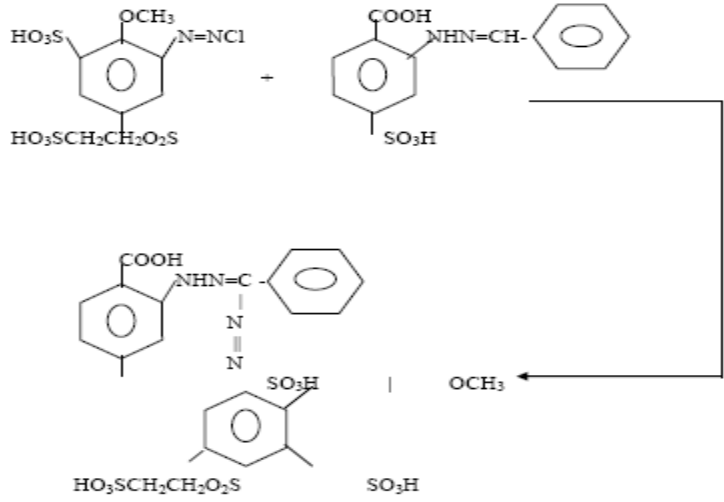
Clarification: The final dye is clarified to remove un-reacted reactants or foreign particles.

Spray Drying: Final product clarified dye solution is spray dried.**Standardization&Packing:** The spray dried powder is then charged to the Ball – Mill and standardize be adding Glauber salt and anti – dusted by anti-dusting oil.The final product is then packed in HDPE bags / M.S. Drums / Plastic Carboys / Paper cartoon boxes.

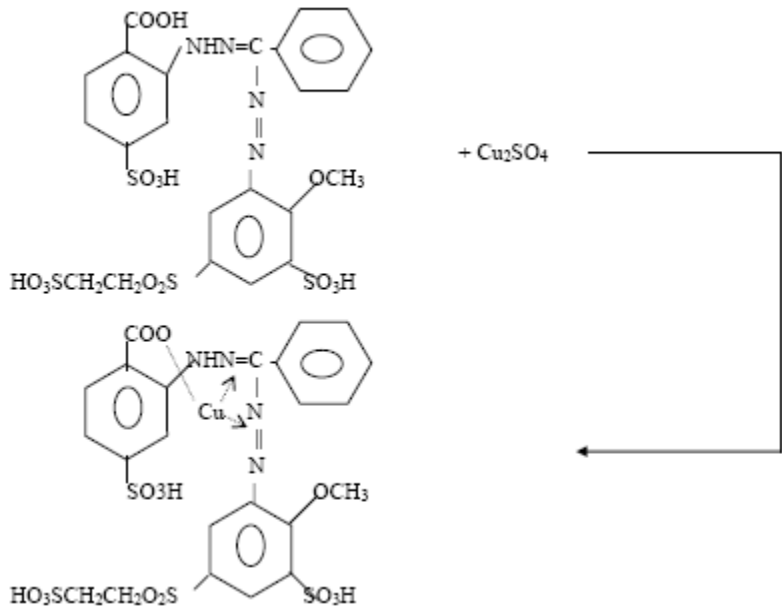
Chemical Reaction:



COUPLING:



COPPERING:



Mass Balance:

INPUT		Mass balance of Reactive blue 220				OUTPUT	
	KG					KG	
Sulpho OAVS	650	→	Diazotization of Sulpho OAVS				
HCl	175	→					
Sodium Nitrite	65	→					
CS Lye	80	→					
Sulphamic acid	2	→					
Soda Ash	125	→					
Water	600	→					
Ice	800	→					
4-Sulpho Hydrazone	450	→	Coupling of 4 - Sulpho Hydrazone				
HCl	150	→					
Sodium Nitrite	65	→					
CS Lye	45	→					
Sulphamic acid	2	→					
Soda Ash	150	→					
Water	800	→					
Ice	600	→					
Copper sulphate	350	→	Coppering				
Soda Bi Carbonate	195	→					
Water	600	→					
Dicamol	70	→	Clarification	→ solid Waste		100	
			RO/UF	→ wastewater for reuse		4154	
SD-40	30	→	Spray Drying	→ Drying loss		750	
			Standardization & Packing	→ Reactive blue 220		1000	
TOTAL	6004					6004	

38. Reactive Blue 221:

Manufacturing Process:

Diazotization: 6-Acetyl OAPSA charged to a MSRL reaction vessel along with water and ice to maintain temperature between 0 to 5°C. Then Hydrochloric Acid will be added followed by Sodium Nitrite powder gradually till diazotization completed, which can be confirmed by starch iodide paper. Any excess nitrite will be removed by adding Sulfamic Acid just before coupling. Keep temperature between 0 to 5 °C throughout the diazotization reaction.

Coupling: Coupling of above mass with 4-Sulpho hydrazone Acid the diazotized 6-Acetyl OAPSA stir it keeping the temperature 0-5°C by adding of ice.

Coppering: The above mass coppering with Copper Sulphate is done at 95°C temperature.

Isolation: Blue BRF base to be isolated with HCl to remove extra impurity by isolation.

Cyanuration: Blue BRF Base is condensed with of Cyanuric Chloride in neutral condition at 0°C temp.

Condensation: The Cyanurated product is further condensed with N-Ethyl Meta Base Ester Eater at 50°C temperature in presence of slightly access of Sodium Carbonate to get the final dye.

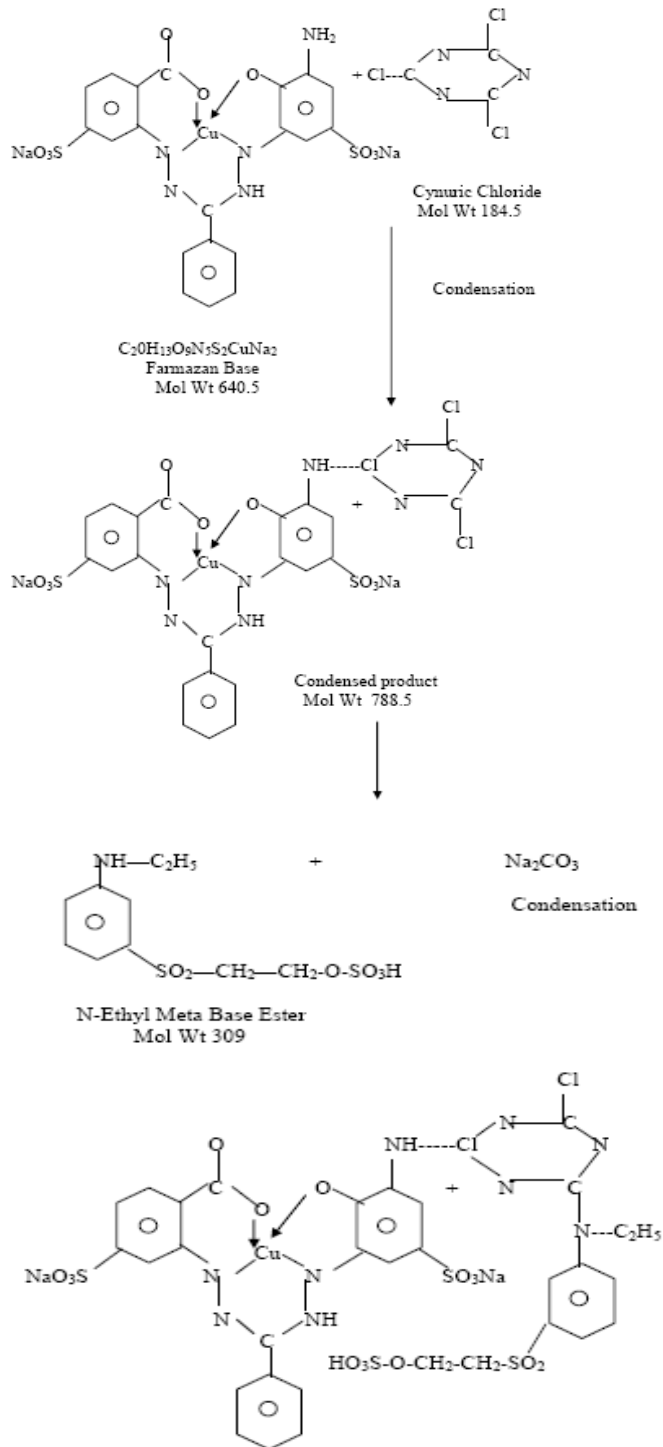
Clarification: Final product dye solution is clarified to remove any insoluble foreign particles in clarifier. The standardized dye liquid will be transferred to the spray drying holding tank and spray dry.

Spray Drying: Final product clarified dye solution is spray dried.

Standardization: The spray dried powder is then charged to the Ball – Mill and standardize be adding Glauber salt and anti-dusted by anti-dusting oil.

Packing: The final product is then packed in HDPE bags / M.S. Drums / Plastic Carboys / Paper cartoon boxes.

Chemical Reaction:



Mass Balance:

Mass Balance of REACTIVE BLUE 221							
INPUT	KG				OUTPUT	KG	
6-Acetyl OAPSA	250	→	Diazotization of 6-Acetyl OAPSA				
CS Lye	55	→					
HCl	550	→					
Sodium nitrite	70	→					
Sulphamic acid	2	→					
Sodium acetate	120	→					
soda ash	65	→					
Water	600	→					
Ice	400	→					
		↓					
4-Sulpho Hydrazone	350	→	Coupling of 4-Sulpho Hydrazone				
Soda ash	120	→					
Ice	400	→					
HCl	250	→					
Water	600	→					
		↓					
Copper sulphate	250	→	Coppering				
CS Flakes	350	→					
Hot water	400	→					
		↓					
Salt	120	→	Isolation & Filtration		wastewater	2430	
Soda ash	150	→					
		↓					
Cyanuric Chloride	150	→	Base Cyanuration				
Tamol	20	→					
		↓					
N-Ethyl MBE	220	→	Condensation				
Soda Bi Carb	130	→					
		↓					
Dicamol	55	→	Clarification		Solid waste	95	
		↓					
		↓	Spray Drying		Drying loss	2152	
		↓					
		↓	Standardization & Packing		Reactive Blue 221	1000	
		↓					
Total	5677					5677	

❖ **BASIC DYES**

39. Basic Brown 1

Manufacturing Process:

Diazotisation of MPD in presence of HCl and nitrite, and further coupling of MPD with caustic Flakes, then Filter it and collect wet cake, and Dry it.

Mass Balance:

Mass Balance of Basic Brown 1							
INPUT	KG					OUTPUT	KG
MPD	215	→	Diazotization				
HCl	750	→					
Nitrite	300	→					
Ice	1000	→					
Water	1250	→					
MPD	430	→	Coupling				
Caustic Flakes	50	→					
Ice	500	→					
Water	1000	→					
Common Salt	450	→	Isolation & Filtration	→	Effluent		3755
			Drying & packig	→	Drying Loss		1190
				→	Basic Brown 1		1000
Total	5945						5945

40. Basic Yellow 2

Manufacturing Process:

Dimethyl Aniline and formaline are reacted in presence of H_2SO_4 , to prepare methane base. Methane base is reacted with T G Urea in presence of Sulphur, filter the reaction mass and dry it.

Chemical Reaction:

Mass Balance:

Mass Balance of Basic Yellow 2							
INPUT	KG					OUTPUT	KG
Di Methyl Aniline	833	→	Condensation				
Formaline	313	→					
Water	2500	→					
H_2SO_4	100	→					
T G UREA	1030	→	Condensation				
SULPHUR	110	→					
			Clarification				
Common Salt	450	→	Filtration			Effluent	3056
			Drying & packig			Drying Loss	1280
							Basic Yellow 2
Total	5336						5336

41. Basic Violet 1 Crystal

Manufacturing Process:

Para Formaldehyde, Mono Methyl Aniline, N,N-dimethylaniline and Acetic Acid are reacted at reflux temp in presence of Catalyst for 12 hrs. Product is isolated with cooling and filter at room temp. Wash with dilute HCl. Dry and pulverized.

Mass Balance:

Mass Balance of Basic Violet 1 Crystal							
INPUT	KG				OUTPUT	KG	
Di Methyl Aniline	670	→	Condensation				
Para Formaldehyde	110	→					
Mono Ethyl Aniline	330	→					
Catalyst	50	→					
Oxygen	50	→					
Acetic Acid	800	→					
Water	1000	→					
			↓				
			Clarification				
			↓				
Caustic Soda	1000	→	Nutralization & Filter	→	Effluent	2640	
HCl	330	→	Paste Forming				
Water	1000	→					
			↓				
			Drying & packig	→	Drying Loss	1700	
				→	Basic Violet 1 Crysta	1000	
Total	5340					5340	

42. Basic Green 4 Crystal

Manufacturing Process:

Benzaldehyde, N,N-dimethylaniline and Acetic Acid are reacted at reflux temp in presence of Ethyl Cellulose and Catalyst for 12 hrs. Product is isolated with cooling and filter at room temp. Wash with dilute HCl. Dry and pulverized.

Mass Balance:

Mass Balance of Basic Green 4 Crystal							
INPUT	KG				OUTPUT	KG	
Di Methyl Aniline	800	→	Condensation				
Benzaldehyde	360	→					
HCl	360	→					
Acetic Acid	600	→					
Catalyst	40	→					
Ethyl Cellulose	80	→					
Oxygen	160	→					
			↓				
			Clarification				
			↓				
Caustic Soda	750	→	Nutralization & Filter		Effluent	1690	
			↓				
Oxalic Acid	600	→	Crystalization				
Water	1000	→					
			↓				
			Drying & packig		Drying Loss	2060	
					Basic Green 4 Crysta	1000	
Total	4750					4750	

43. Basic Green 1 Crystal

Manufacturing Process:

Benzaldehyde, N,N-diethylaniline and Acetic Acid are reacted at reflux temp in presence of Catalyst for 12 hrs. Product is isolated with cooling and filter at room temp. Wash with dilute HCl. Dry and pulverized.

Mass Balance:

Mass Balance of Basic Green 1 Crystal							
INPUT	KG					OUTPUT	KG
Di Ethylaniline	1000	→	Condensation				
Benzaldehyde	330	→					
Acetic Acid	1460	→					
Catalyst	50	→					
Oxygen	160	→					
				↓			
			Clarification				
				↓			
Caustic Soda	800	→	Nutralization & Filter		→	Effluent	2410
				↓			
H2SO4	600	→	Crystalization				
Water	1000	→					
				↓			
			Drying & packig		→	Drying Loss	1990
					→	Basic Green 1 Crystal	1000
Total	5400						5400

44. Basic Blue 26 Crystal

Manufacturing Process:

Para Formaldehyde, Phenyl alpha Naphthyl amine, N,N-dimethylaniline and Acetic Acid are reacted at reflux temp in presence of Catalyst for 12 hrs. Product is isolated with cooling and filter at room temp. Wash with dilute H₂SO₄. Dry and pulverized.

Mass Balance:

Mass Balance of Basic Blue 26 Crystal							
INPUT	KG				OUTPUT	KG	
Di Methyl Aniline	450	→	Condensation				
Para Formaldehyde	75	→					
Phenyl Alpha naphthalamine	415	→					
Acetic Acid	750	→					
Catalyst	20	→					
Oxygen	20	→					
			↓				
			Clarification				
			↓				
Caustic Soda	1000	→	Nutralization & Filter	→	Effluent	1320	
			↓				
H2SO4	600	→	Crystalization				
Water	1000	→					
			↓				
			Drying & packig	→	Drying Loss	2010	
				→	Basic Blue 26 Crystal	1000	
Total	4330					4330	

❖ **BASIC DYES LIQUID:-**

45. Basic Yellow 2

Manufacturing Process:

Dimethyl Aniline and formaline are reacted in presence of H₂SO₄, to prepare methane base. Methane base is reacted with T G Urea in presence of Sulphur, Clarify the reaction mass and send for packing.

Mass Balance:

Mass Balance of Basic Yellow 2 Liquid							
INPUT					OUTPUT		KG
Di Methyl Aniline	270	→	Condensation				
Formaline	100	→					
H ₂ SO ₄	50	→					
↓							
Acetic Acid	225	→	Condensation				
Glycerine	33	→					
T G Urea	335	→					
Sulphur	35	→					
↓							
				Clarification	→	Sludge	48
					→	Basic Yellow 2 Liquid	1000
Total	1048						1048

46. Basic Violet 1

Manufacturing Process:

Para Formaldehyde, Mono Ethyl Aniline, N, N-dimethyl aniline and Acetic Acid are reacted at reflux temp in presence of Catalyst for 12 hrs. Product is clarified, and send for packing.

Mass Balance:

Mass Balance of Basic Violet 1 Liquid						
INPUT	KG				OUTPUT	KG
Di Methyl Aniline	330	→	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> Condensation </div>			
Para Formaldehyde	50	→				
Mono Ethyl Aniline	170	→				
Catalyst	20	→				
Oxygen	20	→				
Acetic Acid	450	→				
			↓			
			<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> Clarification </div>	→	Sludge	40
				→	Basic Violet 1 Liquid	1000
Total	1040					1040

47. Basic Green 4

Manufacturing Process:

Benzaldehyde, N,N-dimethylaniline and Acetic Acid are reacted at reflux temp in presence of Ethyl Cellulose and Catalyst for 12 hrs. Product is clarified and send for packing.

Mass Balance:

Mass Balance of Basic Green 4 Liquid							
INPUT	KG					OUTPUT	KG
Di Methyl Aniline	330	→	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> Condensation </div>				
Benzaldehyde	150	→					
HCl	150	→					
Acetic Acid	300	→					
Catalyst	20	→					
Ethyl Cellulose	30	→					
Oxygen	70	→					
			↓				
				<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> Clarification </div>	→	Sludge	50
					→	Basic Green 4 Liquid	1000
Total	1050						1050

48. Basic Green 1

Manufacturing Process:

Benzaldehyde, N,N-diethylaniline and Acetic Acid are reacted at reflux temp in presence of Catalyst for 12 hrs. Product is clarified and send for packing.

Mass Balance:

Mass Balance of Basic Green 1 Liquid							
INPUT	KG					OUTPUT	KG
Di Ethylaniline	330	→	Condensation				
Benzaldehyde	110	→					
Urea	40	→					
Acetic Acid	500	→					
Catalyst	20	→					
Oxygen	50	→					
				↓			
						Sludge	50
						Basic Green 1 Liquid	1000
Total	1050						1050

49. Basic Blue 26

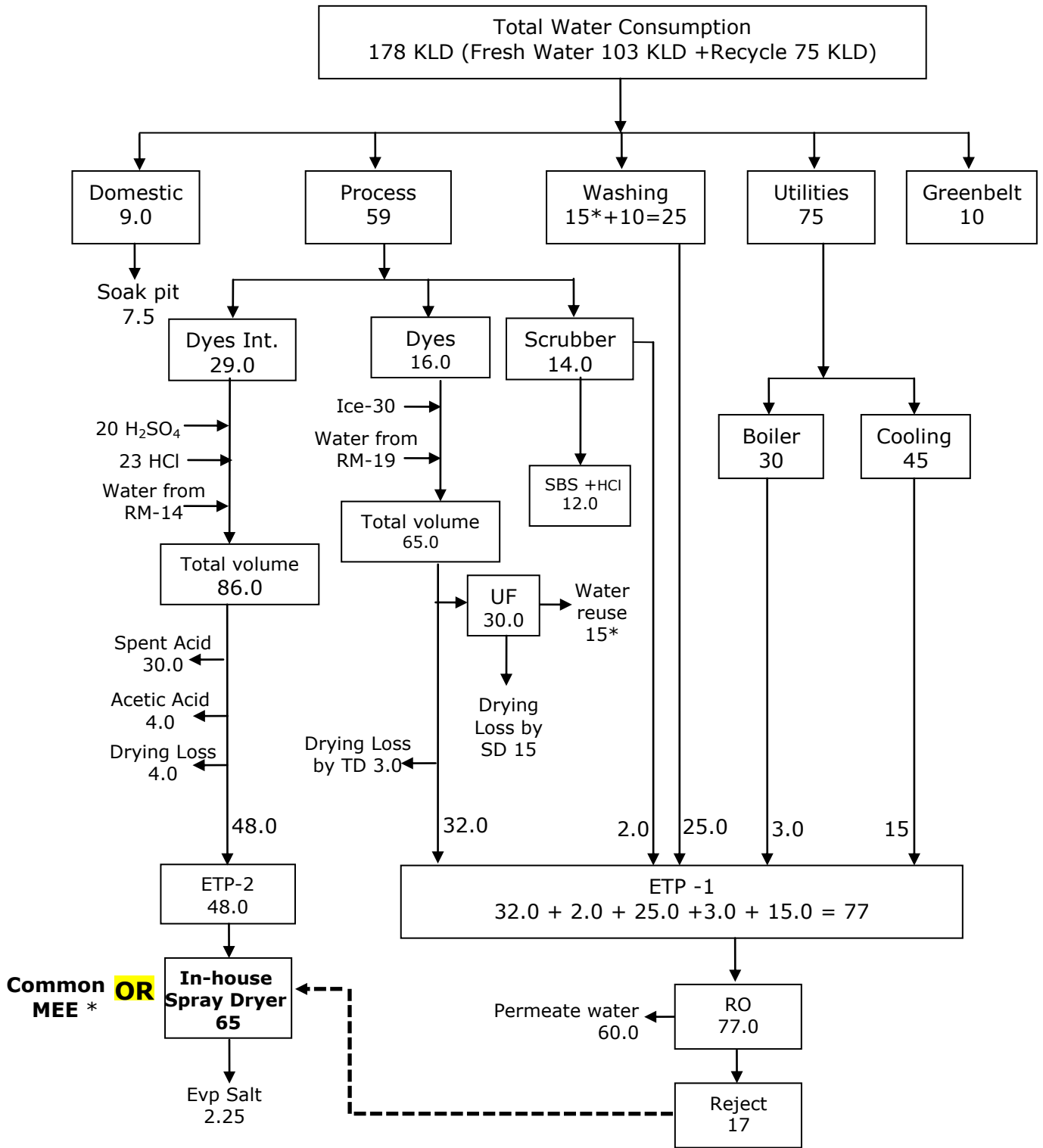
Manufacturing Process:

Para Formaldehyde, Phenyl alpha Naphthyl amine, N,N-dimethylaniline and Acetic Acid are reacted at reflux temp in presence of Catalyst for 12 hrs. Product is clarified and send for packing.

Mass Balance:

Mass Balance of Basic Blue 26 Liquid							
INPUT	KG					OUTPUT	KG
Di Methyl Aniline	280	→	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> Condensation </div>				
Para Formaldehyde	40	→					
Phenyl Alpha naphthalamine	265	→					
Acetic Acid	550	→					
Catalyst	20	→					
Oxygen	20	→					
			↓				
			<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> Clarification </div>	→	Drying Loss	175	
				→	Basic Blue 26 Liquid	1000	
Total	1175						1175

Annexure-III
Water Balance Diagram



* Common MEE facility operated by Chhatral Environment Management system Pvt. Ltd.

Water Consumption and waste water generation

Sr. No.	Source	Water Consumption Existing (KL/day)	Waste Water generation (KL/day)
1.	Domestic	9.0	7.5
2.	Green Belt	10.0	--
3.	Industrial		
A	Process	45	80
B	Scrubber	14	2.0
C	Washing	25	25
D	Boiler	30	3.0
E	Cooling	45	15
Total Industrial		159	125
Total (1 +2 + 3)		178	132.5
Less recycle		75	--
Actual fresh water consumption		103	--

Annexure IV

Details of Hazardous/Solid waste

Sr. No.	Type of Solid Waste	Schedule	Quantity	Disposal method
1	ETP Waste Salt from Spray Dryer	35.3	150.0 65.0 215.0	Collection, storage & disposal at TSDf site approved by GPCB.
2	HCl (20-22%)	26.3	52 MT/month	Collection, Storage and captive consumption and/or sell to actual user.
3	Spent Sulphuric acid (H ₂ SO ₄)	26.3	780 MT/month	Collection, Storage, Reuse with in the process or sold to actual users.
4	Iron sludge	26.1	52 MT/month	Collection, Storage, Transportation, sell to cement manufacturer or disposed at TSDf site.
5	Calcium Thio Sulphite	--	78 MT/month	Collection, Storage, Transportation, sell to actual users under Haz. Waste rule.
6	Acetic Acid	26.3	104 MT/month	Collection, Storage, Reuse with in the process or sold to actual users under Haz. Waste rule.
7	Sodium Bisulphite	26.3	260 MT/month	Collection, Storage, Reuse with in the process or sold to actual users under Haz. Waste rule.
8	Used Lubricating Oil	5.1	0.5 Kl/year	Collection, storage & use within premises as lubricant/sell to registered recycler.
9	Discarded containers/ barrels/ liners	33.1	Barrels- 10000 nos./month Liner-1.0 Mt/month	Collection, storage and reuse for packing of products or disposal by selling to approved recycler.
10	Spent catalyst	28.2	0.5 MT/month	Collection, storage & return back to supplier for regeneration.

Annexure-V
Source of Air Emissions

Flue gas Stack-Proposed						
Sr. No.	Stack attached to	Stack Height in m	Fuel Used	Fuel consumption rate	APC measure	Pollutant
1	Steam Boiler (1TPH)	21	Coal	4 TPD	Cyclone followed by bag filter	PM<150 mg/NM ³ SO ₂ <100 ppm NO _x <50 ppm
2	Steam Boiler (2 TPH)	21	Coal	8 TPD	Cyclone followed by bagfilter	
3	Hot air generator (5.0 lac Kcal/hr)	21	Coal	3 TPD	Cyclone followed by bagfilter	
4	Hot air generator (10.0 lac Kcal/hr)	30	Coal	6 TPD	Cyclone followed by bagfilter	
5	Hot air generator (25.0 lac Kcal/hr)	30	Coal	15 TPD	Cyclone followed by bagfilter	
6	Thermic fluid heater (25 lac Kcal/hr.)	30	Coal	15 TPD	Cyclone followed by bag filter	
7	DG Set (Stand By) (500 kVA)	11	HSD	100 Liter/Hr	--	
Process gas Stack-Proposed						
8	spray dryer-1 (For Product Recovery) (20 KL/Day)	15	--	--	Cyclone + Scrubber + Sub merged type gas bubbling tank	PM<150 mg/NM ³
9	Spray Dryer-2 (For Effluent) (40 KL/Day)	21	--	--		PM<150 mg/NM ³
10	Spray Dryer-3 (For Effluent) (40 KL/Day)					PM<150 mg/NM ³
11	Reaction Vessels of Multipurpose Plant – 2 sets	21	--	--	Alkaline Scubber	SO ₂ <40 mg/NM ³
12	Reaction Vessel of Chloranil	11	--	--	Water Scubber	HCl<20 mg/NM ³

સબ-રજીસ્ટ્રાર કચેરી

એસ આર ઓ - કડી

ગામનું નામ : Rajpur..

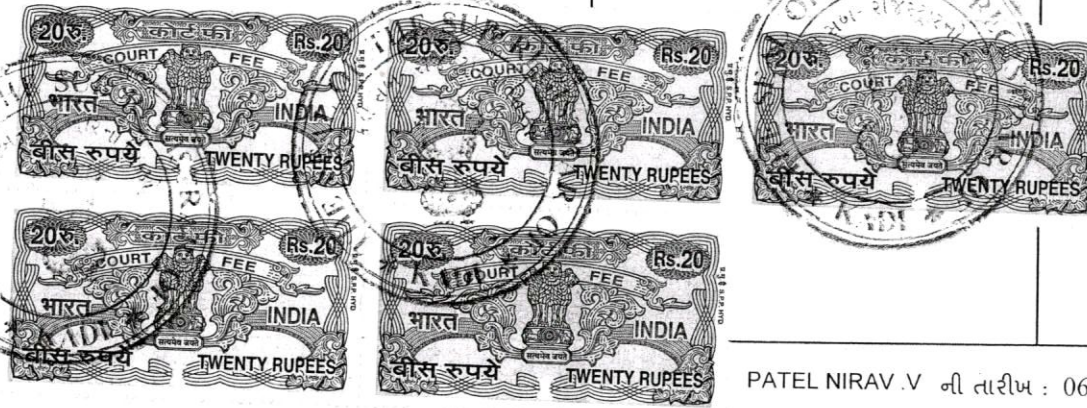
દસ્તાવેજનો પ્રકાર અને અવેજ (ભાડા પટાના કિસ્સામાં આકાર પટે આપનાર અથવા પટે રાખનાર આપે છે તે જણાવવું)	સર્વે નંબર પેટા વિભાગ નંબર અને ઘર નંબર (જો કંઈ પણ હોય તો)	આકાર અથવા જુડી આપવામાં આવે ત્યારે તે.	દસ્તાવેજ કરી આપનાર પક્ષકારનું નામ અથવા દિવાની કોર્ટના હુકમનામા અથવા આદેશના સંબંધમાં પ્રતિવાદીનું નામ	દસ્તાવેજ કરી લેનાર પક્ષકારનું નામ અથવા દિવાની કોર્ટના હુકમનામા અથવા આદેશના સંબંધમાં વાદીનું નામ	સહીની તારીખ	અનુક્રમ. વોલ્યુમ અને પૃષ્ઠ નંબર	શેરો
					નોંધણીની તારીખ		
માલિકી ફેરખત/વેચાણ શ. 7000000=00	ખાતા નંબર - ૫૩૯ પૈકી નવા સર્વે નંબર - ૧૩૮૪ (જુનો સર્વે નંબર - ૭૫૮) કુલ ચો.મી. - ૨૪૪૨૬૭ જમીન પૈકી ઔદ્યોગિક પ્લોટ નંગ - ૨ સબ પ્લોટ નંબર - ૫ ચો.મી. - ૨૫૧૭-૦૦ રોડ રસ્તા વ.વ.વરાડે ચો.મી. - ૩૪૫ કુલ ચો.મી. - ૨૮૬૨-૦૦ તથા સબ પ્લોટ નંબર - ૬ ચો.મી. - ૨૪૫૫-૦૦ રોડ રસ્તા વ.વ.વરાડે ચો.મી. - ૩૪૫ કુલ ચો.મી. - ૨૮૦૦-૦૦ ઔદ્યોગિક હેતુની બીનખેતીની ખુલ્લી જમીન		વાઘેલા જશુજી નારણજી વાઘેલા ઝીલુજી નારણજી વાઘેલા માનબા રણછોડજી વાઘેલા મુકુંદજી રણછોડજી વાઘેલા વિક્રમજી રણછોડજી	અમીત રમેશભાઈ પટેલ કૃણાલ અંબાલાલ પટેલ	05/11/2018 05/11/2018	7366	

મુકાબલ કરનાર

ખરી નકલ

સબ-રજીસ્ટ્રાર
એસ.આર.ઓ - કડી

નોંધ: કોમ્પ્યુટર પ્રિન્ટમાં કોઈ પણ રીતે કરેલ સુધારો માન્ય ગણાશે નહીં.



PATEL NIRAV V ની તારીખ : 06/11/2018 ના રોજની

અરજી નંબર : 7674

પહેલું નંબર : 2018103015677

તારીખ : 06/11/2018

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