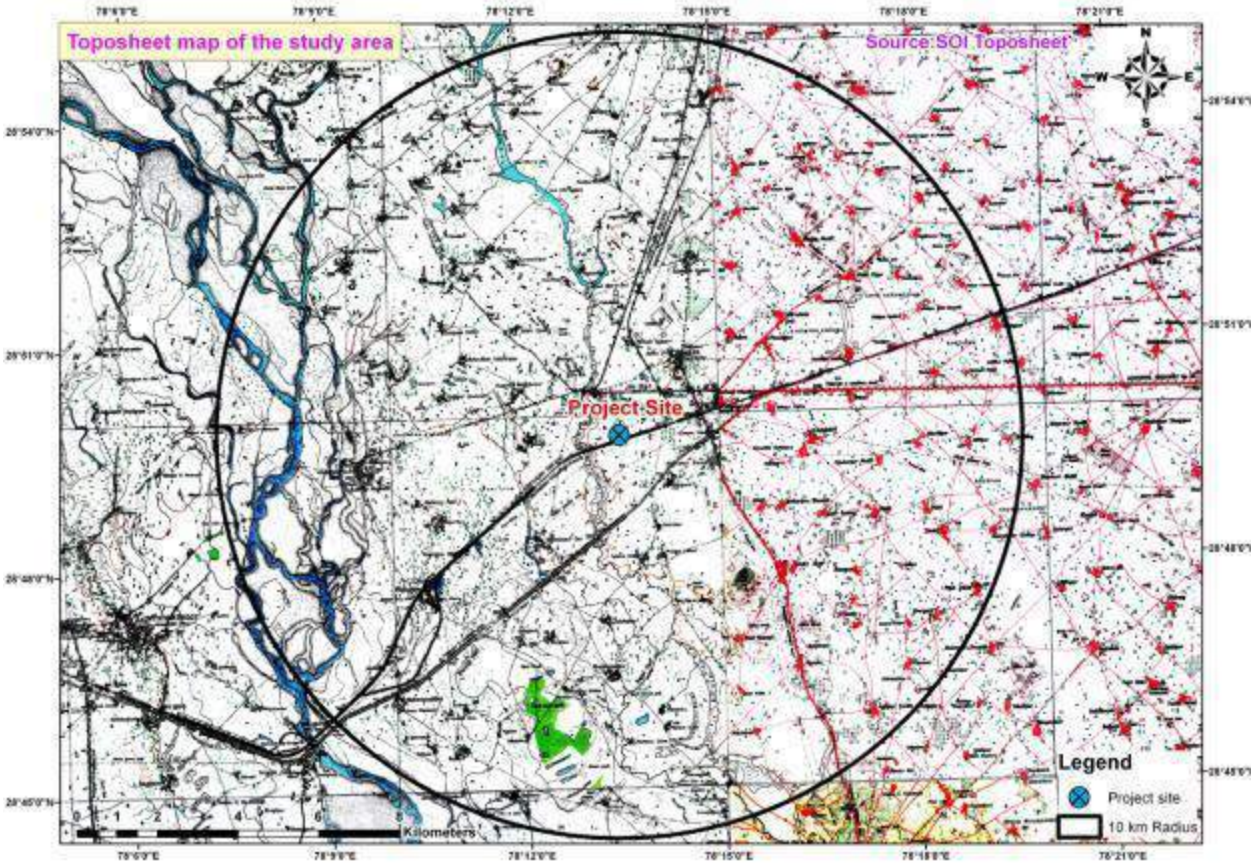
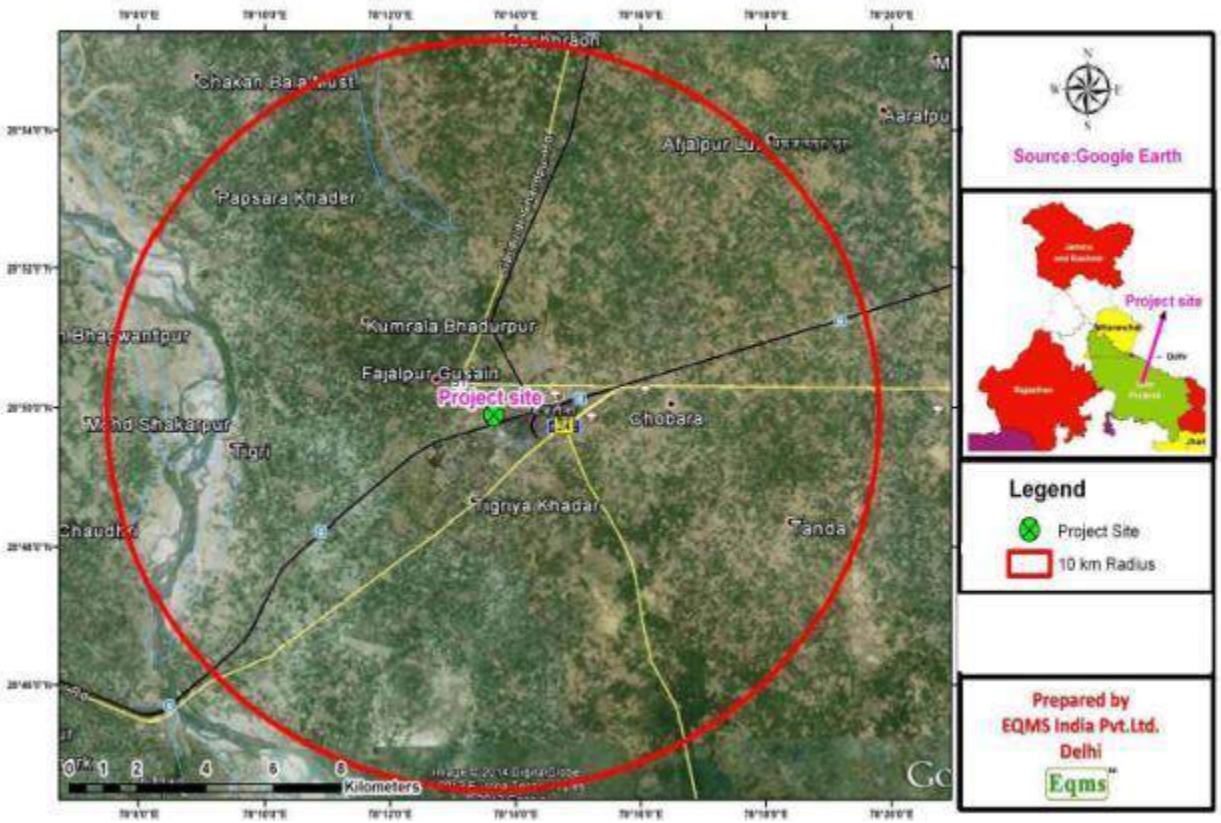
ANNEXURE

Annexure I

TOPO-MAP

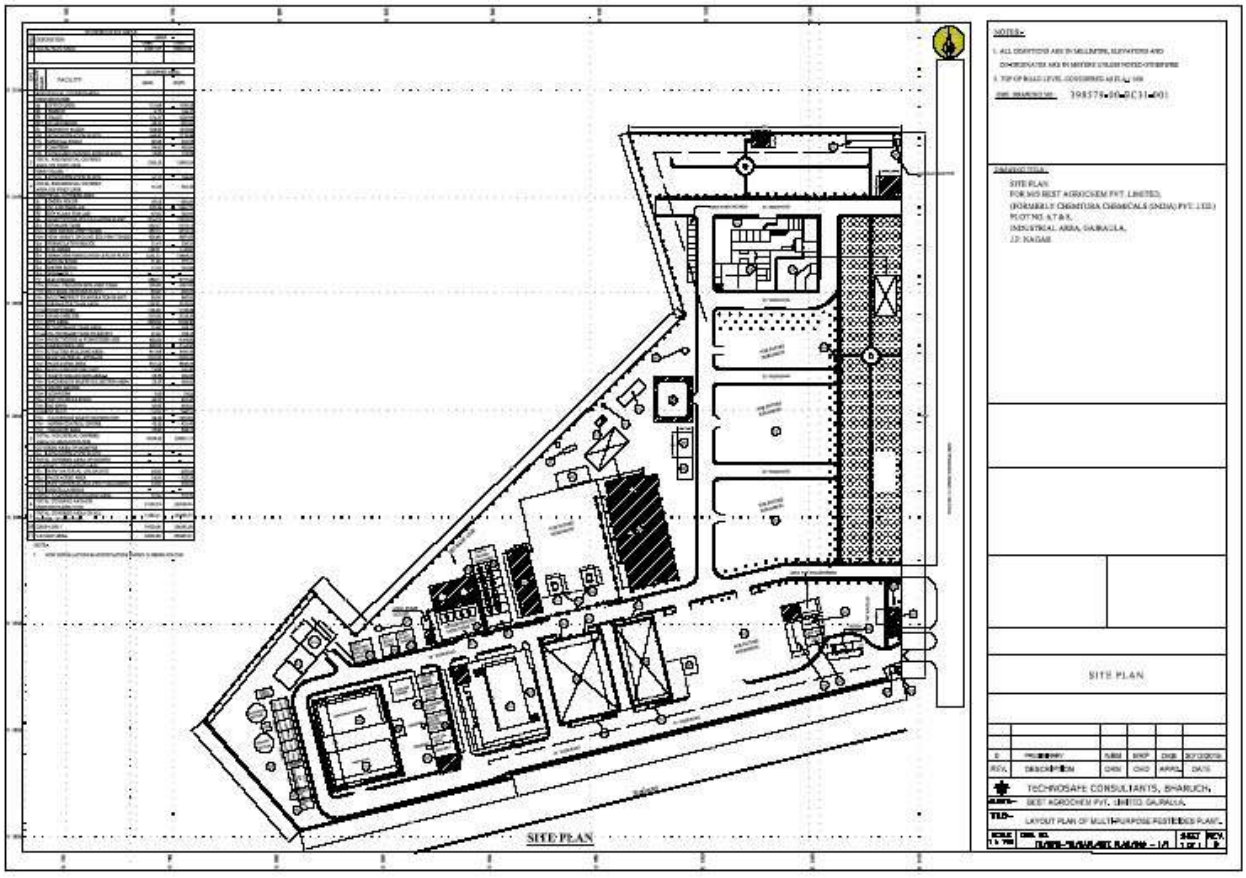


10 Km Google Map of Project Site



Annexure II

Plant Layout



Annexure III

Manufacturing Process

LIST OF PRODUCTS						
S.NO.	**NAME OF PRODUCT**	**PRODUCTION (MT/ANNUM)**	**PHYSICAL STATE**	**MEANS OF STORAGE**	**CARCINOGENICITY**	**LD 50(MG/KG)**
	HERBICIDE	**1100**				
1	METRIBUZIN		SOLID	HDPE BAGS	NON CARCINOGENIC	1090-2300
2	ATRAZINE		SOLID	HDPE BAGS	INCONCLUSIVE	3090
3	SULFOSULFURON		SOLID	FIBER DRUMS	SUSPECTED	980
4	GLYPHOSATE		SOLID	HDPE BAGS	NON CARCINOGENIC	5600
5	CLODINAFOP PROPAROGYL		SOLID	FIBER DRUMS	SUSPECTED	1392
6	PRETILACHLOR		LIQUID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	6049
7	IMAZETHAPYR		LIQUID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	>5000
8	METSULFURON METHYL		SOLID	FIBER DRUMS	NON CARCINOGENIC	>5000
9	PYRAZOSULFURON ETHYL		SOLID	FIBER DRUMS	NON CARCINOGENIC	>5000
10	FENOXAPROP-P-ETHYL		SOLID	HDPE BAGS	NON CARCINOGENIC	3150-4000
11	GLUFOSINATE AMMONIUM		SOLID	FIBER DRUMS	NON CARCINOGENIC	1510-1660
12	CHLORIMURON ETHYL		SOLID	FIBER DRUMS	NON CARCINOGENIC	4102
13	BISPYRIBAC SODIUM		SOLID	FIBER DRUMS	NON CARCINOGENIC	2635
14	OXADIARGYL		SOLID	FIBER DRUMS	NON CARCINOGENIC	>5000
15	OXYFLUROFEN		SOLID	FIBER DRUMS	NON CARCINOGENIC	5000
16	BUTACHLOR		LIQUID	MS-LDPE LINED DRUMS	SUSPECTED	2000

	INSECTICIDE	2500				
17	ACEPHATE		SOLID	HDPE BAGS	NON CARCINOGENIC	866
18	THIAMETHOXAM		SOLID	FIBER DRUMS	NON CARCINOGENIC	688
19	INDOXACARB		SOLID	FIBER DRUMS	NON CARCINOGENIC	268
20	FIPRONIL		SOLID	FIBER DRUMS	SUSPECTED	97
21	DIAFENTHIURON		SOLID	HDPE BAGS	NON CARCINOGENIC	>2000
22	BUPROFEZIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	2198
23	DICHLORVOS		LIQUID	MS-LDPE LINED DRUMS	INCONCLUSIVE	25-80
24	LAMBDA CYHALOTHRIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	56
25	IMIDACHLOPRID		SOLID	FIBER DRUMS	NON CARCINOGENIC	450
26	NOVALURON		SOLID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	>5000
27	BIFENTHRIN		SOLID	MS-LDPE LINED DRUMS	SUSPECTED	54
28	PERMETHRIN		SOLID	MS-LDPE LINED DRUMS	INCONCLUSIVE	430-4000
29	PROPARGITE		LIQUID	MS-LDPE LINED DRUMS	SUSPECTED	960
30	CHLORPYRIPHOS		SOLID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	95-270
31	PROFENOFOS		LIQUID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	358
32	DIFLUBENZURON		SOLID	FIBER DRUMS	NON CARCINOGENIC	4640
33	ACETAMIPRID		SOLID	FIBER DRUMS	NON CARCINOGENIC	330
34	DINOTEFURAN		SOLID	FIBER DRUMS	NON CARCINOGENIC	>2000
35	EMAMECTIN BENZOATE		SOLID	FIBER DRUMS	NON CARCINOGENIC	>92
36	THIOCYCLAM		SOLID	FIBER	NO RELEVANT DATA	195

	OXALTE			DRUMS	AVAILABLE	
37	ETOXAZOLE		SOLID	FIBER DRUMS	NON CARCINOGENIC	>5000
38	PYMETROZINE		SOLID	FIBER DRUMS	CARCINOGENIC	5820
39	FENPYROXIMATE		SOLID	FIBER DRUMS	NON CARCINOGENIC	245
40	TRIAZOPHOS		LIQUID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	66
	FUNGICIDE	**900**				
41	TRICYCLAZOLE		SOLID	HDPE BAGS	NON CARCINOGENIC	314
42	CYMOXANIL		SOLID	HDPE BAGS	NON CARCINOGENIC	960
43	PROPICONAZOLE		LIQUID	MS-LDPE LINED DRUMS	NON CARCINOGENIC	1517
44	HEXACONAZOLE		SOLID	FIBER DRUMS	NON CARCINOGENIC	2189
45	TEBUCONAZOLE		SOLID	FIBER DRUMS	NON CARCINOGENIC	>2000
46	DIFENCONAZOLE		SOLID	FIBER DRUMS	NON CARCINOGENIC	1453
47	METALAXYL		SOLID	HDPE BAGS	INCONCLUSIVE	669
48	CARBOXIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	1300
49	PROPINEB		SOLID	HDPE BAGS	NON CARCINOGENIC	3708
50	AZOXYSTROBIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	>5000
51	MYCLOBUTANIL		SOLID	FIBER DRUMS	NON CARCINOGENIC	1600
52	CARBENDIZIM		SOLID	HDPE BAGS	CARCINOGENIC	>10000
53	PYRACHLOSTROBIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	5000
54	TRIFLOXYSTROBIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	>5000
55	FLUOXASTROBIN		SOLID	FIBER DRUMS	NON CARCINOGENIC	>2000
56	ISOPROTHIOLANE		SOLID	FIBER DRUMS	NON CARCINOGENIC	1190
PLANT GROWTH REGULATOR			**100**			
57	ETHAPHON		SOLID	HDPE	NON	3400-

				BAGS	CARCINOGENIC	4229
-	**R&D PRODUCTS**	**200**	-	-		
	TOTAL	**4800**	-	-		

BYPRODUCT DETAILS				
S.NO.	**BYPRODUCT**	**SOURCE PRODUCT**	**QUANTITY/DAY**	**REMARKS**
1	30% $NAHSO_3$	SO2 FROM LAMBDA CYHALOTHRIN, TRIAZOPHOS, HEXACONAZOLE & CARBOXIN ARE CONVERTED INTO 30% NAHSO3 SOLUTION IN SCRUBBER	4970	TO SALE
2	30% NABr	HBR FROM PROFENOFOS, FLUOXASTROBIN AND PROPICONAZOLE IS CONVERTED INTO 30% NABR SOLUTION IN SCRUBBER	3040	SENT TO EXTERNAL AGENCY FOR RECOVERY OF BROMINE
3	20% NA_2CO_3	CO2 FROM METRIBUZIN, GLYPHOSATE & TRIAZOPHOS IS CONVERTED INTO NA2CO3 SOLUTION IN SCRUBBER	20703	TO SALE/INHOUSE USAGE
4	POLY ALUMINIUM CHLORIDE	BYPRODUCT IN HEXACONAZOLE	1520	TO SALE
5	31% HCl	HCL FROM PRETILACHLOR, OXADIARGYL, LAMBDA CYHALOTHRIN, PERMETHRIN, PROPARGITE, TRICYCLAZOLE, HEXACONAZOLE, METALYXIL, CARBOXIN, PYRACLOSTROBIN, TRIFLOXYSTROBIN AND PROPICONAZOLE IS CONVERTED INTO 31% HCL SOLUTION IN SCRUBBER	6834	TO SALE/INHOUSE USAGE
6	TRIMETHYL AMMONIUM BROMIDE	BYPRODUCT IN PROFENOFOS	540	SENT TO EXTERNAL AGENCY FOR RECOVERY OF BROMINE
7	21% NH_4OH	NH3 FROM DIAFENTHIURON, CARBENDAZIM IS CONVERTED INTO 21% NH4OH SOLUTION INTO SCRUBBER	2775	TO SALE/INHOUSE USAGE
8	METHANOL	BYPRODUCT IN IMAZETHAPYR, ACETAMIPRID AND DINOTEFURON	1303	INHOUSE USAGE
9	METHYL CHLORIDE	BYPRODUCT IN DICHLORVOS	1210	TO INCINERATION
10	EDC	BYPRODUCT IN ETHEPHON	1075	INHOUSE USAGE
11	METHYL MERCAPTAN	BYPRODUCT IN CARBENDAZIN	1456	TO INCINERATION
12	NITROGEN	BYPRODUCT IN	71	TO ATMOSPHERE

		TRIFLOXYSTROBIN		

RAW MATERIALS					
S.NO.	**NAME**	**QUANTITY**	**PHYSICAL STATE**	**MEANS OF STORAGE**	**CARCINOGENICITY**
1	H_2SO_4	3197	LIQUID	ABOVE GROUND MS TANK	NON CARCINOGENIC
2	TRIAZINONE	2000	SOLID	HDPE DRUMS	NON CARCINOGENIC
3	$DMSO_4$	3707	LIQUID	ABOVE GROUND MS TANK	SUSPECTED CARCINOGEN
4	SODIUM CARBONATE (NA_2CO_3)	5198	SOLID	HDPE BAGS	NON CARCINOGENIC
5	CAUSTIC LYE	4931	LIQUID	ABOVE GROUND MS TANK	NON CARCINOGENIC
6	CYANURIC CHLORIDE	1810	SOLID	HDPE BAGS	NON CARCINOGENIC
7	MIPA 70%	810	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
8	HCl	5079	LIQUID	ABOVE GROUND HDPE TANK	NON CARCINOGENIC
9	MEA 50%	870	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
10	NACl	579	SOLID	HDPE BAGS	NON CARCINOGENIC
11	2 ETHYL SULFONYL IMIDAZO (1, 2 -A) PYRIDINE 3 SULFONAMIDE	650	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
12	CARBAMATE	717	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
13	SODIUM TUNGSTATE	25	SOLID	FIBER DRUMS	NON CARCINOGENIC
14	PHISPHONO METHYL IMINODIACETIC ACID (PMIDA)	8105	SOLID	HDPE BAGS	NON CARCINOGENIC
15	SODIUM METABISULFITE	105	SOLID	HDPE BAGS	NON CARCINOGENIC
16	VANADIUM SULFATE	2	SOLID	FIBER DRUMS	NON CARCINOGENIC
17	H_2O_2	3020	LIQUID	HDPE CARBUOYS	NON CARCINOGENIC
18	5-CHLORO-2,3-DIFLUOROPYRIDINE	417	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
19	K_2CO_3	2158	SOLID	HDPE BAGS	NON CARCINOGENIC
20	R(+)-2-(4-HYDROXY PHENOXY PROPIONIC ACID	533	SOLID	FIBER DRUMS	NON CARCINOGENIC

21	PROPARGYL CHLORIDE	430	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
22	2,6-DEA	1150	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
23	PROPOXY ETHYL CHLORIDE	880	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
24	NaOH FLAKES	160	SOLID	HDPE BAGS	NON CARCINOGENIC
25	CHLOROACETYL CHLORIDE **(CAC)**	1180	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
26	DIETHYL 5 ETHYL PYRIDINE DI CARBOXYLATE	970	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
27	2 AMINO 2,3 DIMETHYL BUTANAMIDE	603	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
28	SODIUM ETHOXIDE	658	LIQUID	HDPE DRUMS	NON CARCINOGENIC
29	O-SULFOISOCYANATE METHYL BENZOATE	633	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
30	2-AMINO-4-METHOXY-6-METHYL-1,3,5 TRIAZINE	367	SOLID	FIBER DRUMS	NON CARCINOGENIC
31	ETHYL-1-METHYL-5-SULFENAMIDE-ISOCYANATE-1H-PYRAZOLE-4-CARBOXYLATE (PYRAZOLE)	668	SOLID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
32	2-AMINO-4,6-DIMETHOXY PYRIMIDINE (PYRIMIDINE)	435	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
33	DICHLORO BENZOXAZOLE	611	SOLID	FIBER DRUMS	NON CARCINOGENIC
34	2-(4-HYDROXY PHENOXY) PROPANOATE	590	SOLID	FIBER DRUMS	NO RELEVANT DATA AVAILABLE
35	N-BUTYL (3-CYANO-3- HYDROXY PROPYL METHYL PROPINATE	850	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
36	LIQUOR AMMONIA	4642	LIQUID	ABOVE GROUND MS TANK	NO RELEVANT DATA AVAILABLE
37	2 CARBEETHOXY BENZENE SULFONYL ISOCYANATE	771	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
38	2-AMINO 4-CHLORO 6-METHOXY PYRIMIDINE (ACMP)	459	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
39	DIHYDROXY BENZOIC ACID	360	SOLID	HDPE DRUMS	NON CARCINOGENIC

40	4,6 DIMETHOXY-2-(METHYL SULFONYL) PYRIMIDINE	1020	SOLID	HDPE DRUMS	NON CARCINOGENIC
41	OXADIAZON	1066	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
42	3-CHLOROPHENOL	431	LIQUID	MS DRUMS	NON CARCINOGENIC
43	CHLOROETHANE	225	GAS	CYLINDER	SUSPECTED CARCINOGEN
44	HNO_3	230	LIQUID	HDPE DRUMS	NON CARCINOGENIC
45	4-TRIFLUOROMETHYL-2-CHLORO PHENOL SODIUM SALT	600	SOLID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
46	2,6 DIETHYL ANILINE	500	LIQUID	HDPE DRUMS	NON CARCINOGENIC
47	FORMALDEHYDE **(PARA FORMALDEHYDE)**	100	SOLID	HDPE BAGS	NON CARCINOGENIC
48	DMPTC	1170	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
49	ACETIC ANHYDRIDE	826	LIQUID	ABOVE GROUND SS TANK	NON CARCINOGENIC
50	3-METHYL-4-NITROIMINO-PERHYDRO-1,3,5-OXADIAZINE	1200	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
51	2-CHLORO-5-CHLOROMETHYL TRIAZONE	1276	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
52	METHYL-7-CHLORO-2,5-DIHYDROIDENS[1,2-E] OXADIAZINE-4A(3H)-CARBOXYLATE	600	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
53	METHYL(CHLOROCARBONYL)[4-TRIFLUOROMETHOXY PHENYL] CARBAMATE	300	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
54	1-(2,6-DIISOPROPYL-4-PHENOXYPHENYL) THIOUREA **(DTU)**	2090	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
55	TERTIARY BUTYL AMINE **(TBA)**	1340	LIQUID	HDPE DRUMS	NON CARCINOGENIC
56	TMA-HCl	476	SOLID	HDPE DRUMS	NON CARCINOGENIC
57	FIPRONIL PYRAZOLE	715	SOLID	FIBER DRUMS	NO RELEVANT DATA AVAILABLE

58	TRIFLUORO METHYL SULFINYL CHLORIDE **(TFMSC)**	476	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
59	1-ISOPROPYL-3-TERT-BUTYL THIOUREA	1500	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
60	N-CHLORO METHYL-N-PHENYL CARBAMOYL CHLORIDE	1920	SOLID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
61	AMMONIUM CARBONATE	7200	SOLID	HDPE BAGS	NON CARCINOGENIC
62	CHLORAL	3370	LIQUID	HDPE DRUMS	NON CARCINOGENIC
63	TRIMETHYL PHOSPHITE	2830	LIQUID	HDPE DRUMS	NON CARCINOGENIC
64	LAMBDA CYHALOTHRIC ACID **(MTH ACID)**	1190	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
65	THIONYL CHLORIDE	1374	LIQUID	GI DRUMS	NON CARCINOGENIC
66	METAPHENOXY BENZALDEHYDE **(MPBD)**	1015	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
67	NaCN	109	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
68	SODIUM HYPOCHLORITE **(NaOCl)**	75	SOLID	HDPE DRUMS	NON CARCINOGENIC
69	2 – CHLORO, 5 – CHLOROMETHYL PYRIDINE **(CCMP)**	1746	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
70	N-NITROIMINOIMIDAZOLIDINE **(N-NII)**	1650	SOLID	HDPE BAGS	NON CARCINOGENIC
71	2,6-DIFLUORO BENZOYL ISOCYANATE	320	SOLID	HDPE DRUMS	NON CARCINOGENIC
72	3-CHLORO-4-(1,1,2-TRIFLUORO-2-(TRIFLUORO METHOXY)ETHOXY) ANILINE	792	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
73	2-METHYL 3- BIPHENYL METHYL CHLORIDE (BPC)	500	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
74	SODIUM BICARBONATE	290	SOLID	HDPE BAGS	NON CARCINOGENIC
75	CYPERMETHRIC ACID CHLORIDE **(CMAC)**	650	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
76	2-(4- TERT BUTYL PHENOXY CYCLOHEXANOL	706	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE

77	PROPARGYL ALCOHOL	160	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
78	TRIETHYL AMINE	183	LIQUID	MS DRUMS	NON CARCINOGENIC
79	O,O-DIETHYL THIOPHOSPHORYL CHLORIDE**(DETC)**	4109	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
80	SODIUM SALT OF 3,5,6-TRICHLOROPYRIDINE-2-OL	2512	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
81	O-CHLOROPHENOL	1391	LIQUID	HDPE DRUMS	SUSPECTED
82	BROMINE **(Br_2)**	2095	LIQUID	GLASS BOTTLES	NON CARCINOGENIC
83	TRIMETHYL AMINE	444	LIQUID	MS DRUMS	NON CARCINOGENIC
84	PROPYL BROMIDE	1161	LIQUID	HDPE DRUMS	SUSPECTED
85	CARBON DISULFIDE **(CS_2)**	1450	LIQUID	MS STORAGE TANK IN CONCRETE PIT	NON CARCINOGENIC
86	DIISOPROPYL MALONATE	700	LIQUID	HDPE DRUMS	NON CARCINOGENIC
87	2,6 DIFLUOROBENZAMIDE	516	SOLID	HDPE DRUMS	NON CARCINOGENIC
88	4 CHLOROPHENYL ISOCYANATE	560	LIQUID	HDPE DRUMS	NON CARCINOGENIC
89	N-CYANO METHYL ACETAAMIDE (NCMA)	520	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
90	2-CHLORO 5-(METHYL AMINO METHYL) PYRIDINE (CMAMP)	700	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
91	M,N,O (2,3-DIMETHYLAL NITROSOUREA	700	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
92	3- (AMINOMETHYL) TETRAHYDROFURON	534	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
93	ABAMECTIN BENZOATE	800	SOLID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
94	TETRA METHYLETHANE -1,2-DIAMINE **(TMEDA)**	350	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
95	ALLYL CHLOROFORMATE	140	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
96	PHENYL DICHLOROPHOSPHATE	180	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
97	DIMETHYL SULFOXIDE **(DMSO)**	180	LIQUID	HDPE DRUMS	NON CARCINOGENIC

98	85% PHOSPHORIC ACID	5	LIQUID	HDPE CARBUOY	NON CARCINOGENIC
99	HEPTAMETHYLDISILAZANE	580	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
100	SODIUM BOROHYDRIDE	60	SOLID	HDPE DRUMS	NON CARCINOGENIC
101	ACETIC ACID	41	LIQUID	HDPE DRUMS	NON CARCINOGENIC
102	BENZOIC ACID	120	SOLID	HDPE DRUMS	NON CARCINOGENIC
103	BENSULTAP	2000	SOLID	HDPE DRUMS	NON CARCINOGENIC
104	SODIUM SULFIDE	365	SOLID	HDPE DRUMS	NON CARCINOGENIC
105	OXALIC ACID	417	SOLID	HDPE BAGS	NON CARCINOGENIC
106	N-(2, 6 -DIFLUOROBENZOYL) 2-AMINO 2-(4 TERT BUTYL -2- ETHOXY PHENYL CHLORO ETHANE)	1150	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
107	3 PYRIDINE CARBOXALDEHYDE	519	LIQUID	HDPE DRUMS	NON CARCINOGENIC
108	1,2,4 TRIAZINE-3 (4H) 1,4 -AMINO-5,6 -(DIHYDRO-6-METHYL)	639	SOLID	FIBER DRUMS	NO RELEVANT DATA AVAILABLE
109	1-3 DIMETHYL -5-PHENOXY OXIME **(PCDPO)**	600	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
110	TERT BUTYL -4- (CHLORO METHYL BENZOATE) **(TBCMB)**	590	SOLID	HDPE DRUMS	NON CARCINOGENIC
111	POTASSIUM HYDROXIDE **(KOH)**	1153	SOLID	HDPE BAGS	NON CARCINOGENIC
112	FORMIC ACID	1382	LIQUID	HDPE DRUMS	NON CARCINOGENIC
113	CUCl	7	SOLID	HDPE BAGS	NON CARCINOGENIC
114	2-AMINO- 4-METHYL BENZOTHIAZOLE **(AMBT)**	2400	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
115	HYDRAZINE MONO HYDRATE	804	LIQUID	HDPE DRUMS	SUSPECTED
116	PHENYL HYDRAZINE HYDROCHLORIDE	504	SOLID	HDPE DRUMS	SUSPECTED
117	UREA	280	SOLID	HDPE BAGS	NON CARCINOGENIC
118	SODIUM NITRITE	533	SOLID	HDPE BAGS	NON CARCINOGENIC
119	1-CYANO ACETYL 3 ETHYL UREA	834	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
120	META DICHLORO BENZENE **(MDCB)**	1405	LIQUID	MS DRUMS	NON CARCINOGENIC

121	ACETYL CHLORIDE	375	LIQUID	HDPE DRUMS	NON CARCINOGENIC
122	1, 2 PENTANE DIOL	535	SOLID	HDPE DRUMS	NON CARCINOGENIC
123	1,2,4 TRIAZOLE	1466	SOLID	HDPE BAGS	NON CARCINOGENIC
124	1-(4-CHLOROPHENYL) 4-4-DIMETHYL-3-PENTANOATE	675	SOLID	HDPE BAGS	NON CARCINOGENIC
125	SODIUM METHOXIDE	162	SOLID	HDPE BAGS	NO RELEVANT DATA AVAILABLE
126	DIMETHYL SULFIDE **(DMS)**	186	LIQUID	MS TANK	NO RELEVANT DATA AVAILABLE
127	BROMOKETAL	1833	SOLID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
128	N-(2,6-DIMETHYL PHENYL) ALANINE-METHYL ESTER	754	SOLID	HDPE BAGS	NON CARCINOGENIC
129	METHOXY ACETYL CHLORIDE	400	LIQUID	HDPE DRUMS	NON CARCINOGENIC
130	ACETOACETANILIDE	1506	SOLID	HDPE DRUMS	NON CARCINOGENIC
131	SULFURYL CHLORIDE **(SO_2Cl_2)**	1183	LIQUID	HDPE DRUMS	NON CARCINOGENIC
132	2-MERCAPTOETHANOL	610	LIQUID	HDPE DRUMS	NON CARCINOGENIC
133	DIAMINO PROPANE	570	LIQUID	HDPE DRUMS	NON CARCINOGENIC
134	ZINC SULFATE	2320	SOLID	HDPE BAGS	NON CARCINOGENIC
135	METHYL-3-METHOXY-2-2-6-CHLOROPYRIMIDINE-4-4-IYL-OXYPHENYL- ACRYLATE **(MMCPOA)**	880	LIQUID	MS LDPE LINED DRUMS	NON CARCINOGENIC
136	2 CYANO PHENOL	327	SOLID	HDPE BAGS	NON CARCINOGENIC
137	$CUCl_2$	11	SOLID	HDPE BAGS	NON CARCINOGENIC
138	4 CHLOROPHENYL ACETONITRILE	600	SOLID	HDPE DRUMS	NON CARCINOGENIC
139	N-BUTYL BROMIDE	550	LIQUID	HDPE DRUMS	NON CARCINOGENIC
140	DIBROMOMETHANE	700	LIQUID	HDPE DRUMS	NON CARCINOGENIC
141	THIOUREA	760	SOLID	HDPE BAGS	SUSPECTED

142	METHYL CHLOROFORMATE	500	LIQUID	HDPE DRUMS	NON CARCINOGENIC
143	O-POHENYLENE DIAMINE	573	SOLID	HDPE BAGS	SUSPECTED CARCINOGEN
144	1,4 DICHLORO BENZENE	425	SOLID	HDPE DRUMS	SUSPECTED
145	3 CHLORO PYRAZOLE	275	SOLID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
146	2 CHLORO BENZYL ALCOHOL	370	SOLID	HDPE DRUMS	NON CARCINOGENIC
147	N METHOXY CARBAMATE	270	LIQUID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
148	2-METHYL ANILINE	275	LIQUID	HDPE DRUMS	SUSPECTED
149	GLYOXYLIC ACID METHYL ESTER OXIME	260	LIQUID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
150	CHLORINE	191	GAS	TONNERS	NON CARCINOGENIC
151	OXIDAMIDE	521	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
152	2 HYDROXY PHENACYL BROMIDE	450	SOLID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
153	METHOXY AMINE	100	LIQUID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
154	POTASSIUM TERT BUTOXIDE	233	SOLID	PAPER DRUMS	NON CARCINOGENIC
155	TERT BUTYL NITRATE	215	LIQUID	MS LDPE LINED DRUMS	NO RELEVANT DATA AVAILABLE
156	ETHYLENE OXIDE **(EPOXY ETHANE)**	917	LIQUID	MS TANK	SUSPECTED
157	TRIFLUORO PYRIMIDINE	345	LIQUID	HDPE DRUMS	NO RELEVANT DATA AVAILABLE
158	PCl_3	855	LIQUID	ABOVE GROUND MS LEAD-	NON CARCINOGENIC

				BONDED TANK	
159	AMMONIA GAS	423	GAS	CYLINDERS	NON CARCINOGENIC
160	ALUMINIUM CHLORIDE	1662	SOLID	HDPE DRUMS	NON CARCINOGENIC

LIST OF SOLVENTS				
S. No.	**Raw Material**	**% recovery**	**Means of Storage**	**Tank Capacity KL**
1	TOLUENE	94.66	UG, MS storage tank	20
2	METHANOL	94.64	UG, MS storage tank	20
3	DMF	94.31	ABOVE GROUND MS TANK	25
4	MDC	95.24	ABOVE GROUND MS TANK	25
5	XYLENE	94.50	MS TANK	25
6	HEXANE	88.05	UG, MS storage tank	20
7	MCB	98.38	ABOVE GROUND MS TANK	25
8	1,2 DICHLORO ETHANE	81.82	ABOVE GROUND MS TANK	25
9	ISOPROPYL ACETATE	94.21	MS DRUM	
10	DMS	96.50	HDPE DRUMS	
11	DMSO	97.00	HDPE DRUMS	
12	IPE	94.96	ABOVE GROUND MS TANK	25
13	PE	95.21	HDPE DRUMS	
14	O-XYLENE	96.08	ABOVE GROUND MS TANK	25
15	BUTANOL	78.73	MS DRUM	
16	ACETONE	95.33	UG, MS storage tank	20
17	ETHANOL	96.10	ABOVE GROUND MS TANK	25
18	ISOPROPYL ALCOHOL	92	ABOVE GROUND MS TANK	25

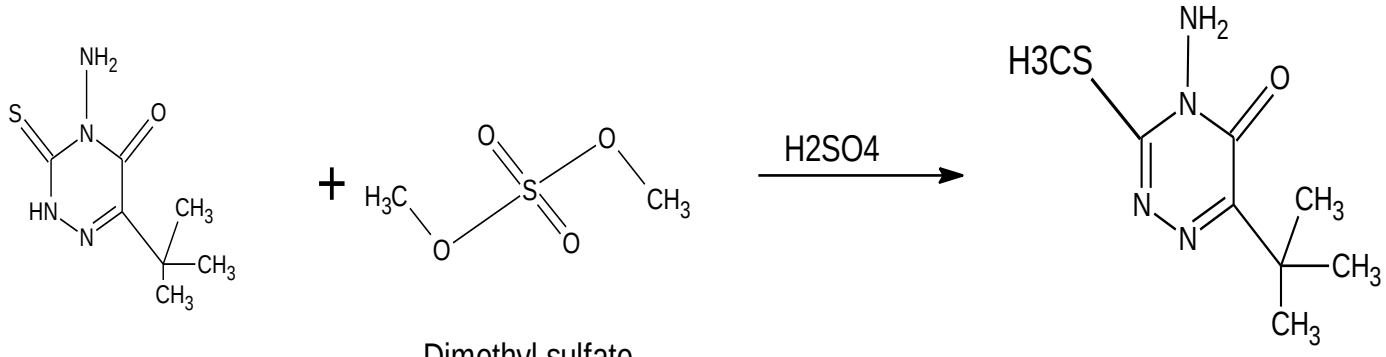
LIST OF CATALYSTS			
S. No.	**CATALYSTS**	**SOURCE PRODUCT**	**Consumption (IN KG/DAY)**
1	CATALYST-1 (DISIOPROPYL AMINE)	LAMBDA-CYHALOTHRIN	20
2	TBAB	BIFENTHRIN , BISPYRIBAC SODIUM & MYCLOBUTANIL	40
3	CATALYST-2	INDOXACARB	8
4	TERTIARY AMINE ACID BORIC TAMPON	CHLORPYRIFOS	60
5	CATALYST-3	METALYXYL	15
6	CATALYST-4	FLUXASTROBIN	50
7	CATALYST-5	PYRACLOSTROBIN	5
8	CATALYST-6	PYRACLOSTROBIN	5
9	PTSA	PROPICONAZOLE & CARBOXIN	27
10	PALLADIUM CHLORIDE	EMAMECTIN BENZOATE	0.2
11	ACTIVATOR	EMAMECTIN BENZOATE	1
12	SODIUM TUNGSTATE	GLYPHOSATE	25
13	VANADIUM SULFATE	GLYPHOSATE	2

(H-1) Metribuzin

Process Description:

It is manufactured by the reaction of 4 Amino-6-Tert-Butyl 3-Mercapto 1,2,4-Triazin-5(4H)-one (ATMT) with Dimethyl Sulphate in presence of sulphuric acid at 45 – 50°C under stirring.
The reaction mass is neutralized with sodium carbonate solution and heated to 50°C. The mass is cooked for 6 to 7 hrs. to complete the reaction during which CO_2 liberates. The evolved gas is scrubbed in caustic solution to get sodium carbonate solution which can be used in the next batch.
The pH is raised to 10.5. Charge hot water and stir for an hour.
Cool to RT, centrifuge, wash the cake with hot water and dry to get Metribuzin technical. The aqueous ML is sent to ETP.

Process Reaction:

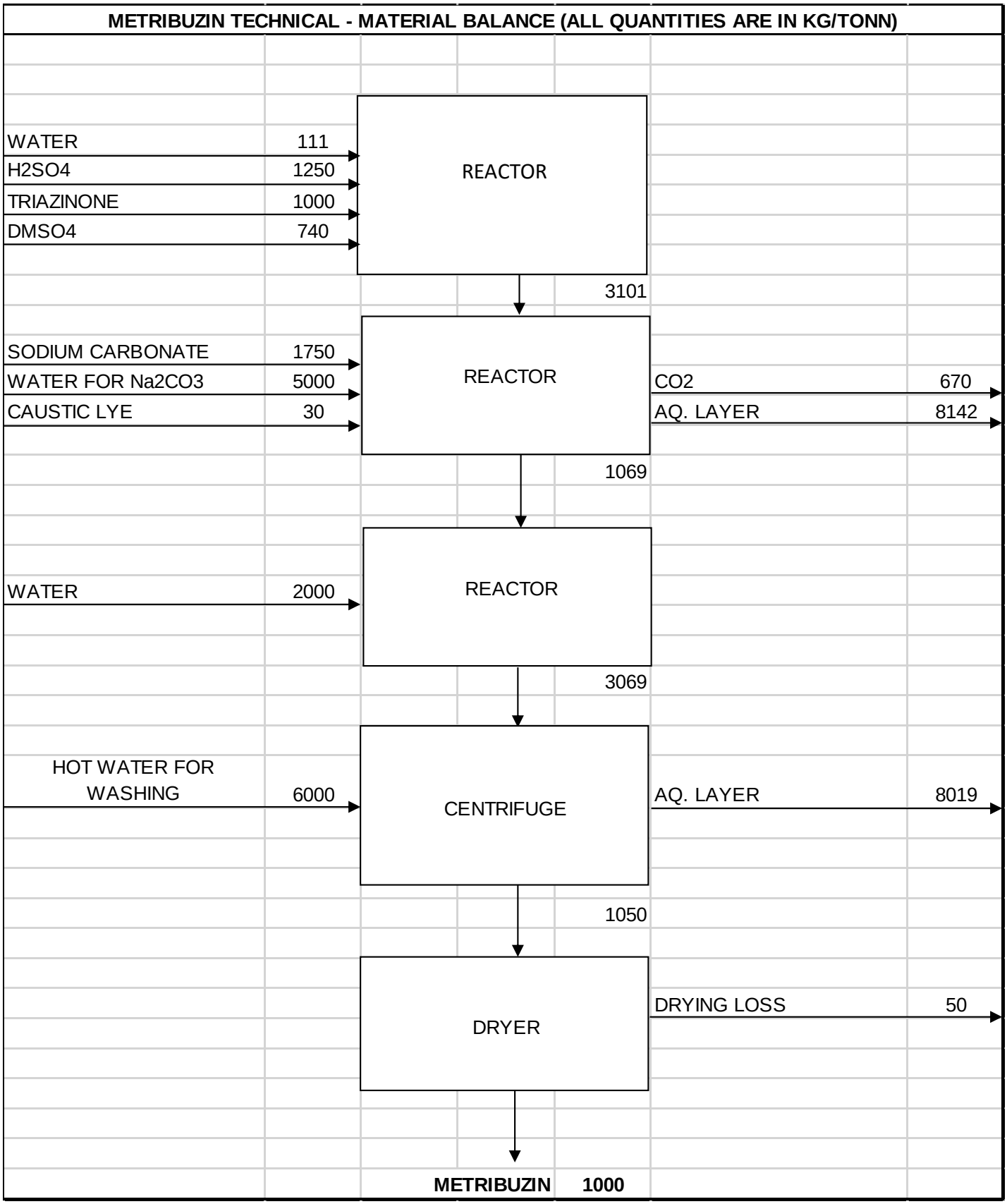


4-Amino-6-tert-butyl-3-mercato-1,2,4-trazin-5(4H)-one
MW.= 200.26

Dimethyl sulfate
MW.= 126.13

METRIBUZIN
MW.=214.3

Process Flow Diagram:



Material Balance:

Material Balance for Metribuzin		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Water	13111
2	H2SO4	1250
3	Triazinone	1000
4	DMSO4	740
5	Sodium Carbonate	1750
6	Caustic Lye	30
Total		**17881**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Metribuzin	-	-	1000	-	Product
2	CO2	-	670	-	-	To Scrubber
3	Aqueous Layer	16161	-	-	-	To ETP
4	Drying Loss	-	50	-	-	To atmosphere
Total		**16161**	**720**	**1000**	**0**	
		17881				

(H-2) Atrazine

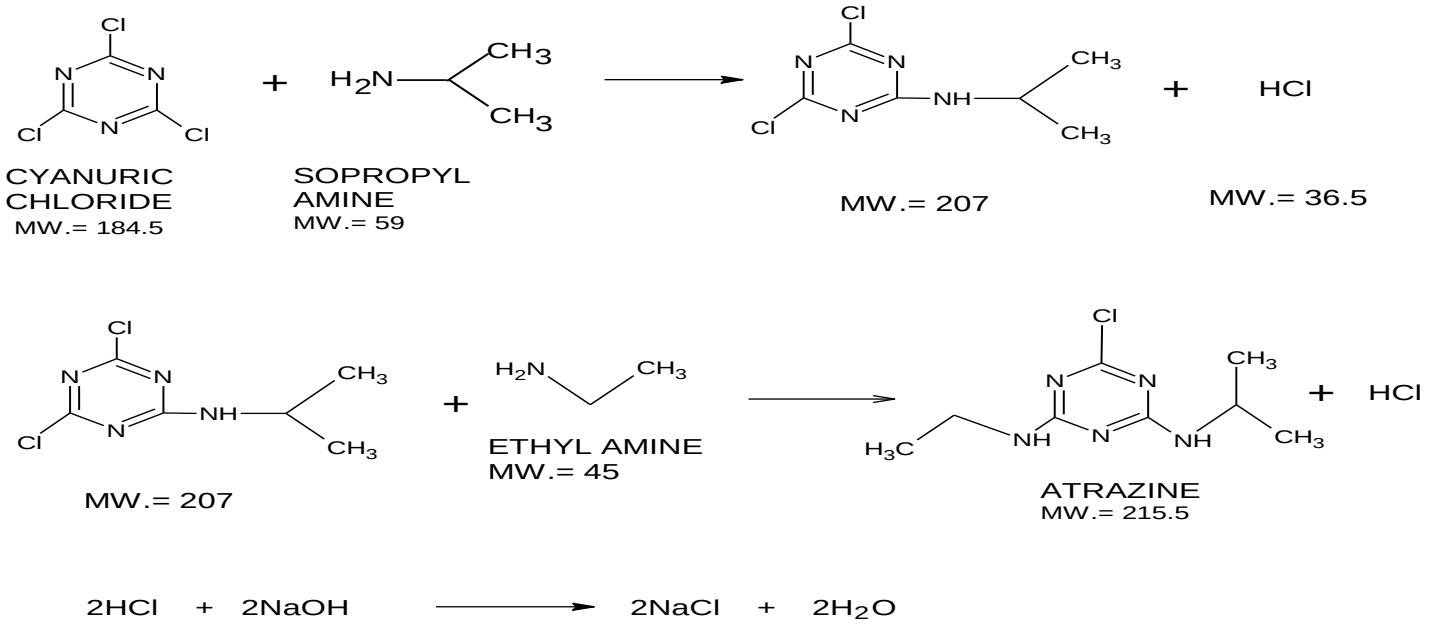
Process Description:

Toluene, Cyanuric chloride, Isopropyl amine and caustic soda solution are charged in the reactor and stirred for one hour at 15 – 25°C.

Ethyl amine is then added and cooked at the same temperature for another hour. Aqueous layer is separated after completion of reaction and solvent is distilled off.

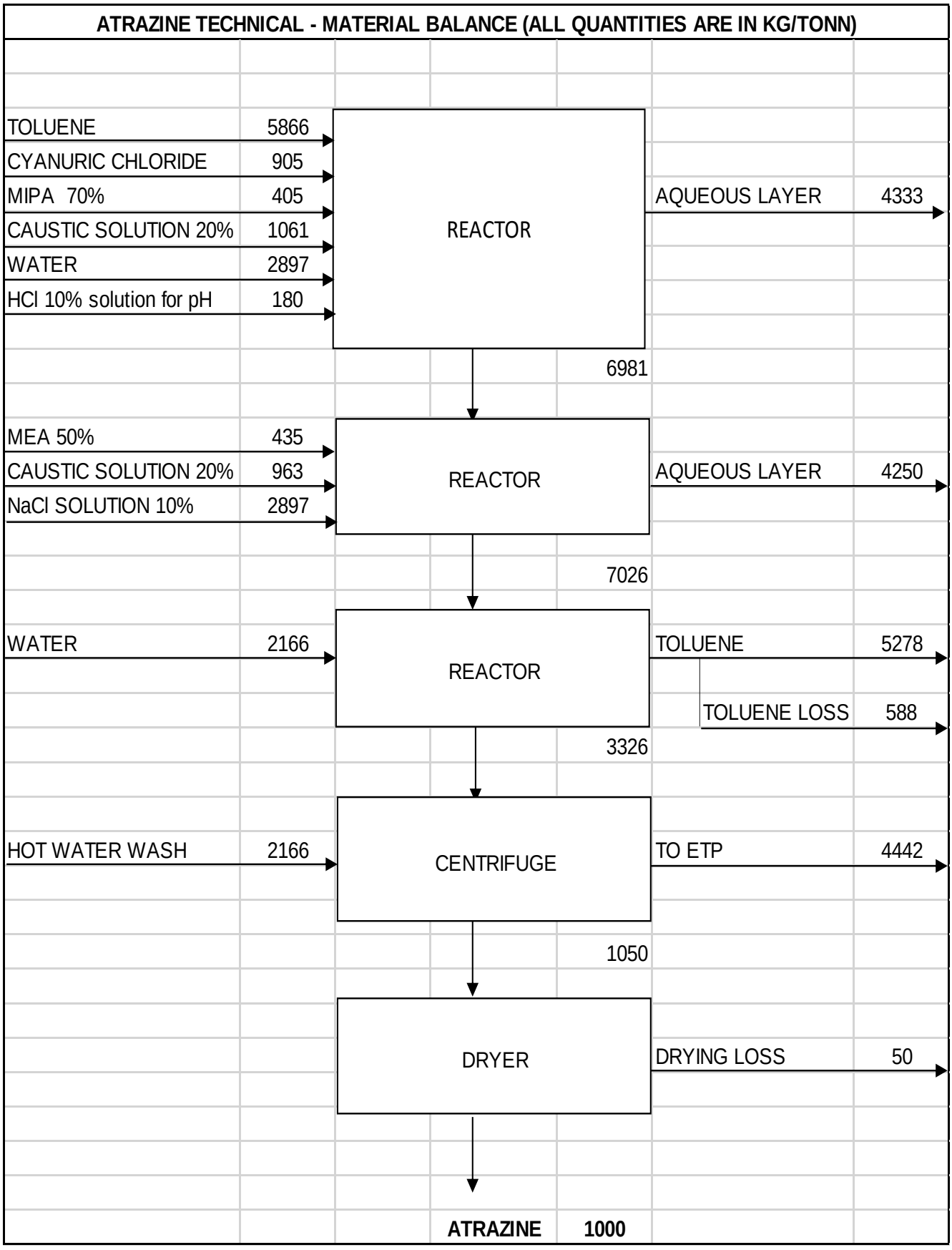
The material is taken in water, the slurry is centrifuged and dried to give Atrazine technical.

Process Reaction:



$$2HCl + 2NaOH \longrightarrow 2NaCl + 2H_2O$$

Process Flow Diagram:



Material Balance:

Material Balance for Atrazine

S. No.	Raw Materials	Input/MT of Product (KG)
1	Toluene	5866
2	Cyanuric Chloride	905
3	MIPA 70%	405
4	Caustic Solution 20%	2024
5	Water	7230
6	HCl 10% Solution for pH	180
7	MEA 50%	435
8	NaCl Solution 10%	2897
Total		**19941**

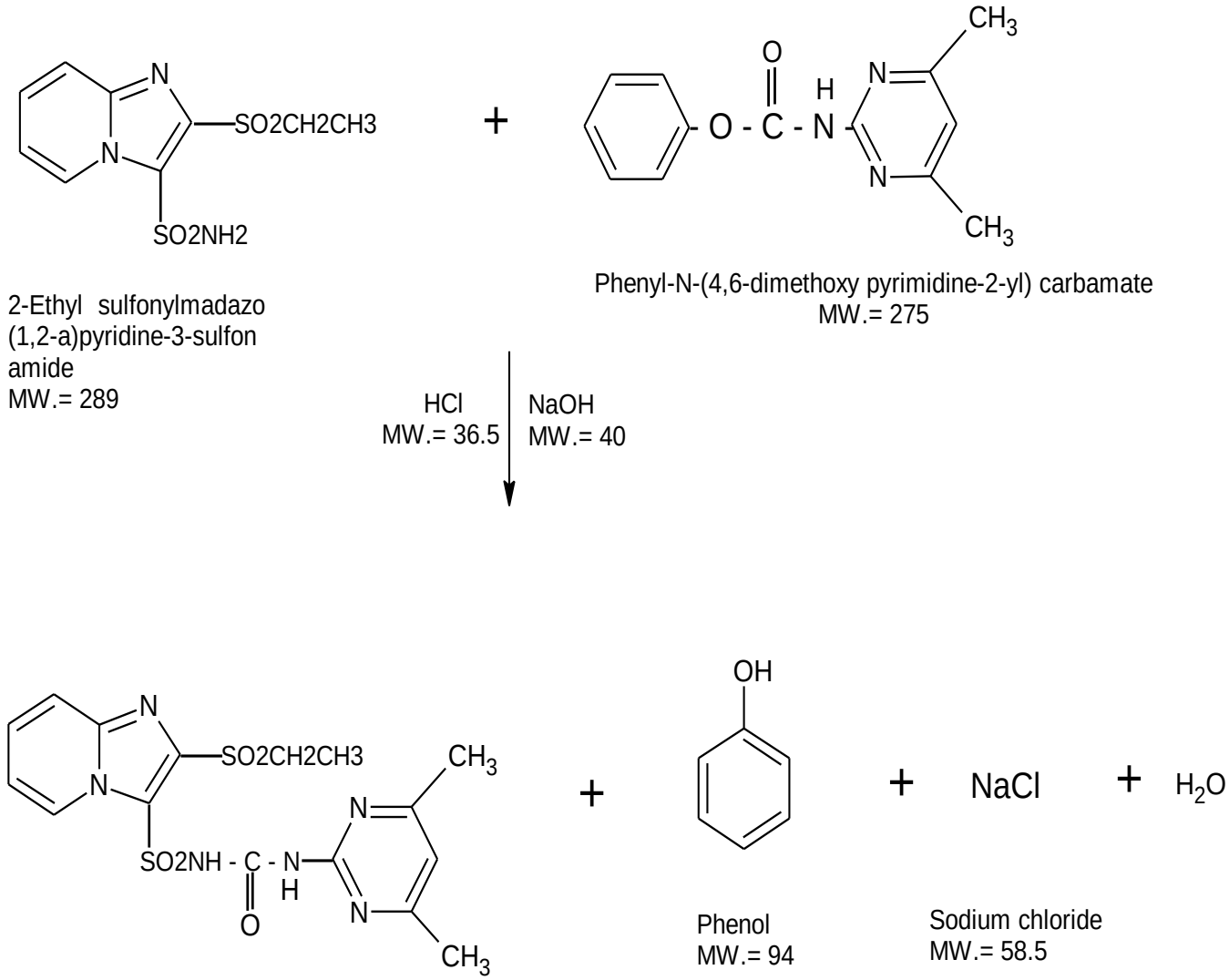
S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission/ loss	Recovery	Solid Waste	
1	Atrazine	-	-	1000	-	Product
2	Toluene	-	588	5278	-	Recycle
3	Aqueous Layer	13025	-	-	-	To ETP
4	Drying Loss	-	50	-	-	To atmosphere
Total		**13025**	**638**	**6278**	**-**	
		19941				

(H-3) Sulfosulfuron

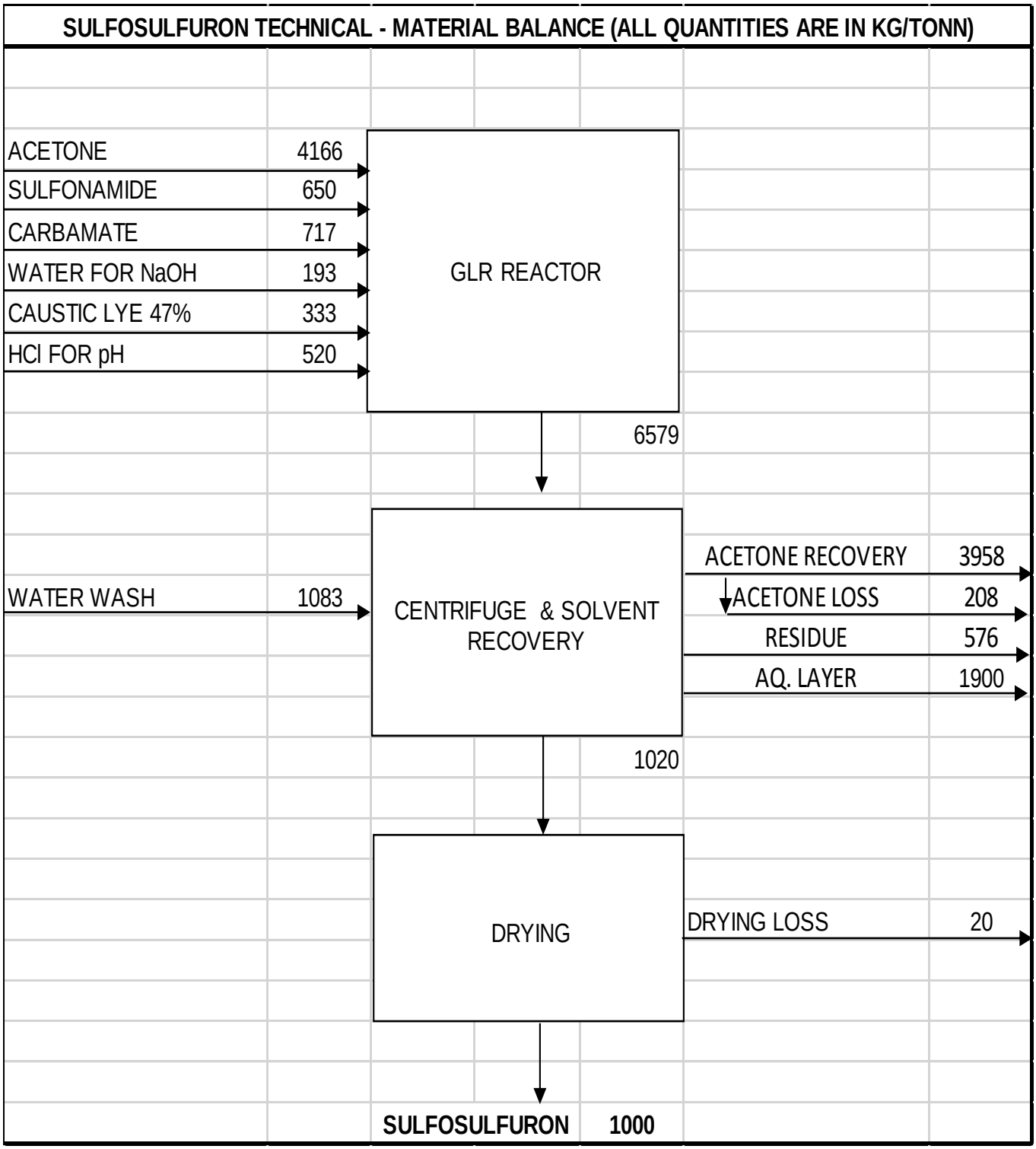
Process Description:

Charge Sulfonamide, carbamate and acetone in a reactor under stirring. Cool the mass to 10 – 15°C and gradually add Caustic lye to the reaction mass. Cook the mass at 15 – 20°C till the reaction is completed.
Crude Sulfosulfuron product is centrifuged, washed with water and dried to produce technical grade Sulfosulfuron.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Sulfosulfuron		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Acetone	4166
2	Sulfonamide	650
3	Carbamate	717
4	Water	1276
5	Caustic Lye 47%	333
6	HCl 10% Solution for pH	520
Total		**7662**

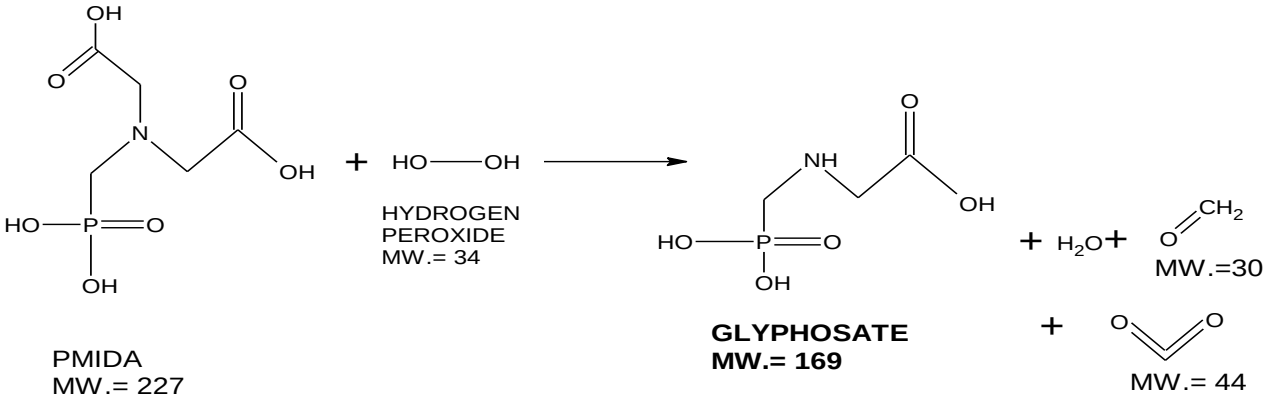
S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission / loss	Recovery	Solid Waste	
1	Sulfosulfuron	-	-	1000	-	Product
2	Acetone	-	208	3958	-	Recycle
3	Residue	-	-	-	576	For incineration
4	Aqueous Layer	1900	-	-	-	To ETP
5	Drying Loss	-	20	-	-	To atmosphere
Total		**1900**	**228**	**4958**	**576**	
		7662				

(H-4) Glyphosate

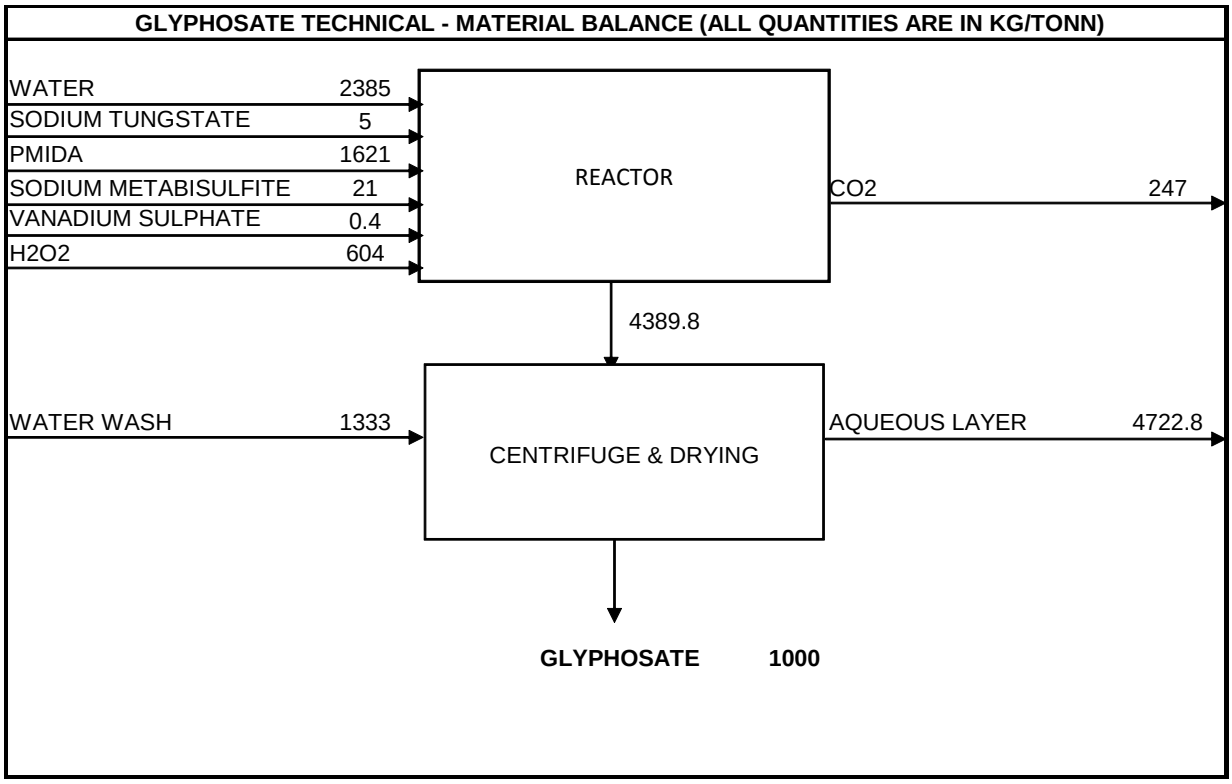
Process Description:

Phosphono Methyl Imino Diacetic Acid (PMIDA) is charged in water in a reactor under stirring. Catalyst Sodium Tungstate is charged and the temperature is raised to 65 – 70°C while stirring. Hydrogen peroxide is then added to the mass at the same temperature. A clear solution is formed. Cool to 30°C and add catalyst Vanadium sulphate to form Glyphosate.
Product slurry is cooled to 20°C, centrifuged and dried to get Glyphosate technical.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Glyphosate		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Water	3719
2	Sodium Tungstate	5
3	PMIDA	1621
4	Sodium Metabisulfate	21
5	Vanadium Sulphate	0.4
6	H2O2	604
Total		**5970**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Glyphosate	-	-	1000	-	Product
2	CO2	-	247	-	-	To Scrubber
3	Aqueous Layer	4722.8	-	-	-	To ETP
Total		**4723**	**247**	**1000**	**0**	
		5970				

(H-5) ClodinafopPropargyl

Process Description:

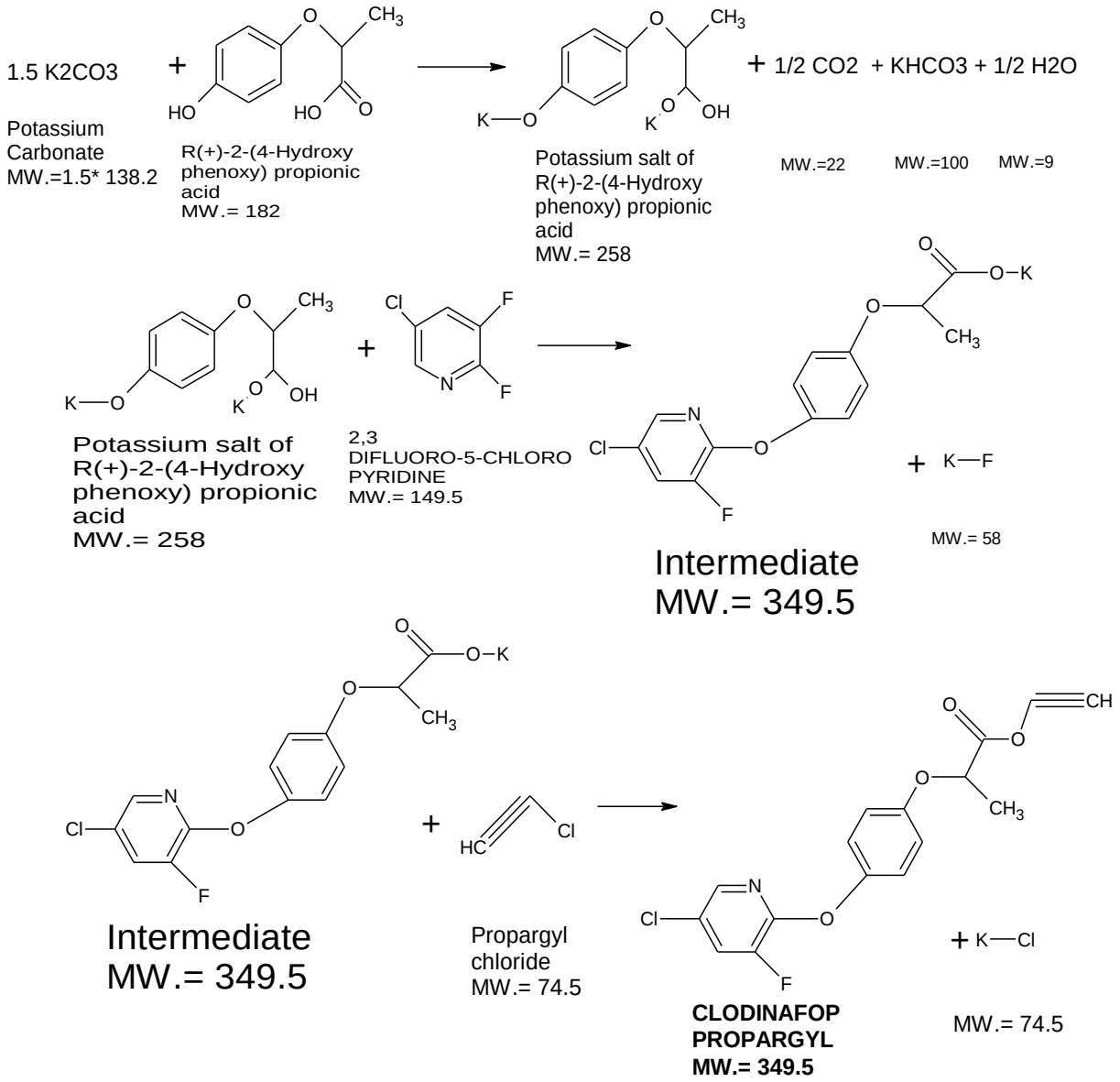
5-chloro-2,3-difluoro pyridine and R(+) – 2 –(4-hydroxy phenoxy) propionic acid are charged in the reactor in presence of potassium carbonate and DMF.

Once reaction at 65 – 70°C is completed, propargyl chloride is charged and allowed to react further. DMF is then recovered by distillation, the reaction mass is washed with water and the aqueous layer is discharged to ETP.

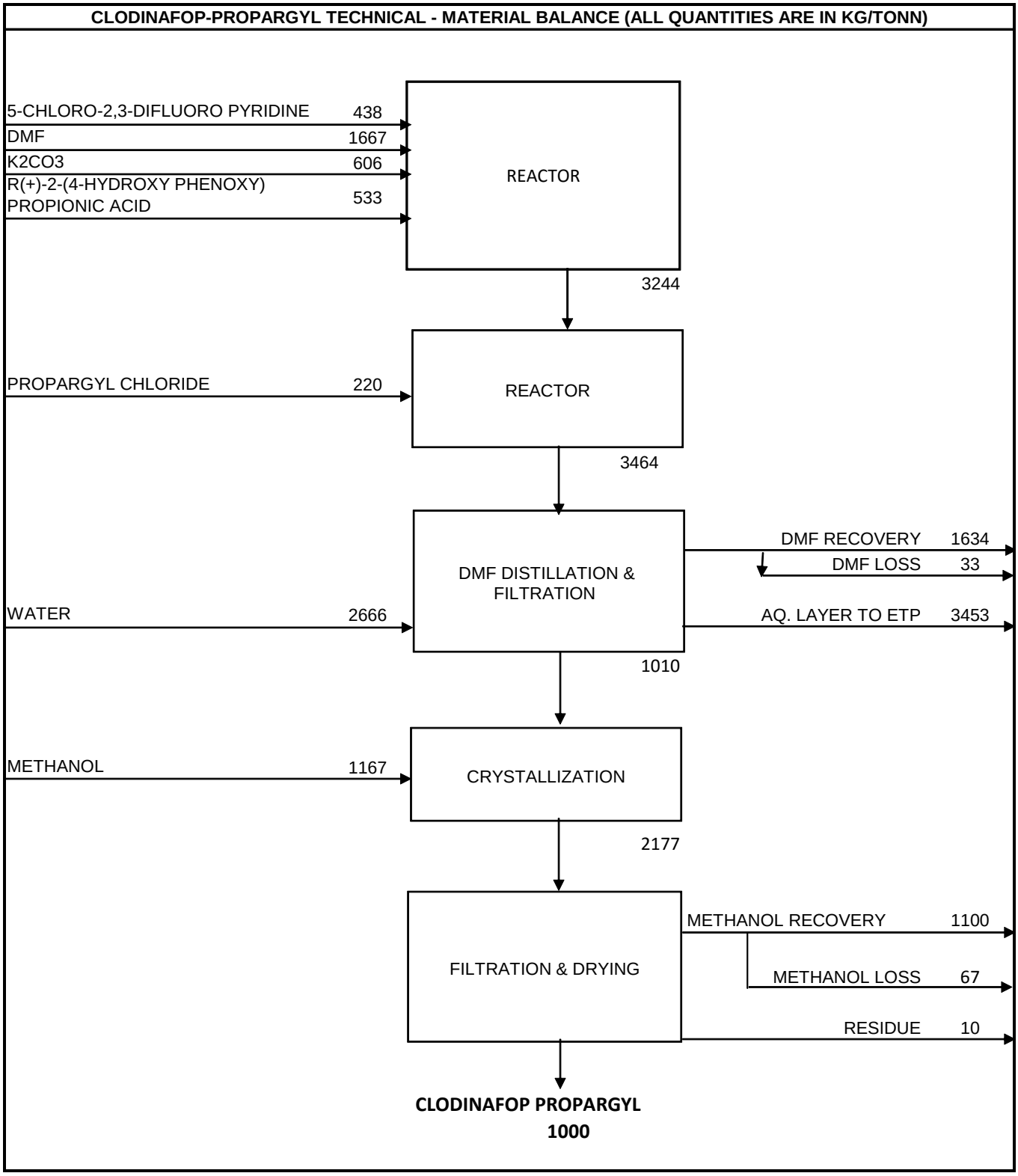
Methanol is added to the organic layer for crystallization of the product followed by centrifugation and drying to obtain Clodinafop Propargyl technical.

Methanol is recovered from the ML by distillation and recycled.

Process Reaction:



Process Flow Diagram:


CLODINAFOP-PROPARGYL TECHNICAL - MATERIAL BALANCE (ALL QUANTITIES ARE IN KG/TONN)
5-CHLORO-2,3-DIFLUORO PYRIDINE 438
DMF 1667
K2CO3 606
R(+)-2-(4-HYDROXY PHENOXY) PROPIONIC ACID 533
REACTOR
3244
PROPARGYL CHLORIDE 220
REACTOR
3464
DMF DISTILLATION & FILTRATION
DMF RECOVERY 1634
DMF LOSS 33
WATER 2666
AQ. LAYER TO ETP 3453
1010
METHANOL 1167
CRYSTALLIZATION
2177
FILTRATION & DRYING
METHANOL RECOVERY 1100
METHANOL LOSS 67
RESIDUE 10
CLODINAFOP PROPARGYL
1000

Material Balance:

Material Balance for Clodinafop-Propargyl		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	5-Chloro-2,3-Difluoro Pyridine	438
2	DMF	1667
3	K2CO3	606
4	R(+)-2-(4-Hydroxy Phenoxy) Propionic acid	533
5	Propargyl Chloride	220
6	Methanol	1167
7	Water	2666
Total		**7297**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Clodinafop-Propargyl	-	-	1000	-	Product
2	DMF	-	33	1634	-	Recycle
3	Methanol	-	67	1100	-	Recycle
4	Residue	-	-	-	10	For incineration
5	Effluent	3453	-	-	-	To ETP
Total		**3453**	**100**	**3734**	**10**	
		7297				

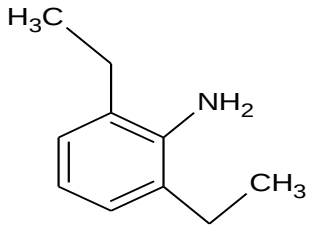
(H-6) Pretilachlor

Process Description:

Propoxy ethyl chloride is reacted with excess 2,6-Diethyl aniline at 185 – 190°C. HCl formed in the reaction is trapped by the excess 2,6-DEA as its hydrochloride.
The reaction mass is quenched in caustic soda solution to regenerate 2,6-DEA from its hydrochloride. The layers are separated and the aqueous layer is sent to ETP.
The organic layer is subjected to distillation to recover unreacted 2,6-DEA and the intermediate 2,6- Diethyl-N-(2-propoxyethyl) aniline. The residue is sent for incineration.
The intermediate 2,6- Diethyl-N-(2-propoxyethyl) aniline is reacted with chloroacetylchloride in presence of toluene as a solvent at 50 – 55°C. HCl gas evolved is scrubbed in water to get 30% HCl byproduct.
After completion of the reaction, the mass is washed with sodium bicarbonate solution, followed with water and the solvent is distilled off to get Pretilachlor technical. The washings are sent to ETP.

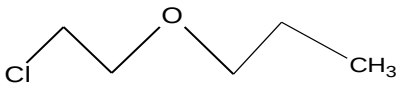
Process Reactions:

STEP-1



2,6-Diethyl aniline
MW.= 149

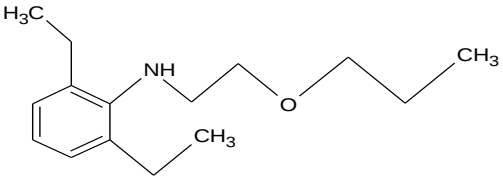
+



n-Propoxy ethyl chloride
MW.= 122.6

+ Na—OH

Sodium hydroxide
MW.=40

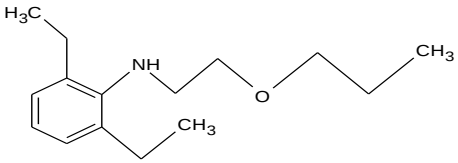


Diethyl -n-propoxy ethyl aniline
MW.= 235

+ NaCl + H_2O

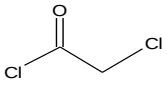
Sodium chloride
MW.= 58.5

STEP-2



Diethyl -n-propoxy ethyl aniline
MW.= 235

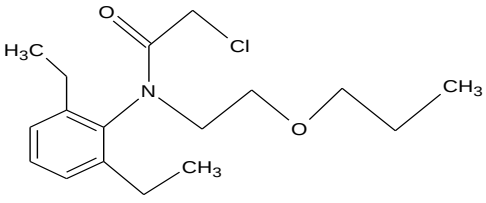
+



Chloro acetyl chloride
MW.= 113

+ NaHCO3

Sodium bicarbonate
MW.= 84



PRETILACHLOR
MW.= 311.5

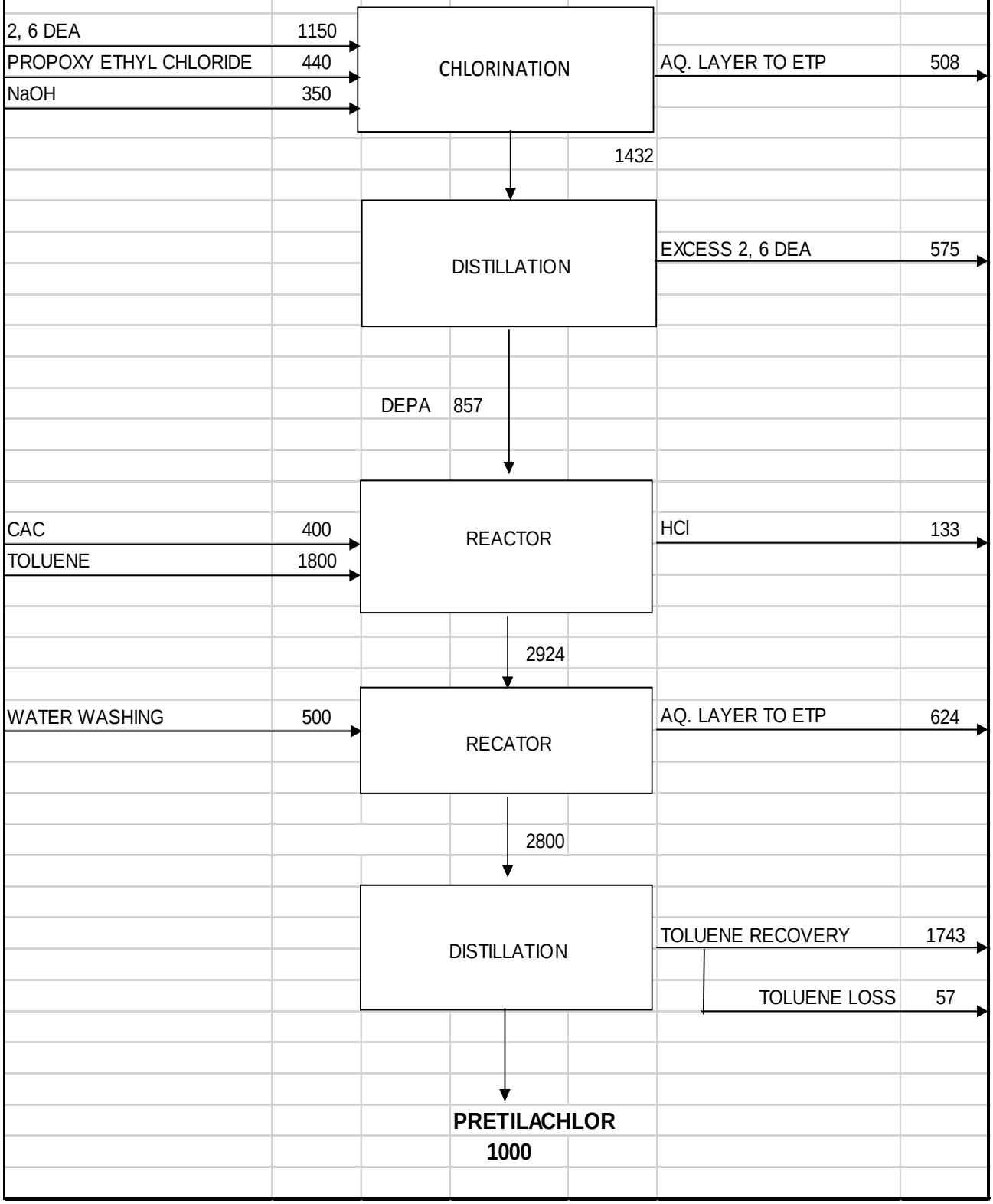
+ NaCl + H2O + CO2

Sodium chloride
MW.= 58.5

Carbon dioxide
MW.= 44

Process Flow Diagram:

PRETILACHLOR TECHNICAL - MATERIAL BALANCE (ALL QUANTITIES ARE IN KG/TONN)



Material Balance:

Material Balance for Pretilachlor		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	2,6 DEA	1150
2	Propoxy Ethyl Chloride	440
3	NaOH	350
4	CAC	400
5	Toluene	1800
6	Water Washing	500
Total		**4640**

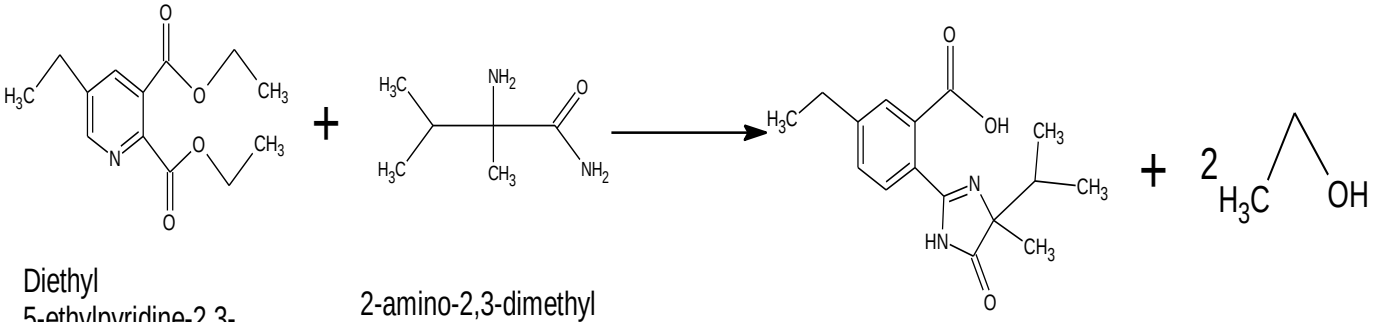
S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission /loss	Recovery	Solid Waste	
1	Pretilachlor	-	-	1000	-	Product
2	Aqueous Layer	1132	-	-	-	To ETP
3	Excess 2,6 DEA	-	-	575	-	Recycle
4	HCl	-	-	133	-	To Scrubber
5	Toluene	-	57	1743	-	Recycle
Total		**1132**	**57**	**3451**	-	
		4640				

(H--7) Imazethapyr

Process Description:

Charge 2 Amino 2,3 Di methyl Butane amide , Ethyl 5 Ethyl Pyridine Dicarboxylate and sodium Ethoxide in Toluene in a reactor under stirring.
Heat the reaction mass to 50°C. Distil ethanol from the reaction mixture by raising the temperature to 110°C.
After removal of Ethanol from reaction mixture maintain the temperature at 110°C for a few hours.
On completion of the reaction, charge water to reaction mass and adjust pH to 3.5 with Hydrochloric acid.
Cool the reaction mass to 30°C, Filter the crude Imazethapyr and crystallize from ethanol, filter again and dry to obtain Imazethapyr technical. Distil the ML to recover Ethanol for recycling.

Process Reaction:



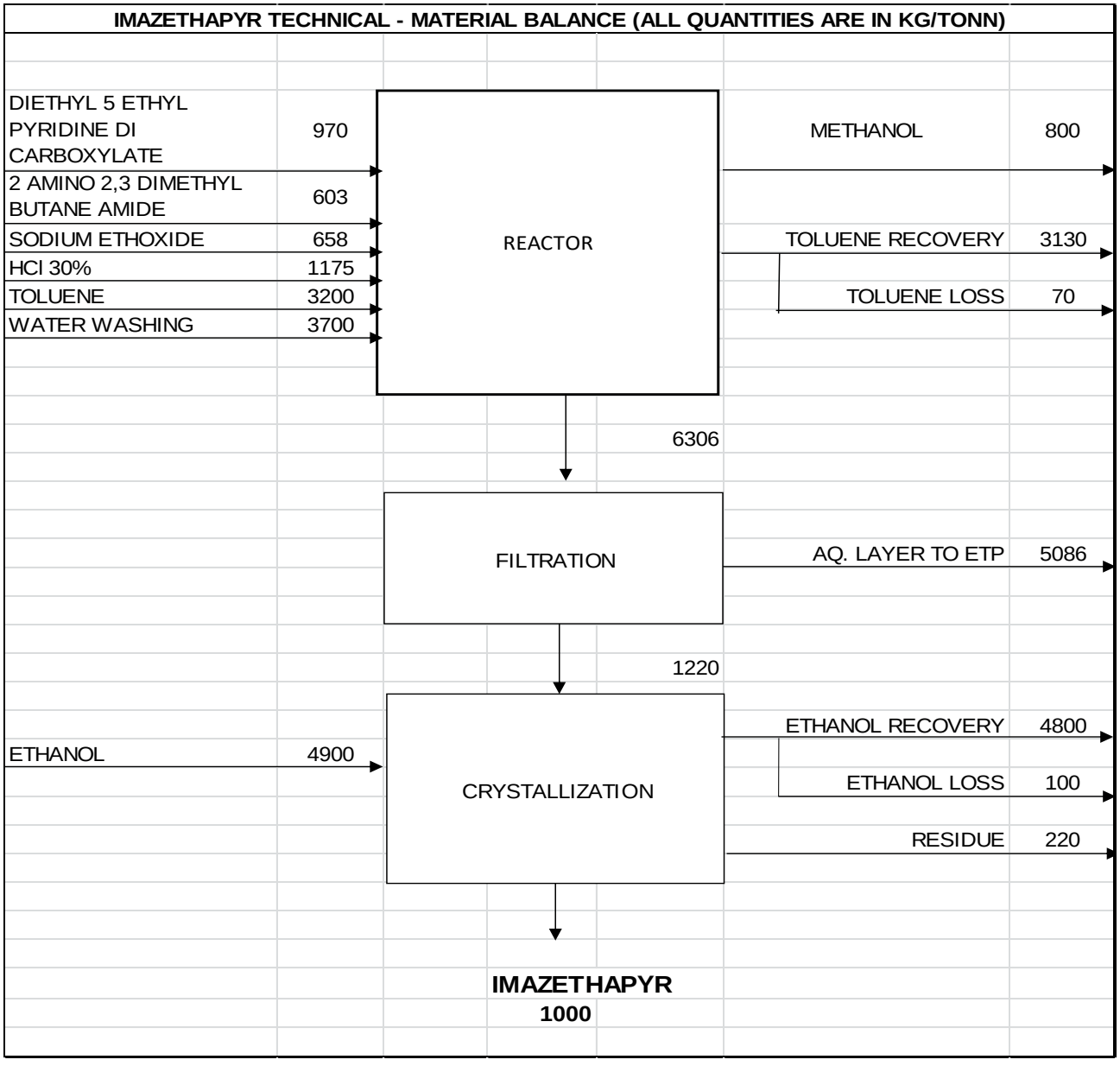
Diethyl 5-ethylpyridine-2,3-dicarboxylate
MW.= 251

2-amino-2,3-dimethyl butanamide
MW.=130

IMAZETHAPYR
MW.= 289

Ethanol
MW.= 2* 46= 92

Process Flow Diagram:



Material Balance:

Material Balance for Imazethapyr		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Diethyl 5 Ethyl Pyridine Di Carboxylate	970
2	2 Amino 2,3 Dimethyl Butane Amide	603
3	Sodium Ethoxide	658
4	HCl 30%	1175
5	Toluene	3200
6	Water for washing	3700
7	Ethanol	4900
Total		**15206**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Imazethapyr	-	-	1000	-	Product
2	Methanol	-	-	800	-	Recycle
3	Aqueous Layer	5086	-	-	-	To ETP
4	Toluene	-	70	3130	-	Recycle
5	Residue	-	-	-	220	To incineration
6	Ethanol	-	100	4800	-	Recycle
Total		**5086**	**170**	**9730**	**220**	
		15206				

(H--8) Metsulfuron Methyl

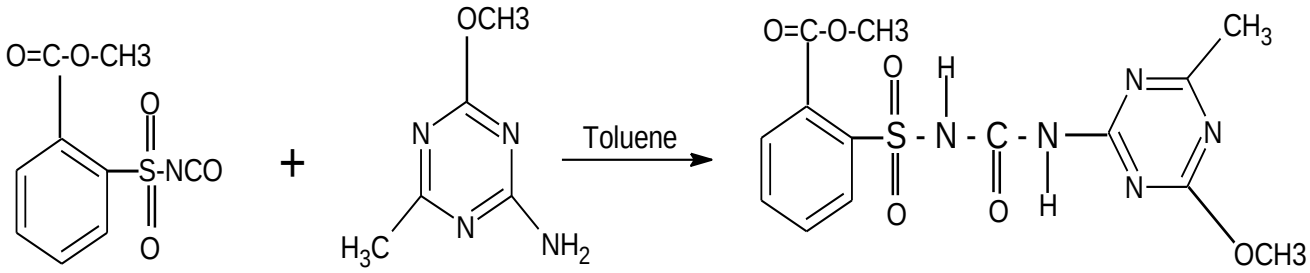
Process Description:

o-Sulfoisocyanate Methyl Benzoate reacts with 2-Amino 4-Methoxy 6-Methyl 1,3,5 Triazine in presence of Solvent-Toluene at 65 – 70°C.

Since this reaction is an addition reaction, no byProduct or effluent is generated. After the reaction is completed the reaction mass is cooled to 5°C to crystallize the product.

The slurry is centrifuged and the cake is dried to obtain Metsulfuron Methyl. The solvent is distilled out from the ML and recycled.

Process Reaction:

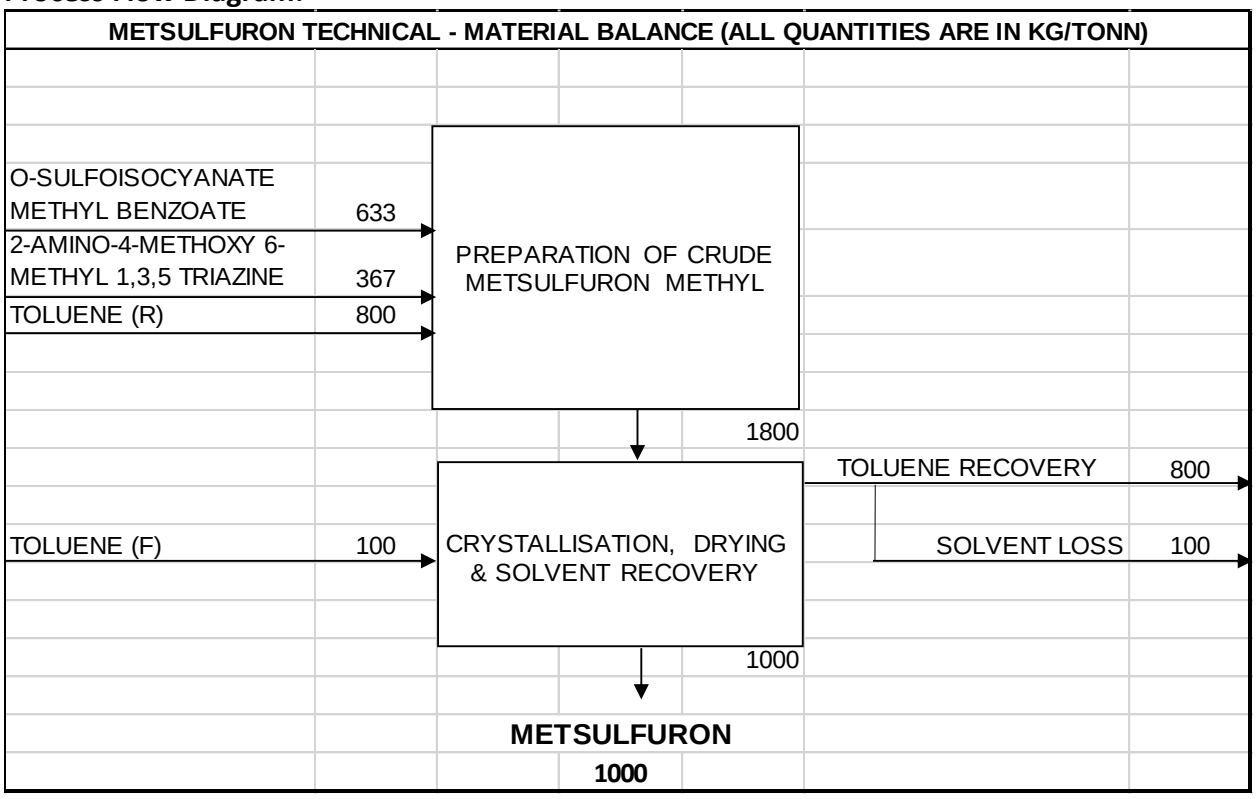


O-sulfo iso cyanate methyl benzoate
MW.=241.4

2-Amino 4-methoxy 6-methyl 1,3,5 traizine
MW.=139.97

METSULFURON METHYL
MW.= 381.37

Process Flow Diagram:



Material Balance:

Material Balance for Metsulfuron

S. No.	Raw Materials	Input/MT of Product (KG)
1	o-Sulfoisocyanate Methyl Benzoate	633
2	2-Amino-4-Methoxy 6- Methyl 1,3,5 Triazine	367
3	Toluene	900
Total		**1900**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission/loss	Recovery	Solid Waste	
1	Metsulfuron	-	-	1000	-	Product
2	Toluene	-	100	800	-	Recycle
Total		-	**100**	**1800**	**-**	
		1900				

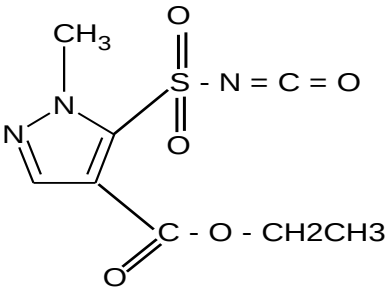
(H-9) Pyrazosulfuron Ethyl

Process description:

Ethyl-1-methyl-5-Sulfenamide-isocyanate-1H-pyrazole-4-carboxylate is reacted with 2-amino-4,6-dimethoxy pyrimidine in presence of toluene in a reactor under stirring. Mass is cooked for 2 hours at 85 - 90°C.

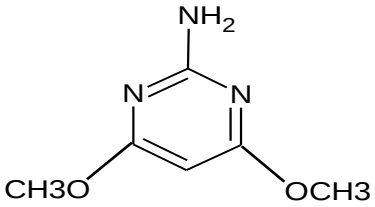
Then, cool the mass and centrifuge it. Dry the cake to get technical grade Pyrazosulfuron Ethyl product. Recover the toluene from the ML by distillation.

Process Reactions:



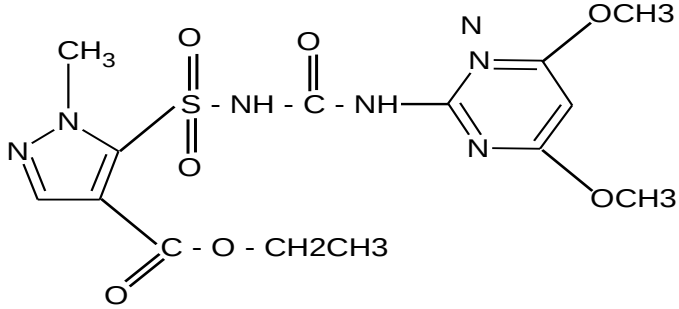
Ethyl-1-methyl-5- sulfenamide isocyanate-1H-pyrazole-4-car boxylate
MW.= 259

+



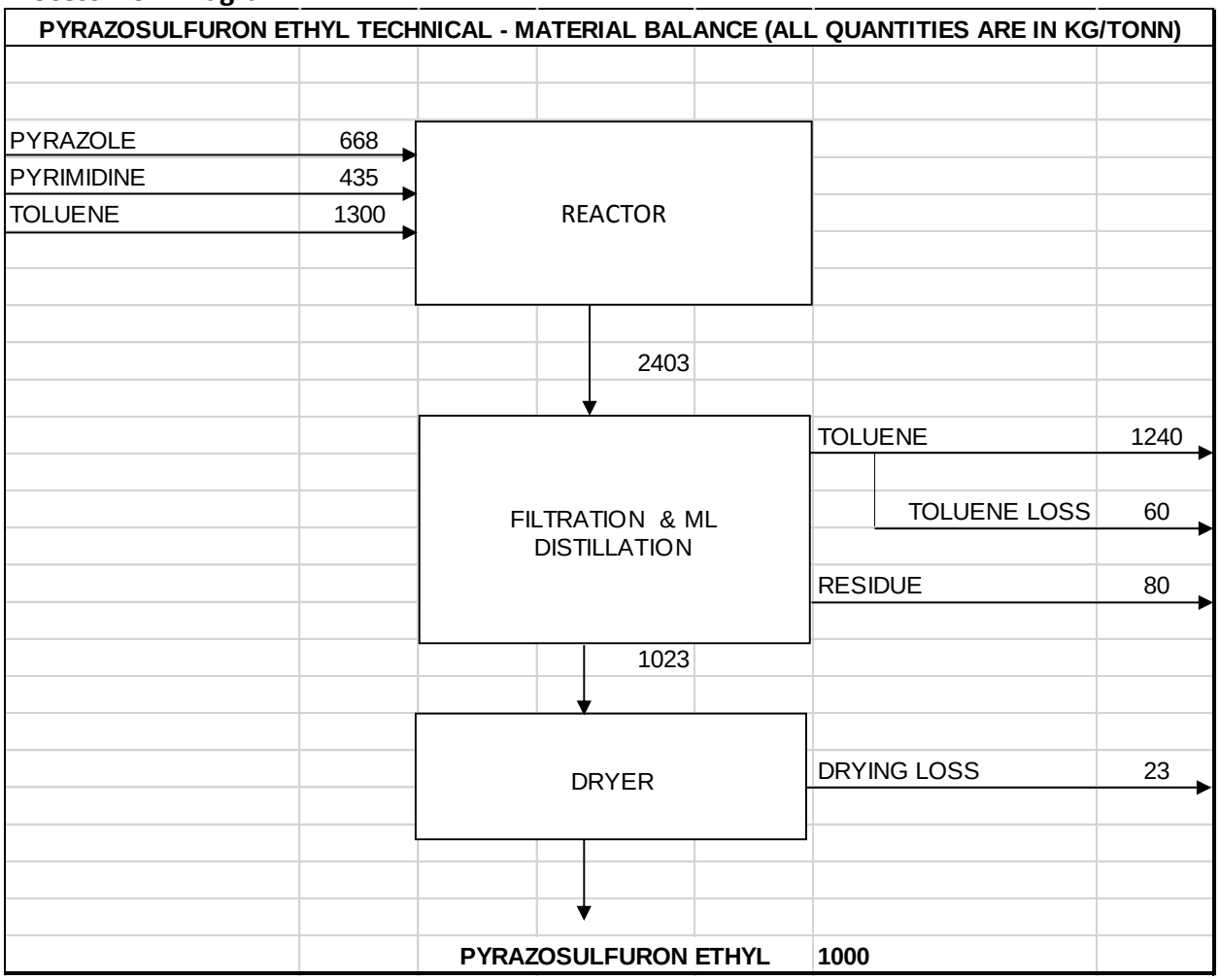
2-Amino-4,6- dimethoxy pyrimidine
MW.= 155

Toluene



PYRAZOSULFURON ETHYL
MW.= 414

Process Flow Diagram:



PYRAZOSULFURON ETHYL TECHNICAL - MATERIAL BALANCE (ALL QUANTITIES ARE IN KG/TONN)

Material Balance:

Material Balance for Pyrazosulfuron Ethyl

S. No.	Raw Materials	Input/MT of Product (KG)
1	Pyrazole	668
2	Pyrimidine	435
3	Toluene	1300
Total		**2403**

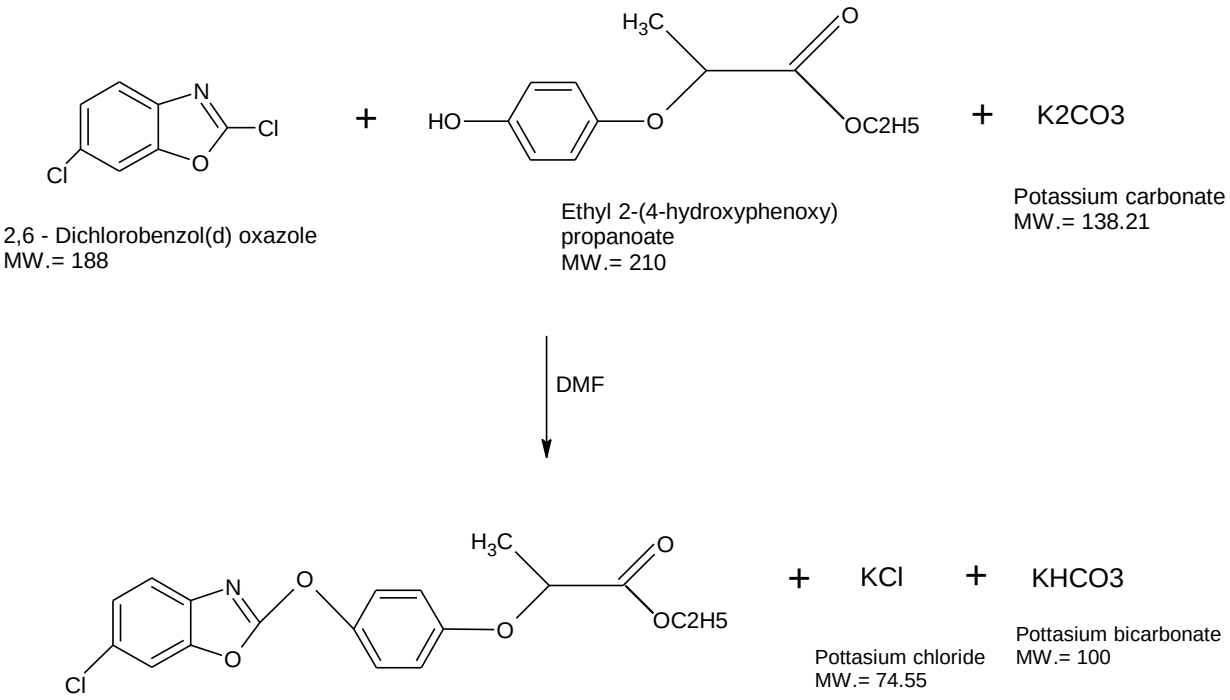
S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission /loss	Recovery	Solid Waste	
1	Pyrazosulfuron	-	-	1000	-	Product
2	Toluene	-	60	1240	-	Recycle
3	Residue	-	-	-	80	For Incineration
4	Drying Loss	-	23	-	-	To atmosphere
Total		**0**	**83**	**2240**	**80**	
		2403				

(H-10) Fenoxaprop-P-Ethyl

Process description:

Charge 2,6-Dichloro Benzoxazole, Ethyl (HydroxyPhenoxy) propanoate and Potassium carbonate in Dimethyl formamide. Raise the temperature to 50 – 55°C and maintain for 5 hrs. to complete the reaction.
When reaction is completed filter out the inorganic salt.
Distilthe solvent from the organic phase. Charge methanol, cool to 10°C to crystallise, centrifuge and dry To get the technical product.
Recover methanol from ML.

Process Reaction:



2,6 - Dichlorobenzol(d) oxazole
MW.= 188

Ethyl 2-(4-hydroxyphenoxy) propanoate
MW.= 210

Potassium carbonate
MW.= 138.21

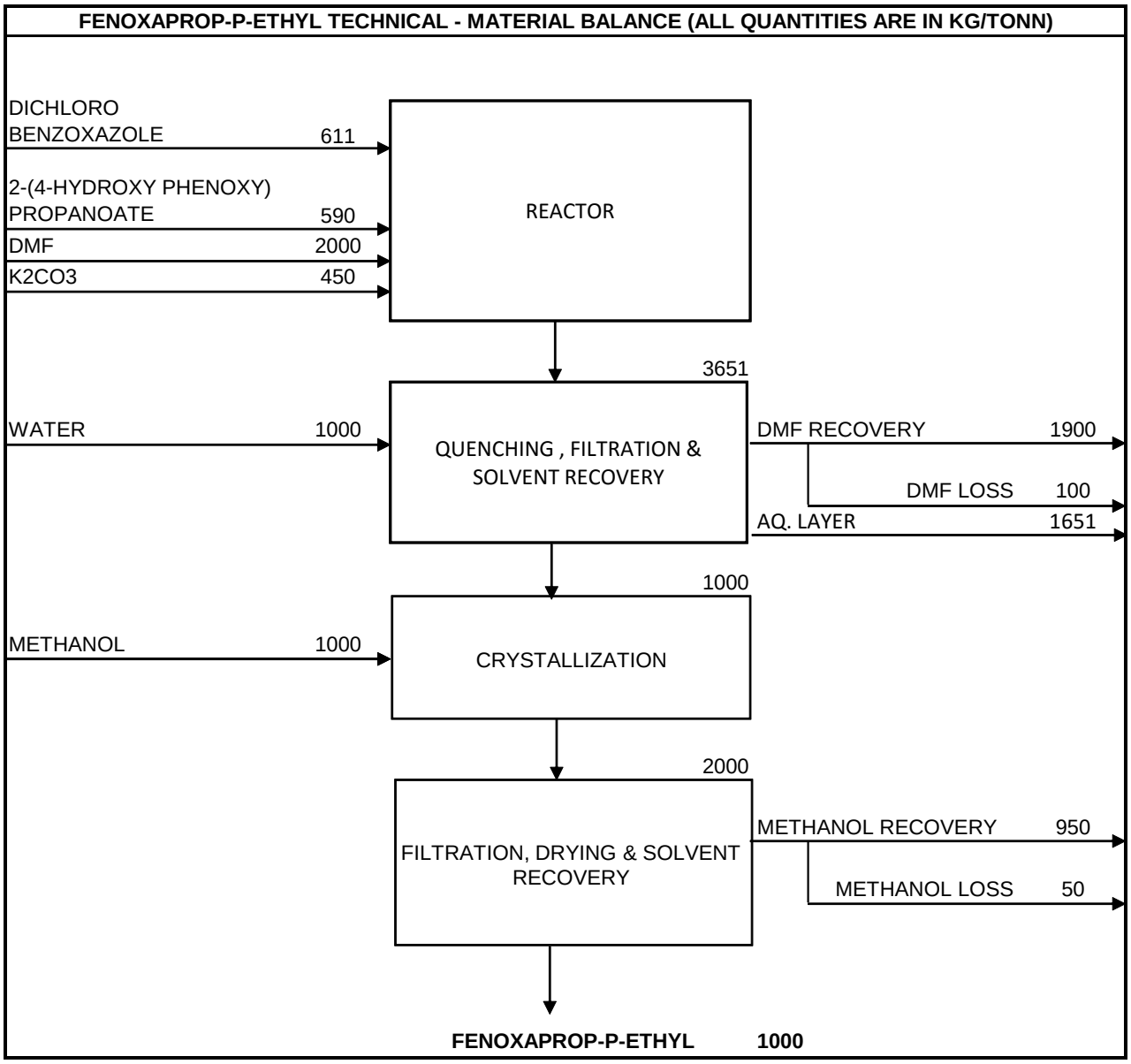
Pottasium chloride
MW.= 74.55

Pottasium bicarbonate
MW.= 100

Ethyl 2-(4-(6-chlorobenzol[d]oxazol-2-yloxy) phenoxy) propanoate
MW.= 361.78

FENOXAPROP-P-ETHYL

Process Flow Diagram:



Material Balance:

Material Balance for Fenoxaprop-P-Ethyl

S. No.	Raw Materials	Input/MT of Product (KG)
1	Dichloro Benzoxazole	611
2	2-(4-Hydroxy Phenoxy) Propionic Acid	590
3	DMF	2000
4	K2CO3	450
5	WATER	1000
6	METHANOL	1000
Total		**5651**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission/ loss	Recovery	Solid Waste	
1	Fenoxaprop-P-Ethyl	-	-	1000	-	Product
2	DMF	-	100	1900	-	Recycle
3	METHANOL	-	50	950	-	Recycle
4	Aqueous Layer	1651	-	-	-	To ETP
Total		**1651**	**150**	**3850**	-	
		5651				

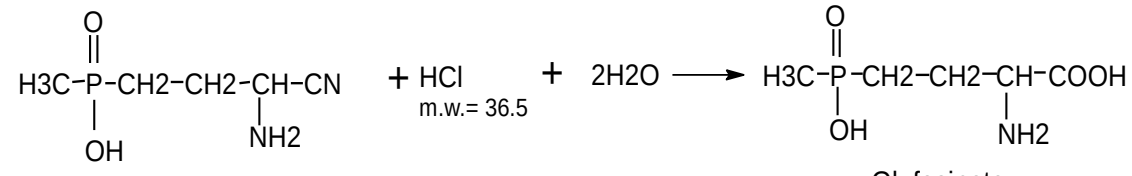
(H-11) Glufosinate Ammonium

Process Description:

Charge water, HCl and n-Butyl (3-cyano-3-hydroxypropyl) methyl propionate in the reactor. The mass is subjected to acidolysis at 45 – 50°C.
After the acidolysis reaction cool the mass to 20°C and purge ammonia gas at 20 – 25°C, centrifuge and dry the cake to get Glufosinate Ammonium Technical. Send aqueous ML to ETP.

Process Reactions:

STEP-1



n-Butyl (3- Cyno-3- Hydroxypropyl) Methyl Propinate

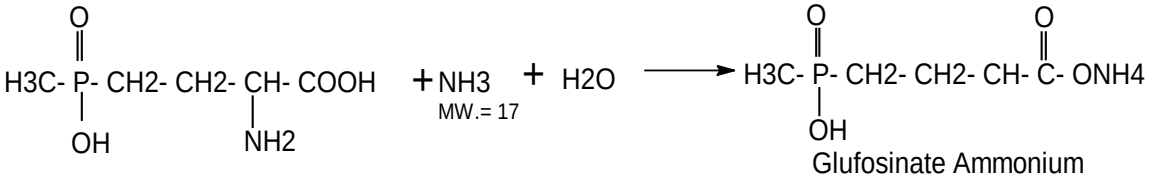
M.W.= 162

Glufosinate
m.w.= 181.01

+

NH4Cl
M.W.= 53.49

STEP-2



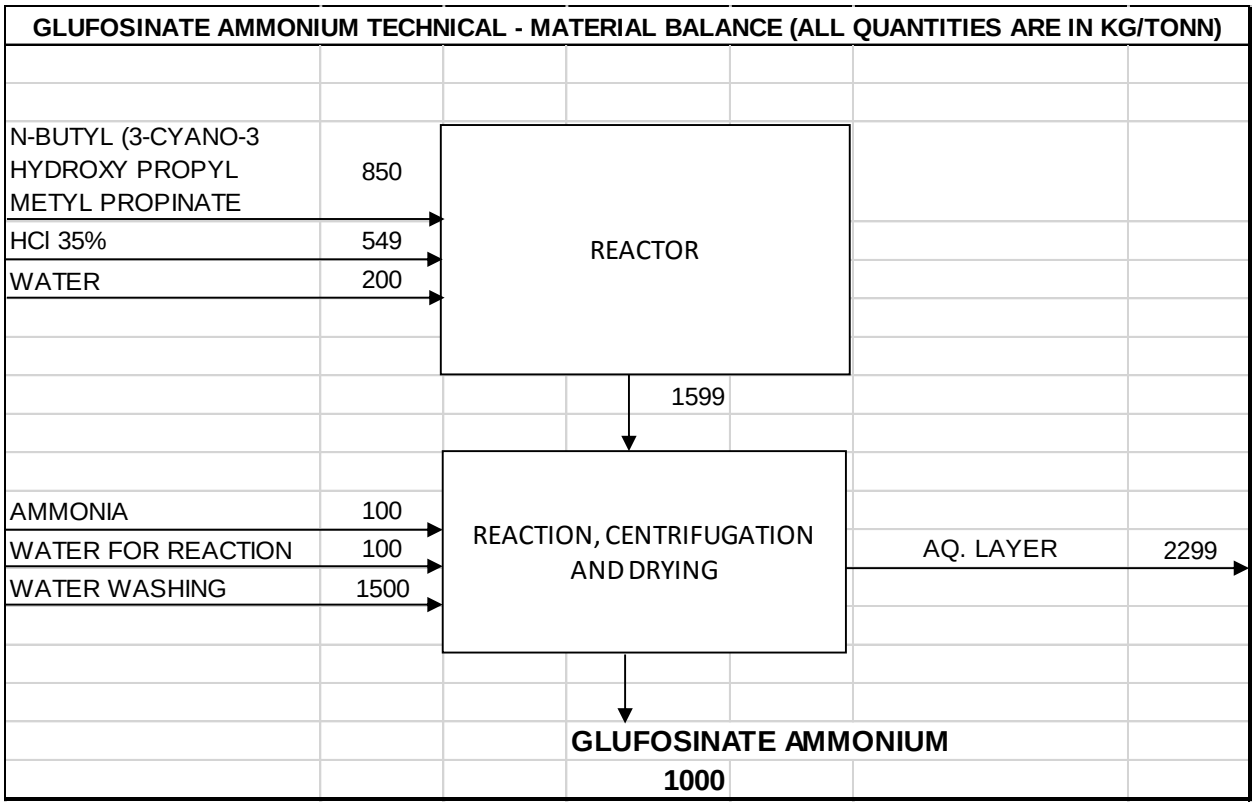
Glufosinate
M.W.= 181.01

Glufosinate Ammonium
M.W.= 198.01

+

H2O

Process Flow Diagram:



Material Balance:

Material Balance for Glufosinate Ammonium		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	N-BUTYL (3-CYANO-3 HYDROXY PROPYL METHYL PROPINATE	850
2	HCl 35%	549
3	WATER	1800
4	AMMONIA	100
Total		**3299**

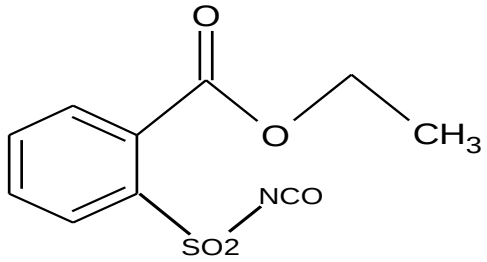
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Glufosinate Ammonium	-	-	1000	-	Product
2	Aqueous Layer	2299	-	-	-	To ETP
Total		**2299**	-	**1000**	-	
		3299				

(H-12) Chlorimuron

Process Description:su

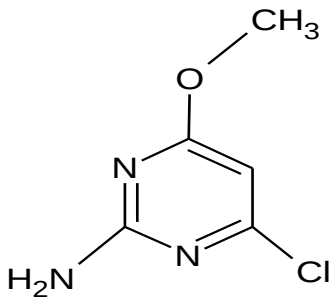
Isocyanate and ACMP are reacted in presence of toluene solvent at controlled conditions of 65 – 70°C. Cool the mass obtained from reaction which, is then centrifuged and dried to obtain technical grade Chlorimuron.

Process Reaction:

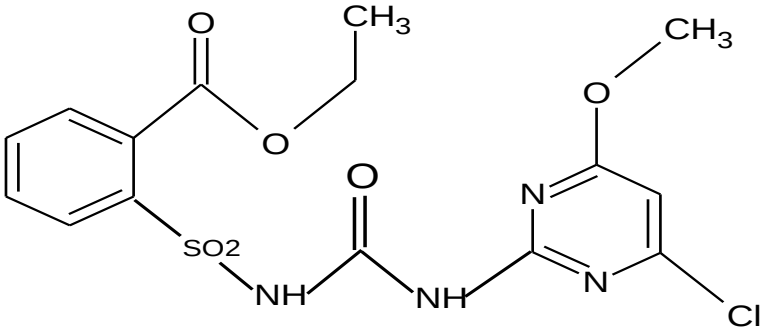


2 CARBEETHOXY BENZENE SULFONYL ISOCYNATE
MW.= 255.25

+

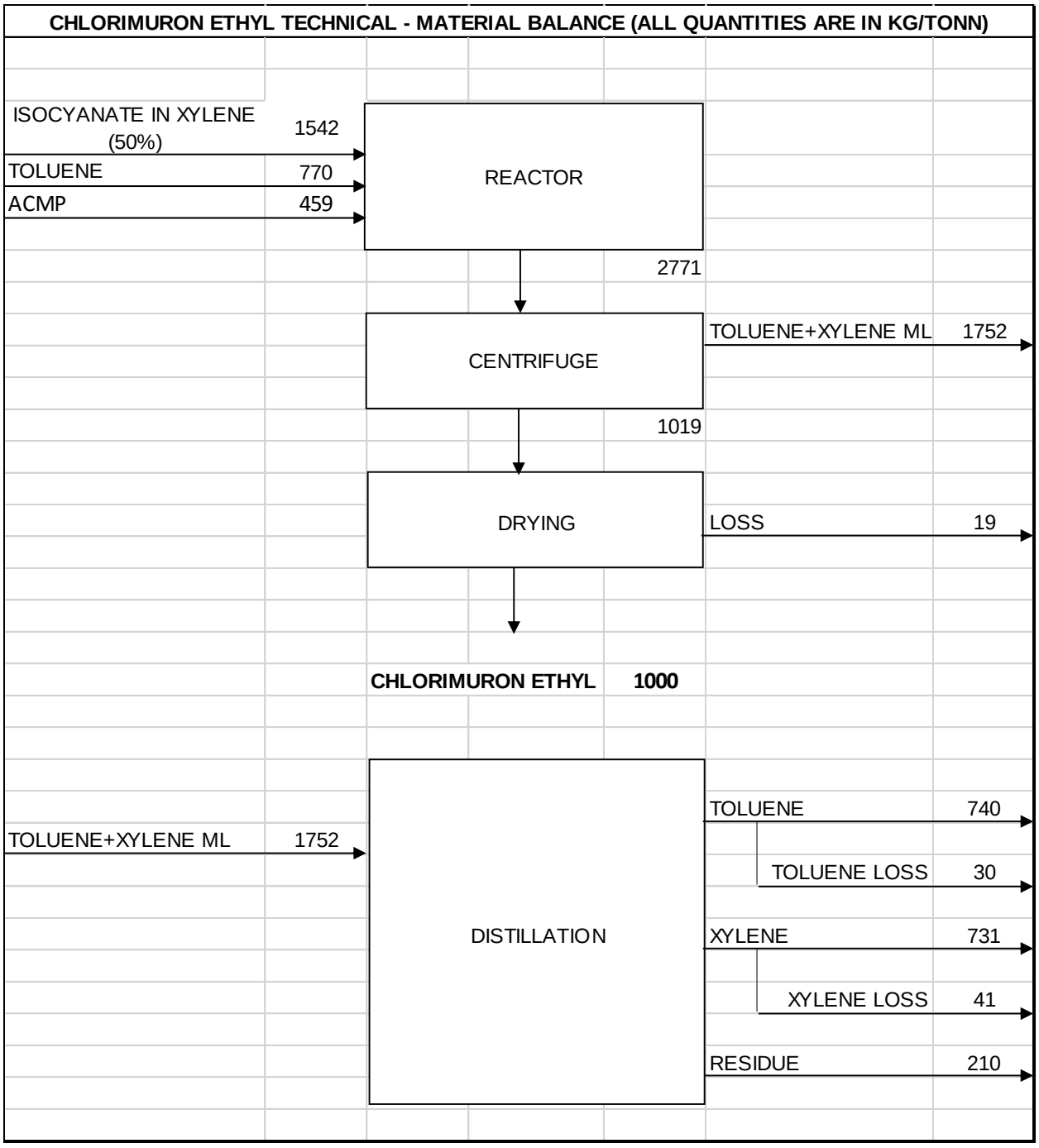


2 AMINO 4 CHLORO 6 METHOXY PYRIMIDINE
MW.= 159.57



CHLORIMURON
MW.= 414.82

Process Flow Diagram:



Material Balance:

Material Balance for Chlorimuron Ethyl		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Isocyanate in Xylene (50%)	1542
2	Toluene	770
3	ACMP	459
Total		**2771**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Chlorimuron	-	-	1000	-	Product
2	Toluene	-	30	740	-	Recycle
3	Xylene		41	731	-	Recycle
4	Drying Loss	-	19	-	-	To atmosphere
5	Residue	-	-	-	210	To Incineration
Total		-	**90**	**2471**	**210**	
		2771				

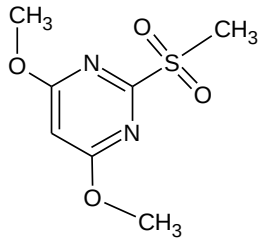
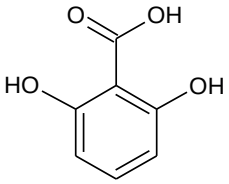
(H-13) Bispyribac Sodium

Process Description:

DMF, Caustic soda flakes and 2,4 Dihydroxy Benzoic acid are charged in reactor and followed by addition of 4,6 Dimethoxy-2-Methoxy Sulfonyl Pyrimidine. The reaction mass is heated for six to seven hours at 80 - 90°C to complete the reaction.

After completion of the reaction DMF is distilled out. Crude product is crystallized using methanol.
After centrifugation of the slurry the wet cake is dried to get Bis-Pyribac Sodium technical. The ML is distilled to recover methanol which, is then recycled.

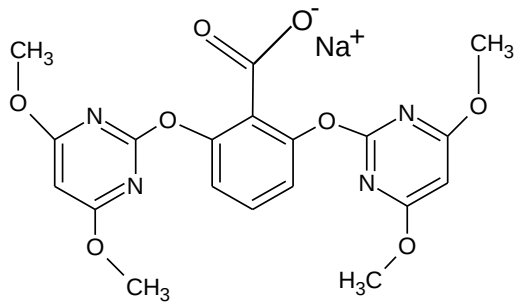
Process Reactions:

2  +  + 3NaOH

4,6Dimethoxy-2-(Methylsulphonyl) Pyrimidine
M.W.= 218.23

2,4 Dihydroxy Benzoic Acid
MW.= 154.12

Sodium Hydroxide
MW.= 40

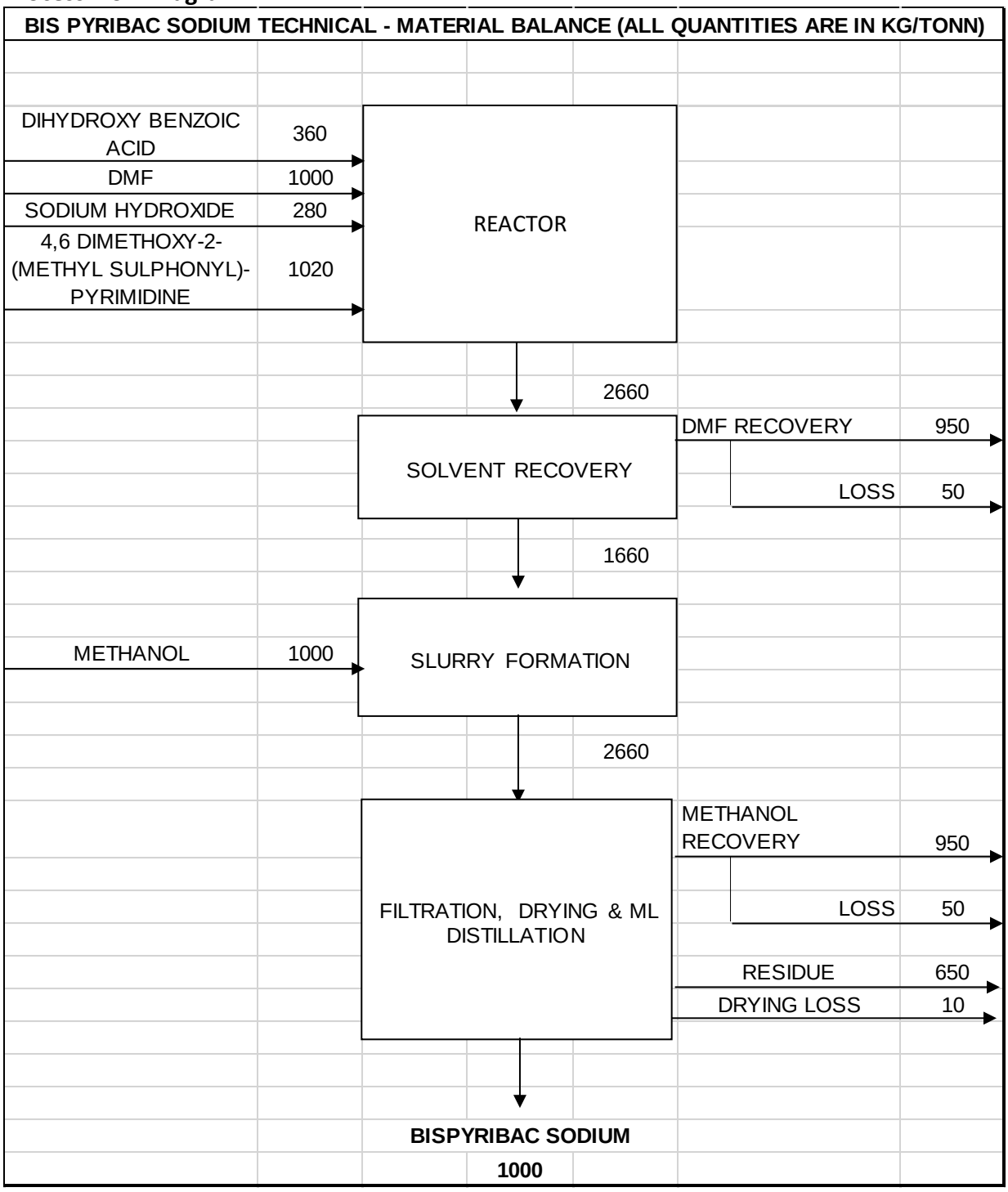


+ 2NaSO2CH3 + 3H2O

Sodium methane Sulfinate
MW.= (2*102.11)

BISPYRIBAC SODIUM
Sodium 2,6-bis [(4,6-Dimethoxypyrimidin-2-yl)oxy] benzoate
MW.= 452.36

Process Flow Diagram:



Material Balance:

Material Balance for Bispyribac Sodium		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	DIHYDROXY BENZOIC ACID	360
2	DMF	1000
3	SODIUM HYDROXIDE	280
4	4, 6 DIMETHOXY-2- (METHYL SULPHONYL)-PYRIMIDINE	1020
5	METHANOL	1000
Total		**3660**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	BISPYRIBACSODIUM	-	-	1000	-	Product
2	METHANOL	-	50	950	-	Recycle
3	DRYING LOSS	-	10	-	-	To atmosphere
4	DMF	-	50	950	-	Recycle
5	RESIDUE	-	-	-	650	For incineration
Total		**-**	**110**	**2900**	**650**	
		3660				

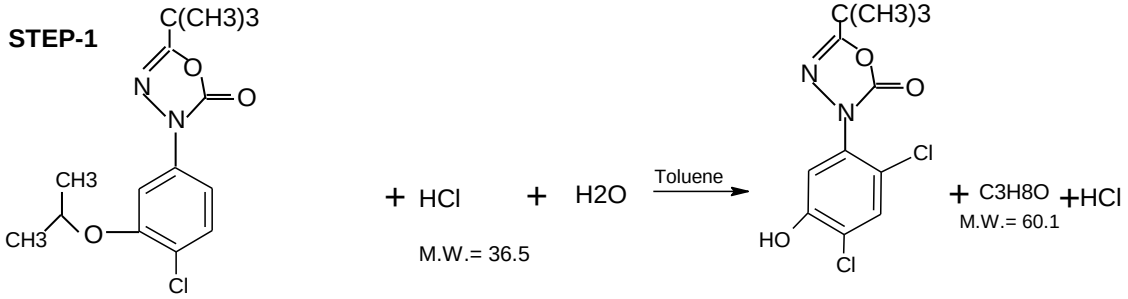
(H-14) Oxadiargyl

Process Description:

Oxadiazon is subjected to acidolysis under acidic conditions at 40 -45°C and the resulting intermediate is extracted with toluene after completion of acidolysis.
The intermediate is reacted with Propargyl chloride under alkaline conditions at 50 – 55°C to form crude oxadiargyl. The solvent is distilled out and the crude product is taken in methanol.
This mass is cooled and crystallized, centrifuged and the cake is dried to get Oxadiargyl technical.

Process Reaction:

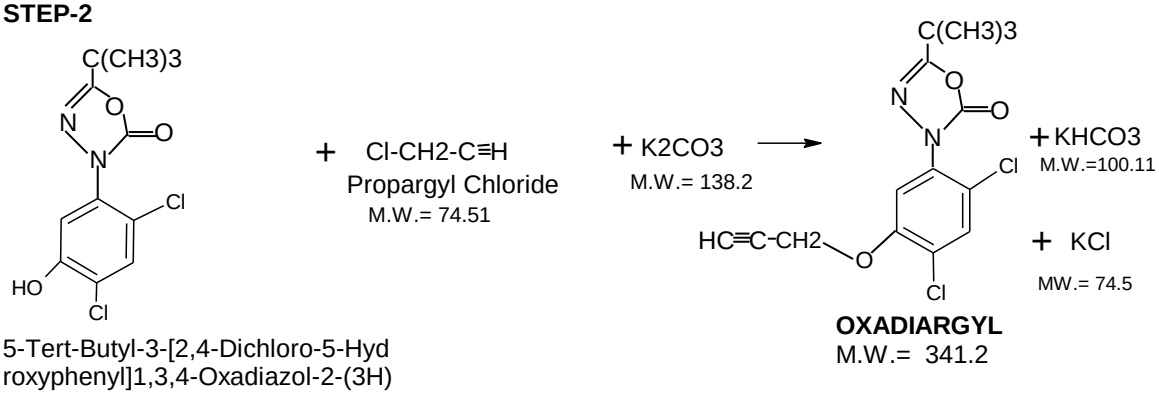
STEP-1



5-Tert-Butyl-3-[2,4-Dichloro-5-Iso propoxyphenyl]1,3,4-Oxadiazol-2-(3H)one **(or Oxadiazon)**

M.W.= 345.22

STEP-2

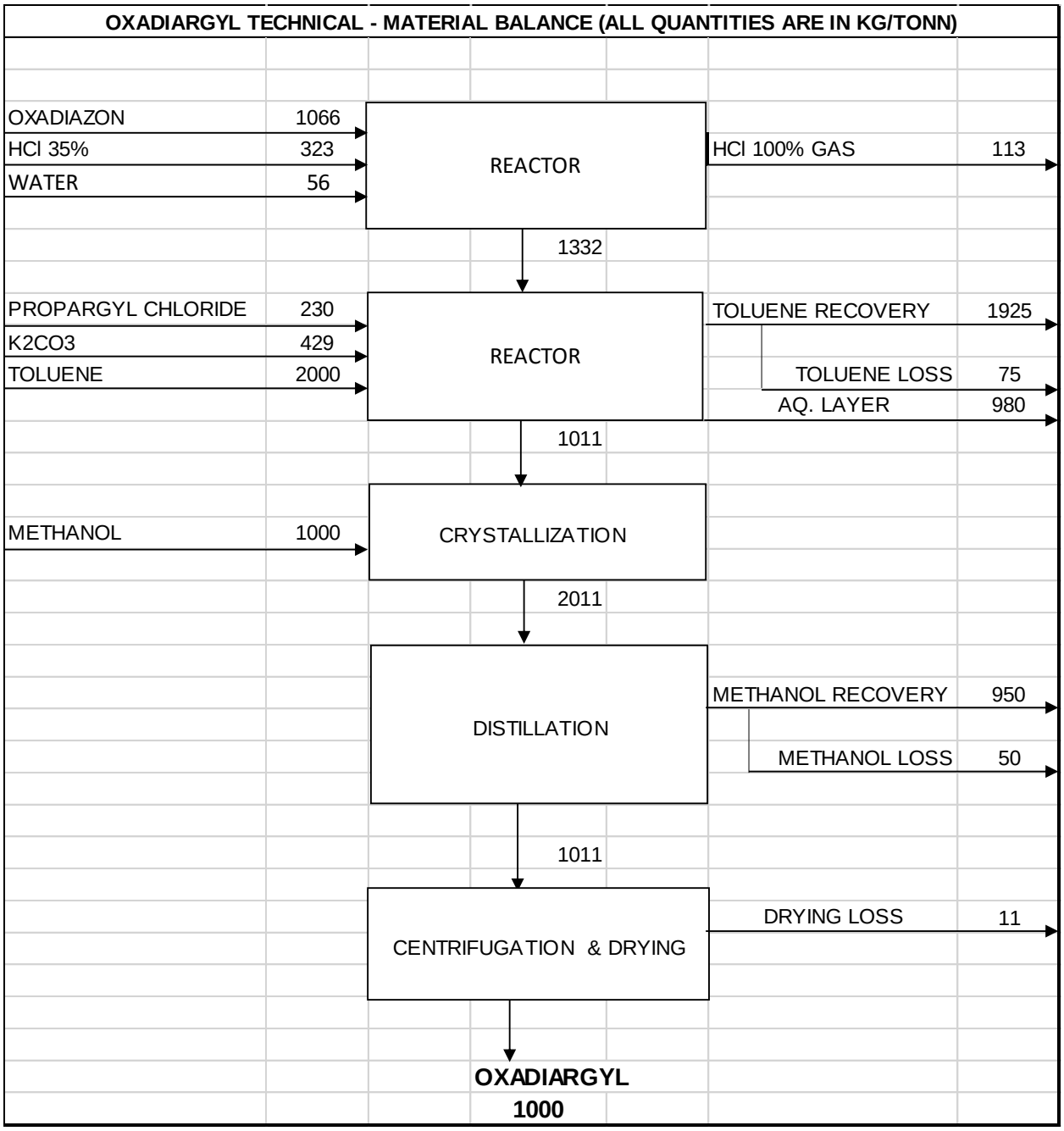


5-Tert-Butyl-3-[2,4-Dichloro-5-Hyd roxyphenyl]1,3,4-Oxadiazol-2-(3H) one

M.W.= 303.12

OXADIARGYL
M.W.= 341.2

Process Flow Diagram:



Material Balance:

Material Balance for Oxadiargyl		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Oxadiazon	1066
2	HCl 35%	323
3	Propargyl Chloride	230
4	K2CO3	429
5	TOLUENE	2000
6	WATER	56
7	METHANOL	1000
Total		**5104**

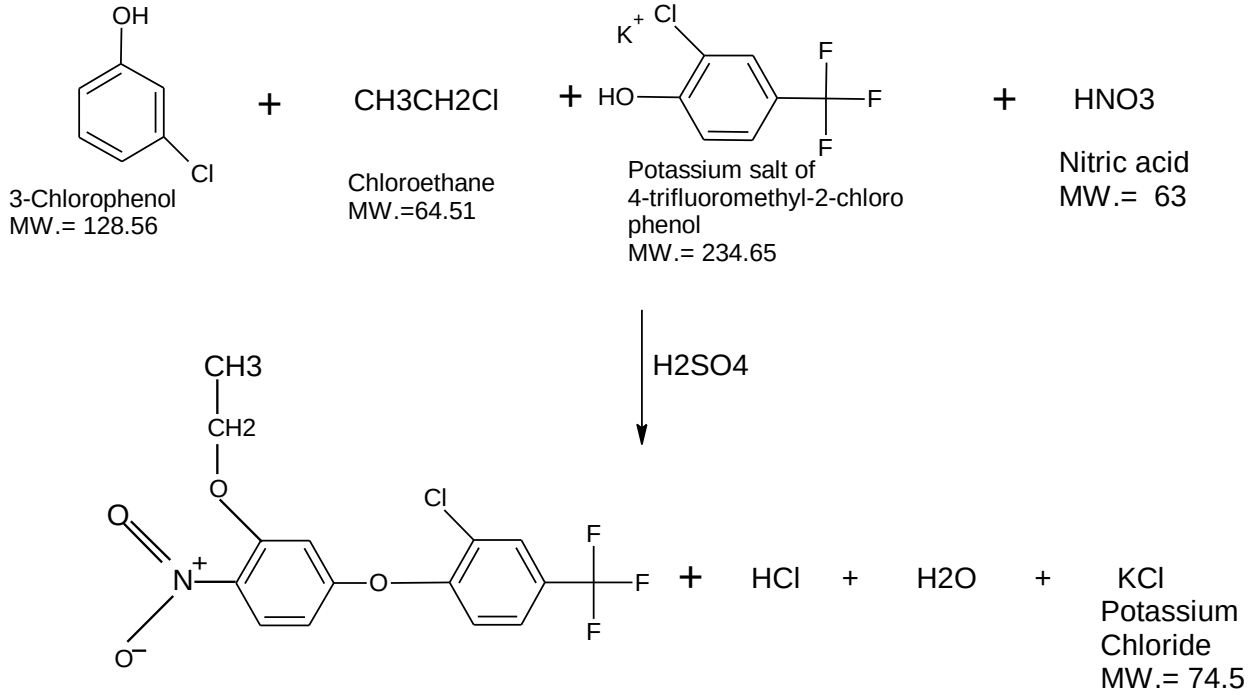
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/Loss**	**Recovery**	**Solid Waste**	
1	Oxadiargyl	-	-	1000	-	Product
2	HCl	-	-	113	-	To Scrubber
3	Toluene	-	75	1925	-	Recycle
4	Methanol	-	50	950	-	Recycle
5	Drying loss	-	11	-	-	Losses
6	Aqueous Layer	980	-	-	-	To ETP
Total		**980**	**136**	**3988**	-	
		5104				

(H-15) Oxyfluorfen

Process Description:

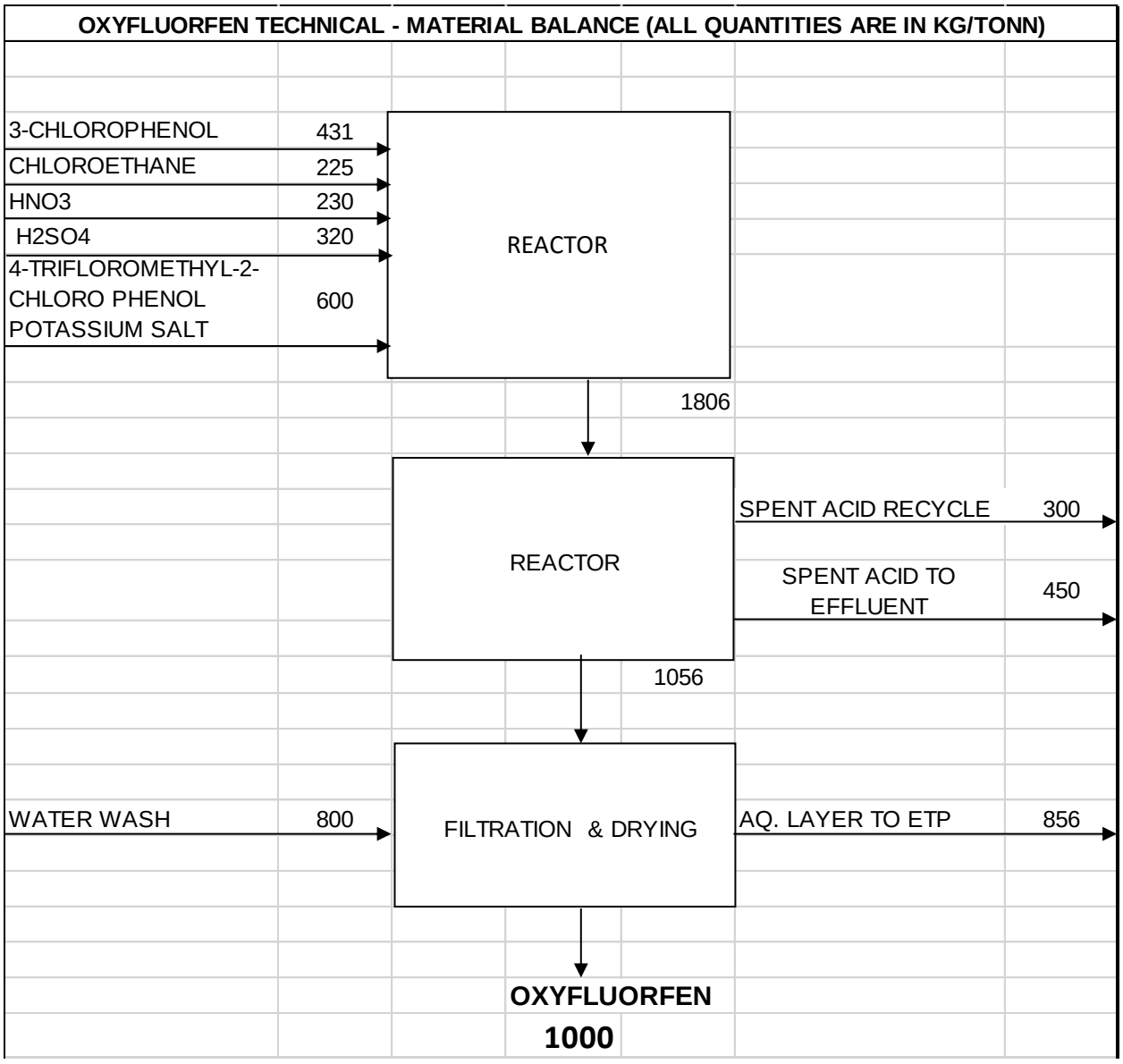
3-Chlorophenol, potassium salt of 4-Trifloromethyl-2-Chloro Phenol is reacted with chloroethane and nitric acid in presence of sulfuric acid at 50 – 55°C to form the crude Oxyfluorfen.
After washing it with water, mass is centrifuged and dried to form technical grade Oxyfluorfen.

Process Reaction:



OXYFLUORFEN
MW.= 361.7

Process Flow Diagram:



Material Balance:

Material Balance for Oxyfluorfen		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	3-Chlorophenol	431
2	Chloroethane	225
3	HNO3	230
4	H2SO4	320
5	Water Wash	800
6	4-Trifloromethyl-2-Chloro Phenol Potassium Salt	601
Total		**2607**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission /loss**	**Recovery**	**Solid Waste**	
1	Oxyfluorfen	-	-	1000	-	Product
2	Spent acid	-	-	751	-	Recycle
3	Aqueous Layer	856	-	-	-	To ETP
Total		**856**	-	**1751**	-	
		2607				

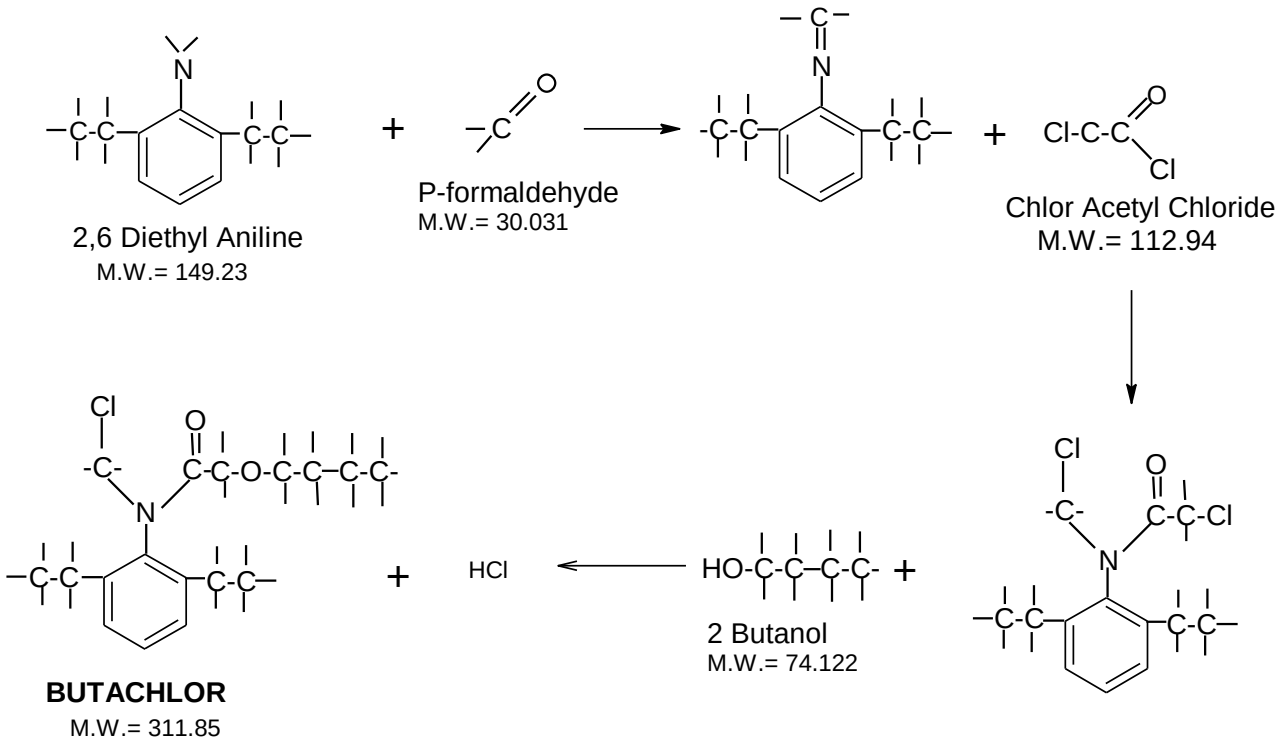
(H-16) Butachlor

Process Description:

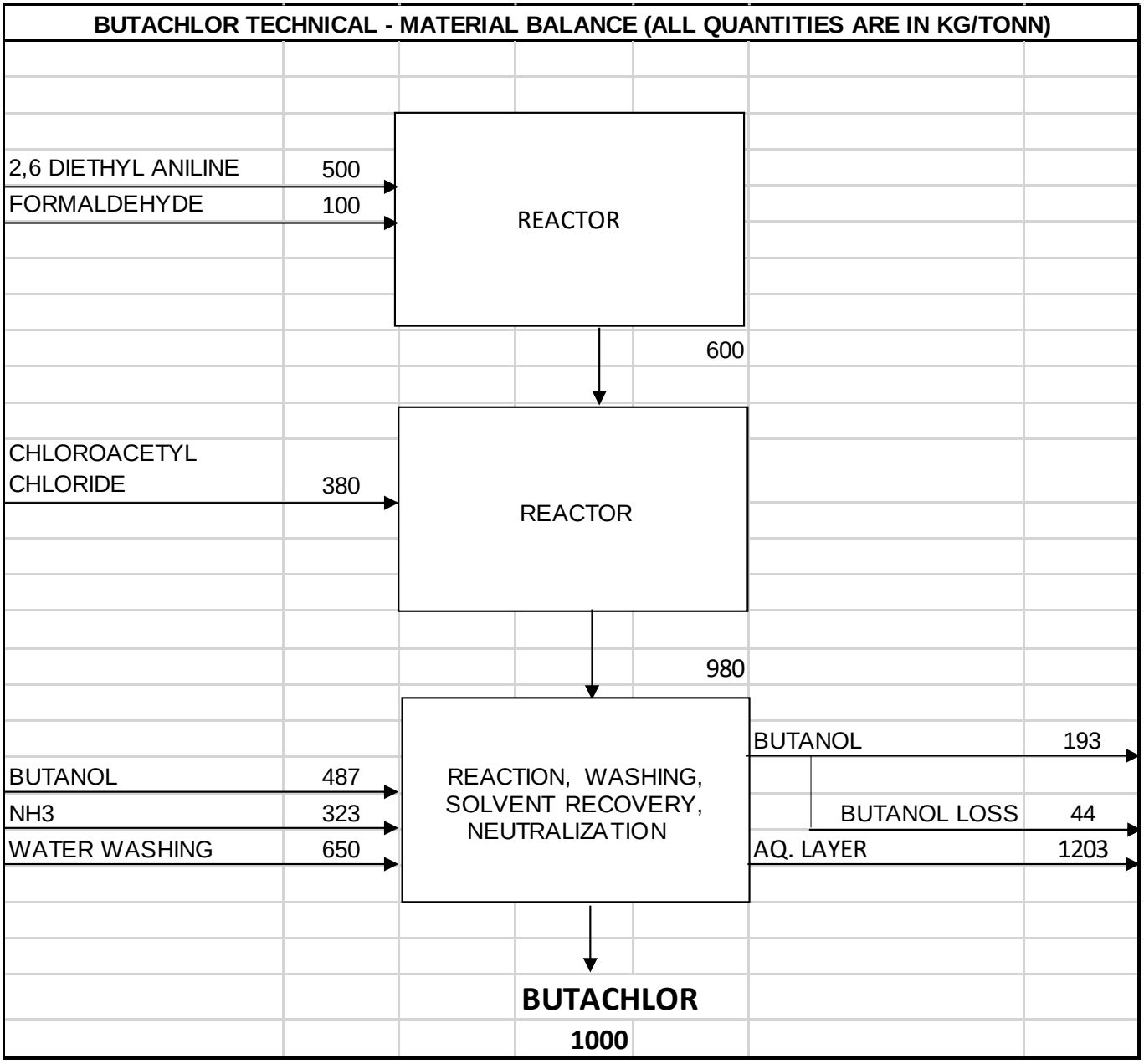
2,6-DEA is reacted with Paraformaldehyde to form the intermediate-1 at about 40°C. This intermediate is further reacted with Chloro Acetyl Chloride to form intermediate-2 which on further reaction with Butanol at about 60°C gives crude Butachlor.

The reaction mass is neutralized with gaseous ammonia at sub atmospheric temperature. Solvent recovery is done by distillation to get technical grade Butachlor.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Butachlor

S. No.	Raw Materials	Input/MT of Product (KG)
1	2,6 Diethyl Aniline	500
2	Formaldehyde	100
3	Chloro Acetyl Chloride	380
4	Butanol	487
5	NH3	323
6	Water	650
Total		**2440**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission/ loss	Recovery	Solid Waste	
1	Butachlor	-	-	1000.00	-	Product
2	Butanol	-	44	193	-	To Scrubber
3	Aqueous Layer	1203	-	-	-	To ETP
Total		**1203**	**44**	**1193**	**0**	
		2440				

INSECTICIDE

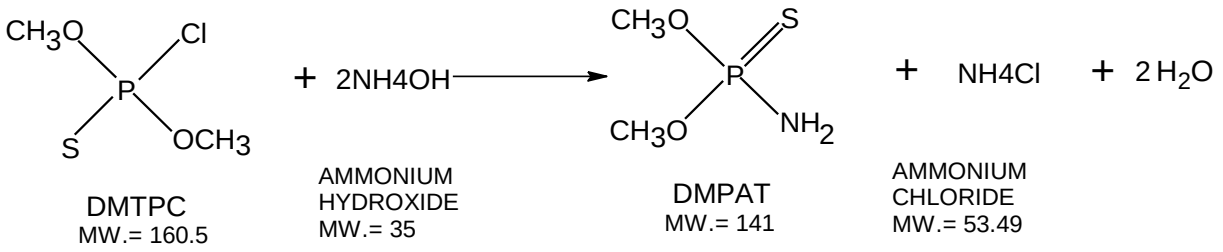
(I-1) Acephate

Process Description:

O, O-Dimethyl thio phorphoryl chloride (DMPTC) is allowed to react with liquor ammonia in presence of methylene chloride solvent in reactor forming intermediate called as O, O dimethyl phosphoro amidothioate (DMPAT) at ambient temperature and pressure.
In the next stage, DMPAT is isomerized with Dimethly sulfate to form the intermediate monitor (methamidophos) which is acetylated by acetic anhydride in presence of H_2SO_4 at about 50°C.
The reaction mass is then neutralized with liquor ammonia, at 20 – 30°C, extracted with methylene chloride, concentrated and crystallized to obtain Acephate technical product. Solvent is recovered and recycled.

Process Reaction:

PRODUCTION OF DMPAT



DMTPC
MW.= 160.5

AMMONIUM HYDROXIDE
MW.= 35

DMPAT
MW.= 141

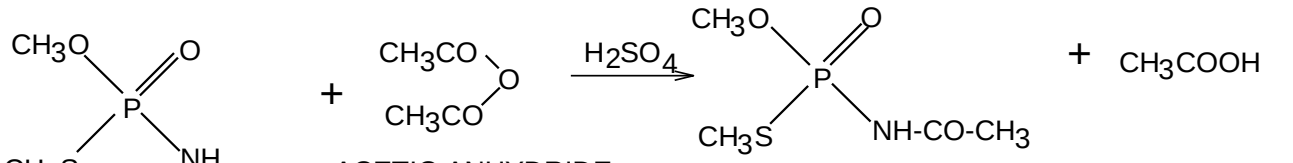
AMMONIUM CHLORIDE
MW.= 53.49

PRODUCTION OF MONITOR (ISOMERISATION)

DMPAT
MW.= 141

MONITOR

PRODUCTION OF ACEPHATE (ACETYLATION)



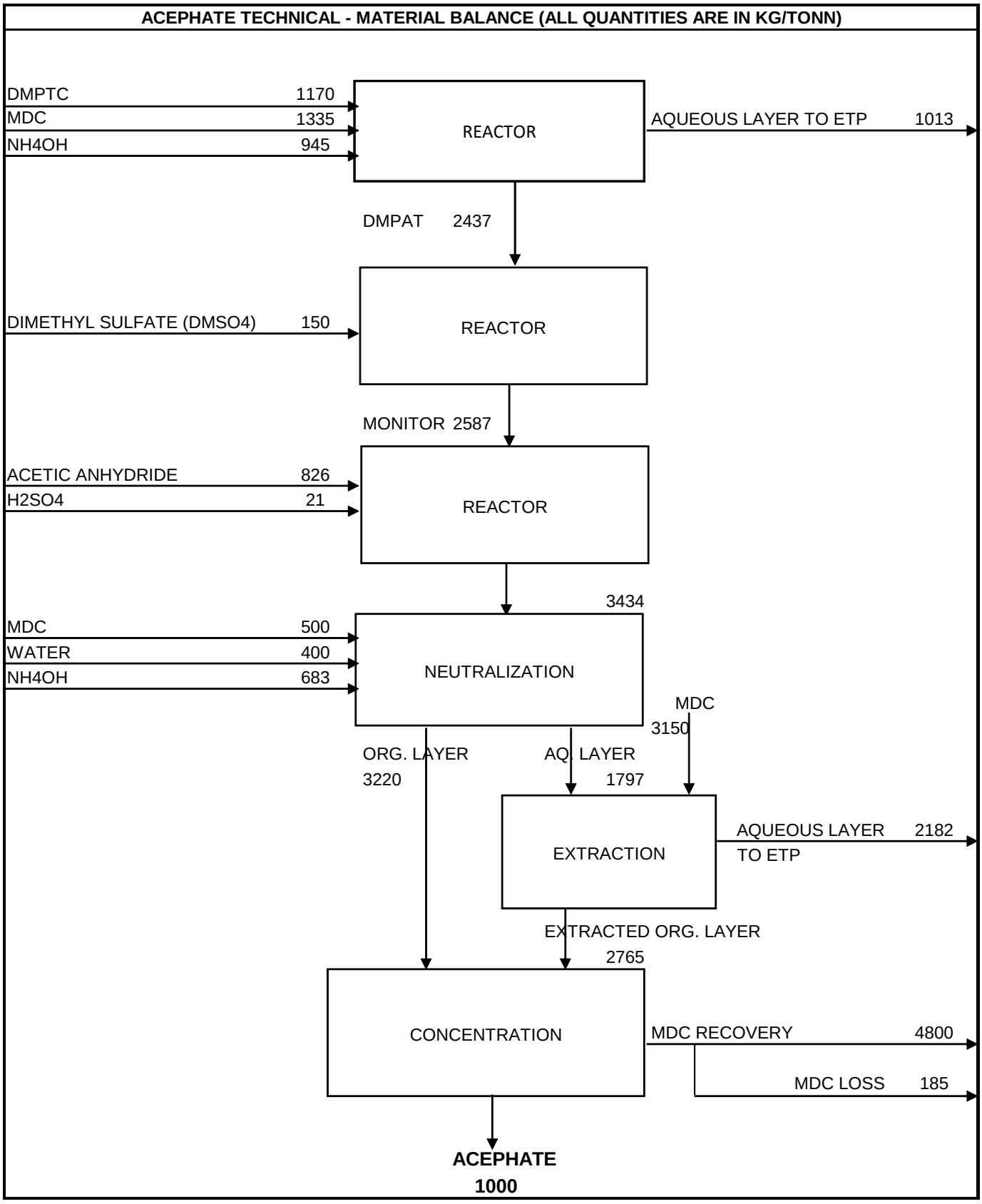
MONITOR

ACETIC ANHYDRIDE
MW.= 102

ACEPHATE
MW.= 183

ACETIC ACID
MW.= 60

Process Flow Diagram:



Material Balance:

Material Balance for Acephate		
S. No.	**Raw Materials**	**Input/MT of Product (KG.)**
1	DMPTC	1170
2	MDC	4985
3	NH4OH	1628
4	Dimethyl Sulfate	150
5	Acetic Anhydride	826
6	H2SO4	21
7	WATER	400
Total		**9180**

S. No.	**Output/MT of Product(KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Acephate	-	-	1000	-	Product
2	MDC	-	185	4800	-	Recycle
3	Aqueous Layer	3195	-	-	-	To ETP
Total		**3195**	**185**	**5800**	**0**	
		9180				

(I-2)Thiamethoxam

Process Description:

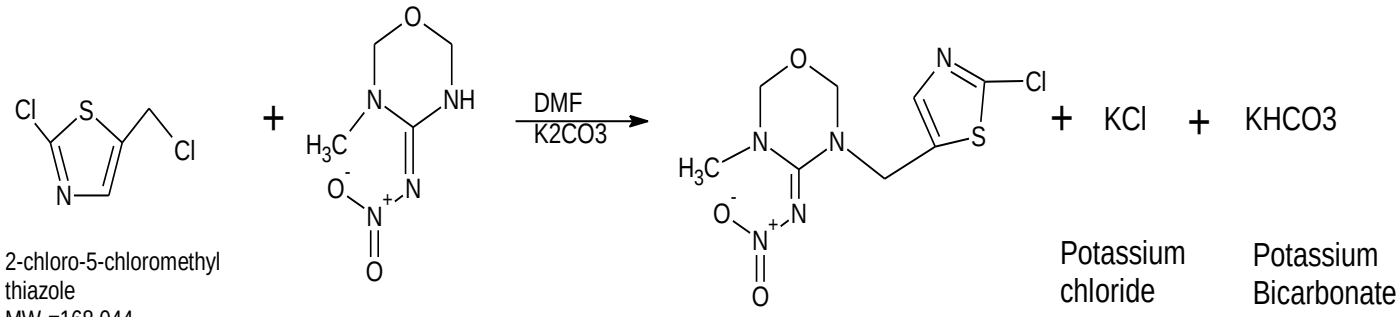
Step 1.
Dimethylformamide is charged into the reactor, to which is added 2-chloro 5-chloromethyl thiazole to form a solution (A). 4-Nitroimino 3-methyl isoxazole is charged into Dimethylformamide in another reactor and is stirred for 1 hr to form a solution (B).

Step 2
Solution (B) is charged into reaction mass of solution (A). It is stirred and cooled to 30°C.

Step 3
Potassium carbonate is added lot-wise to the above reaction mass at 30 – 32°C and cook for 5 hrs at the same temperature. After reaction is over the reaction mass is filtered to remove potassium chloride formed in the reaction. The filtrate is distilled to remove DMF.

Step 4
pH of concentrated filtrate is adjusted to 4 – 5 with 30% Hydrochloric acid to precipitate Thiamethoxam, which is centrifuged washed with water and dried to get Thiamethoxam technical.

Process Reaction:



2-chloro-5-chloromethyl thiazole
MW.=168.044

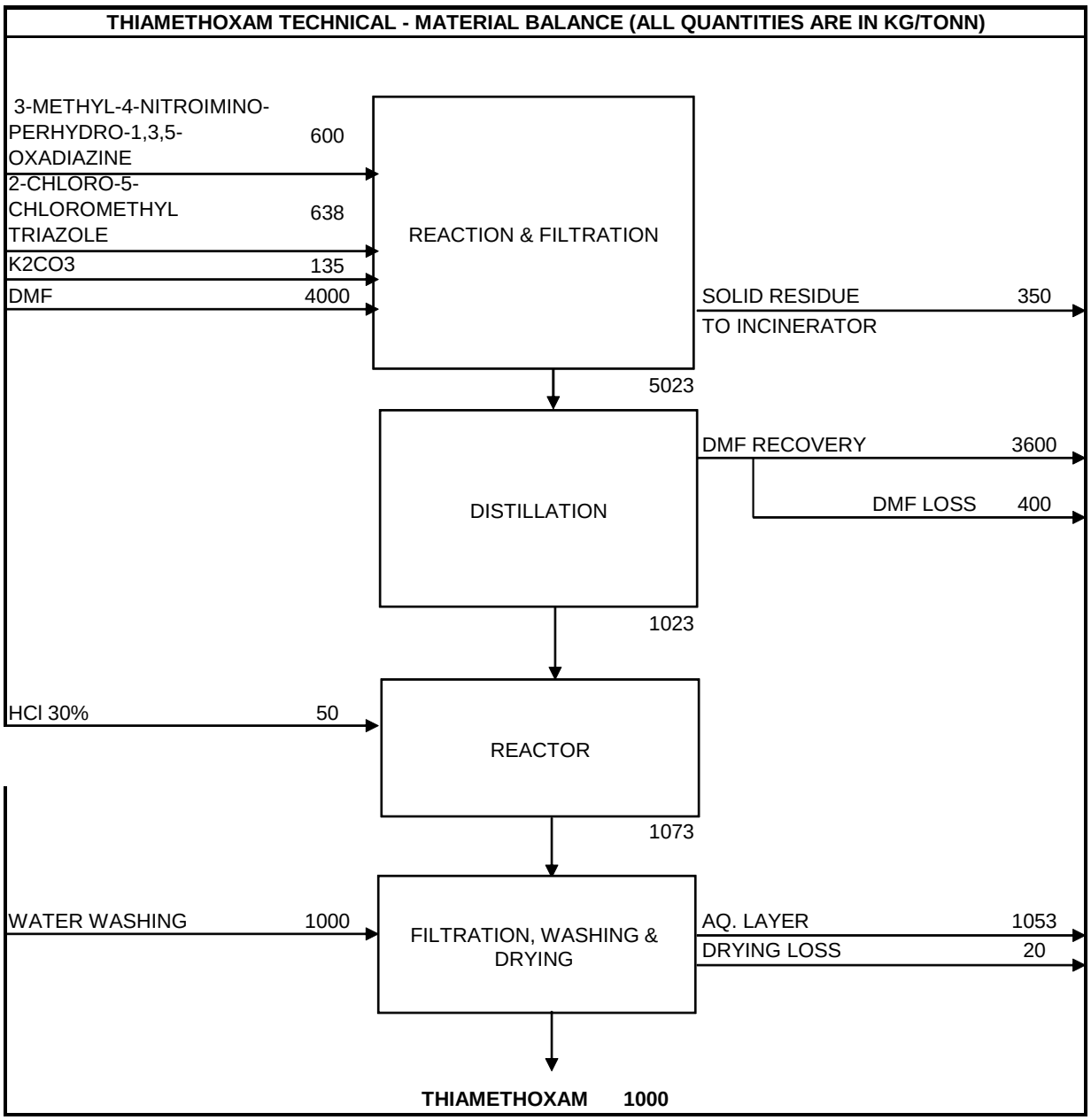
4-nitroimino 3-methyl isoxazole
MW.= 160

THIAMETHOXAM
MW.= 291.71

Potassium chloride
MW.= 74.5

Potassium Bicarbonate
MW.= 100

Process Flow Diagram:



Material Balance:

Material Balance for Thiamethoxam		
S.No.	**Raw Materials**	**Input/MT of Product (KG.)**
1	3-METHYL-4-NITROIMINO-PERHYDRO-1,3,5-OXADIAZINE	600
2	2-Chloro-5-Chloromethyl Triazole	638
3	K2CO3	135
4	DMF	4000
5	WATER	1000
6	HCL 30%	50
Total		**6423**

S. No.	**Output/MT of Product (KG.)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Thiamethoxam	-	-	1000	-	Product
2	DMF	-	400	3600	-	Recovery
3	Aq. Layer	1053	-	-	-	To ETP
4	Drying Loss	-	20	-	-	To atmosphere
5	Solid residue	-	-	-	350	To Incineration
Total		**1053**	**420**	**4600**	**350**	
		6423				

(I-3) Indoxacarb

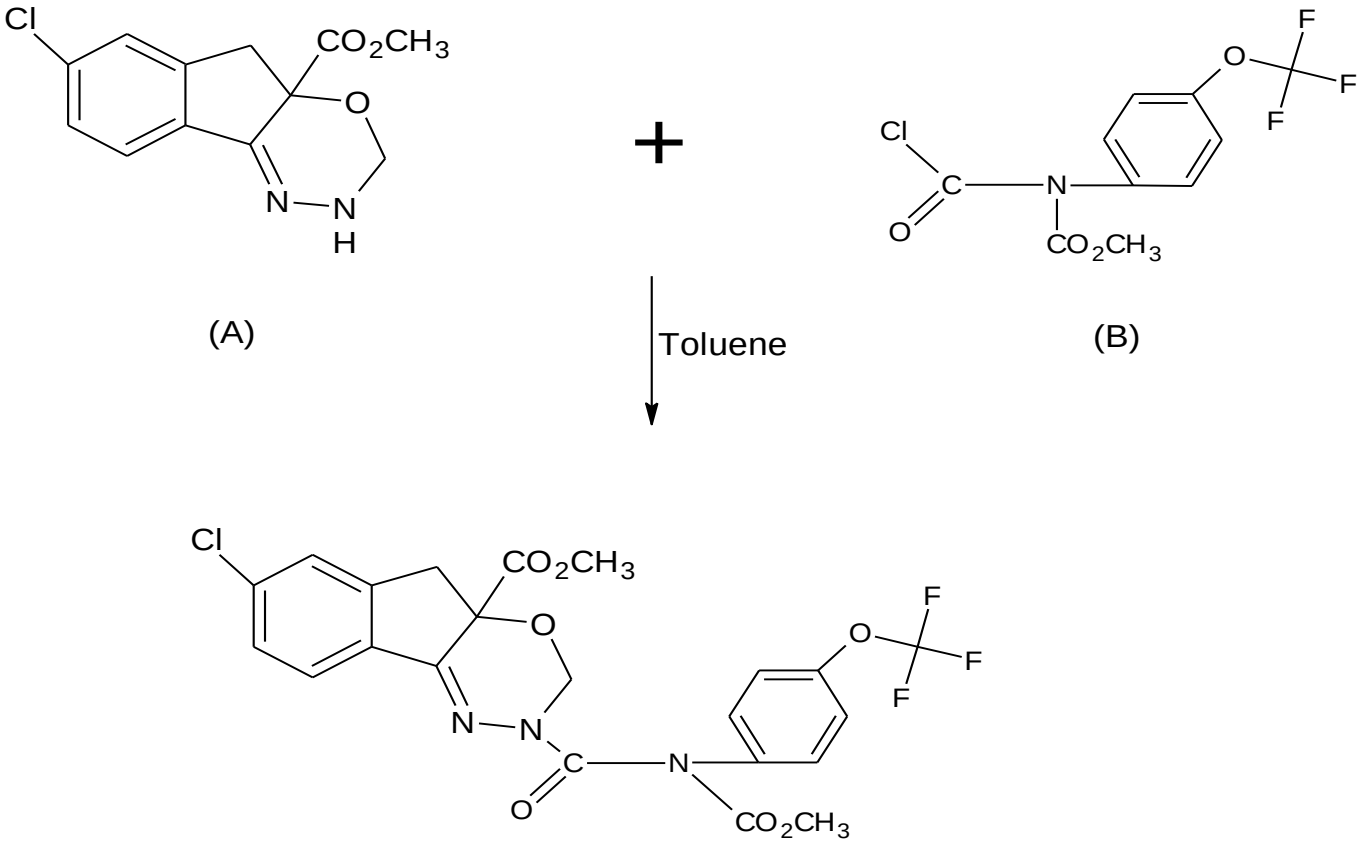
Process Description:

Take Methyl 7-Chloro-2,5-dihydroindeno [1,2-e][1,3,4] oxadiazine-4a(3H)-carboxylate (A), Toluene & Catalyst in the reactor.

Add Methyl (Chlorocarbonyl) [4-(trifluoromethoxy) phenyl] carbamate (B) at 45 – 50°C and cook till the reaction is completed.

Distil off toluene, cool, add water to the mass to make a slurry, centrifuge and dry the cake to get Indoxacarb technical. Send aqueous ML to ETP.

Process Reaction:

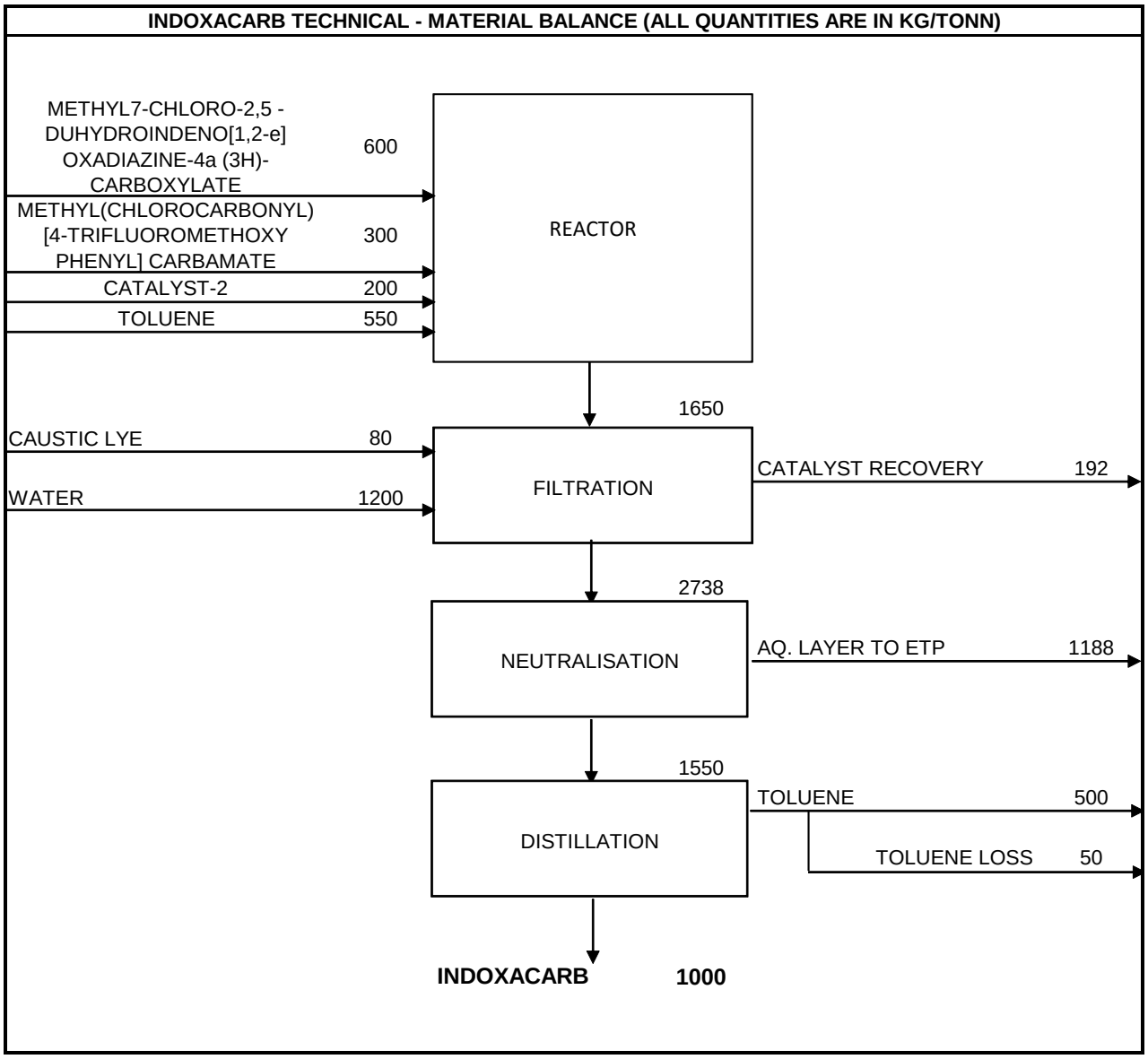


INDOXACARB
MW.= 527.84

A= Methyl-7-chloro-2,5-dihydroindens[1,2-e] oxadiazine-4a(3H)- carboxylate

B= Methyl(chlorocarbonyl) [4-trifluoromethoxy) phenyl] carbamate

Process Flow Diagram:



Material Balance:

Material Balance for Indoxacarb		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Methyl 7-CHLORO-2,5 -Duhydroindeno [1,2-e] Oxadiazine-4a (3H)-Carboxylate	600
2	Methyl (Chlorocarbonyl) [4-Trifluoromethoxy Phenyl] Carbamate	300
3	Catalyst	200
4	Toluene	550
5	Caustic Lye	80
6	Water	1200
Total		**2930**

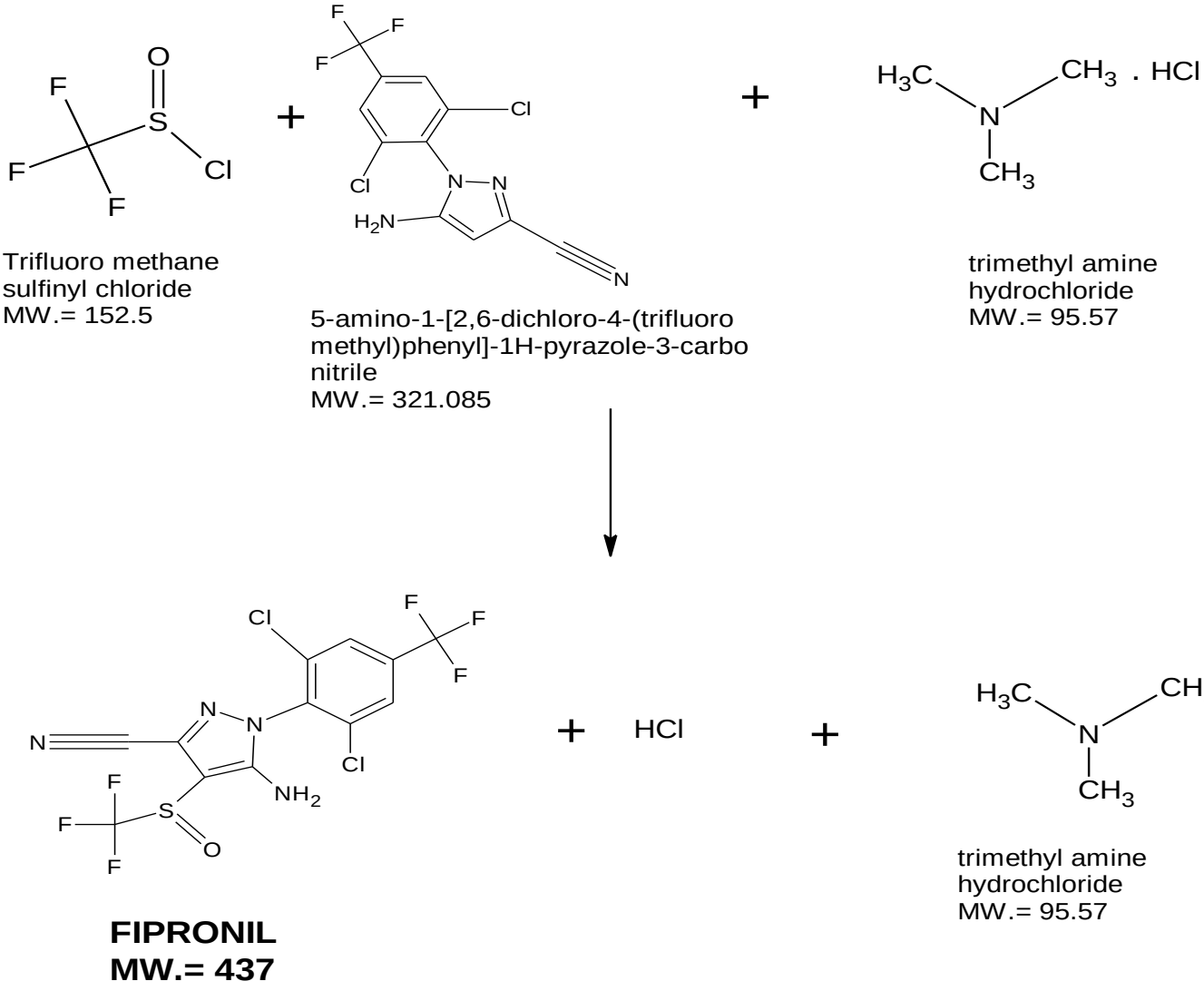
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Indoxacarb	-	-	1000	-	Product
2	Catalyst	-	-	192	-	Recycle
3	Aqueous Layer	1188	-	-	-	To ETP
4	Toluene		50	500		Recycle
Total		**1188**	**50**	**1692**	**-**	
		2930				

(I-4) Fipronil

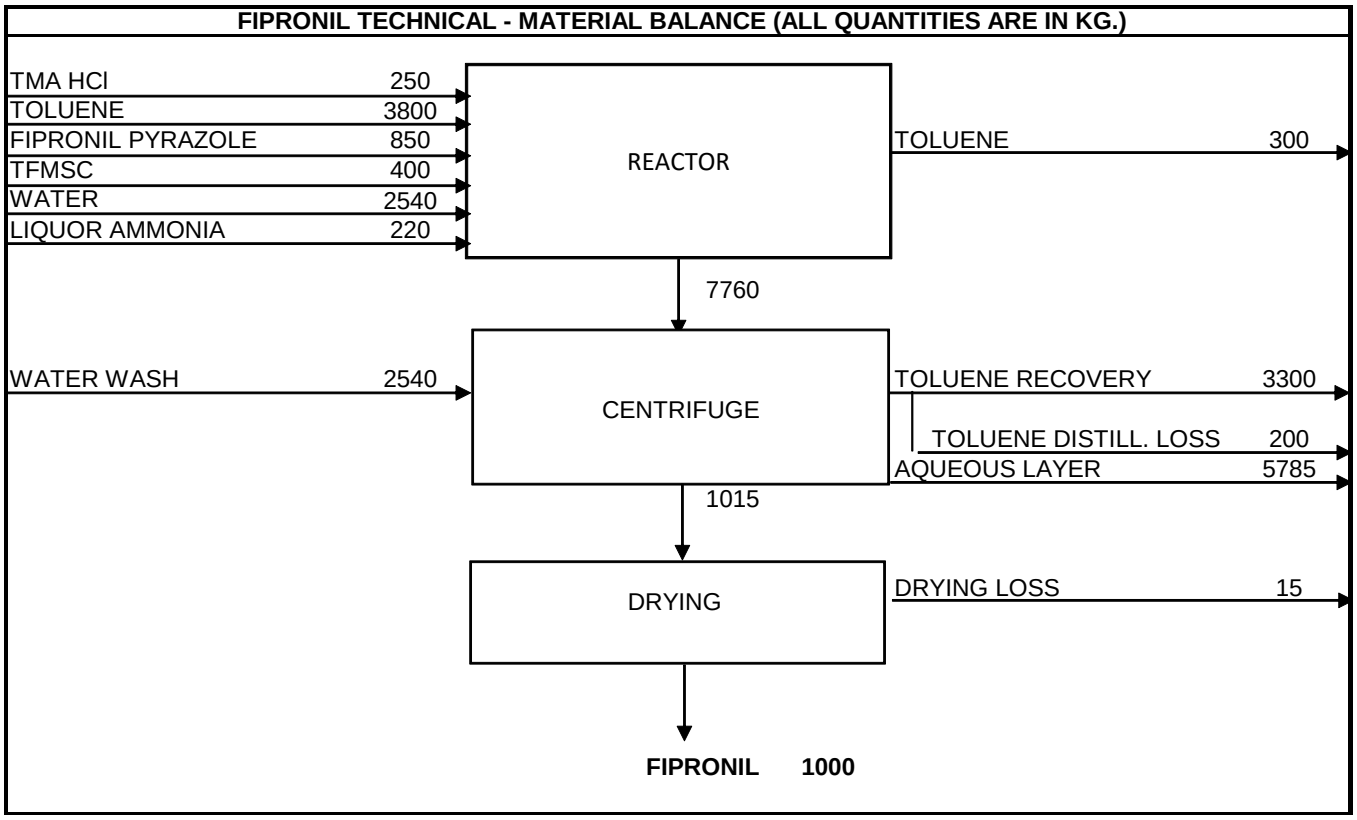
Process Description:

Fipronil is manufactured by reaction of Fipronil pyrazole with Trifluoromethane sulphinyl chloride in Toluene at 15 to 20°C in presence of TMA-HCl. HCl gas evolved is scrubbed in water.
Check for unreacted pyrazole, if more than 2%, continue cooking for 2 more hours. After completion of reaction add water, stir and settle the layers. Send aq. layer to ETP.
Organic layer is distilled to recover solvent.
Charge Butyl acetate to the mass, centrifuge and dry at 60 -65°C to obtain Fipronil technical product.
The ML is distilled to recover butyl acetate which is recycled for next batch.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Fipronil		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Fipronil Pyrazole	850
2	TMA HCl	250
3	TFMSC	400
4	Liquor Ammonia	220
5	Water	5080
6	Toluene	3800
Total		**10600**

S. No.	**Output/MT of Product(KG.)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Fipronil	-	-	1000	-	Product
2	Toluene	-	200	3600	-	Recycle
3	Aqueous Layer	5785	-	-	-	To ETP
4	Drying loss	-	15	-	-	To atmosphere
Total		**5785**	**215**	**4600**	**-**	
		10600				

(I-5) Diafenthiuron

Process Description:

Step-1

1-(2,6-diisopropyl-4-phenoxyphenyl)thiourea **(DTU)** is heated to reflux with ortho-xylene as solvent to give 1,3-diisopropyl-2-isothiocyanato-5-phenoxybenzene **(DITC)**. Ammonia gas evolved is scrubbed in water. Xylene is distilled out.

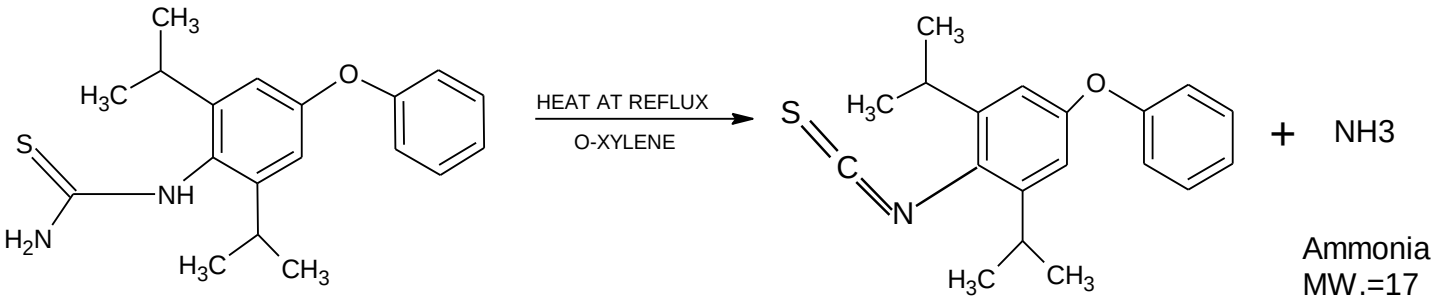
Step-2

Condensation of 1,3-diisopropyl-2-isothiocyanato-5-phenoxybenzene **(DITC)** with tertiarybutyl amine **(TBA)** in presence of toluene as solvent at 55 – 60°C gives Diafenthiuron crude. Toluene is then distilled out.

Finally purification is carried out in n-hexane by crystallization. The slurry is centrifuged and dried to yield technical grade Diafenthiuron.

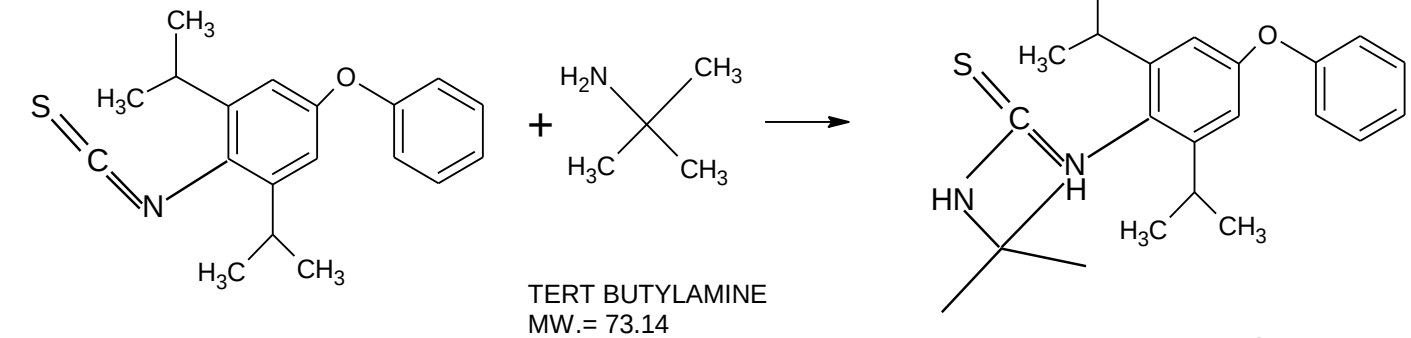
N-hexane is distilled out of the ML and recycled.

Process Reaction:



1-(2,6-DIISOPROPYL-4-PHENOXYPHENYL)THIOUREA
MW.= 328.47

1,3-DIISOPROPYL-2-ISOTHIOCYANATO-5-PHENOXYBENZENE
MW.= 311.44

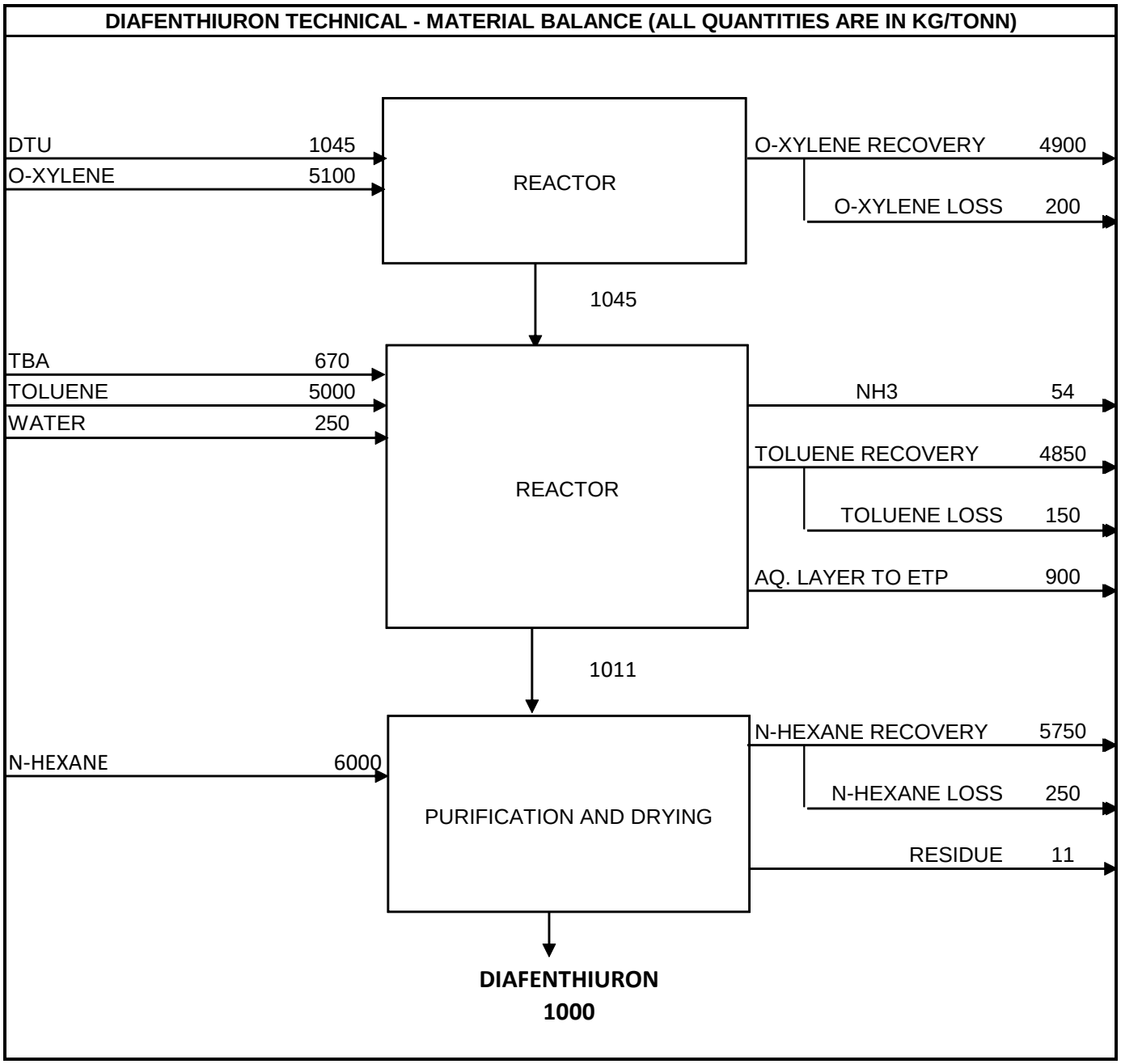


1,3-DIISOPROPYL-2-ISOTHIOCYANATO-5-PHENOXYBENZENE
MW.= 311.44

TERT BUTYLAMINE
MW.= 73.14

DIFENTHIURON
MW.= 384.58

Process Flow Diagram:



Material Balance:

Material Balance for Diafenthiuron		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	DTU	1045
2	O-Xylene	5100
3	TBA	670
4	Toluene	5000
5	Water	250
6	N-Hexane	6000
Total		**18065**

S. No.	**Output/MT of Product (KG.)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Diafenthiuron	-	-	1000	-	Product
2	O-Xylene	-	200	4900	-	Recycle
3	NH3	-	54	-	-	To scrubber
4	Toluene	-	150	4850	-	Recycle
5	Effluent	900	-	-	-	To ETP
6	Residue	-	-	-	11	For incineration
7	N-Hexane	-	250	5750	-	Recycle
Total		**900**	**654**	**16500**	**11**	
		18065				

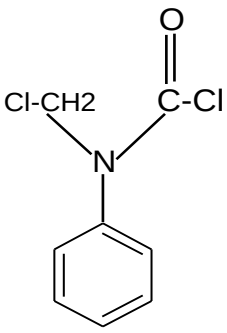
(I-6) Buprofezin

Process Description:

Water and ammonium bicarbonate are charged into the reactor. MCB and thiourea are charged after stirring the mixture.
It is reacted with N-chloromethyl-N-phenyl carbamoyl chloride at controlled condition of 15 – 20°C. After completing the reaction the layers are separated. Aqueous layer is sent to ETP.
MCB is then distilled out of the organic layer.

Methanol is charged to the crude mass and the slurry is cooled to 10°C for crystallization. Buprofezin technical grade product is obtained after centrifugation and drying. ML is distilled to recover methanol.

Process Reaction:

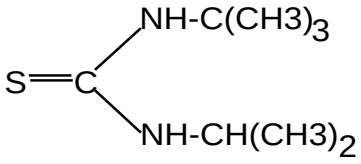


N-Chloromethyl N-Phenyl Carbamoyl Chloride
MW.= 204

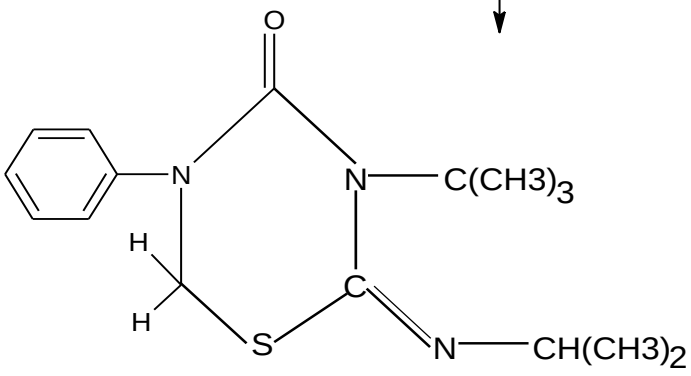
+ $2NH_4HCO_3$

Ammonium Bicarbonate
MW.= 79.05

+



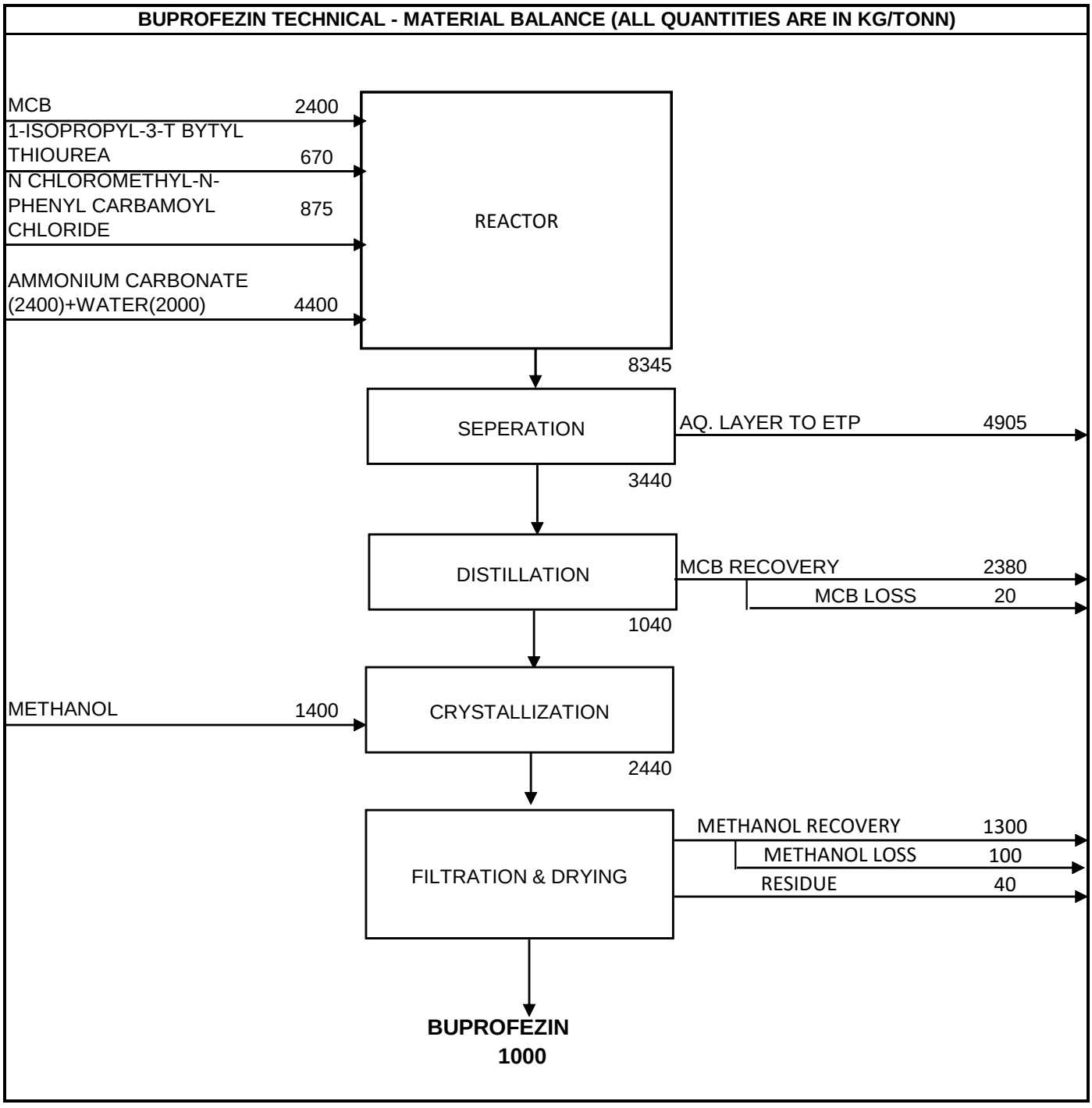
N-di-ter Butyl N-Isopropyl Thiourea
MW.= 174



+ 2NH4Cl + 2H2O + 2CO2

BUPROFEZIN
MW.= 305

Process Flow Diagram:



Material Balance:

Material Balance for Buprofezin		
S.No.	**Raw Materials**	**Input/MT of Product (Kg.)**
1	MCB	2400
2	1-Isopropyl-3-T Bytyl Thiourea	670
3	N Chloromethyl-N-Phenyl Carbamoyl Chloride	875
4	Ammonium Carbonate(2400) + Water(2000)	4400
5	Methanol	1400
Total		**9745**

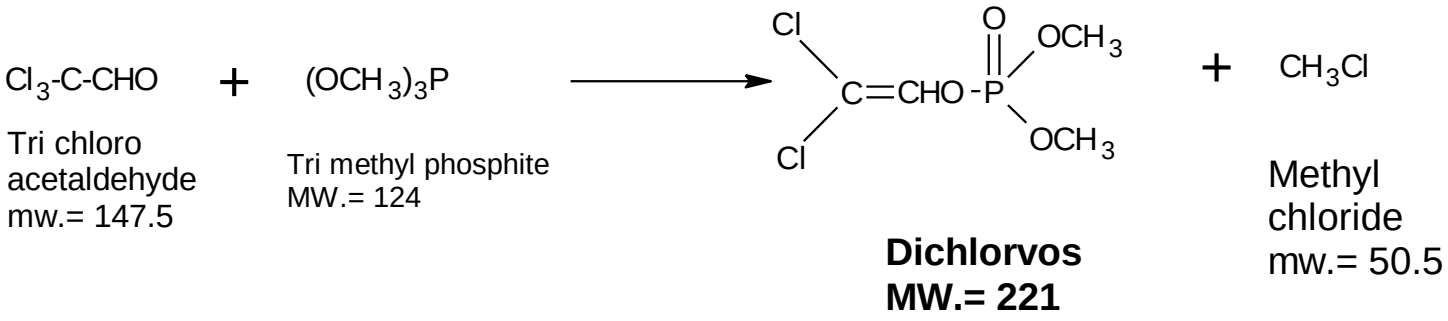
S. No.	**Output/MT of Product (Kg.)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Buprofezin	-	-	1000	-	Product
2	Effluent	4905	-	-	-	To ETP
3	Methanol	-	100	1300	-	Recovery
4	MCB	-	20	2380	-	Recycle
5	RESIDUE	-	-	-	40	Incineration
Total		**4905**	**120**	**4680**	**40**	
		9745				

(I-7) Dichlorvos

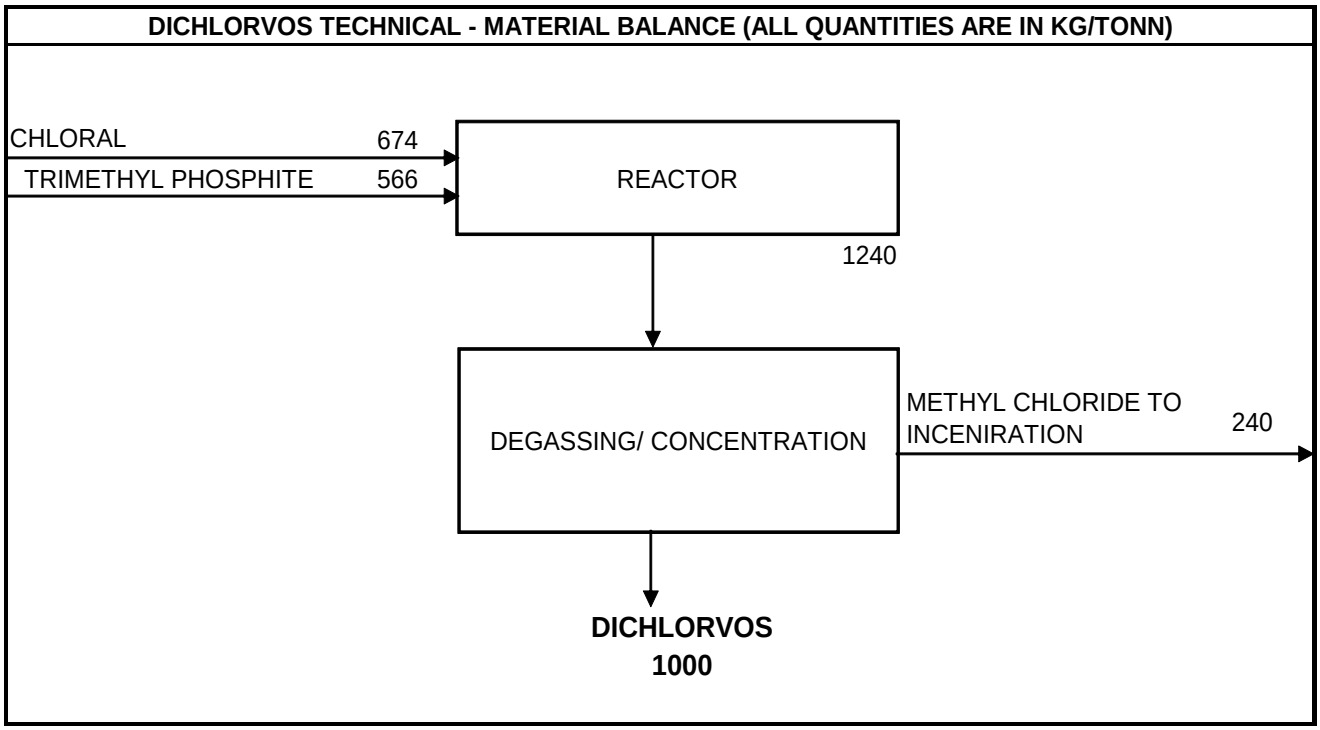
Process Description:

Dichlorvos Technical is manufactured by condensing Chloral and trimethyl Phosphite at 40°C.
During condensation Methyl Chloride is formed which is removed by degassing.
The Dichlorvos technical thus obtained is packed in drums.

Process Reaction:



Process Flow Diagram:



Material Balance:

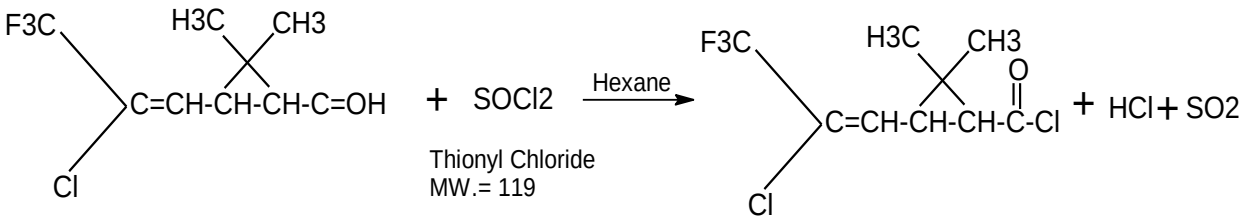
Material Balance for Dichlorvos							
S. No.	**Raw Materials**					**Input/MT of Product (KG.)**	
1	Chloral					674	
2	Trimethyl Phosphite					566	
Total						**1240**	
S. No.	**Output/MT of Product(KG)**						**Remarks**
	Product	**Liquid Effluent**	**Air Emission /loss**	**Recovery**	**Solid Waste**		
1	Dichlorvos	-	-	1000	-		Product
2	Methyl Chloride	-	240	-	-		To Incineration
Total		**0**	**240**	**1000**	**0**		
		1240					

(I-8) Lambda Cyhalothrin

Process Description:

Lambda Cyhalothric Acid is chlorinated with thionyl chloride as the chlorinating agent using hexane as the solvating media at 40 – 45°C. Sulphur dioxide and hydrogen chloride gas which are evolved is scrubbed in a two stage scrubber.
The reaction mass, Tri Fluoro Propenyl Acid Chloride (TFP Acid Chloride) is then condensed with Meta Phenoxy Benzaldehyde and Sodium Cyanide at 20 – 25°C to form the Product Cyhalothrin.
In this process n - Hexane is used as solvent along with phase transfer Catalyst (TEBA).
The reaction mass of Cyhalothrin is washed with water. The aqueous layer is separated and sent for for detoxification. Solvent- n-Hexane from organic layer is stripped off to get Cyhalothrin oil. Finally Cyhalothrin oil is epimerized at -5 to 0°C in Isopropyl Alcohol and di-isopropyl amine to give Lambda Cyhalothrin technical.
An aqueous layer which contains traces of Sodium Cyanide is detoxified by treatment with Sodium Hypochlorite Solution (8 - 10%) up to < 0.2 ppm Level.

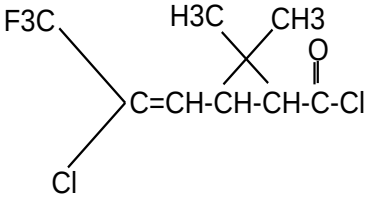
Process Reaction:



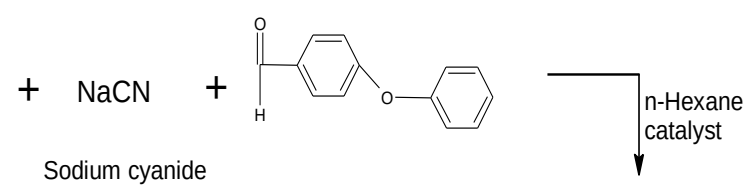
2-Chloro trifluoro Propanic acid
MW.= 242.5

Thionyl Chloride
MW.= 119

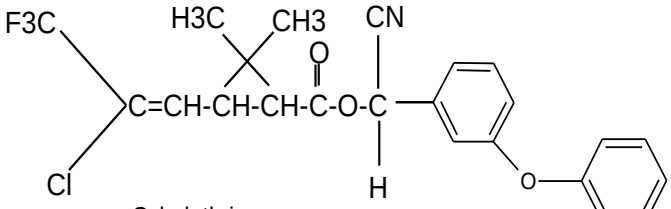
2 Chloro trifluoro propenyl acid chloride
MW.= 261



2 Chloro trifluoro propenyl acid chloride
MW.= 261

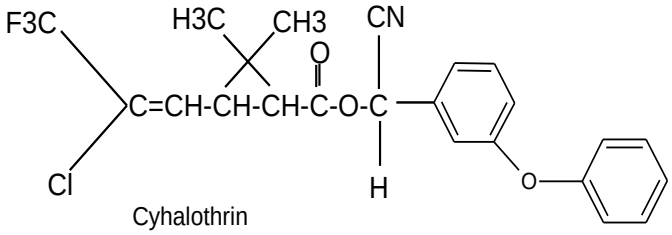


Sodium cyanide
MW.= 49.1

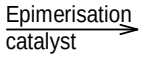


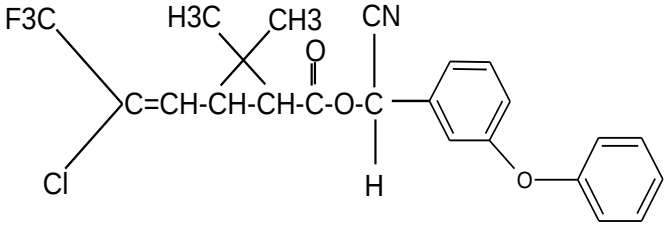
Cyhalothrin
MW.= 449.9

Sodium chloride
MW.=58.5



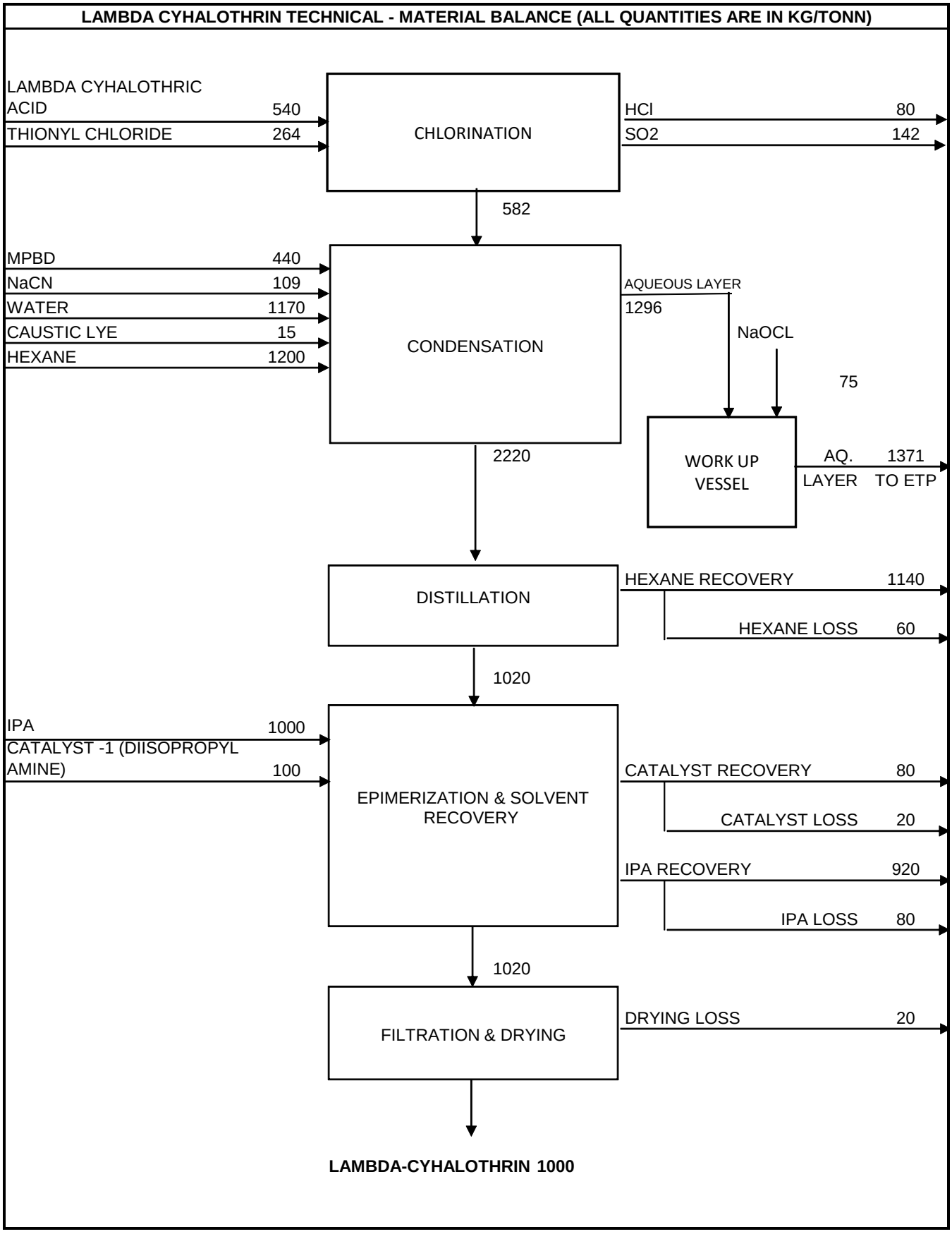
Cyhalothrin
MW.= 449.9





Lambda cyhalothrin
MW.= 449.9

Process Flow Diagram:



Material Balance:

Material Balance for Lambda Cyhalothrin		
S. No.	**Raw Materials**	**Input/MT of Product (MT)**
1	Lambda Cyhalothric Acid	540
2	Thionyl Chloride	264
3	MPBD	440
4	NaCN	109
5	Water	1170
6	Caustic Lye	15
7	Hexane	1200
8	NaOCL	75
9	IPA	1000
10	Catalyst-1 (Diisopropyl amine)	100
Total		**4913**

S. No.	**Output/MT of Product**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Lambda Cyhalothrin	-	-	1000	-	Product
2	HCl	-	80	-	-	To Scrubber
3	SO2	-	142	-	-	To scrubber
4	Aqueous Layer	1391	-	-	-	To ETP
5	Hexane	-	60	1140	-	Recycle
6	IPA	-	80	920	-	Recycle
7	Catalyst-I	-	-	80	20	Recycle
Total		**1391**	**362**	**3140**	**20**	
		4913				

(I-9) Imidacloprid

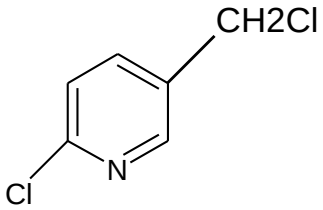
Process Description:

2 – Chloro, 5 – Chloromethyl Pyridine (CCMP) is reacted with N – Nitro Imino Imidazolidine (N-NII) in presence of potassium carbonate and Dimethyl Formamide as solvent at 55 – 60°C.

After completion of the reaction the slurry is filtered to remove the salts of potassium Chloride (KCl) & potassium bicarbonate.
The solvent is then removed by distillation from the reaction mass under vacuum, the residual mass is diluted with water and the resultant slurry is filtered to remove Imidacloprid. The wet cake is washed with water. Aqueous layer is sent to ETP.

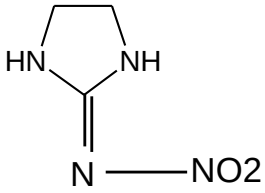
Methanol is used to crystallize the product to get Imidacloprid Technical.

Process Reaction:



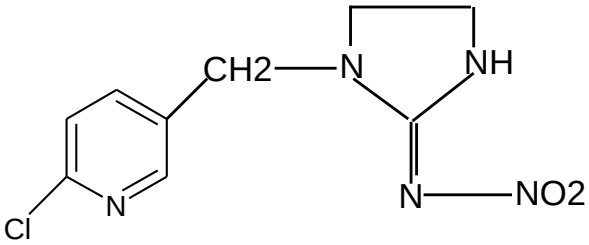
2-CHLORO-5-CHLOROMETHYL
PYRIDINE
MW.= 162

+



NITROIMINOIMIDAZOLIDINE
MW.=130

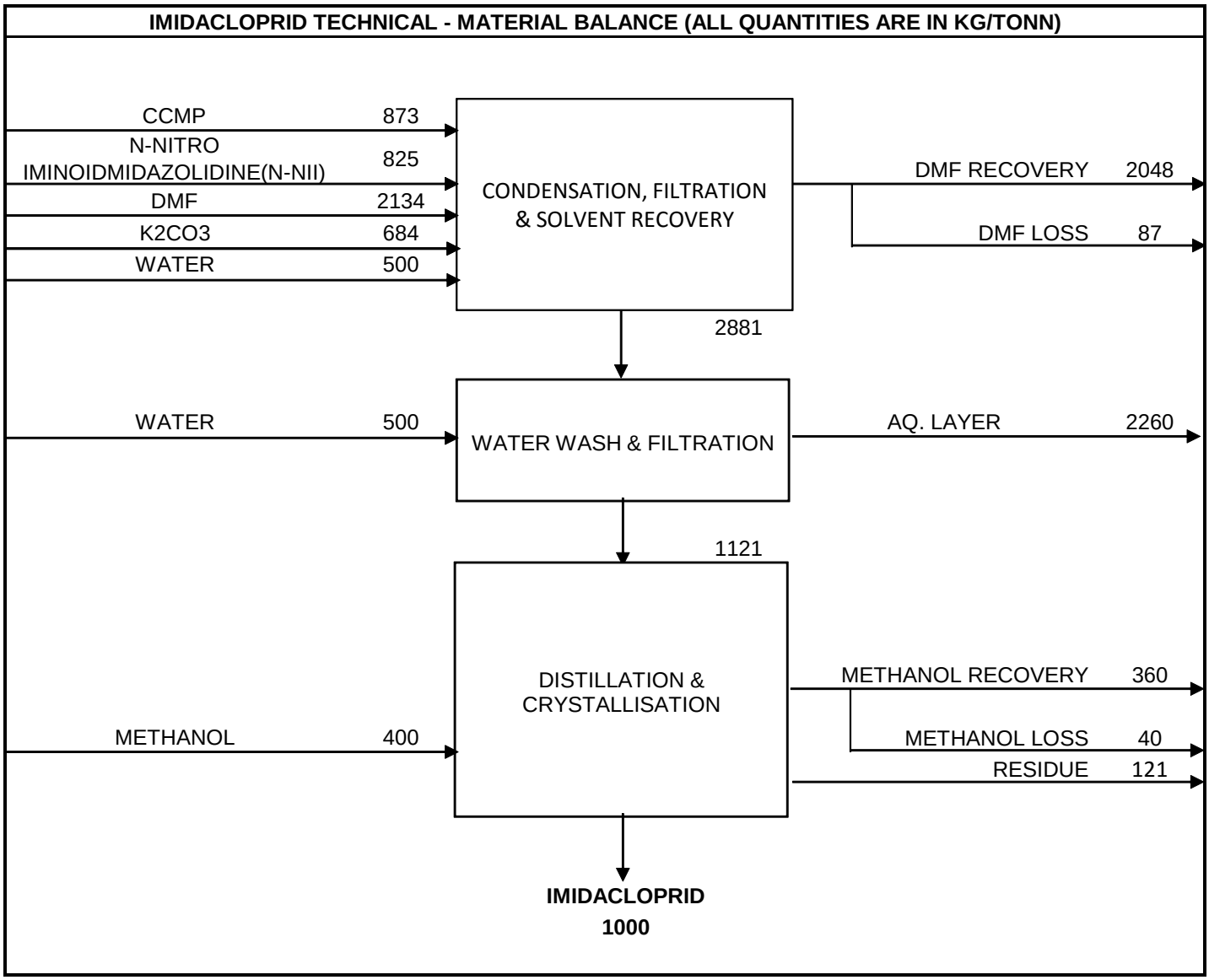
DMF K2CO3



+ KCl + KHCO3

IMIDACLOPRID
MW.= 255.5

Process Flow Diagram:



Material Balance:

Material Balance for Imidacloprid		
S. No.	**Raw Materials**	**Input/MT of Product (MT)**
1	CCMP	873
2	N-Nitro Iminoidmmidazolidine(N-NII)	825
3	DMF	2134
4	K2CO3	684
5	Water	1000
6	Methanol	400
Total		**5916**

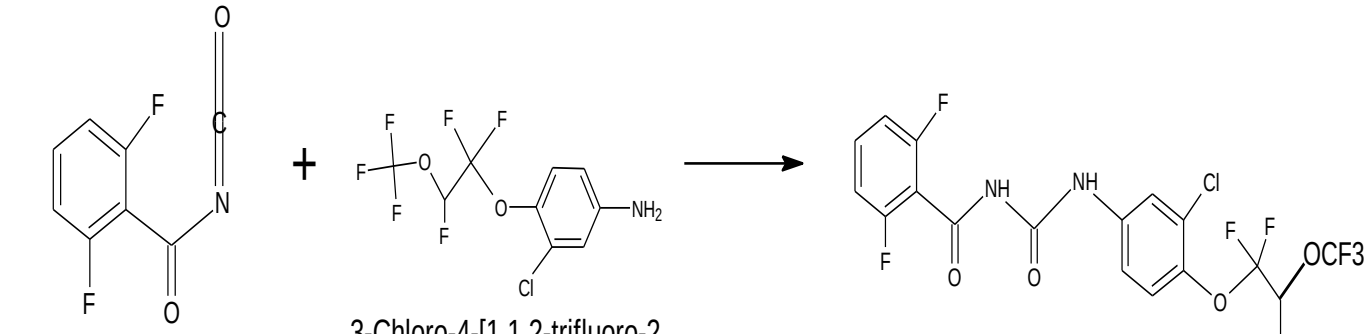
S. No.	**Output/MT of Product**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Imidacloprid	-	-	1000	-	Product
2	Aqueous Layer	2260	-	-	-	To ETP
3	DMF	-	87	2048	-	Recycle
4	Methanol	-	40	360	-	Recycle
6	Residue	-	-	-	121	To Incineration
Total		**2260**	**127**	**3408**	**121**	
		5916				

(I-10) Novaluron

Process Description:

Novaluron technical is produced by the reaction of 2,6 – difluoro benzoyl isocyanate with 2-chloro-4 amino phenoxy ether in presence of monochlorobenzene as a solvent at a temperature of 90 – 95°C.
After completion of the reaction, the reaction mass is cooled, centrifuged and washed with water. The ML is recycled as such in the reaction.
Novaluron wet cake is then crystallized from toluene, centrifuged and dried to get Novaluron technical.
ML is distilled and the solvent is recycled.

Process Reaction:

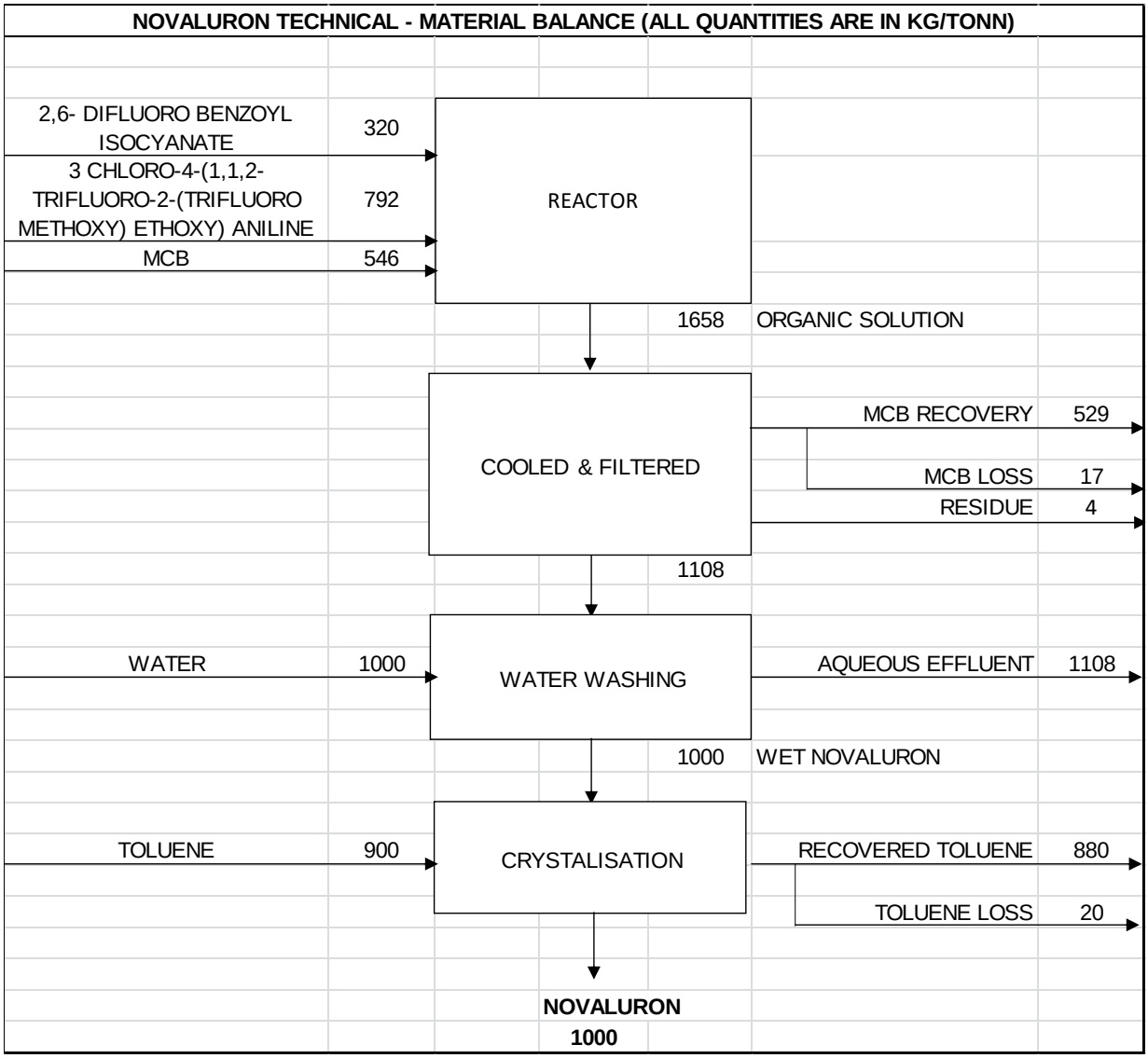


2,6 Difluoro benzoyl isocyanate
MW.= 183.11

3-Chloro-4-[1,1,2-trifluoro-2 -(trifluoromethoxy)ethoxy] aniline
MW.= 309.59

NOVALURON
MW.= 492.70

Process Flow Diagram:



Material Balance:

Material Balance for Novaluron		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	2,6- Difluoro Benzoyl Isocyanate	320
2	3 Chloro-4-(1,1,2- Trifluoro-2-(TrifluoroMethoxy) Ethoxy) Aniline	792
3	MCB	546
4	Water	1000
5	Toluene	900
Total		**3558**

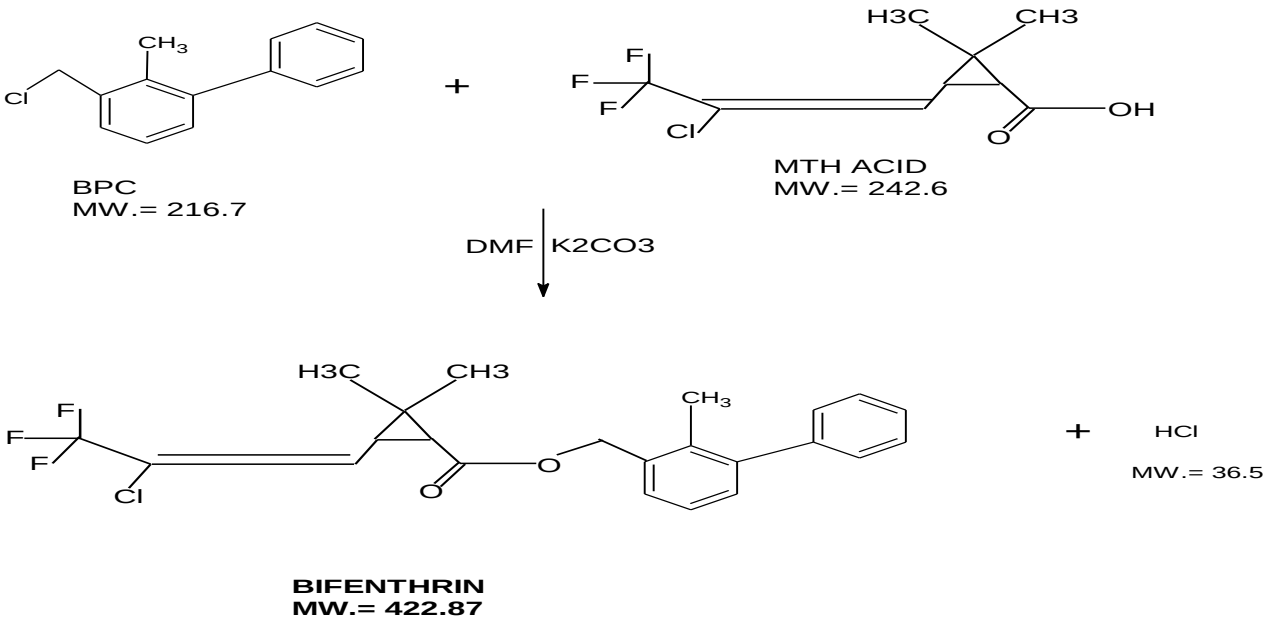
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Novaluron	-	-	1000	-	Product
2	MCB	-	17	529	-	Recycle
3	Aqueous Layer	1108	-	-	-	To ETP
4	Residue	-	-	-	4	For Incineration
5	Toluene	-	20	880		Recycle
Total		**1108**	**37**	**2409**	**4**	
		3558				

(I-11) Bifenthrin

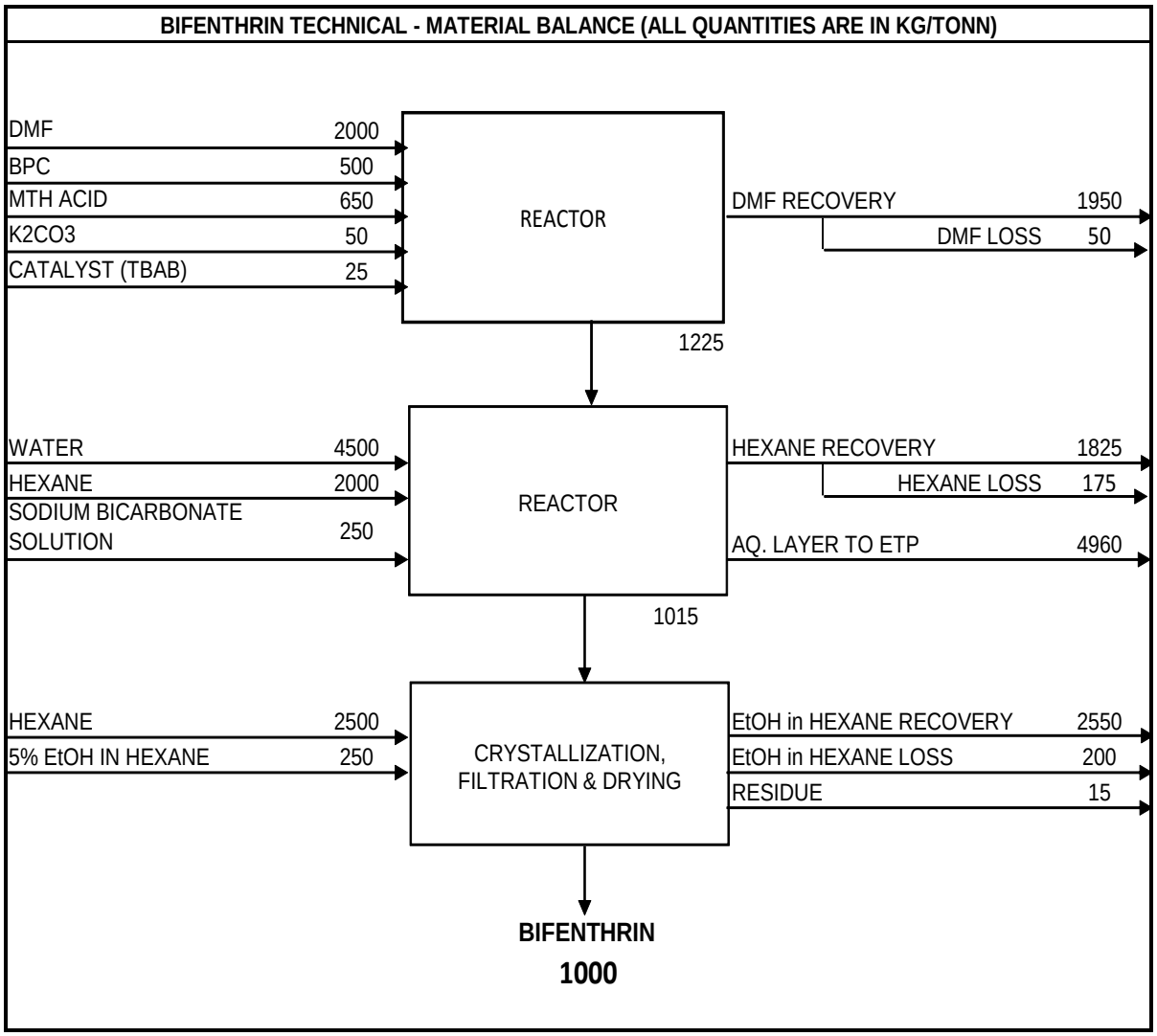
Process Description:

STEP: 1
Charge DMF, 2-Methyl 3- Biphenyl methyl chloride (BPC), Cyhalothric acid (MTH – Acid), K_2CO_3 in presence of catalyst (TBAB) and stir for 5 hours at 40 – 50°C.
Remove DMF from the reaction mixture by distillation.
STEP: 2
Add water to the reaction mass and extract with n-hexane. Send aqueous layer to ETP.
Take the organic layer and wash with 10% $NaHCO_3$. Finally wash the organic layer with water.
STEP: 3
The crude Bifenthrin is finally crystallized from n-hexane to obtain Bifenthrin technical. The ML is distilled to recover n-hexane, which, is recycled.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Bifenthrin		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	DMF	2000
2	BPC	500
3	MTH Acid	650
4	K2CO3	50
5	Catalyst(TBAB)	25
6	Water	4500
7	Hexane	4500
8	Sodium Bicarbonate Soultion	250
9	5% EtOH in Hexane	250
Total		**12725**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Bifenthrin	-	-	1000	-	Product
2	DMF	-	50	1950	-	Recycle
3	HEXANE	-	175	1825	-	Recycle
4	EtOH in Hexane	-	200	2550	-	Recycle
5	Residue	-	-	-	15	For incineration
6	Effluent	4960	-	-	-	To ETP
Total		**4960**	**425**	**7325**	**15**	
		12725				

(I-12) Permethrin

Process Description:

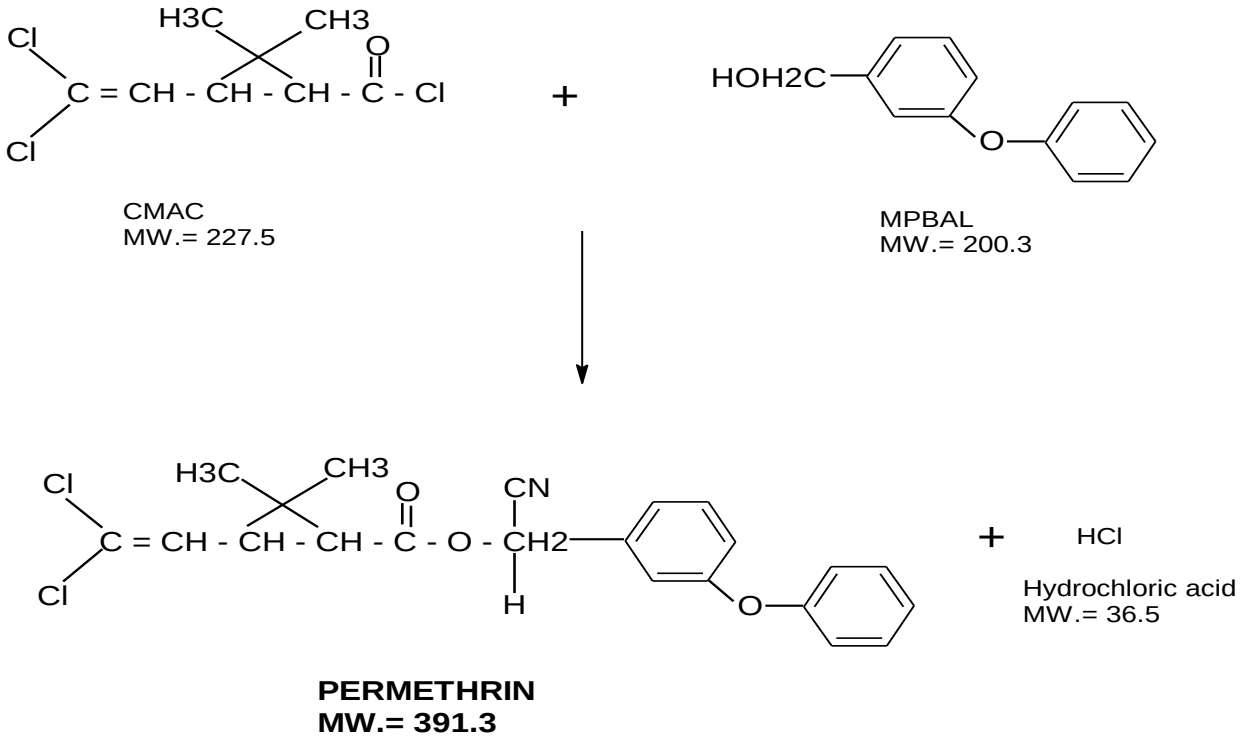
Meta Phenoxy Benzyl Alcohol is reacted with Cypermethric Acid Chloride (CMAC) in presence of n-Hexane as solvent at 50 – 55°C to give the Permethrin mass.

Hydrochloric acid gas is generated during the reaction which is scrubbed in water to get 30% solution of hydrochloric acid.

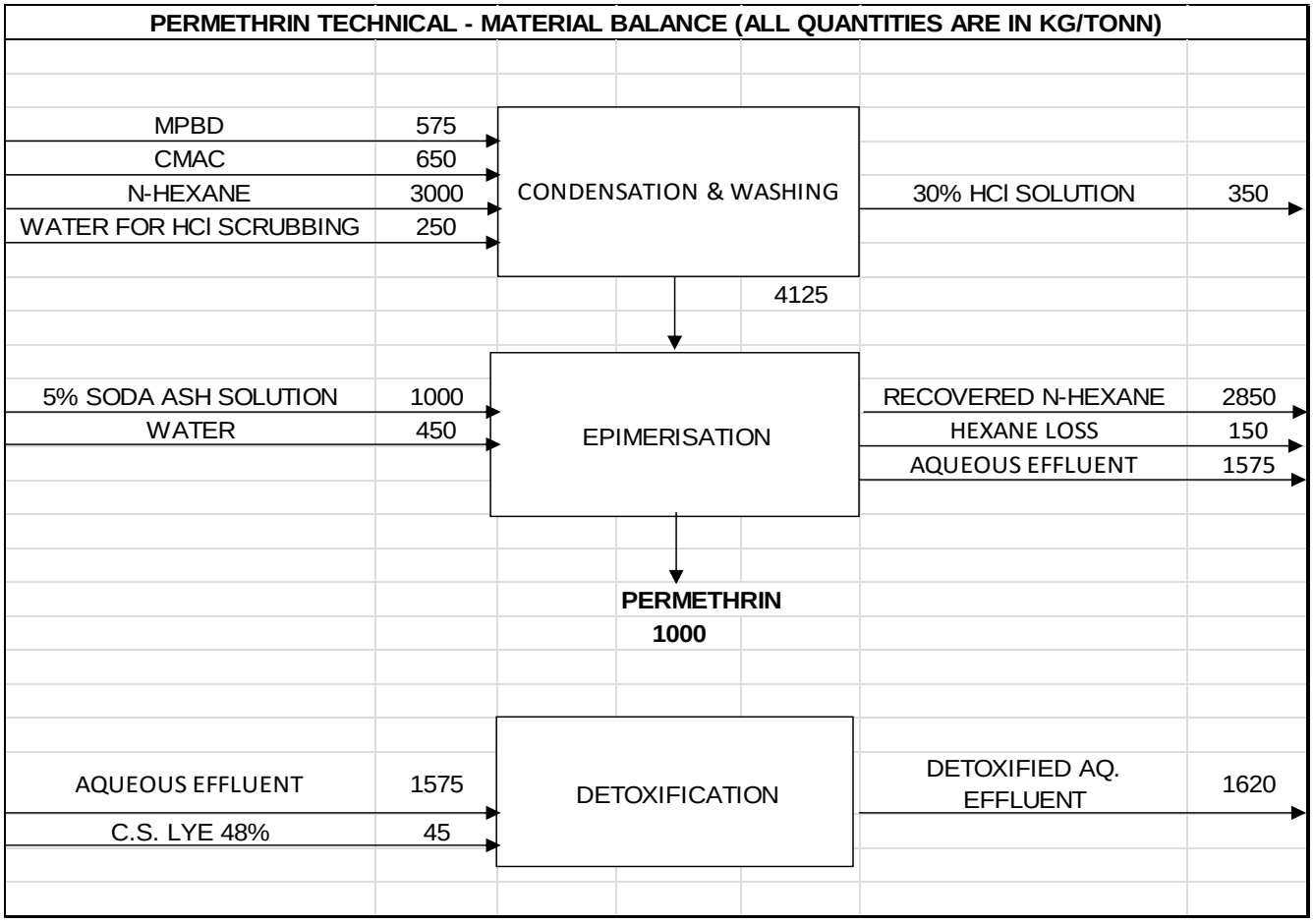
The resulting mass is then washed with 5% sodium carbonate solution as well as water. The aqueous layer is sent to ETP.

The organic phase is dehydrated and the solvent is distilled off to get Permethrin Technical.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Permethrin		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	MPBAL	575
2	CMAC	650
3	N-Hexane	3000
4	Water	700
5	5% Soda Ash solution	1000
6	C. S. Lye	45
Total		**5970**

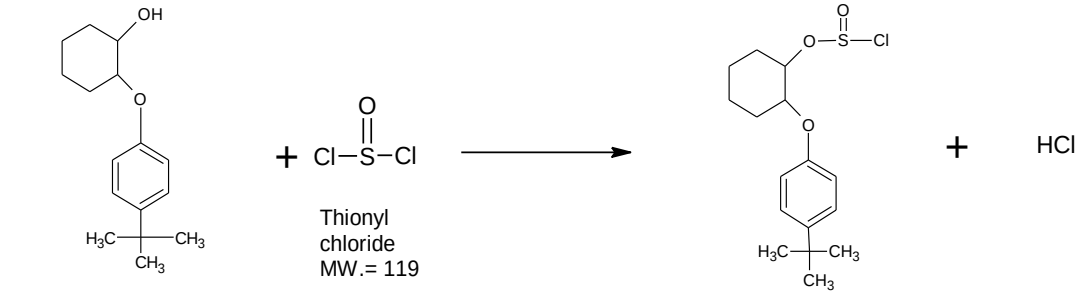
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Permethrin	-	-	1000	-	Product
2	30% HCl Solution	-	350	-	-	Byproduct
3	N-Hexane	-	150	2850	-	Recycle
4	Aqueous Layer	1620	-	-	-	To ETP
Total		**1620**	**500**	**3850**	**-**	
		5970				

(I-13) Propargite

Process Description:

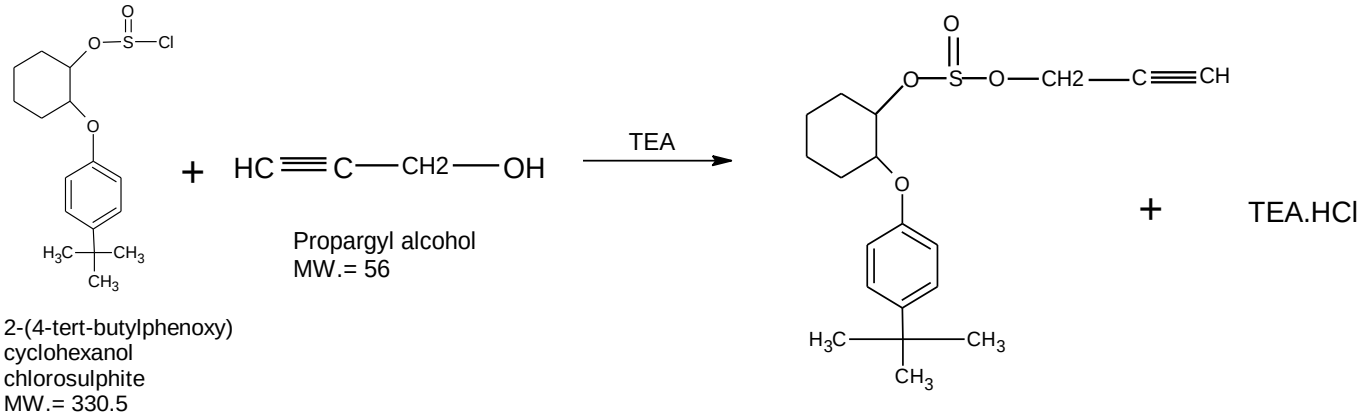
STEP: 1
Initially 2-(4-tert. Butylphenoxy) cyclohexanol and thionyl chloride are reacted in toluene to form the 2-(4-tert. Butylphenoxy) cyclohexyl chlorosulphite intermediate at 50 -55°C. HCl & SO_2gas evolved during the reaction is removed by scrubbing with water & caustic soda solution respectively.
STEP: 2
The resulting reaction mixture containing 2-(4-tert.Butylphenoxy) cyclohexyl chlorosulphite intermediate is then treated with propargyl alcohol and triethylamine.
The reaction mixture is filtered to remove TEA.HCl.
Washing of organic layer with water is done followed by recovery of toluene by distillation to give Propargite Technical.

Process Reaction:



2-(4-tert-butylphenoxy)
cyclohexanol
MW.= 248

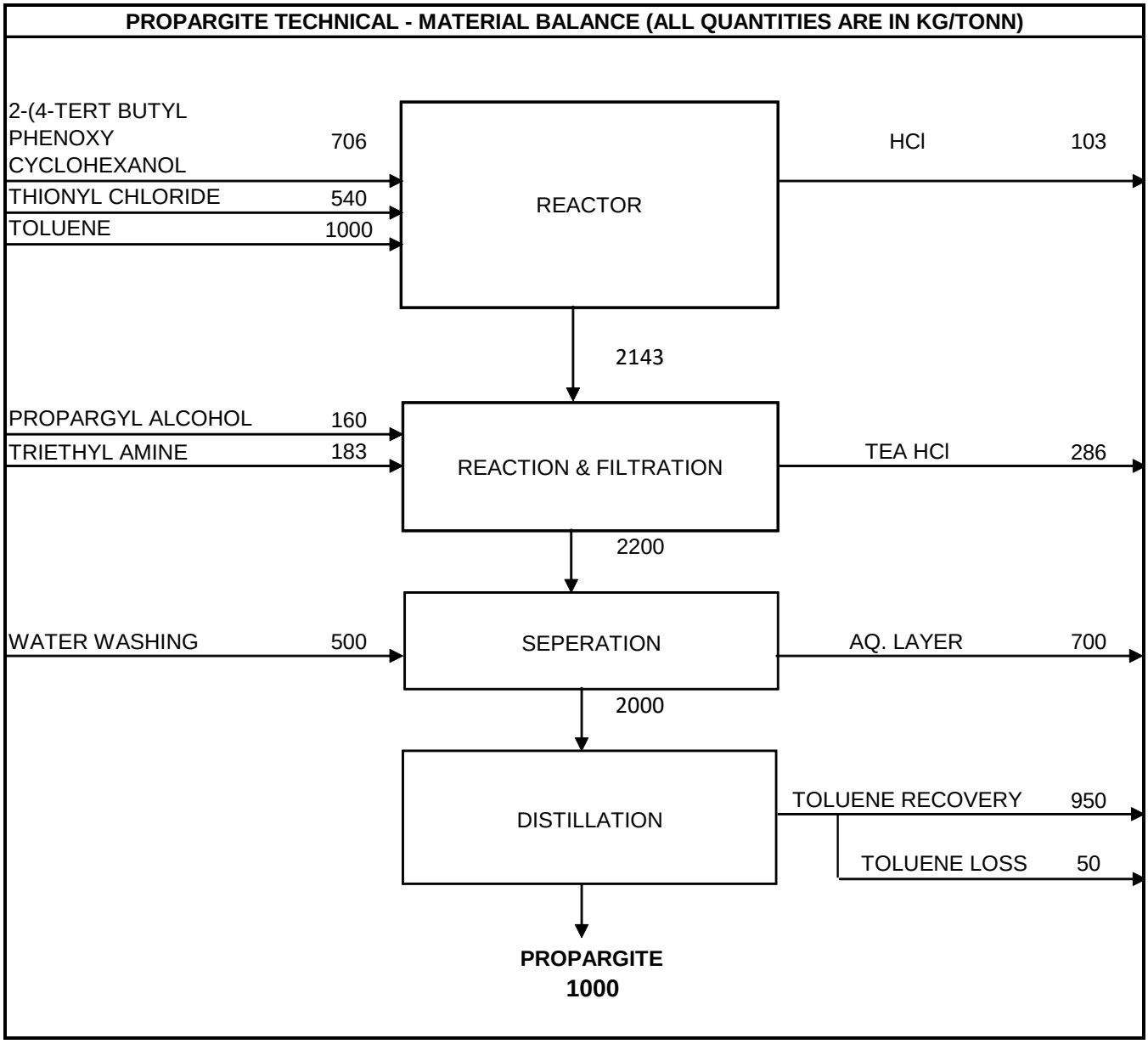
2-(4-tert-butylphenoxy)
cyclohexanol
chlorosulphite
MW.= 330.5



2-(4-tert-butylphenoxy)
cyclohexanol
chlorosulphite
MW.= 330.5

PROPARGITE
MW.= 350

Process Flow Diagram:



Material Balance:

Material Balance for Propargite		
S. No.	**Raw Materials**	**Input/MT of Product (KG.)**
1	2-(4-Tert Butyl Phenoxy Cyclohexanol	706
2	Thionyl Chloride	540
3	Toluene	1000
4	Propargyl Alcohol	160
5	Triethyl Amine	183
	Water for Washing	500
Total		**3089**

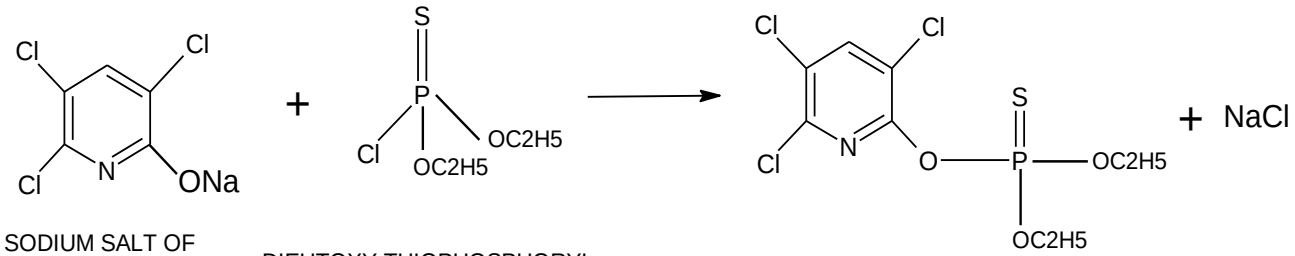
S. No.	Output/MT of Product(KG)					Remarks
	Product	**Liquid Effluent**	**Air Emission /loss**	**Recovery**	**Solid Waste**	
1	Propargite	-	-	1000	-	Product
2	HCl	-	103	-	-	To Scrubber
3	Aqueous Layer	700	-	-	-	To ETP
4	Toluene	-	50	950	-	Recycle
5	TEA HCl	-	-	286	-	For TEA Recovery
Total		**700**	**153**	**2236**	**0**	
		3089				

(I-14) Chlorpyrifos

Process Description:

Diethyl phosphoro chloridothioate is charged in the reactor along with sodium salt of 3,5,6-Trichloropyridin-2-ol. MDC is used as a solvent. Reaction is allowed to take place in presence of phase transfer catalyst at about 30 – 35°C.
Aq. Layer is disposed off to ETP. Organic layer is filtered and the solvent is recovered by distillation to obtain technical grade Chlorpyrifos.

Process Reaction:

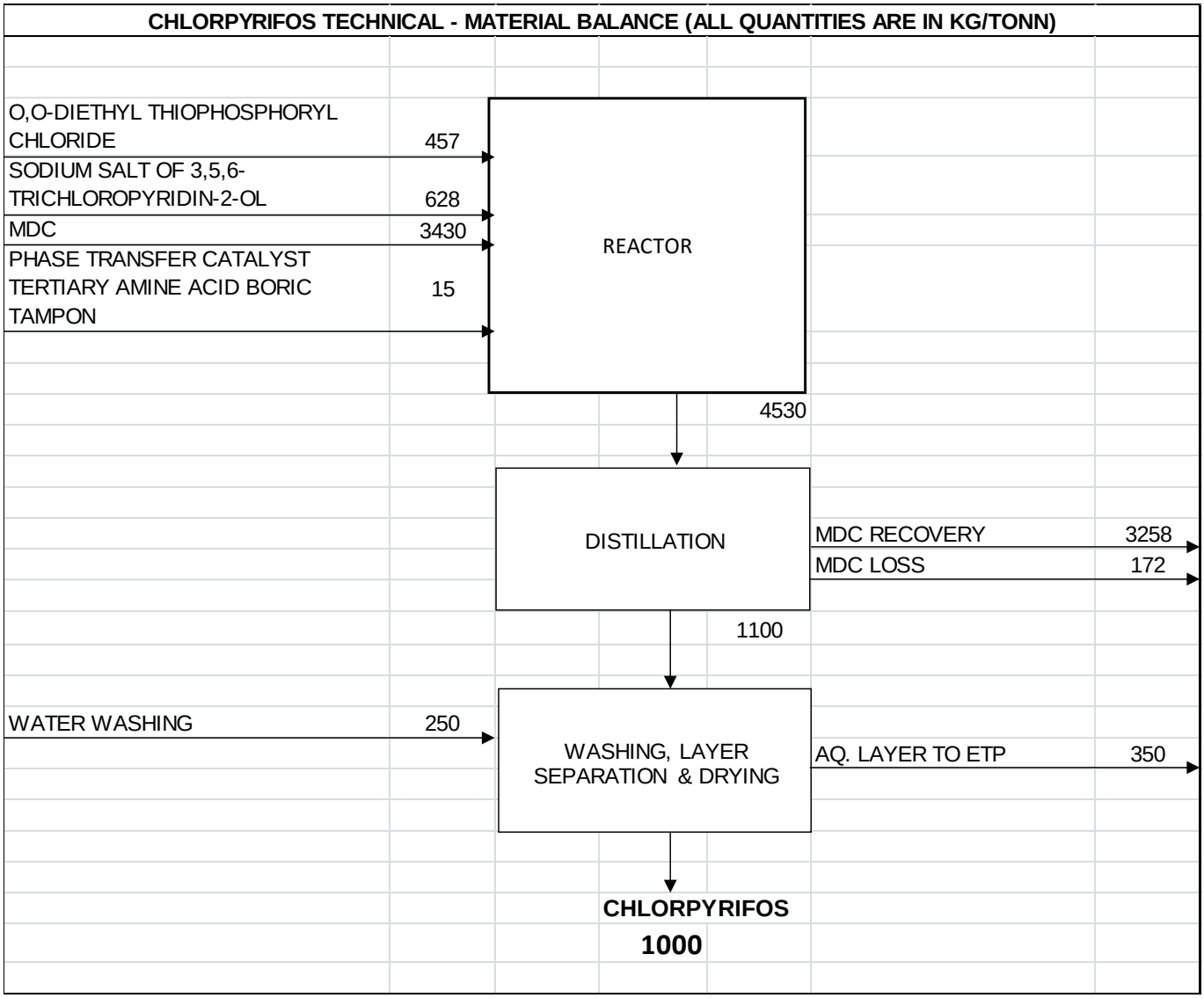


SODIUM SALT OF TRICHLORO PYRIDIN-2-OL
MW.= 220.4

DIEHTOXY THIOPHOSPHORYL CHLORIDE (DETCl)
MW.= 188.5

CHLORPYRIFOS
MW.= 350.5

Process Flow Diagram:



Material Balance:

Material Balance for Chlorpyrifos		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Diethyl PhosphorochloridoThioate	457
2	Sodium Salt of 3,5,6- Trichloropyridin-2-ol	628
3	MDC	3430
4	Phase Transfer Catalyst Tertiary Amine Acid Boric Tampon	15
5	Water	250
Total		**4780**

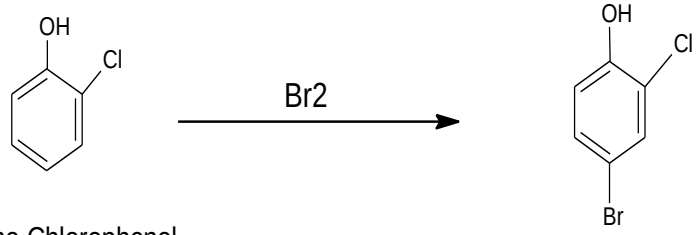
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Chlorpyrifos	-	-	1000	-	Product
2	MDC	-	172	3258	-	Recycle
3	Effluent	350	-	-	-	To ETP
Total		**350**	**172**	**4258**		
		4780				

(I-15) Profenofos

Process Description:

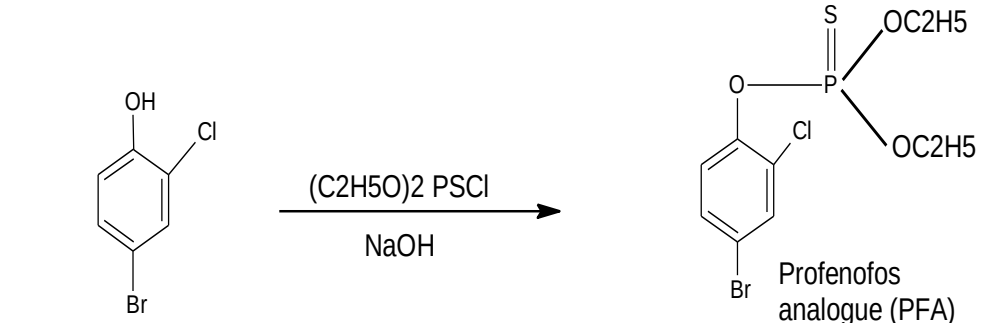
Bromination of ortho chlorophenol (OCP) is done with liquid bromine in presence of Mono chlorobenzene as solvent to produce 4-Bromo-2-chlorophenol (BCP) at 20 – 25°C. HBr formed in the reaction is scrubbed with water and the resulting solution is sent for Bromine recovery.
In the next stage, condensation of BCP is allowed to take place with Diethyl thiophosphoryl chloride (DETC) to obtain the trimester, Profenofos analogue (PFA).
Conversion of PFA takes place into Quaternary ammonium salt ('Q'-Salt) by reacting with tri-methyl amine (TMA) solution. MCB separated as organic layer is recycled.
Condensation of 'Q'-Salt with n-Propyl bromide gives crude Profenofos. The layers are separated. The aqueous layer containing trimethyl ammonium bromide is a saleable product.
The organic layer is washed with water. Aqueous washings are sent to ETP.
Excess n-Propyl bromide is distilled out from the washed organic layer to obtain Profenofos Technical.

Process Reaction:



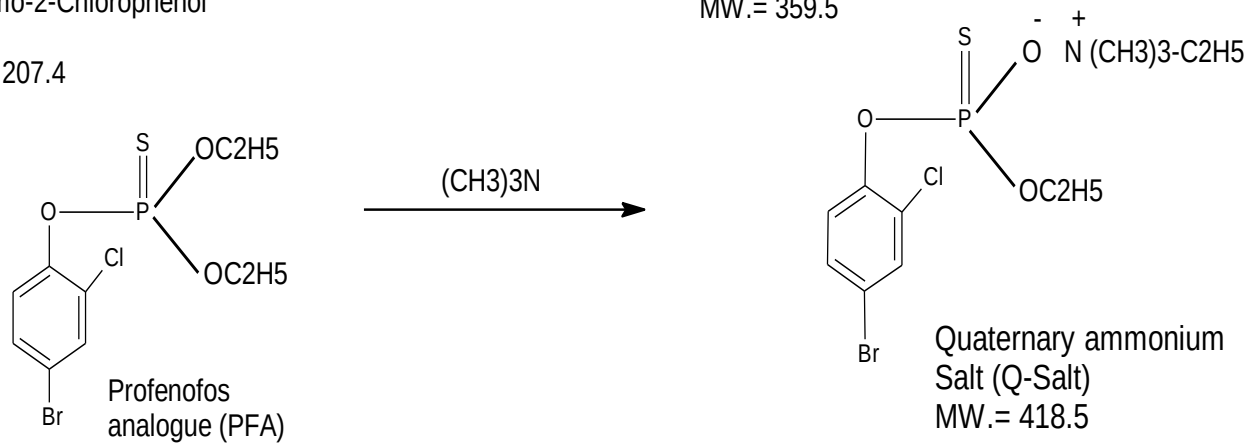
Ortho Chlorophenol
(OCP)
MW.=128.5

4-Bromo-2-Chlorophenol
(BCP)
MW.= 207.4



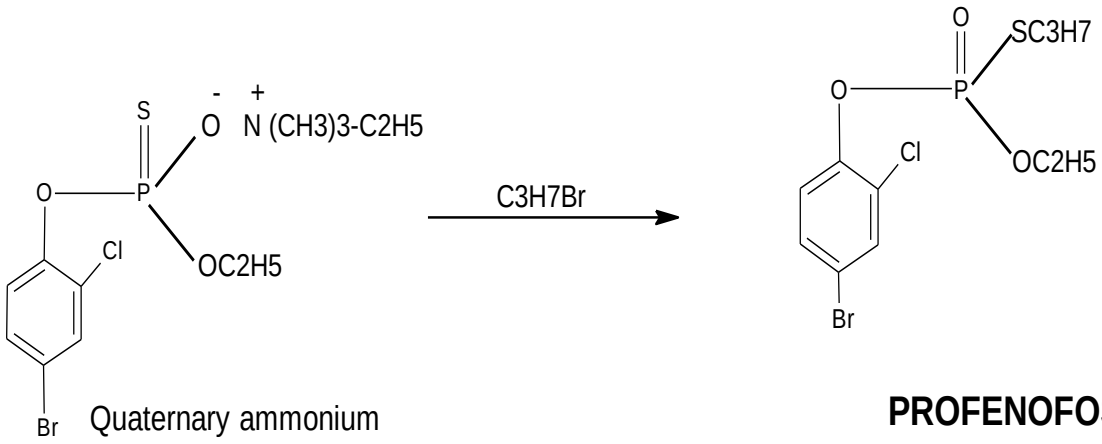
4-Bromo-2-Chlorophenol
(BCP)
MW.= 207.4

Profenofos
analogue (PFA)
MW.= 359.5



Profenofos
analogue (PFA)
MW.= 359.5

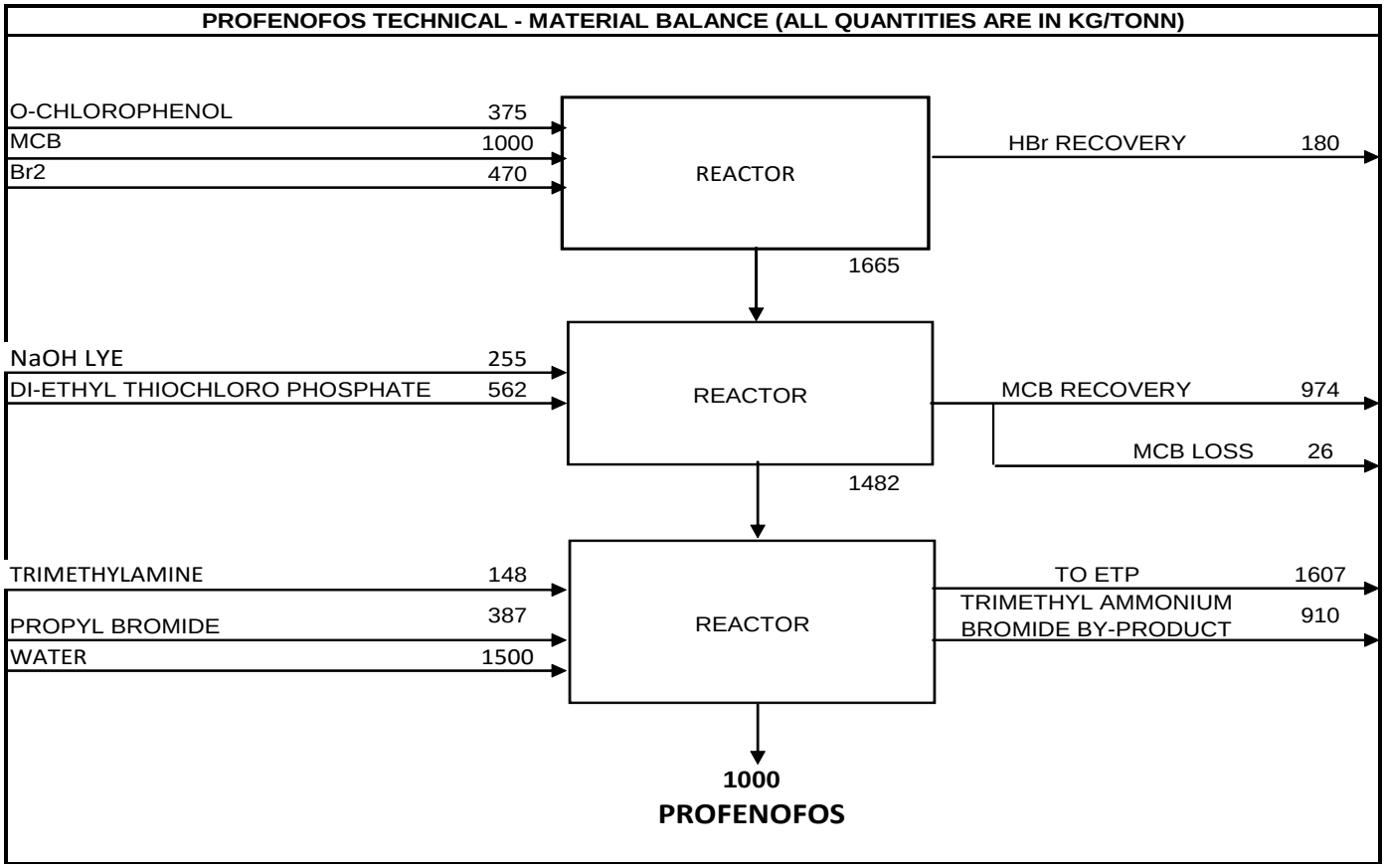
Quaternary ammonium
Salt (Q-Salt)
MW.= 418.5



Quaternary ammonium
Salt (Q-Salt)
MW.= 418.5

PROFENOFOS
MW.= 373.5

Process Flow Diagram:



Material Balance:

Material Balance for Profenofos		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	O-Chlorophenol	375
2	MCB	1000
3	Br2	470
4	TMA	148
5	Di-Ethyl Thiochloro Phosphate	562
6	Propyl Bromide	387
7	NaOH Lye	255
7	Water	1500
Total		**4697**

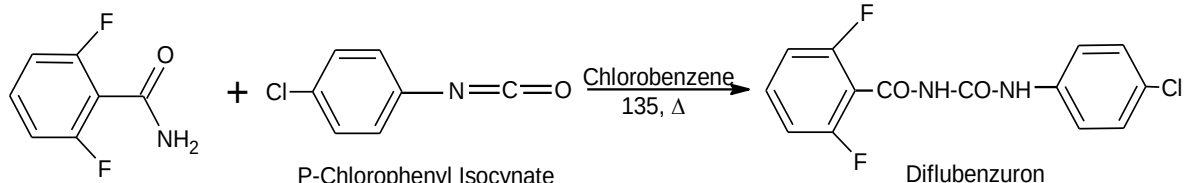
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission /loss**	**Recovery**	**Solid Waste**	
1	Profenofos	-	-	1000	-	Product
2	HBr	-		180	-	To scrubber
3	MCB		25	975	-	Recycle
4	Aqueous Layer	1607	-	-	-	To ETP
5	Trimethyl Ammonium Bromide Byproduct	-	-	910	-	Byproduct
Total		**1607**	**25**	**3065**	-	
		4697				

(I-16) Diflubenzuron

Process Description:

2, 6 difluorobenzamide is mixed with 4 chloro phenyl isocyanate in presence of solvent chlorobenzene. Mixture is heated up to 135°C and cooked till completion of reaction.
The reaction mass is cooled to room temperature, filtered and dried to get Diflubenzuron technical. Solvent is recovered from ML by distillation.

Process Reaction:

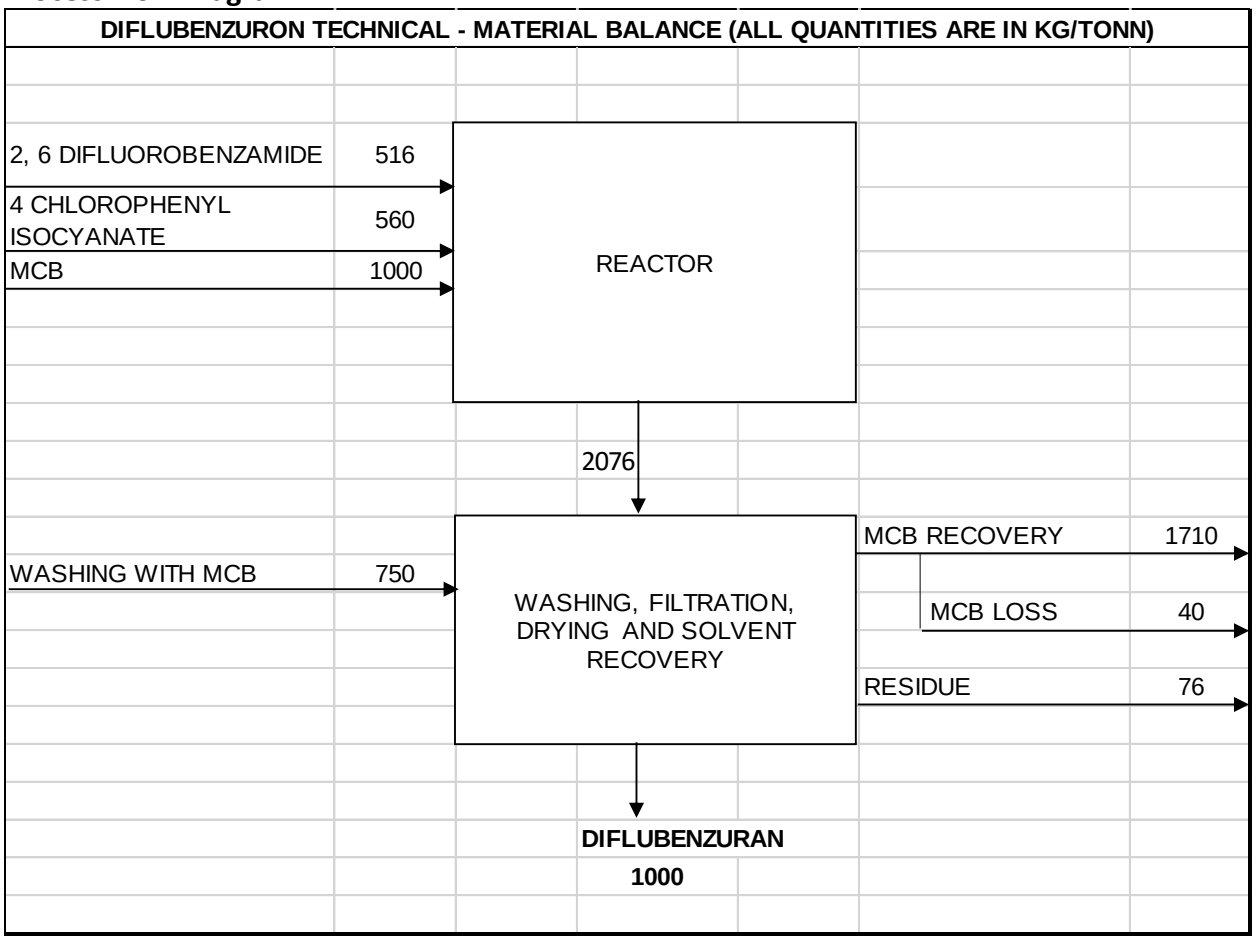


2,6- Diflurobenzamide
M.W.-157.11

P-Chlorophenyl Isocynate
M.W.-153.56

Diflubenzuron
M.W.- 310.67

Process Flow Diagram:



Material Balance:

Material Balance for Diflubenzuron		
S. No.	**Raw Materials**	**Input/MT of Product (KG.)**
1	2, 6 Difluorobenzamide	516
2	4 ChlorophenylIsocyanate	560
3	MCB	1750
Total		**2826**

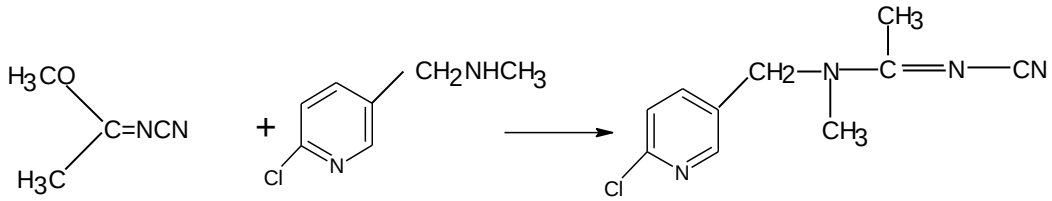
S. No.	**Output/MT of Product(KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Diflubenzuron	-	-	1000	-	Product
2	MCB	-	40	1710	-	Recycle
3	Residue	-	-	-	76	ForIncineration
Total		**-**	**40**	**2710**	**76**	
		2826				

(I-17) Acetamiprid

Process Description:

N-Cyano methyl Acetamidate (NCMA) is reacted with 2-Chloro 5-(methyl amino methyl) Pyridine (CMAMP) in Methanol as solvent media at a sub-atmospheric temperature (10 – 15°C). After the reaction is completed the product is filtered and dried to obtain technical grade product. The mother liquor is distilled to recover Methanol solvent which is then recycled.

Process Reaction:



NCMA
N-cyanomethyl Acetamidate
MW.= 98

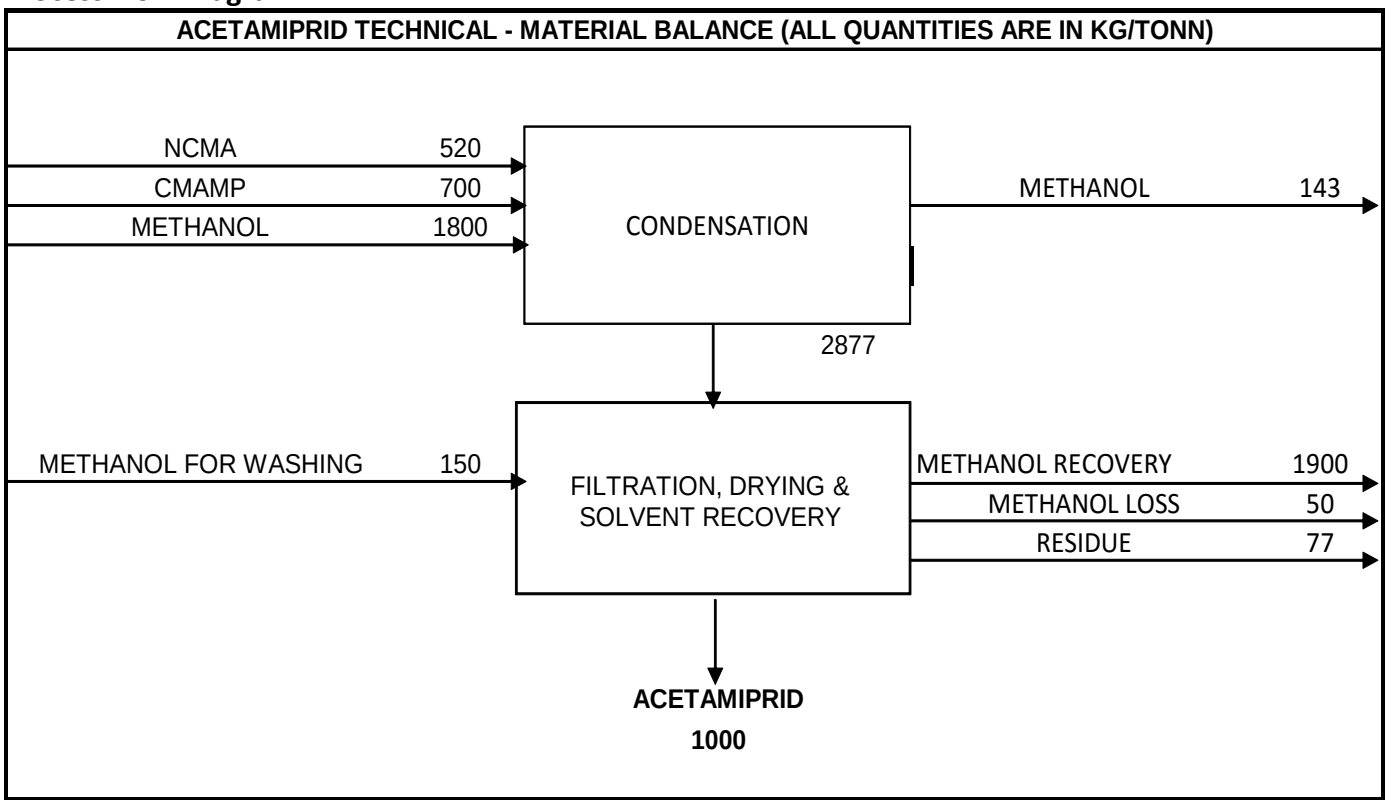
CMAMP
[2-Chloro-5-(methyl amino methyl) Pyridine
MW.= 156.5

ACETAMIPRID
MW. = 222.5

+

CH_3OH
METHANOL
MW.= 32

Process Flow Diagram:



Material Balance:

Material Balance for Acetamiprid		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	NCMA	520
2	CMAMP	700
3	Methanol	1950
Total		**3170**

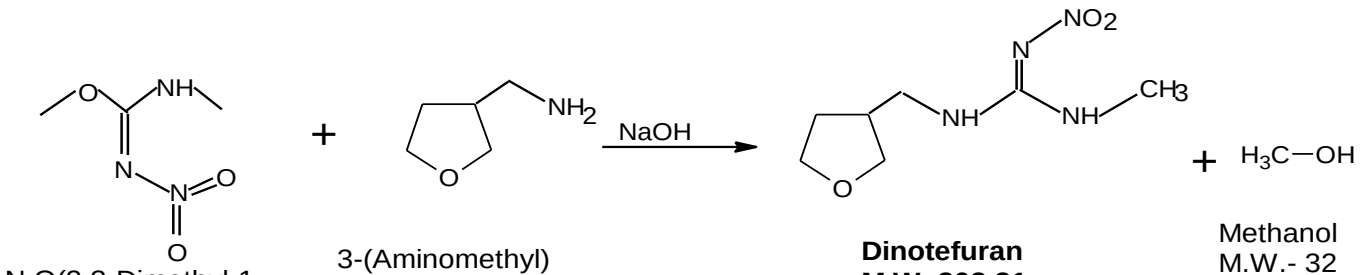
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Acetamiprid	-	-	1000	-	Product
2	Methanol	-	50	2043	-	Recycle (Also includes byproduct methanol
3	Residue	-	-	-	77	To Incineration
Total		-	**50**	**3043**	**77**	
		3170				

(I-18) Dinotefuran

Process Description:

Charge Furfurylamine and Isourea into a reactor along with water and NaOH. The mass is heated to 50°C and cooking for 10 hours. After completion of the reaction cool to room temperature, centrifuged and the wash the cake with water. The wet cake is the dried to get technical grade Dinotefuran.

Process Reaction:



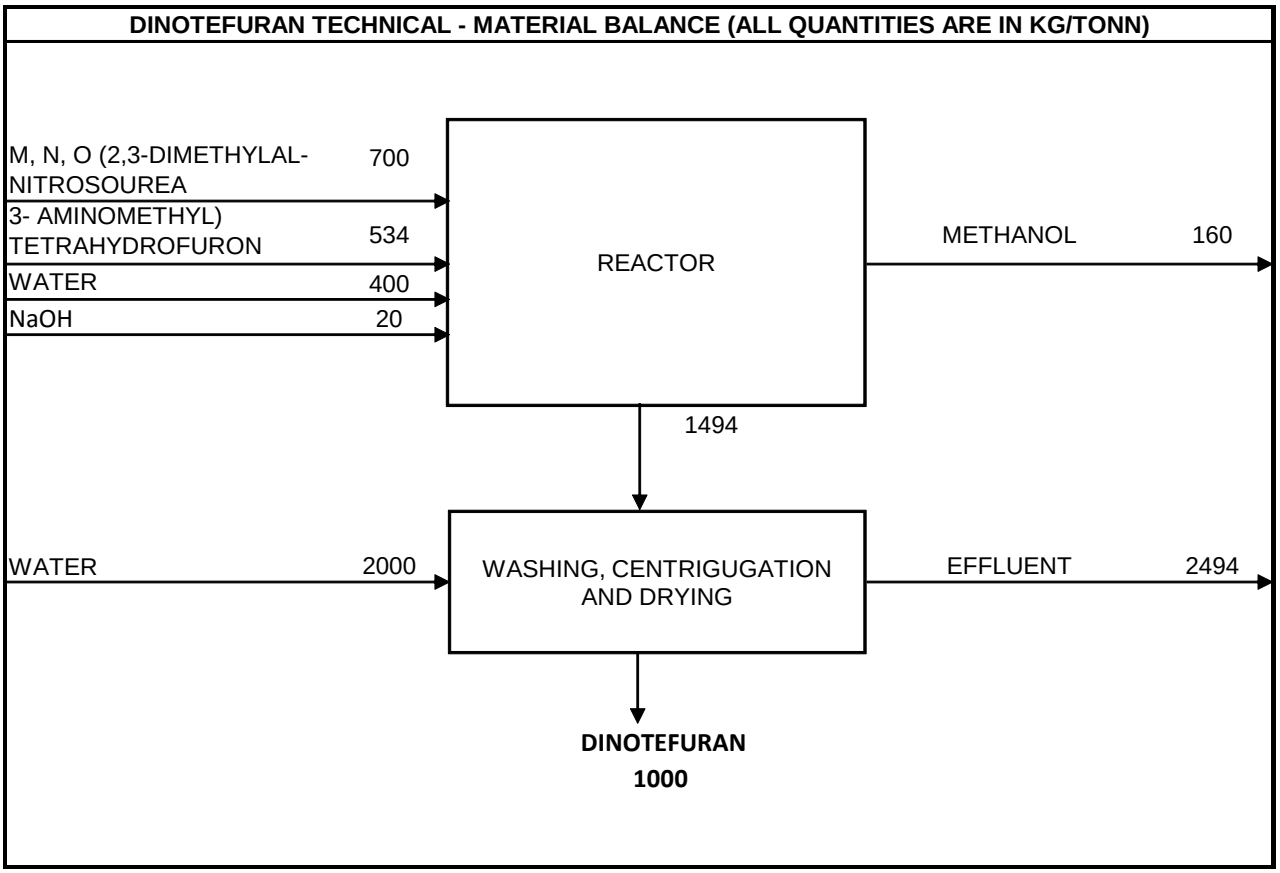
N,O(2,3-Dimethyl-1-Nitroisourea
M.W.-133.05

3-(Aminomethyl) Tetrahydrofuran
M.W.-101.15

Dinotefuran
M.W.-202.21

Methanol
M.W.- 32

Process Flow Diagram:



Material Balance:

Material Balance for Dinotefuran		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	M, N, O (2,3-DIMETHYLAL-NITROSOUREA	700
2	3- AMINOMETHYL) TETRAHYDROFURAN	534
3	Water	2400
4	NaOH	20
Total		**3654**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Dinotefuran	-	-	1000	-	Product
2	Methanol	-	-	160	-	Inhouse Usage
3	Aqueous Layer	2494	-	-	-	To ETP
Total		**2494**	**-**	**1160**	**-**	
		3654				

(I-19) Emamectin Benzoate

Process Description:

Ebamectin, Allylchloroformate and TMEDA in dichlormethane are reacted at 10 – 15°C for 3 to 4 hrs. to get the protection product.

This protection product is reacted with phenyl dichlorophosphate at 5 – 10°C for 2 hrs. to get oxidation product. Dichloromethane is then distilled out.

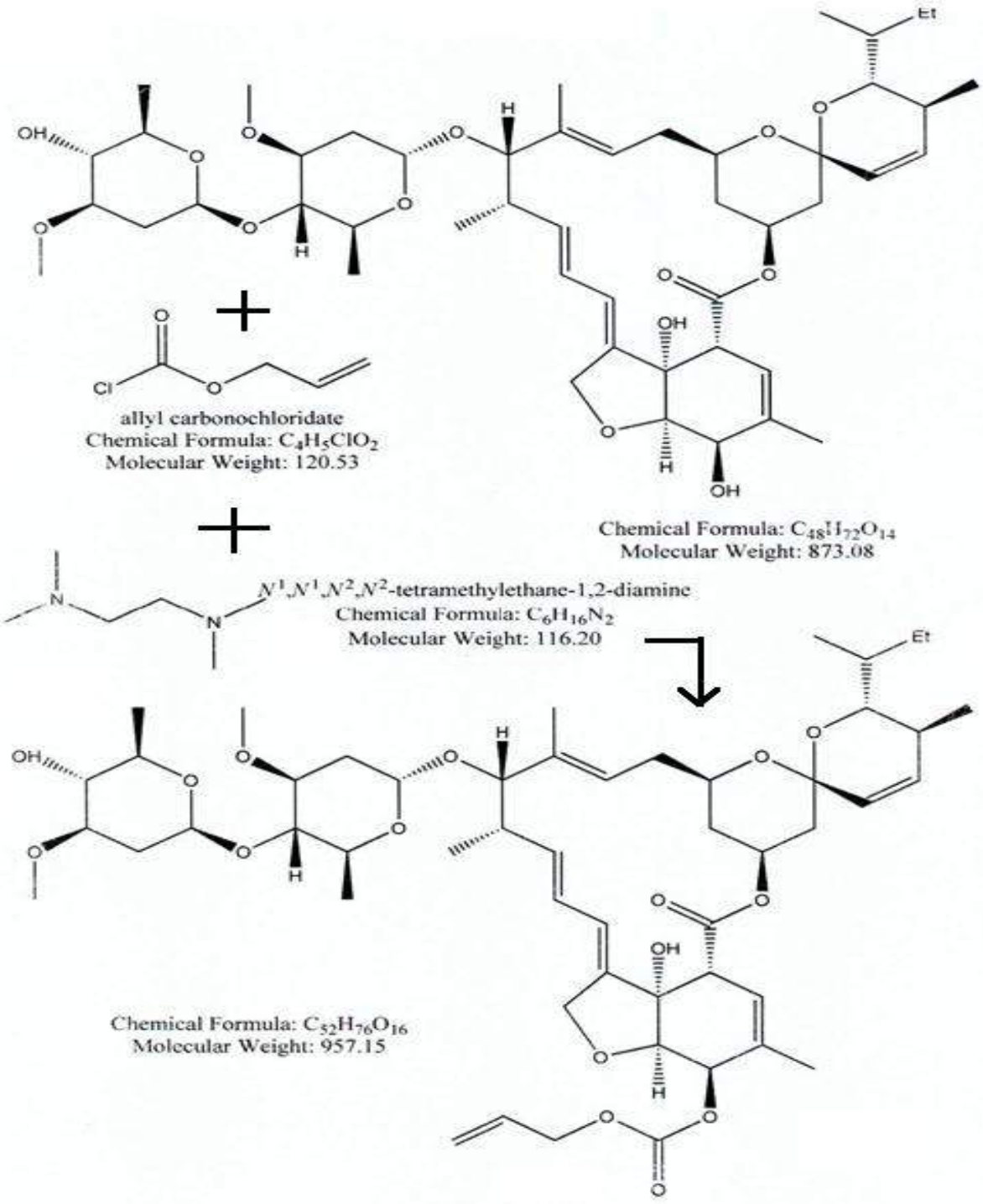
Iso propyl acetate is charged in the oxidation product mass and is reacted with hepta methyl disilane, trifluoroacetic acid and sodium borohydride at 55 – 60°C for 3 – 4 hrs. to get the reduction product.

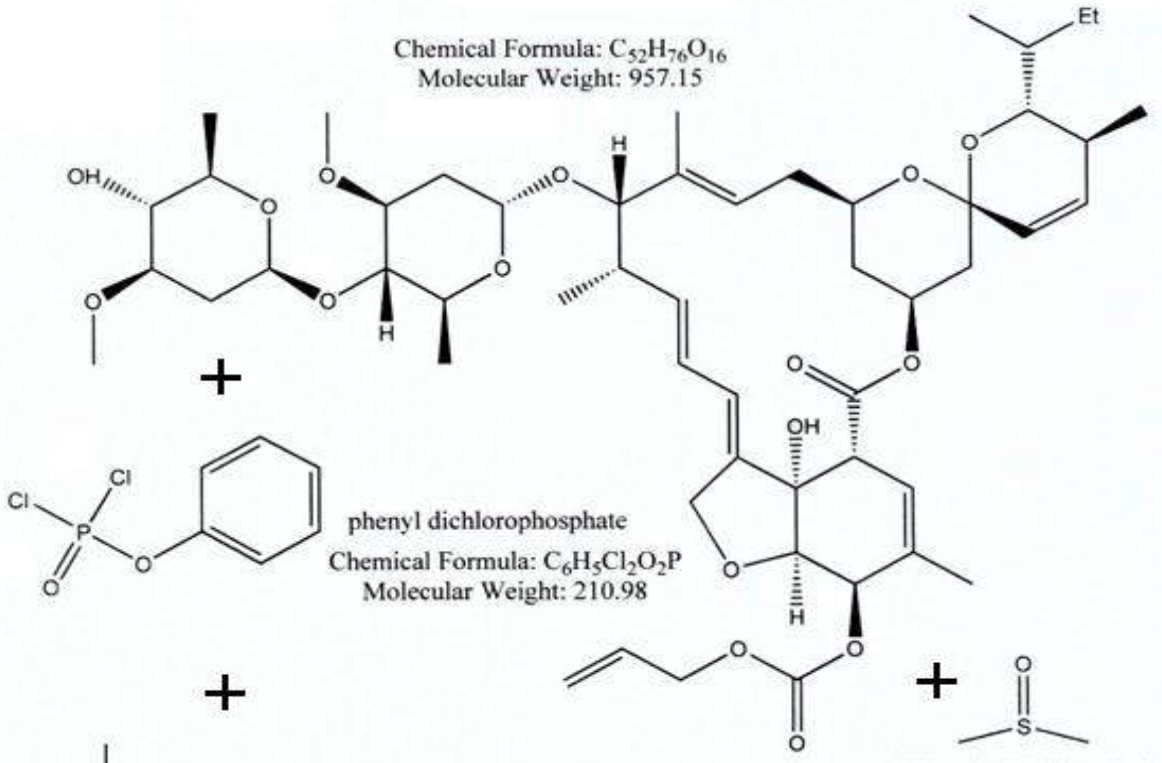
Distil out Isopropyl acetate from the reduction product mass, add ethanol, Sodium borohydride& Palladium chloride and maintain the mass for 5 hrs. at 5°C to get the de-protection product. Distil out ethanol.

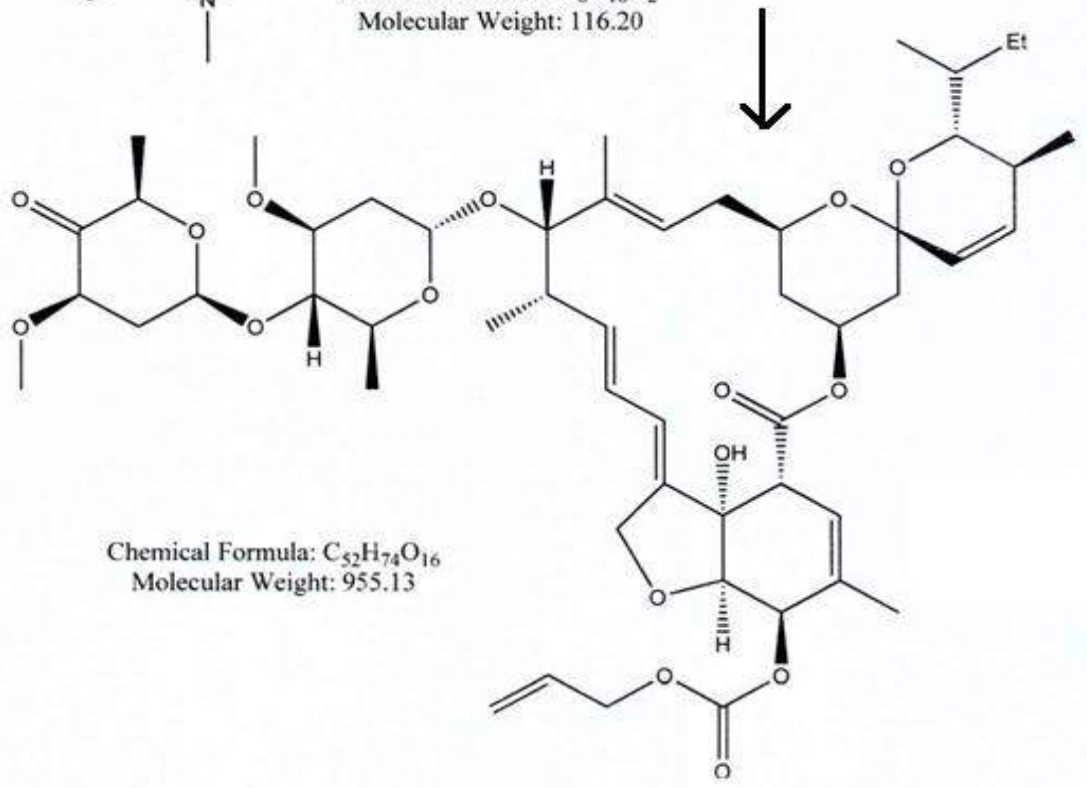
This residual product mass is further reacted with Benzoic acid and Isopropyl acetate at 60 – 70°C for 1 hr. Cool to room temperature, centrifuge and dry to get Emamectin Benzoate technical.

Isopropyl acetate is recovered from ML and recycled.

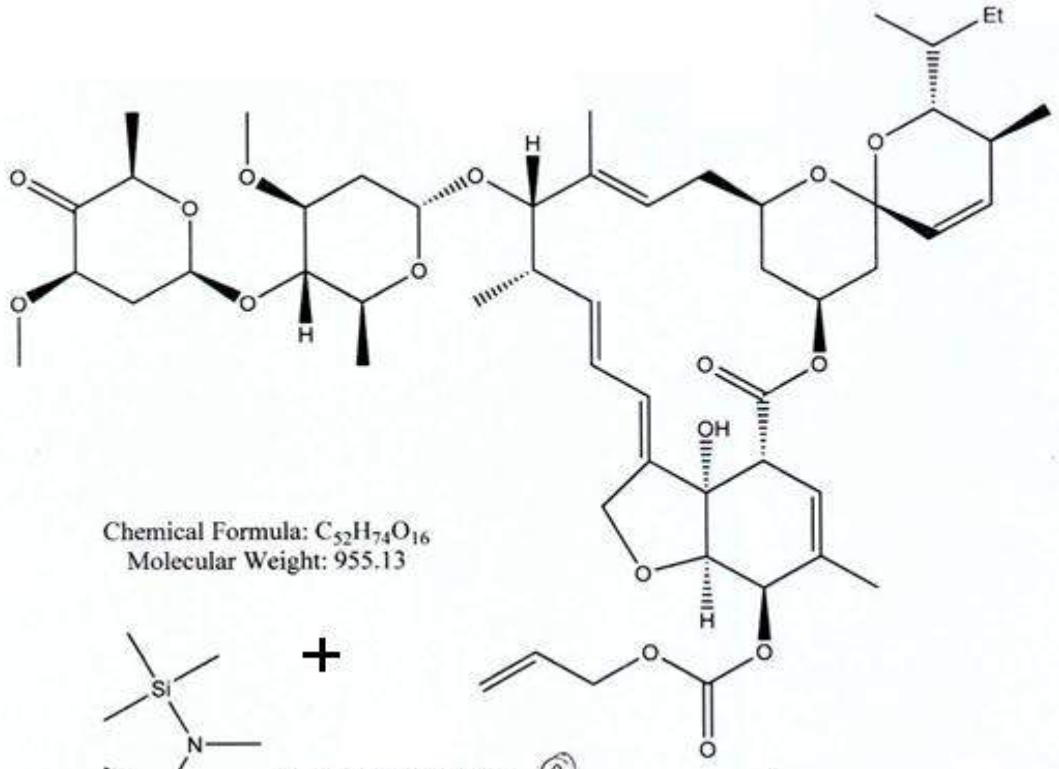
Process Reaction:







Chemical Formula: $C_{52}H_{74}O_{16}$
Molecular Weight: 955.13

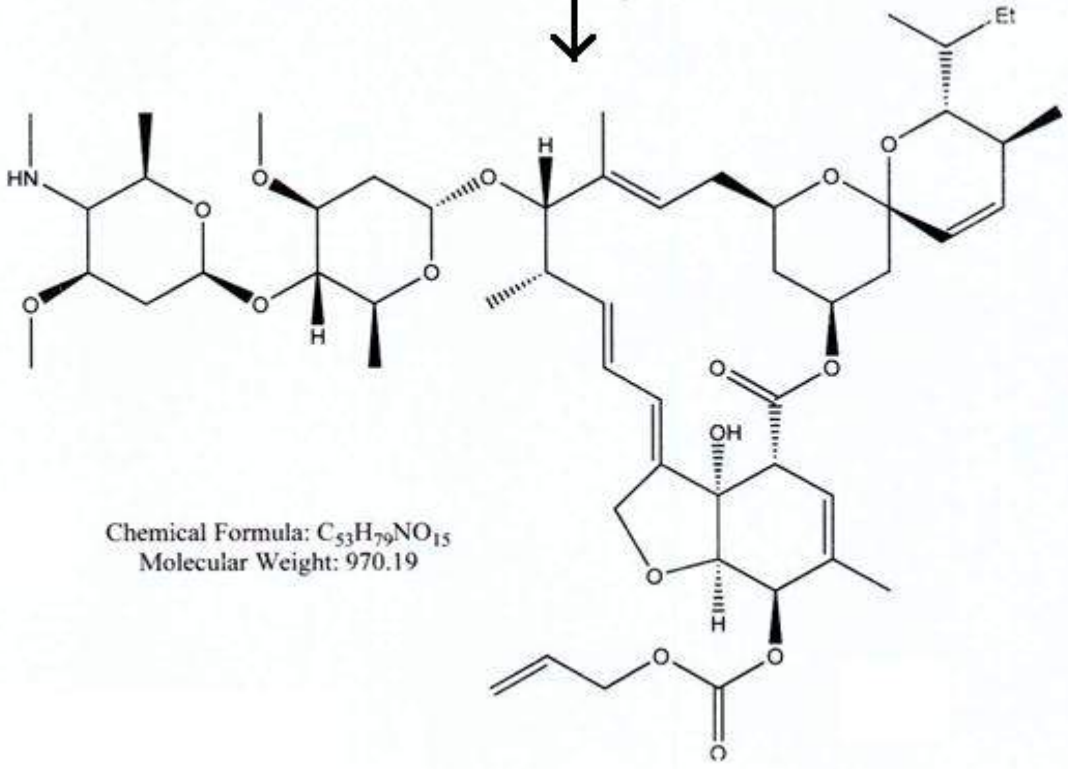


Chemical Formula: $C_{52}H_{74}O_{16}$
Molecular Weight: 955.13

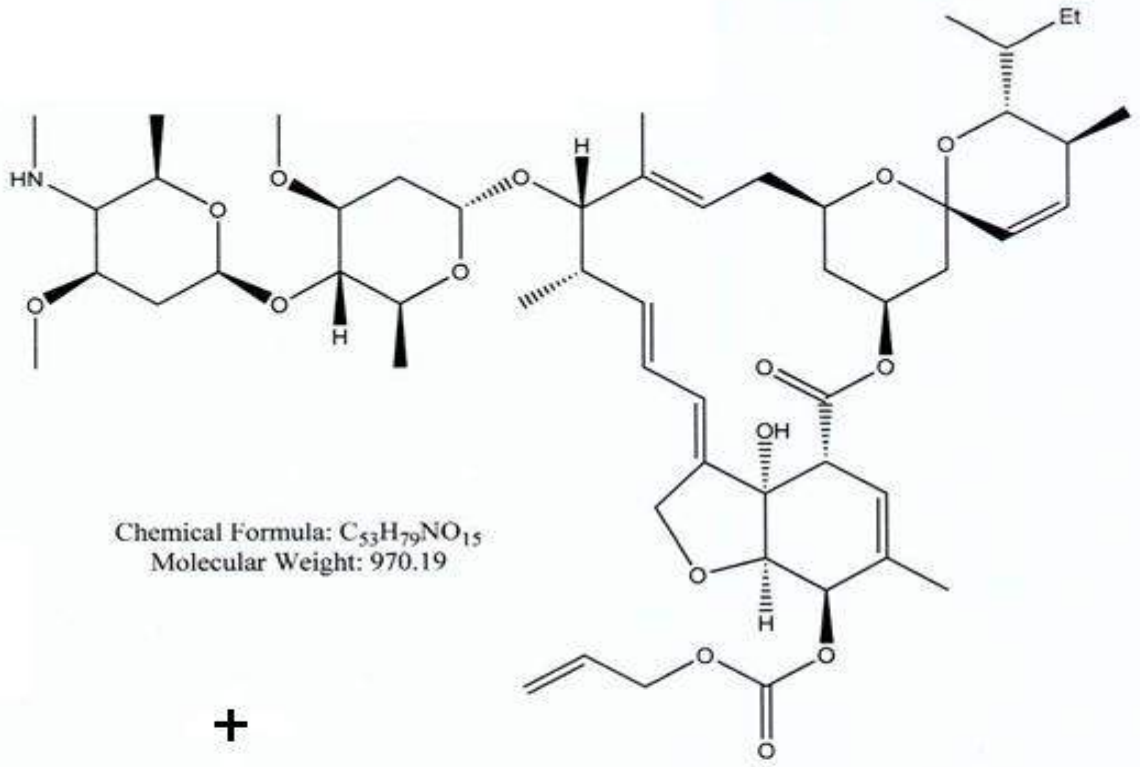
+

heptamethyldisilazane (A)
Chemical Formula: $C_7H_{21}NSi_2$
Molecular Weight: 175.42

+ NaBH4
Molecular Weight: 37.83



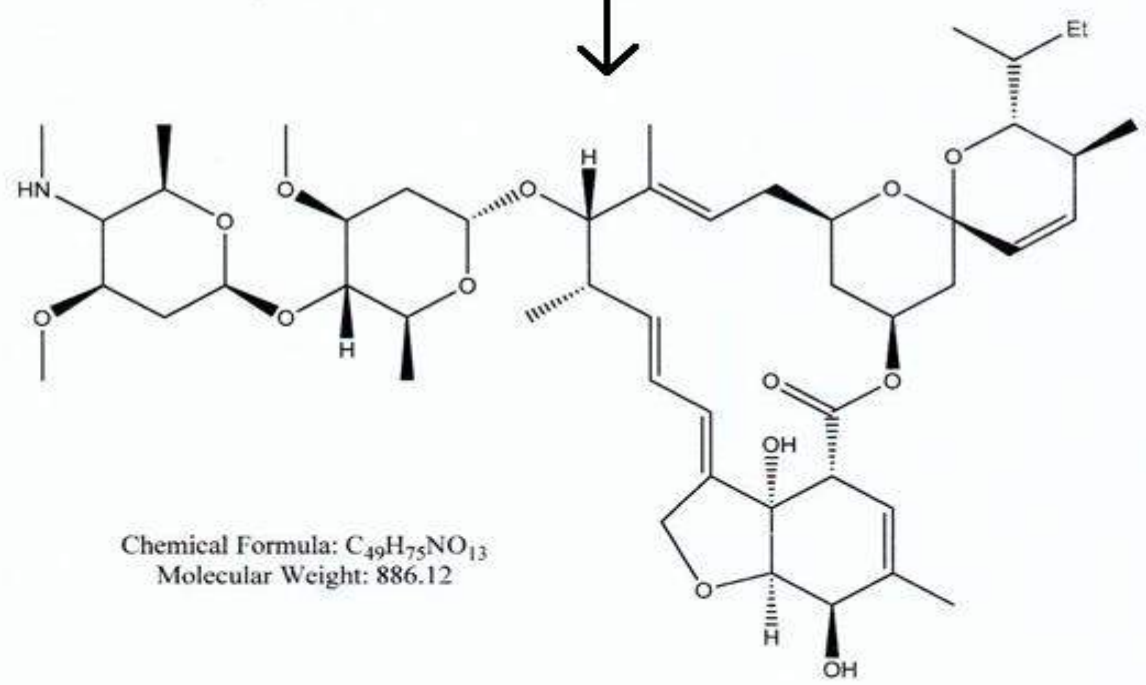
Chemical Formula: $C_{53}H_{79}NO_{15}$
Molecular Weight: 970.19



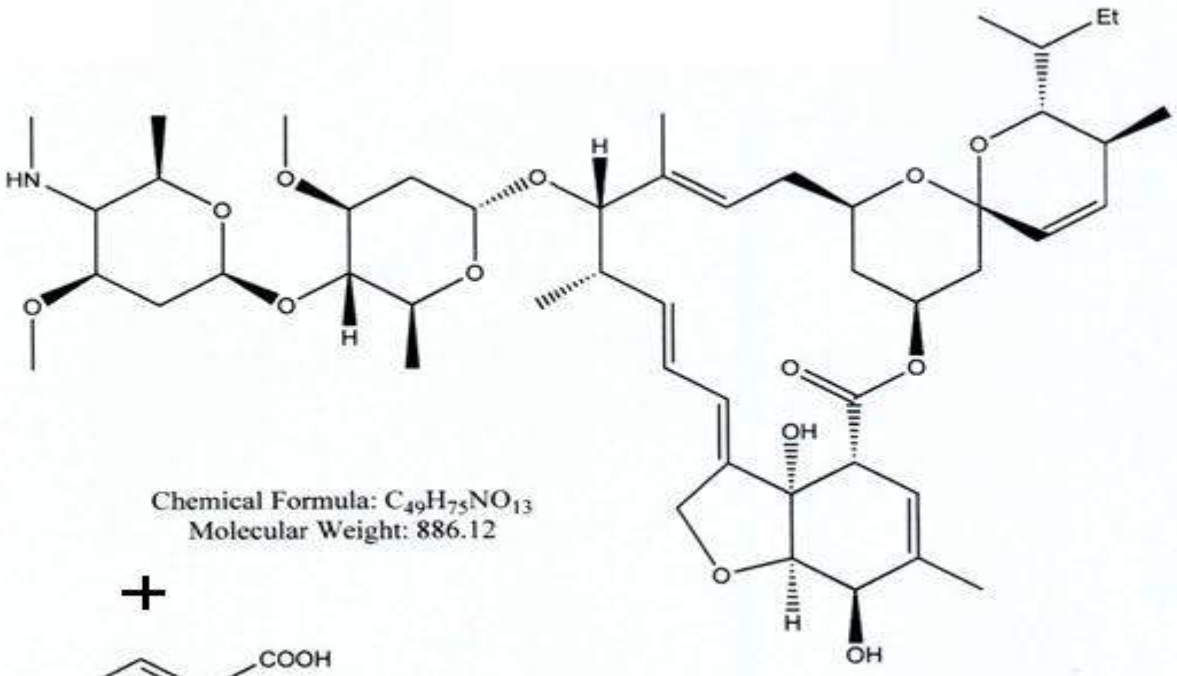
Chemical Formula: $C_{53}H_{79}NO_{15}$
Molecular Weight: 970.19

+

NaBH4
Molecular Weight: 37.83

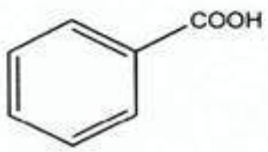


Chemical Formula: $C_{49}H_{75}NO_{13}$
Molecular Weight: 886.12



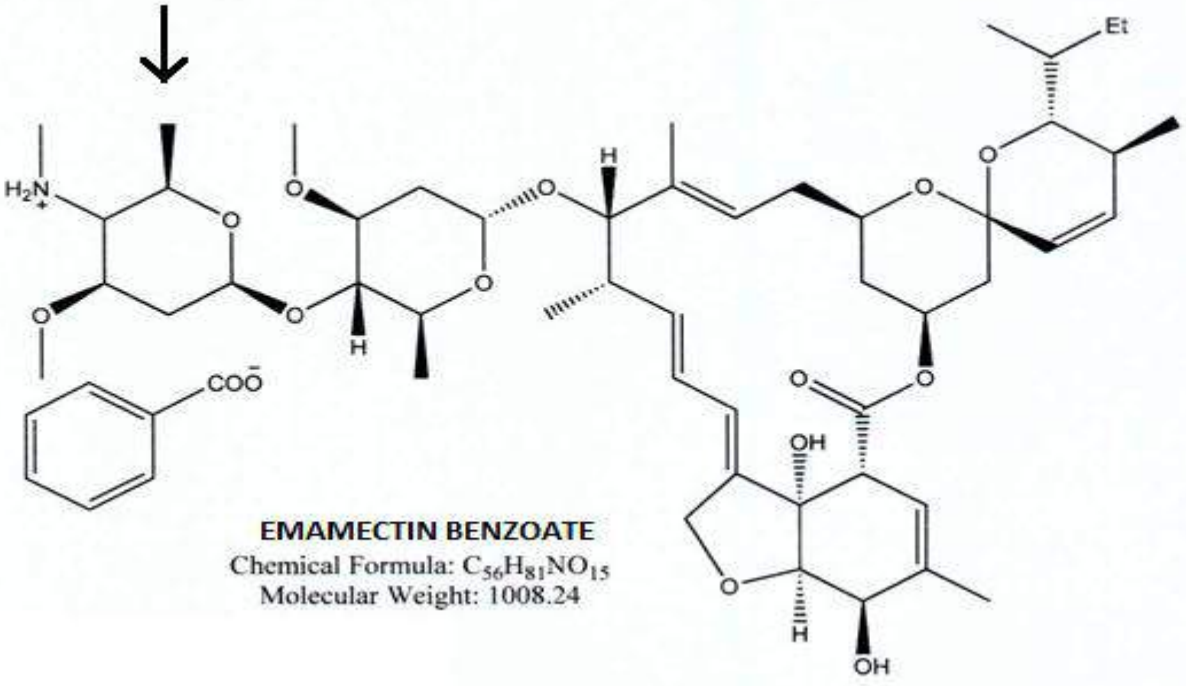
Chemical Formula: $C_{49}H_{75}NO_{13}$
Molecular Weight: 886.12

+



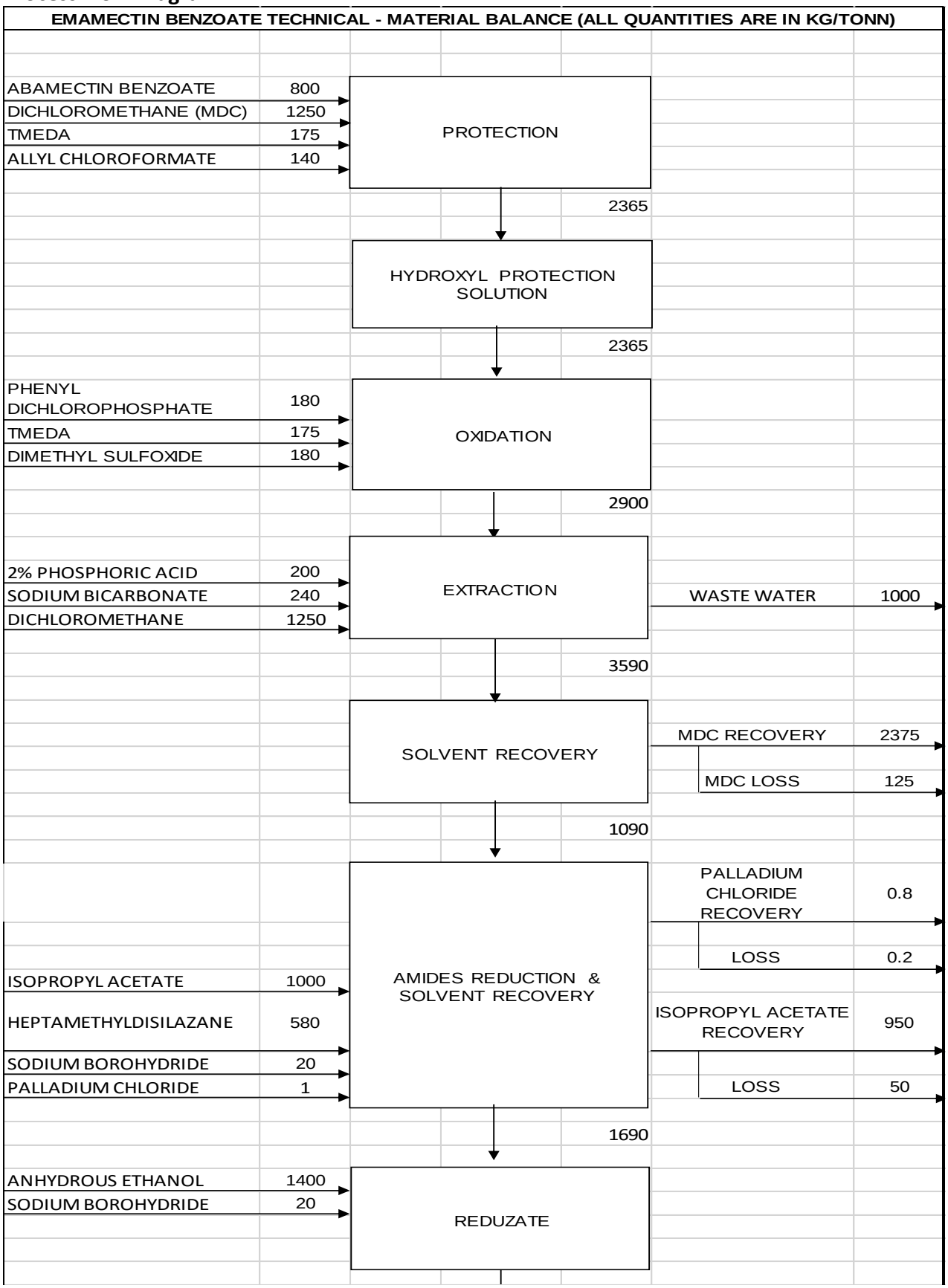
benzoic acid
Chemical Formula: $C_7H_6O_2$
Molecular Weight: 122.12

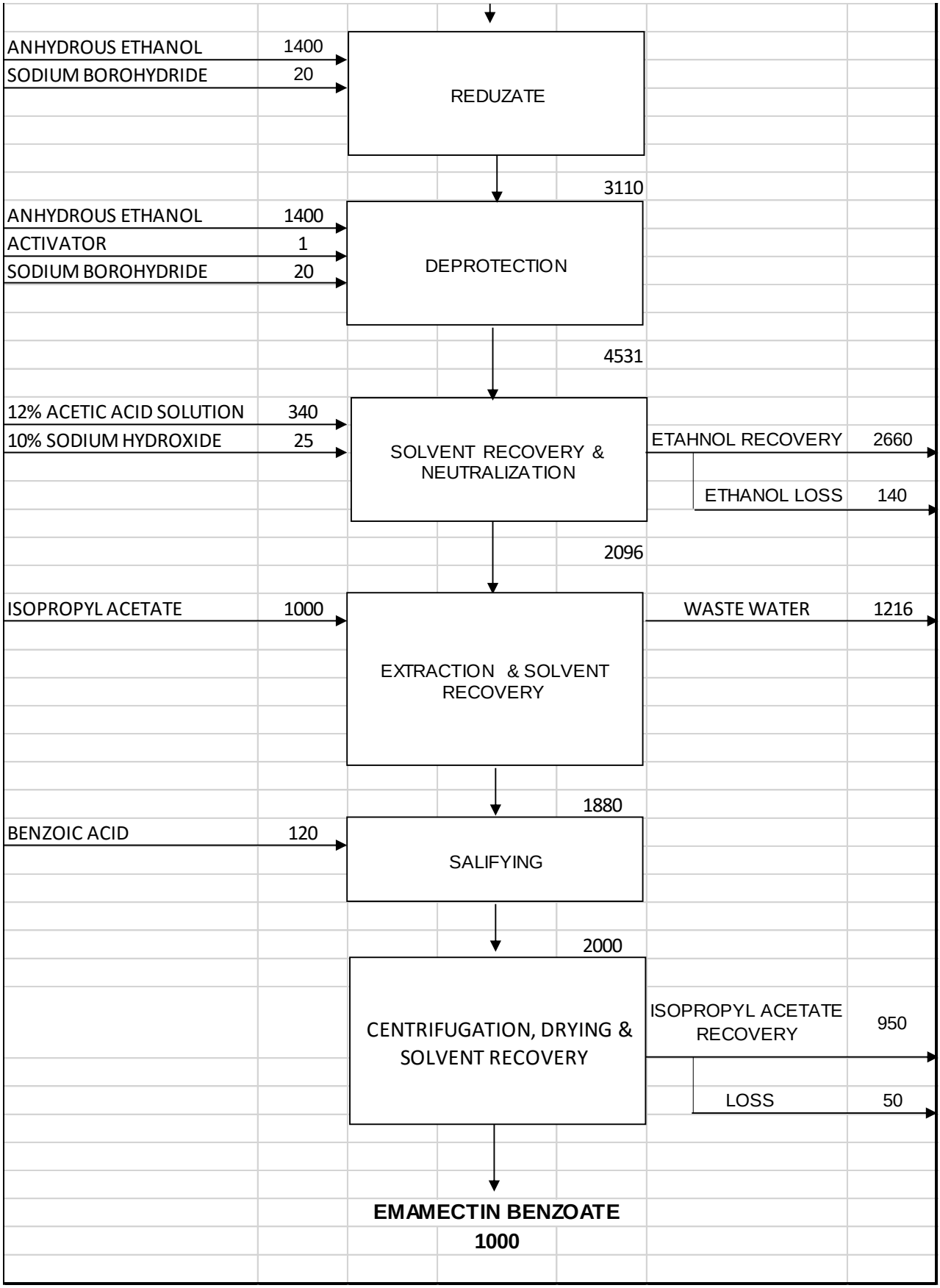
↓



EMAMECTIN BENZOATE
Chemical Formula: $C_{56}H_{81}NO_{15}$
Molecular Weight: 1008.24

Process Flow Diagram:




ANHYDROUS ETHANOL
1400
SODIUM BOROHYDRIDE
20
REDUZATE
3110
ANHYDROUS ETHANOL
1400
ACTIVATOR
1
SODIUM BOROHYDRIDE
20
DEPROTECTION
4531
12% ACETIC ACID SOLUTION
340
10% SODIUM HYDROXIDE
25
SOLVENT RECOVERY & NEUTRALIZATION
ETAHNOL RECOVERY
2660
ETHANOL LOSS
140
2096
ISOPROPYL ACETATE
1000
EXTRACTION & SOLVENT RECOVERY
WASTE WATER
1216
1880
BENZOIC ACID
120
SALIFYING
2000
CENTRIFUGATION, DRYING & SOLVENT RECOVERY
ISOPROPYL ACETATE RECOVERY
950
LOSS
50
EMAMECTIN BENZOATE
1000

Material Balance:

Material Balance for Emamectin Benzoate		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Abamectin Benzoate	800
2	MDC	2500
3	TMEDA	350
4	ALLYL CHLOROFORMATE	140
5	PHENYL DICHLORPHOSPHATE	180
6	DMSO	180
7	2% PHOSPHORIC ACID	200
8	SODIUM BICARBONATE	240
9	ISOPROPYL ACETATE	2000
10	HEPTAMETHYLDISILAZANE	580
11	SODIUM BOROHYDRIDE	60
12	PALLADIUM CHLORIDE	1
13	ACTIVATOR	1
14	12% ACETIC ACID	340
15	10% NaOH	25
16	BENZOIC ACID	120
17	ANHYDROUS ETHANOL	2800
Total		**10517**

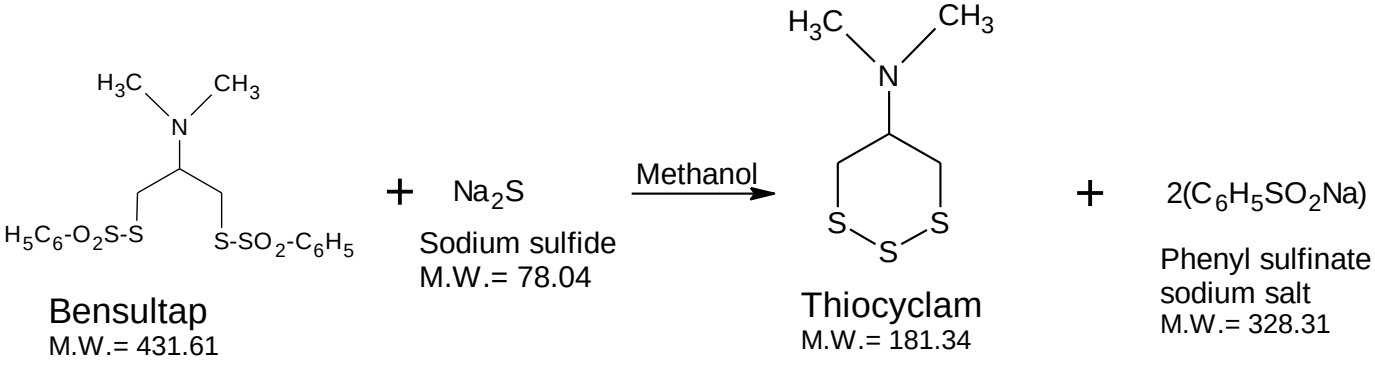
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Emamectin Benzoate	-	-	1000	-	Product
2	Aqueous Layer	2216	-	-	-	To ETP
3	MDC	-	125	2375	-	Recycle
4	Isopropyl acetate	-	100	1900	-	Recycle
5	Ethanol	-	140	2660	-	Recycle
6	Palladium Chloride	-	-	0.8	0.2	Recycle
Total		**2216**	**365**	**7936**	**0.2**	
		10517				

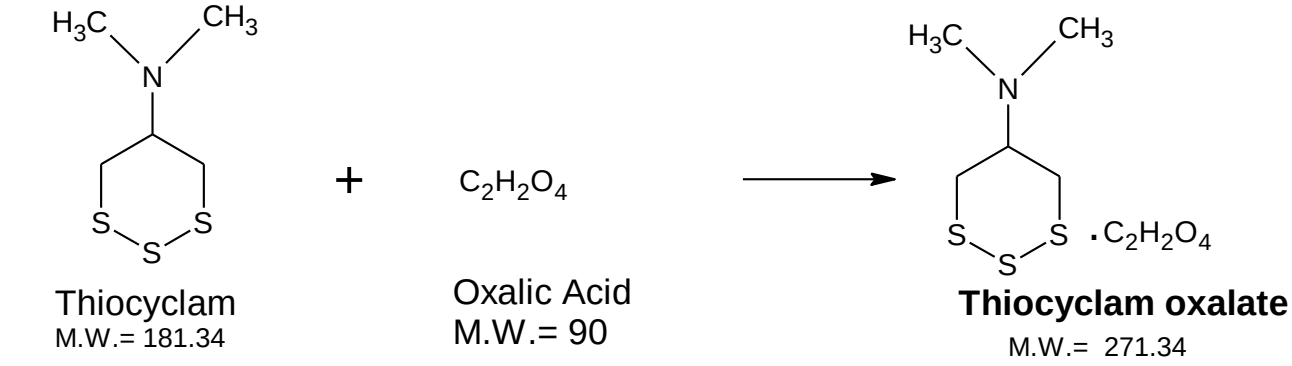
(I-20) Thiocyclam Oxalate

Process Description:

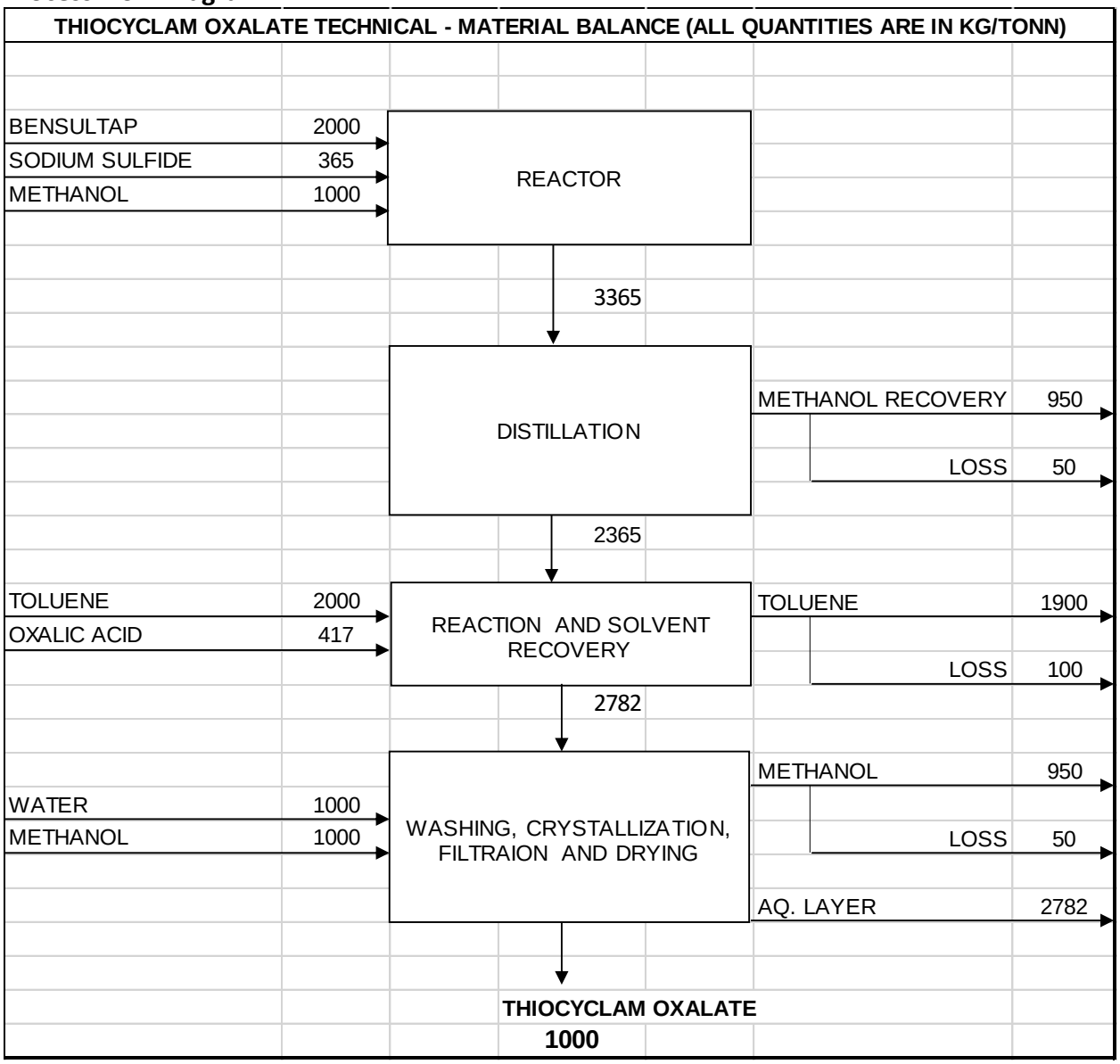
Bensultap is reacted with sodium sulfide at 50 - 58°C in presence of methanol. After completion of the reaction, methanol is distilled out followed by extraction of Thiocyclam with toluene.
Toluene layer of thiocyclam is further reacted with oxalic acid at 40-50°C to form Thiocyclam oxalate crude.
Toluene is distilled out under vacuum and the reaction mass is taken in methanol again. Crystallization from methanol, centrifugation and drying is done to get technical Thicyclam oxalate. Methanol is distilled out of the ML and recycled.

Process Reaction:





Process Flow Diagram:



Material Balance:

Material Balance for Thiocyclam Oxalate		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Bensultap	2000
2	Sodium Sulfide	365
3	Methanol	2000
4	Toluene	2000
5	Oxalic acid	417
6	Water	1000
Total		**7782**
S. No.	**Output/MT of Product (KG)**	**Remarks**

	Product	Liquid Effluent	Air Emission/ loss	Recovery	Solid Waste	
1	Thiocyclam	-	-	1000	-	Product
2	Methanol	-	102	1898	-	Recycle
3	Toluene	-	102	1898	-	Recycle
4	Aq. Layer	2782	-	-	-	To ETP
Total		**2782**	**204**	**4796**	**0**	
		7782				

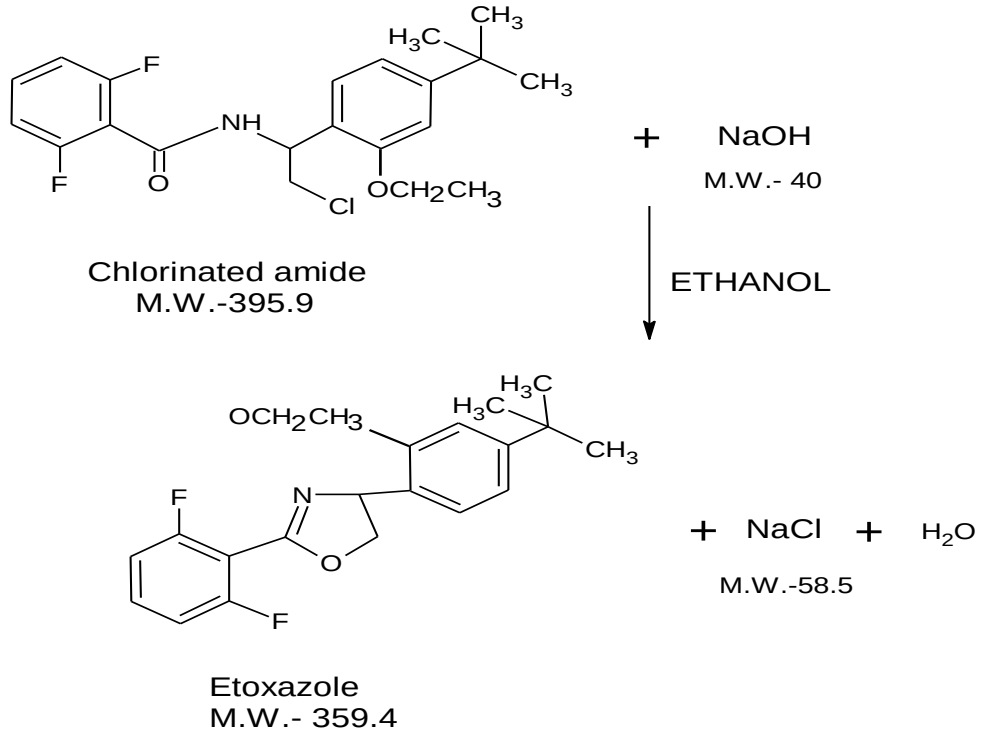
(I-21) Etoxazole

Process Description:

Charge NaOH solution in a reactor with chlorinated amide in presence of solvent Ethanol. Cook for 2 hrs at 70°C to form crude product.

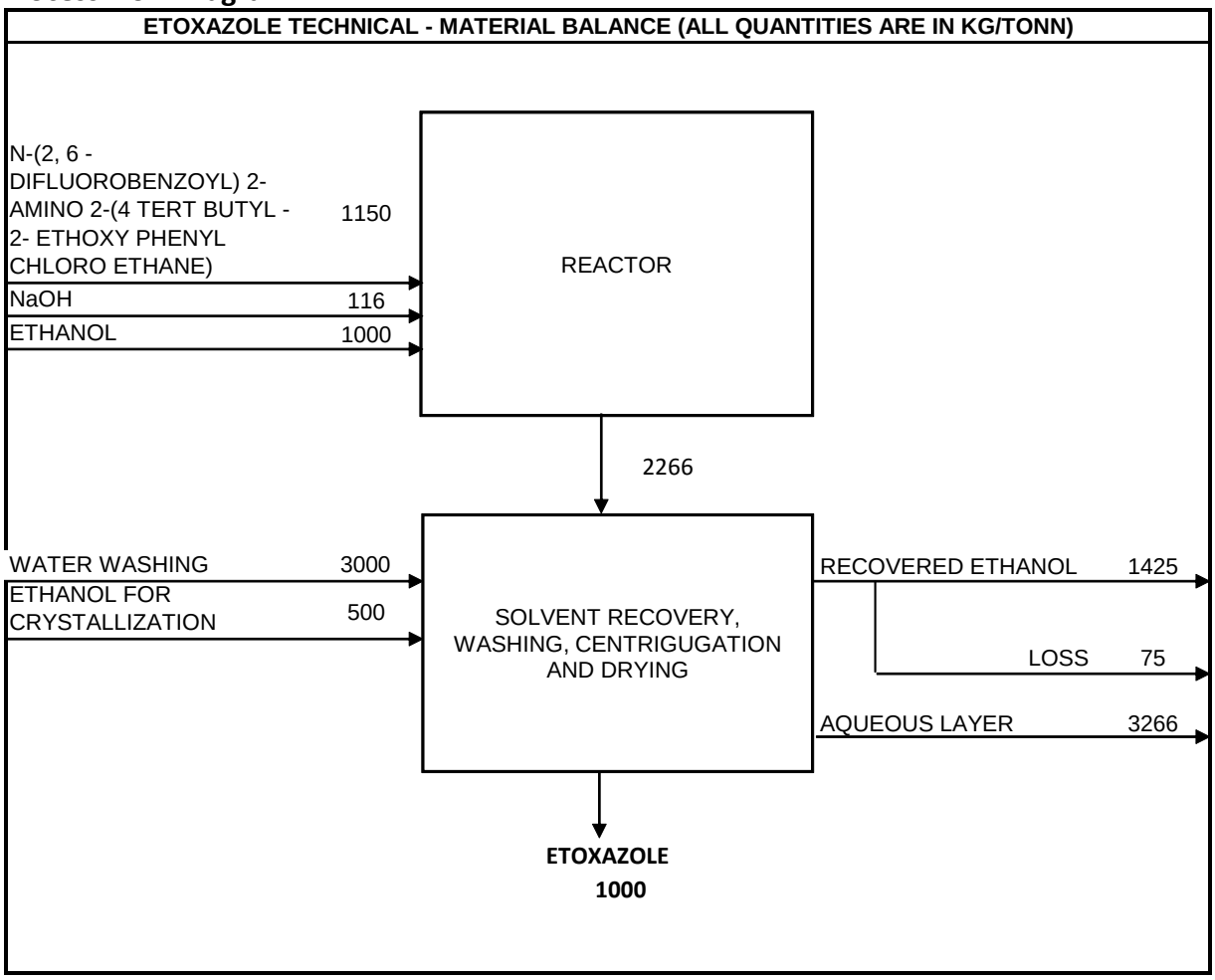
Cool, centrifuge the slurry and wash the cake with water. Recrystallise the cake from Ethanol, centrifuge and dry to get technical grade product. Recover Ethanol from ML and recycle. Send aqueous ML to ETP.

Process Reaction:



CHLORINATED AMIDE – N-(2,6- Diflurobenzoyl) 2-Amino-2-(4- Tert Butyl-2- Ethoxy phenyl Chloro Ethane)

Process Flow Diagram:



Material Balance:

Material Balance for Etoxazole		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	N-(2, 6 -Difluorobenzoyl) 2-Amino 2-(4 Tert Butyl -2-Ethoxy Phenyl Chloro Ethane)	1150
2	Water	3000
3	NaOH	116
4	Ethanol	1500
Total		**5766**

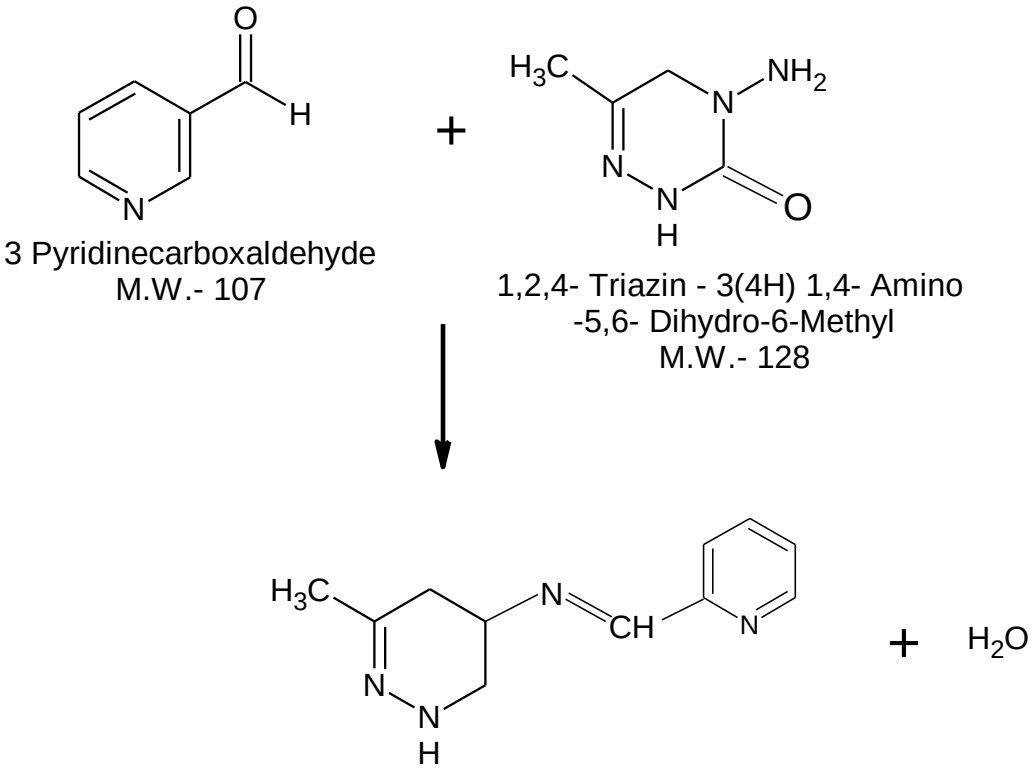
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Etoxazole	-	-	1000	-	Product
2	Ethanol	-	75	1425	-	Recycle
3	Aqueous Layer	3266	-	-	-	To ETP
Total		**3266**	**75**	**2425**	**0**	
		5766				

(I-22) Pymetrozine

Process Description:

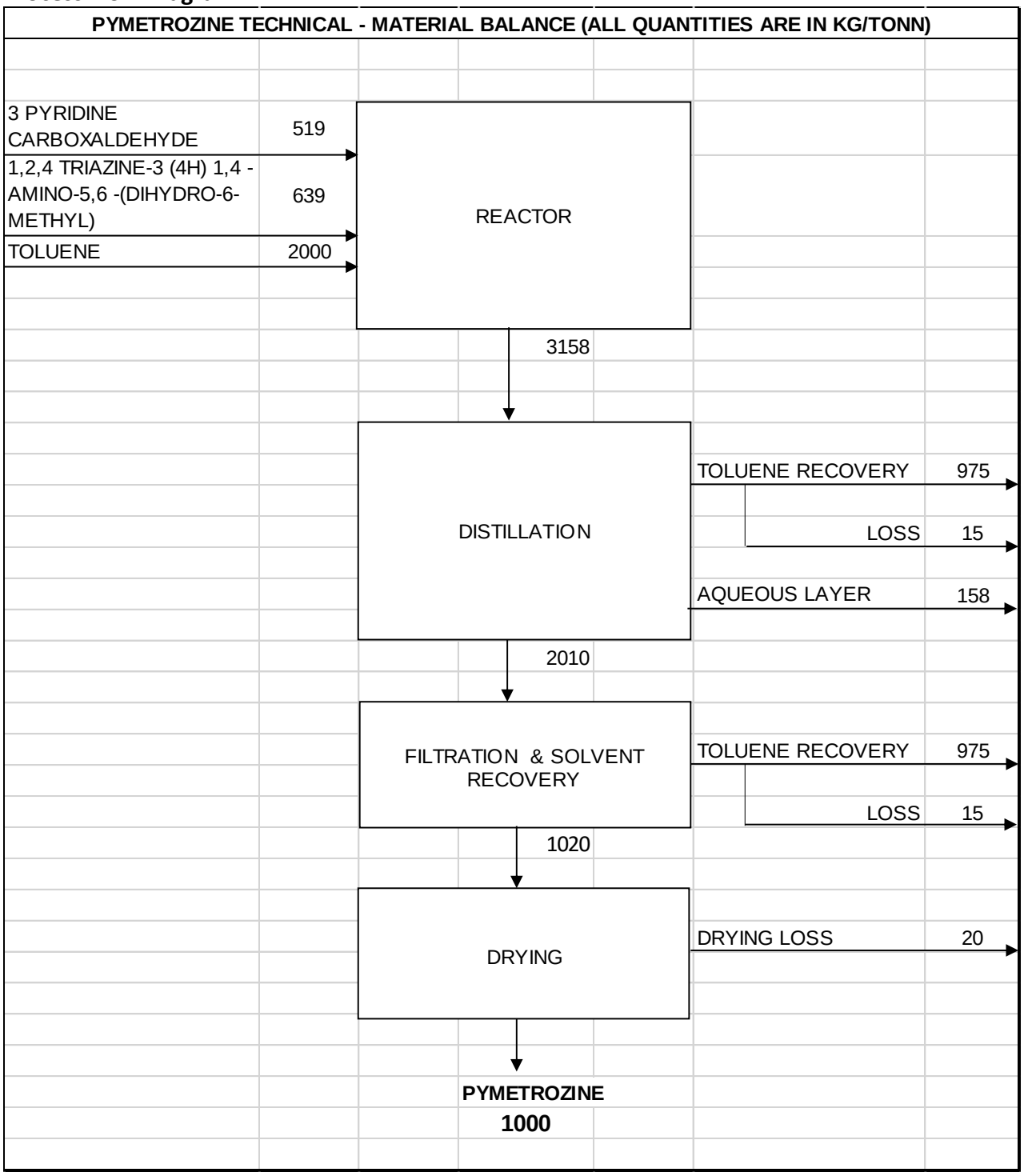
Charge 3-Pyridine carboxaldehyde, 1,2,4-Triazine-3(4H)-1,4-Amino-5,6-dihydro-6-methyl and toluene in a reactor under stirring. Raise the temperature to 65°C and maintain for 6 hrs.
Once the reaction completes, distil half of the toluene and cool to crystallize the mass. Centrifuge and dry the crude mass to get technical grade Pymetrozine. Recover the toluene from the ML by distillation.

Process Reaction:



PYMETROZINE
MW.= 217

Process Flow Diagram:



Material Balance:

Material Balance for Pymetrozine		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	3 Pyridine Carboxaldehyde	519
2	1,2,4 Triazine-3 (4H) 1,4 -Aamino-5,6 -(Dihydro-6-Methyl)	639
3	Toluene	2000
Total		3158

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Pymetrozine	-	-	1000	-	Product
2	Toluene	-	30	1950	-	Recycle
3	Aqueous Layer	158	-	-	-	To ETP
4	Drying Loss	-	20	-	-	Loss
Total		**158**	**50**	**2950**	**0**	
		3158				

(I-22) Fenpyroximate

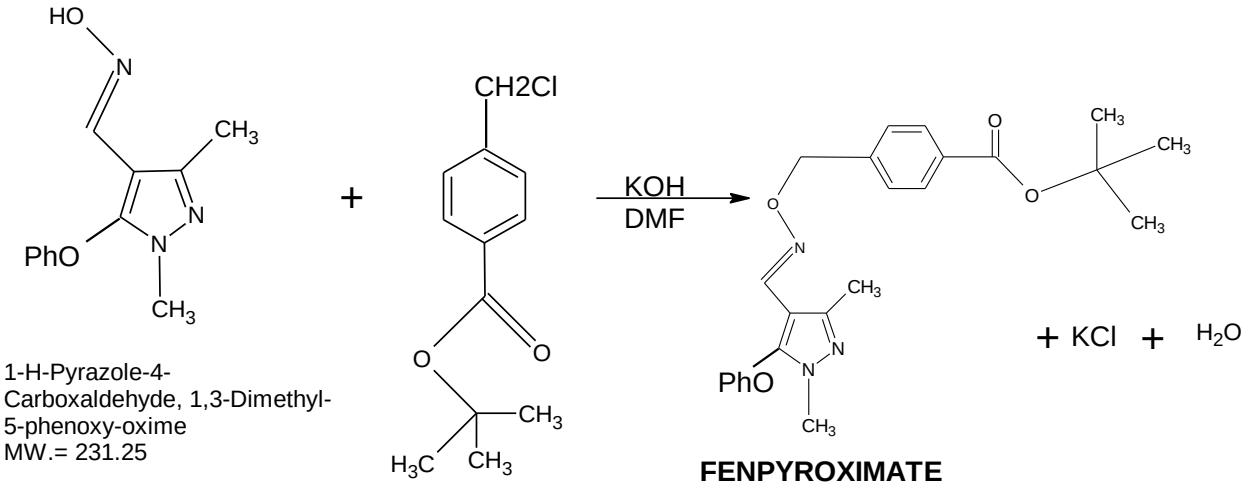
Process Description:

Step-1:
Charge H-pyrazole-4-carboxaldehyde,1,3-dimethyl-5-phenoxy-oxime(PCDPO) and tertiary butyl-4-(chloro methyl benzoate (TBCMB) in presence of KOH as base and DMF as solvent in a vessel for carrying out the reaction at 65 – 68°C.

Step-2:
After completion of the reaction cool to RT and filter out the inorganic salt.

Step-3:
The solvent DMF is distilled out and the mass is taken in water, centrifuged, then washed with water and dried to get Fenpyroximate technical. Aqueous ML is sent to ETP.

Process Reaction:

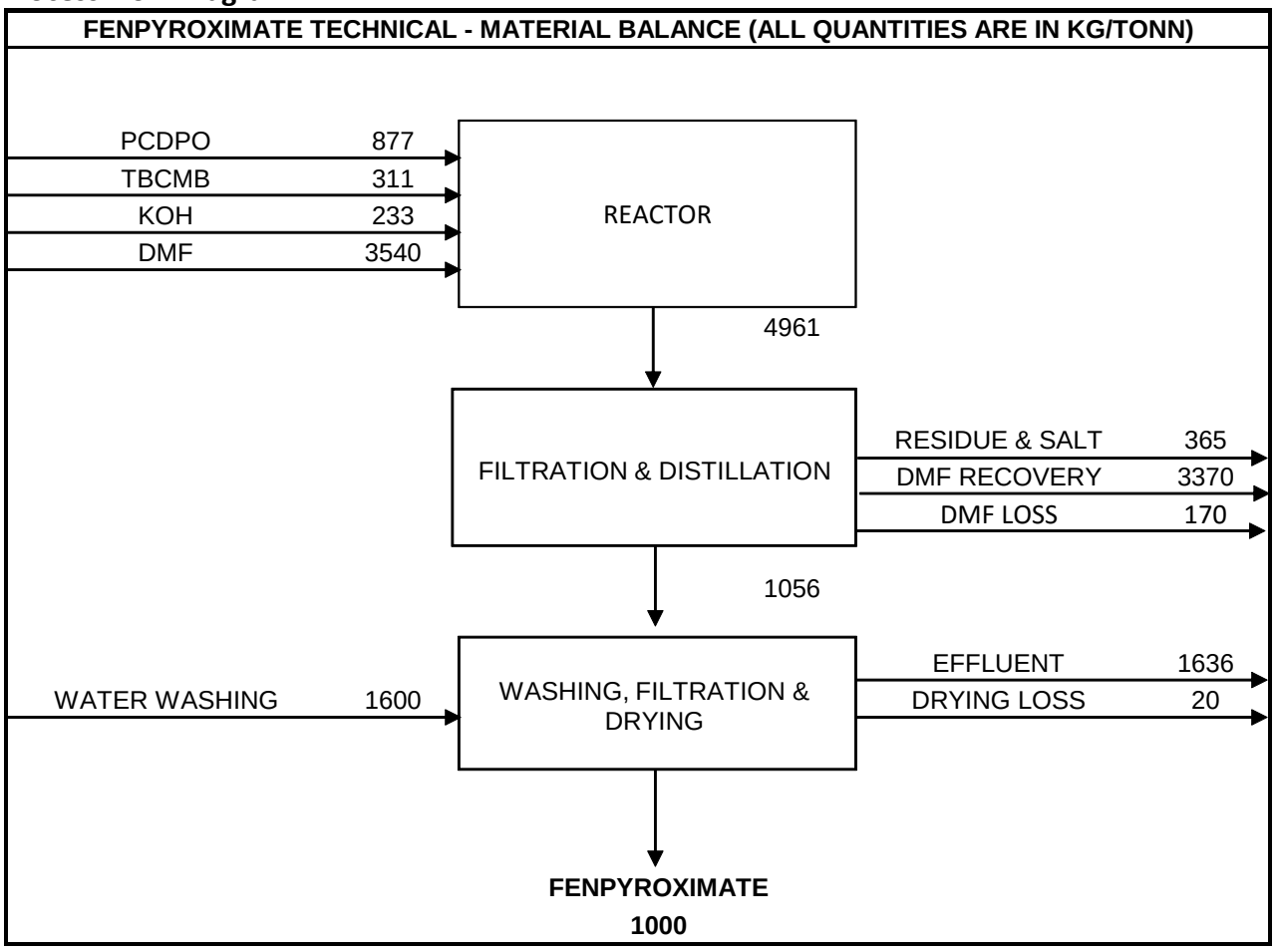


1-H-Pyrazole-4-Carboxaldehyde, 1,3-Dimethyl-5-phenoxy-oxime
MW.= 231.25

Tert Butyl-4-(chloromethyl) benzoate
mw.= 226.7

FENPYROXIMATE
MW.= 421.5

Process Flow Diagram:



Material Balance:

Material Balance for Fenpyroximate		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	PCDPO	877
2	TBCMB	311
3	KOH	233
4	DMF	3540
5	Water	1600
Total		6561

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Fenpyroximate	-	-	1000	-	Product
2	DMF	-	170	3370	-	Recycle
3	Residue & Salt	-	-	-	365	To Incineration
4	Aqueous Layer	1636	-	-	-	To ETP
5	Drying Loss		20	-	-	To atmosphere
Total		**1636**	**190**	**4370**	**365.000**	
		6561				

(I-22) Triazophos

Process Description:

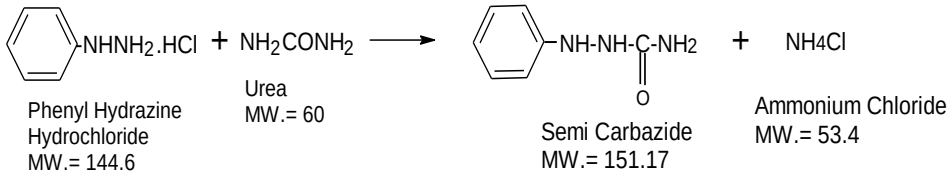
Phenylhydrazine hydrochloride is reacted with urea in aqueous medium at a temperature of 80 – 85°C. The resulting mass is then reacted with formic acid at the same temperature to form an intermediate.

This intermediate is filtered and then transferred into another reaction vessel and is reacted with diethyl thiophosphoryl chloride in Xylene medium in presence of an alkali at 50 – 55°C temperature.

The resulting mass is then washed with water and separated into two layers. The organic layer is concentrated to get Triazofos Technical (concentrate) and aqueous layer is sent to the Effluent Treatment Plant.

Process Reaction:

STEP-1 (I)



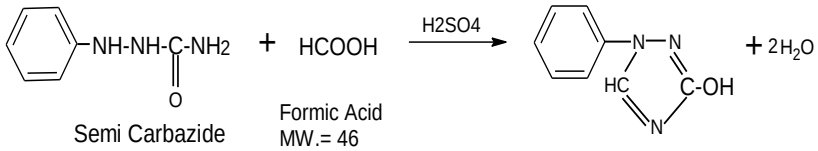
Phenyl Hydrazine Hydrochloride
MW.= 144.6

Urea
MW.= 60

Semi Carbazide
MW.= 151.17

Ammonium Chloride
MW.= 53.4

(II)

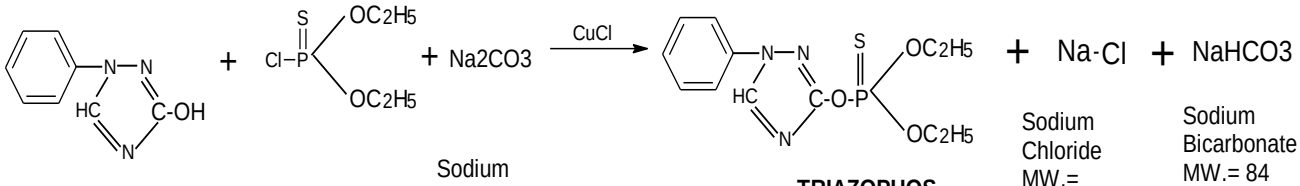


Semi Carbazide
MW.= 151.17

Formic Acid
MW.= 46

Triazole
MW.= 161

STEP-2



Triazole
MW.= 161

O,O Diethyl Phosphoro chlor Thioate
MW.= 188.5

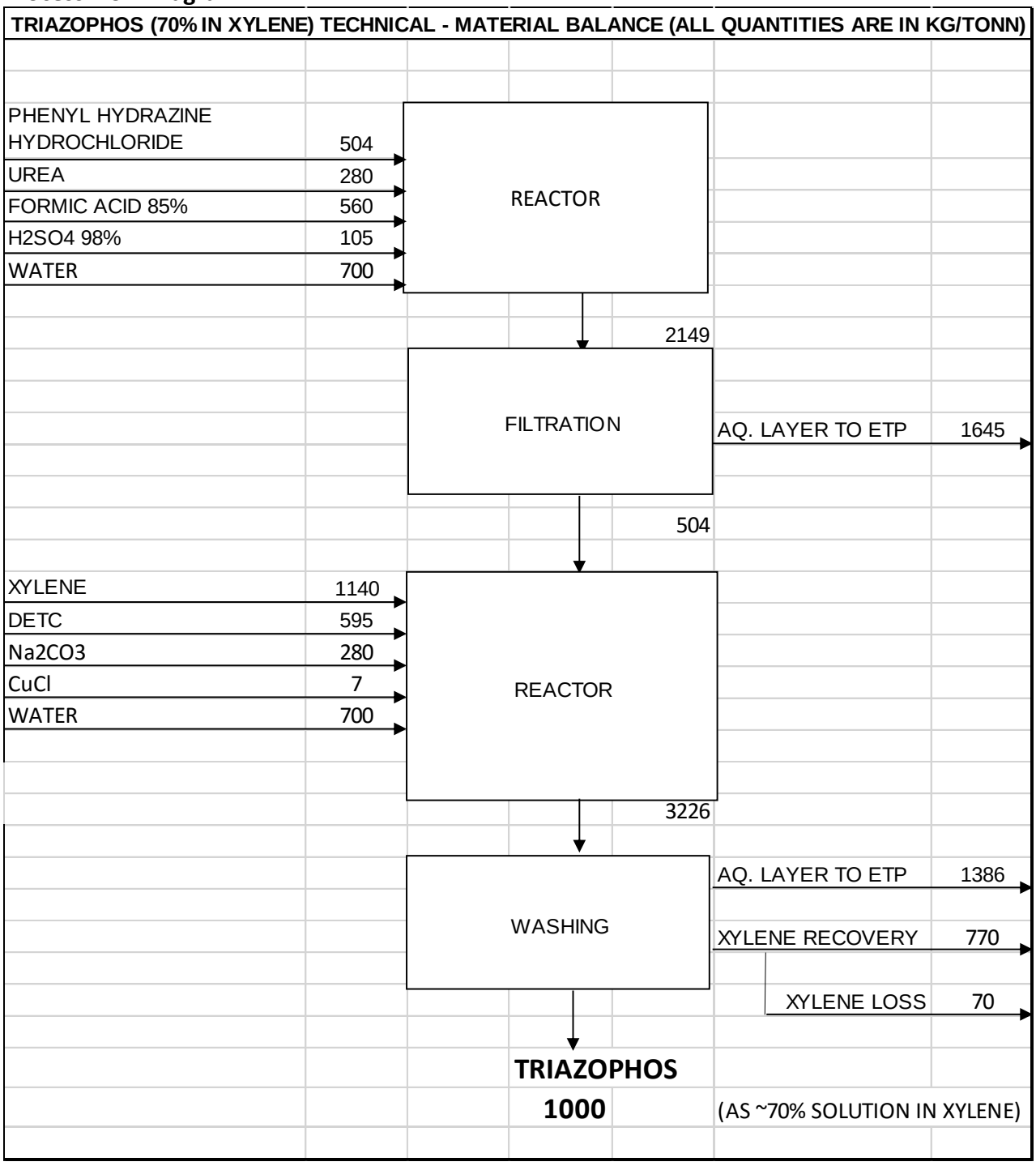
Sodium Carbonate
MW.= 105.9

TRIAZOPHOS
MW.= 313

Sodium Chloride
MW.= 58.44

Sodium Bicarbonate
MW.= 84

Process Flow Diagram:



Material Balance:

Material Balance for Triazophos (70% IN XYLENE)

S. No.	Raw Materials	Input/MT of Product (KG)
1	Phenyl Hydrazine Hydrochloride	504
2	Urea	280
3	Formic Acid 85%	560
4	H2SO4 98%	105
5	Xylene	1140
6	DETC	595
7	Na2CO3	280
8	CuC	7
9	Water	1400
Total		**4871**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission /loss	Recovery	Solid Waste	
1	Triazophos 70%	-	-	1000.0	-	Product
3	Aqueous Layer	3031	-	-	-	To ETP
4	Xylene	-	70	770	-	Recovery
Total		3031	**70**	**1770**		
		4871				

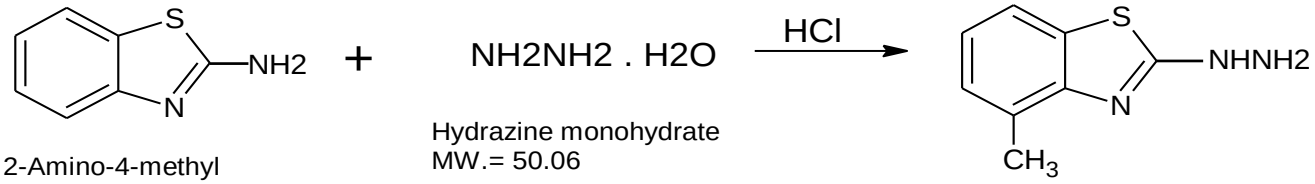
FUNGICIDE

(F-1) Tricyclazole

Process Description:

Tricyclazole is a benzothiazole type fungicide. It is manufactured by reaction of 2-amino-4-methyl benzothiazole (AMBT) with hydrazine mono hydrate in presence of HCl at 50 – 55°C to give 2- hydrazino-4-methyl benzothiazole (HMBT).
HMBT is reacted with formic acid at 90 – 95°C. Excess formic acid is distilled off under vacuum and the residual mass is taken in water, centrifuged, the cake is washed with water and dried to yield Tricyclazole technical.
The aqueous ML is sent to ETP.

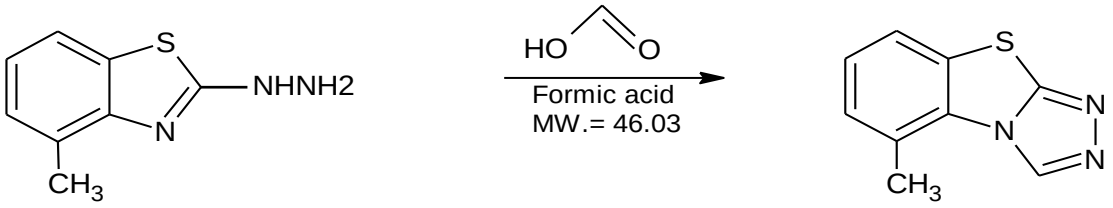
Process Reaction:



2-Amino-4-methyl benzothiazole **(AMBT)**
MW.= 164.23

Hydrazine monohydrate
MW.= 50.06

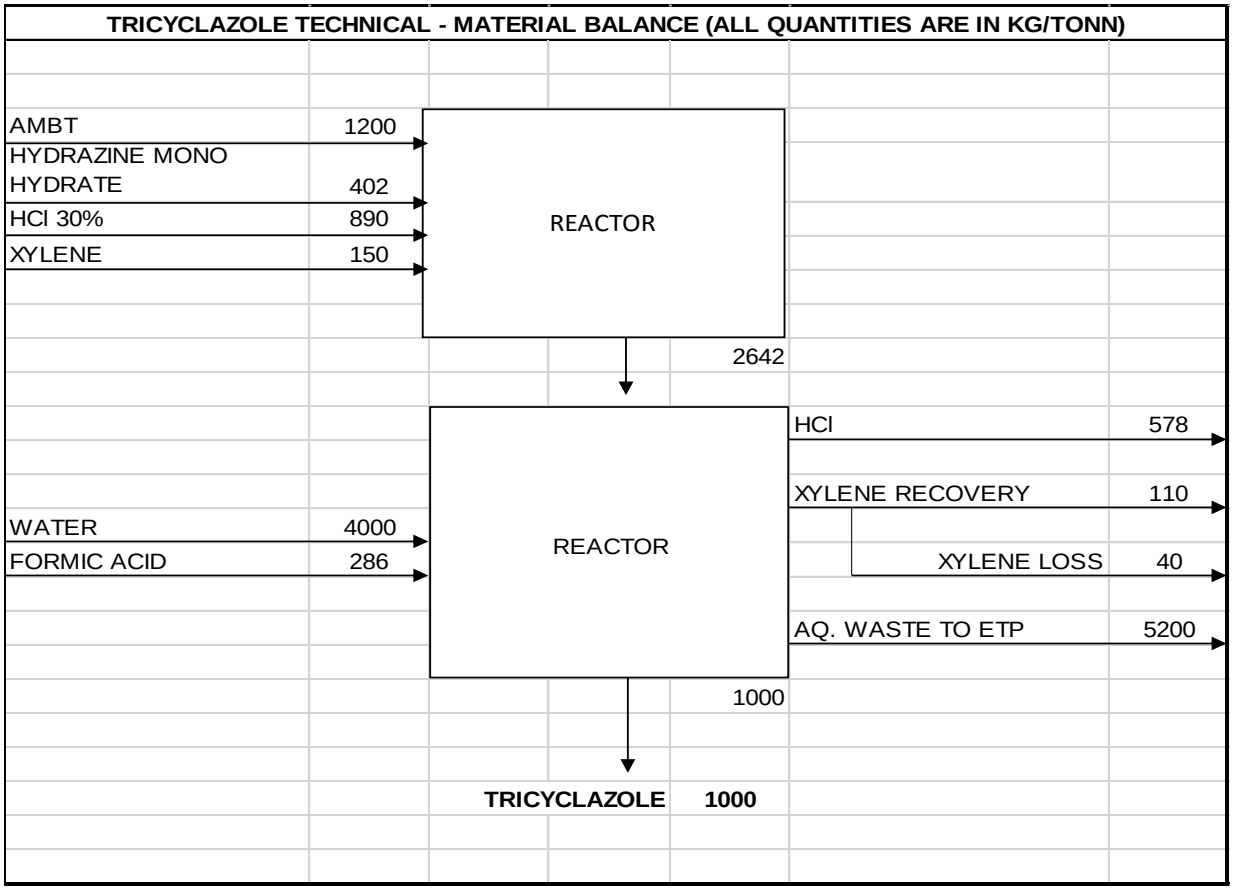
2- Hydrazino -4-methyl benothiazole **(HMBT)**
MW.=



2- Hydrazino -4-methyl benothiazole **(HMBT)**
MW.=

TRICYCLAZOLE
MW.= 189.24

Process Flow Diagram:



Material Balance:

Material Balance for Tricyclazole		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	AMBT	1200
2	Hydrazine mono hydrate	402
3	HCl 30%	890
4	Formic acid	286
5	Xylene	150
6	Water	4000
Total		**6928**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Tricyclazole	-	-	1000	-	Product
2	Effluent	5200	-	-	-	To ETP
4	HCl	-	-	578	-	To scubber
5	Xylene	-	40	110	-	Recycle

Total	**5200**	**40**	**1688**	**0**	
	6928				

(F-2) Cymoxanil

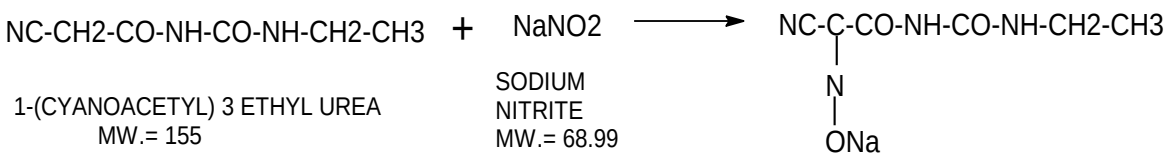
Process Description:

Step-1:
1-cyanoacetyl-3-ethyl urea and sodium nitrite solution (40%) are added sequentially into the reactor containing water. The reaction is allowed to take place at controlled temperature of 40 – 45°C and the reaction mass is held at this temperature till completion of the reaction.
The reaction mass is then cooled to room temperature.

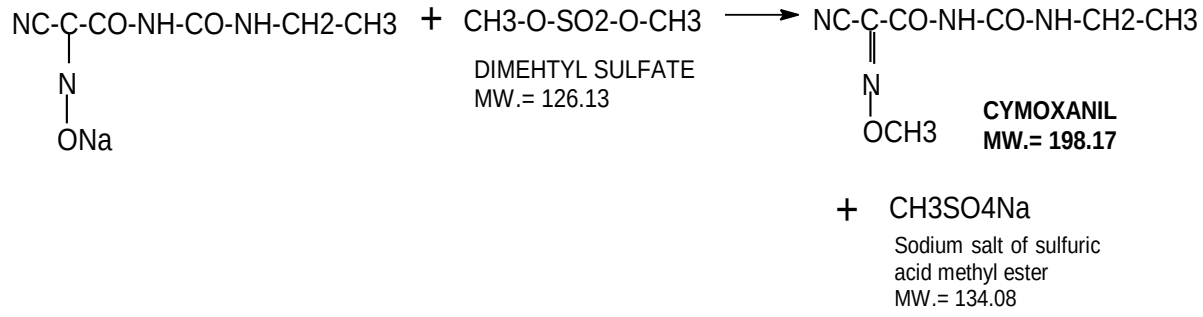
Step-2:
After the reaction mass of 1st step is cooled to room temperature dimethyl sulfate is added to it. The reaction mass is held at 50 – 55°C till completion of the reaction.
The reaction mass is then cooled to room temperature and centrifuged. The cake obtained is washed with water and dried to give Cymoxanil technical.

Process Reaction:

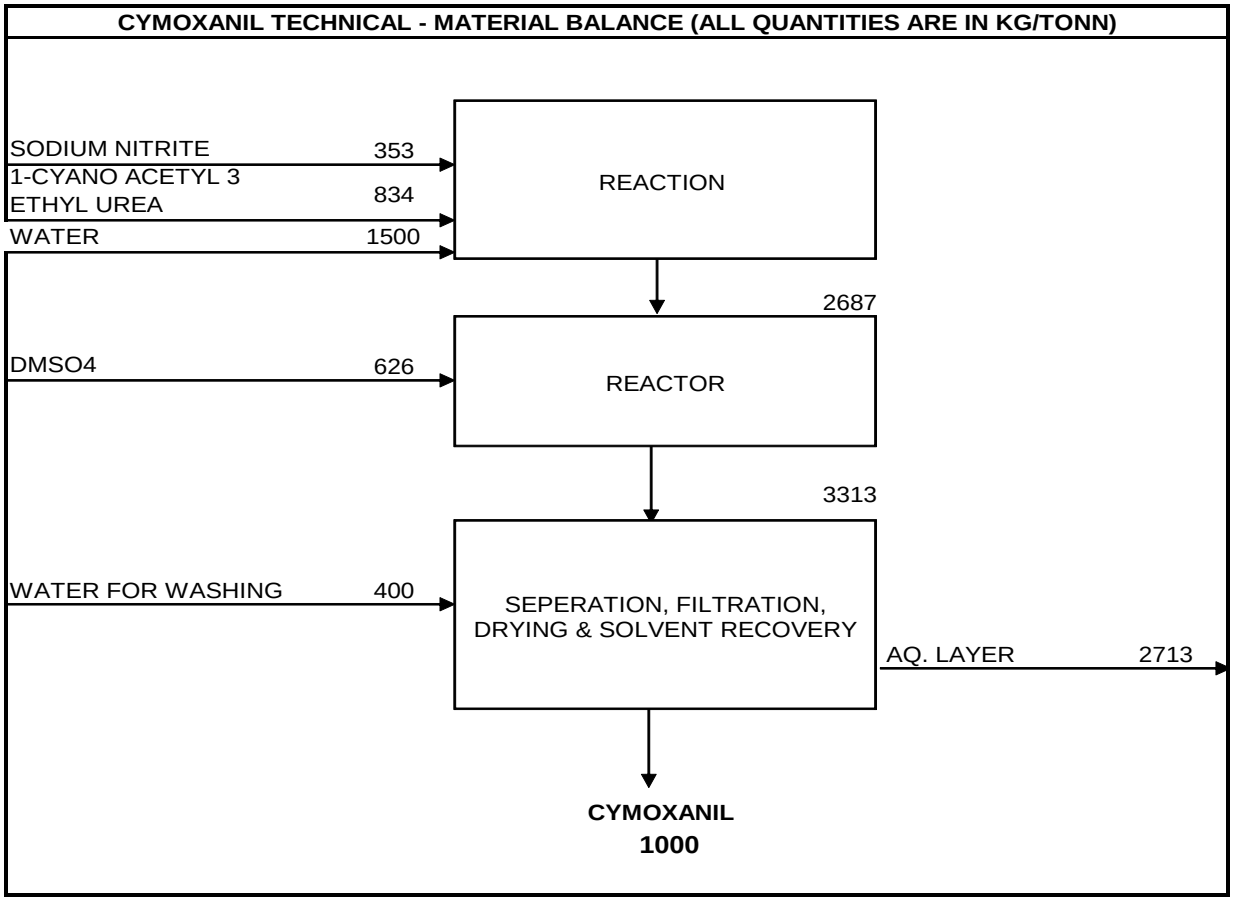
STEP-1



STEP-2



Process Flow Diagram:



Material Balance:

Material Balance for Cymoxanil		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
7	1 Cyano Acetyl 3 Ethyl urea	834
8	Water	1900
9	Sodium Nitrite	353
10	DMSO4	626
Total		**3713**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission / loss**	**Recovery**	**Solid Waste**	
1	Cymoxanil	-	-	1000	-	Product
2	Aqueous Layer	2713	-	-	-	To ETP
Total		**2713**	**-**	**1000**	-	
		3713				

(F-3) Propiconazole

Process Description:

Step – 1. **Preparation of 2,4-dichloroacetophenone**

1,3-dichlorobenzene is reacted with acetyl chloride in presence of AICI3 at 10-15°C under stirring to produce 2,4-dichloroacetophenone. After reaction, The mass is quenched, washed with water and the organic layer is distilled to get pure 2,4-dichloroacetophenone.

Step – 2. **Preparation of Ketal**

The intermediate product from step 1 is reacted with 1,2-pentanediol in Presence of Para toluene sulphonic acid and solvent. In this connection water is removed by azeotropic distillation. After completion of reaction the mass (Ketal)is washed with water and solvent is recovered. Final mass is taken to next stage.

Step – 3. **Preparation of 2-Bromo methyl – (2,4-dichlorophenyl) ketone**

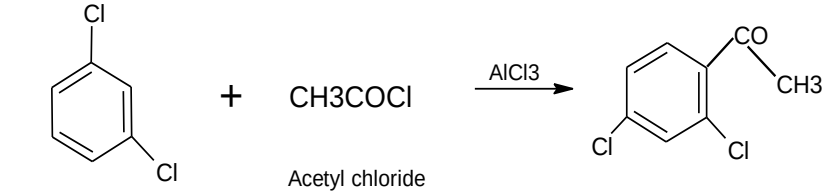
The Ketal intramediate produced in Step 2 is reacted with bromine at 20°C in solvent and the Bromo Ketal product is isolated after distillation of solvent.

Step – 4. **Preparation of Propiconazole**

Sodium salt of 1,2,4-Trizole in solvent DMF is reacted with the Bromo ketal produced in Step 3 and the technical product is isolated by filtration and distillation.

Process Reaction:

STEP-1 Preparation of 2,4 Dichloroacetophenone

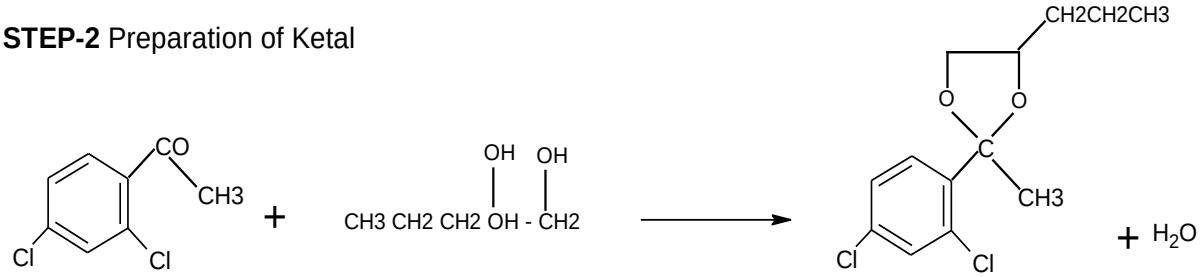


1,3-Dichlorobenzene
MW.= 147

Acetyl chloride
MW.= 78.49

2,4- Dichloroacetophenone
MW.= 189.04

STEP-2 Preparation of Ketal

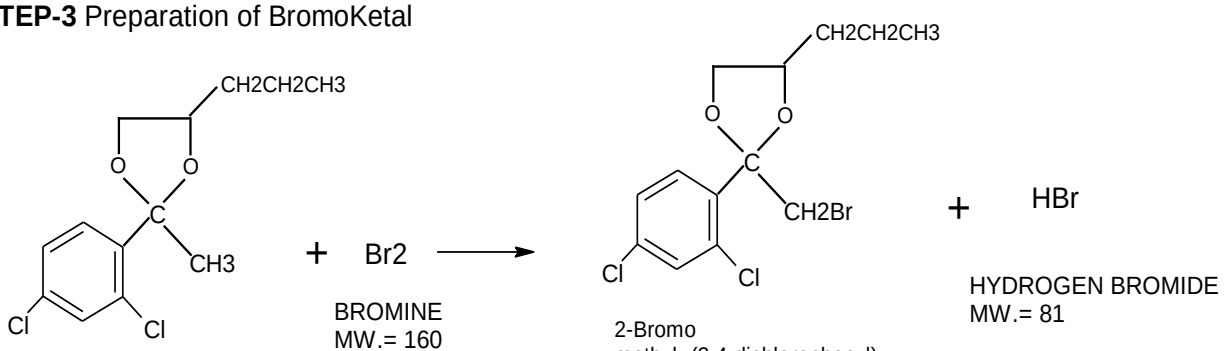


2,4- Dichloroacetophenone
MW.= 189.04

1,2 Pentanediol
MW.= 104

Ketal
MW.= 275

STEP-3 Preparation of BromoKetal



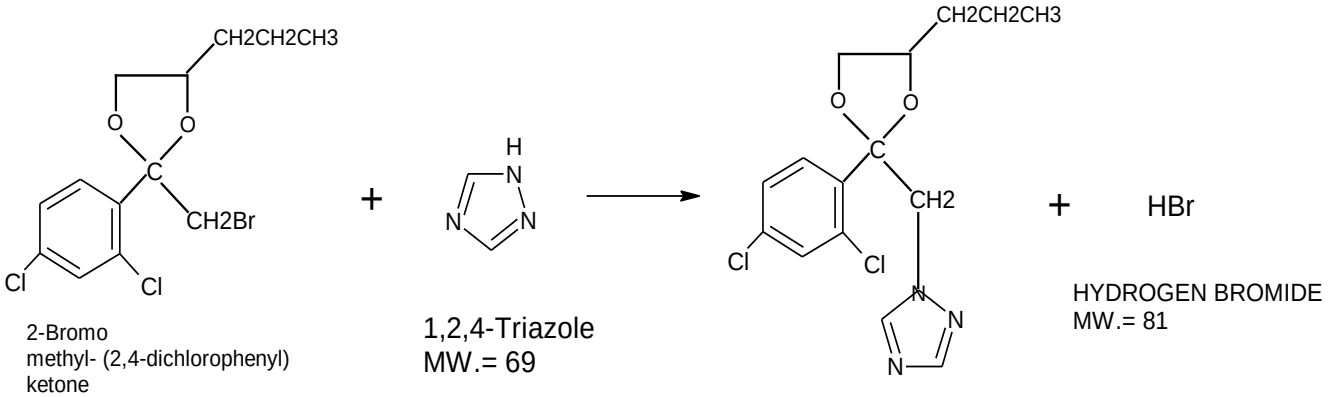
Ketal
MW.= 275

BROMINE
MW.= 160

2-Bromo
methyl- (2,4-dichlorophenyl)
ketone
mw.= 354

HYDROGEN BROMIDE
MW.= 81

STEP-4 Preparation of Propiconazole



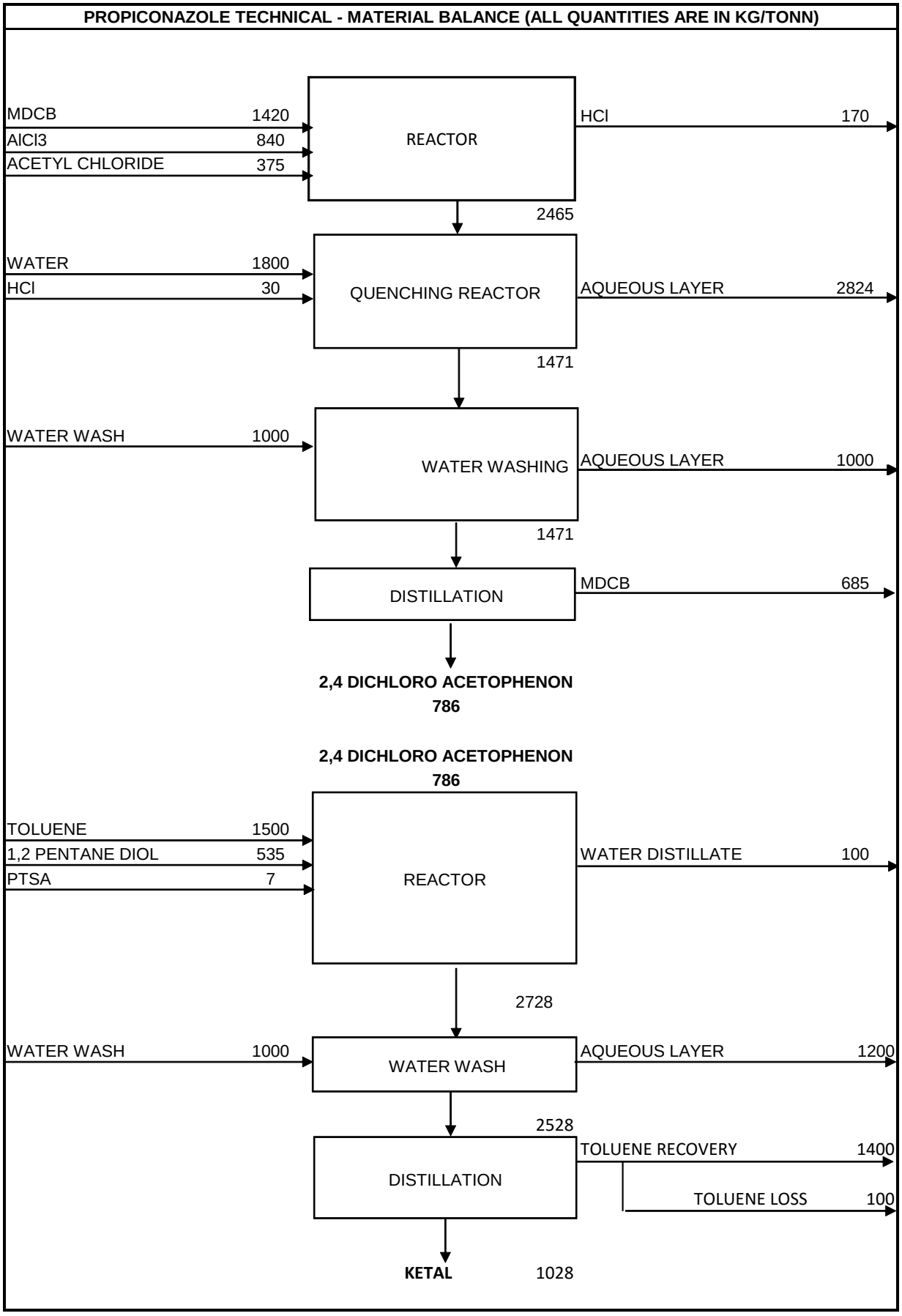
2-Bromo
methyl- (2,4-dichlorophenyl)
ketone
mw.= 354

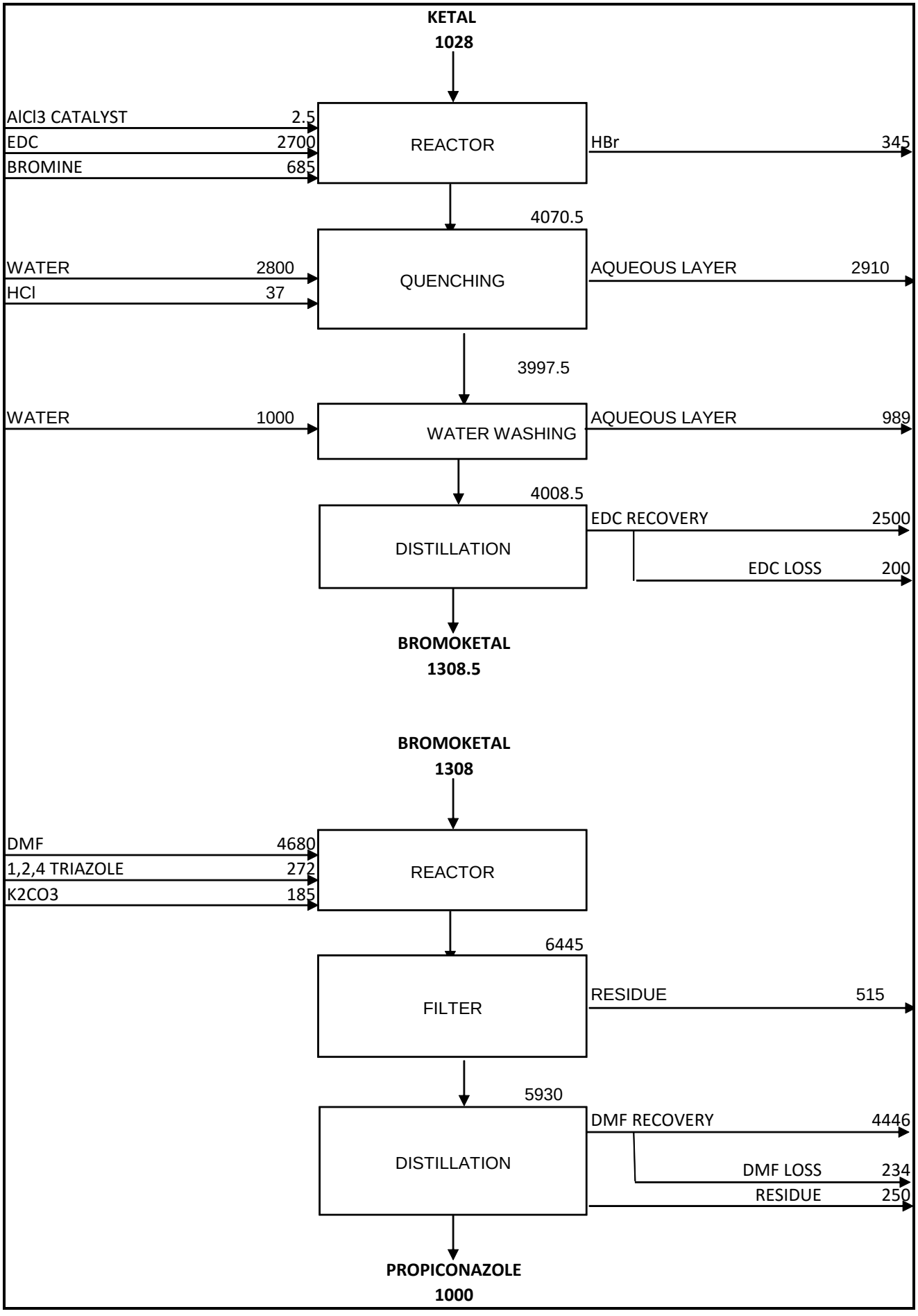
1,2,4-Triazole
MW.= 69

HYDROGEN BROMIDE
MW.= 81

PROPICONAZOLE
MW.= 342

Process Flow Diagram:




KETAL
1028
AlCl3 CATALYST
2.5
EDC
2700
BROMINE
685
REACTOR
HBr
345
4070.5
WATER
2800
HCl
37
QUENCHING
AQUEOUS LAYER
2910
3997.5
WATER
1000
WATER WASHING
AQUEOUS LAYER
989
4008.5
DISTILLATION
EDC RECOVERY
2500
EDC LOSS
200
BROMOKETAL
1308.5
BROMOKETAL
1308
DMF
4680
1,2,4 TRIAZOLE
272
K2CO3
185
REACTOR
6445
FILTER
RESIDUE
515
5930
DISTILLATION
DMF RECOVERY
4446
DMF LOSS
234
RESIDUE
250
PROPICONAZOLE
1000

Material Balance:

Material Balance for Propiconazole		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	MDCB	1420
2	AlCl3	843
3	Acetyl Chloride	375
4	Water	7600
5	Toluene	1500
6	1, 2 Pentane diol	535
7	PTSA	7
8	EDC	2700
9	Bromine	685
10	HCl 30%	67
11	DMF	4680
12	1,2,4 Triazole	272
13	K2CO3	185
Total		**20869**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Propiconazole	-	-	1000	-	Product
2	HCl	-	-	170	-	To Scrubber
3	Excess MDCB	-	-	685	-	Recycle
4	Toluene	-	100	1400	-	Recycle
5	DMF	-	234	4446	-	Recycle
6	EDC	-	200	2500	-	Recycle
7	HBr	-	345	-	-	To scrubber
8	Residue	-	-	-	765	For incineration
9	Aq. Layer	9024	-	-	-	To ETP
Total		**9024**	**879**	**10201**	**765**	
		20869				

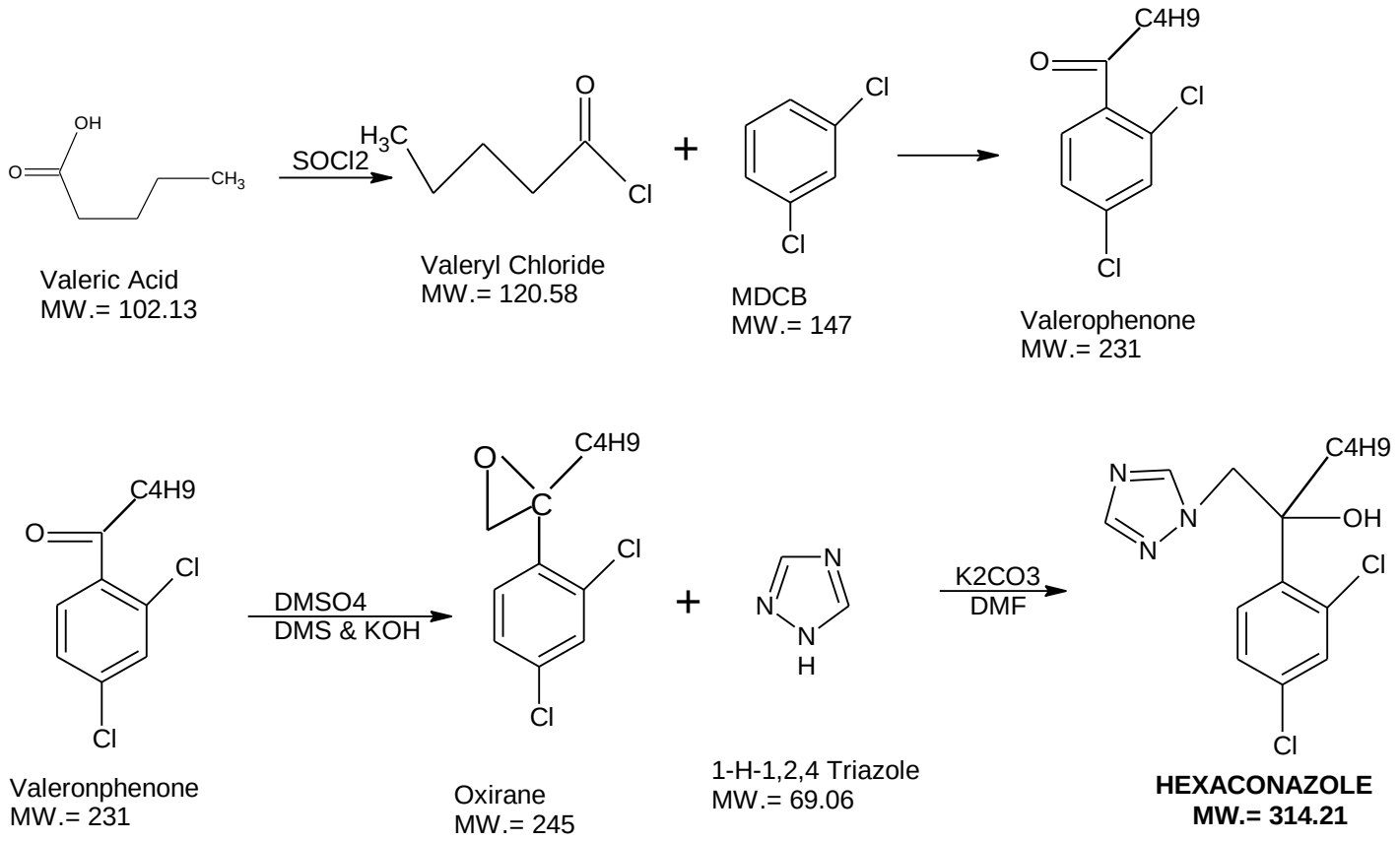
(F-4) Hexaconazole

Process Description:

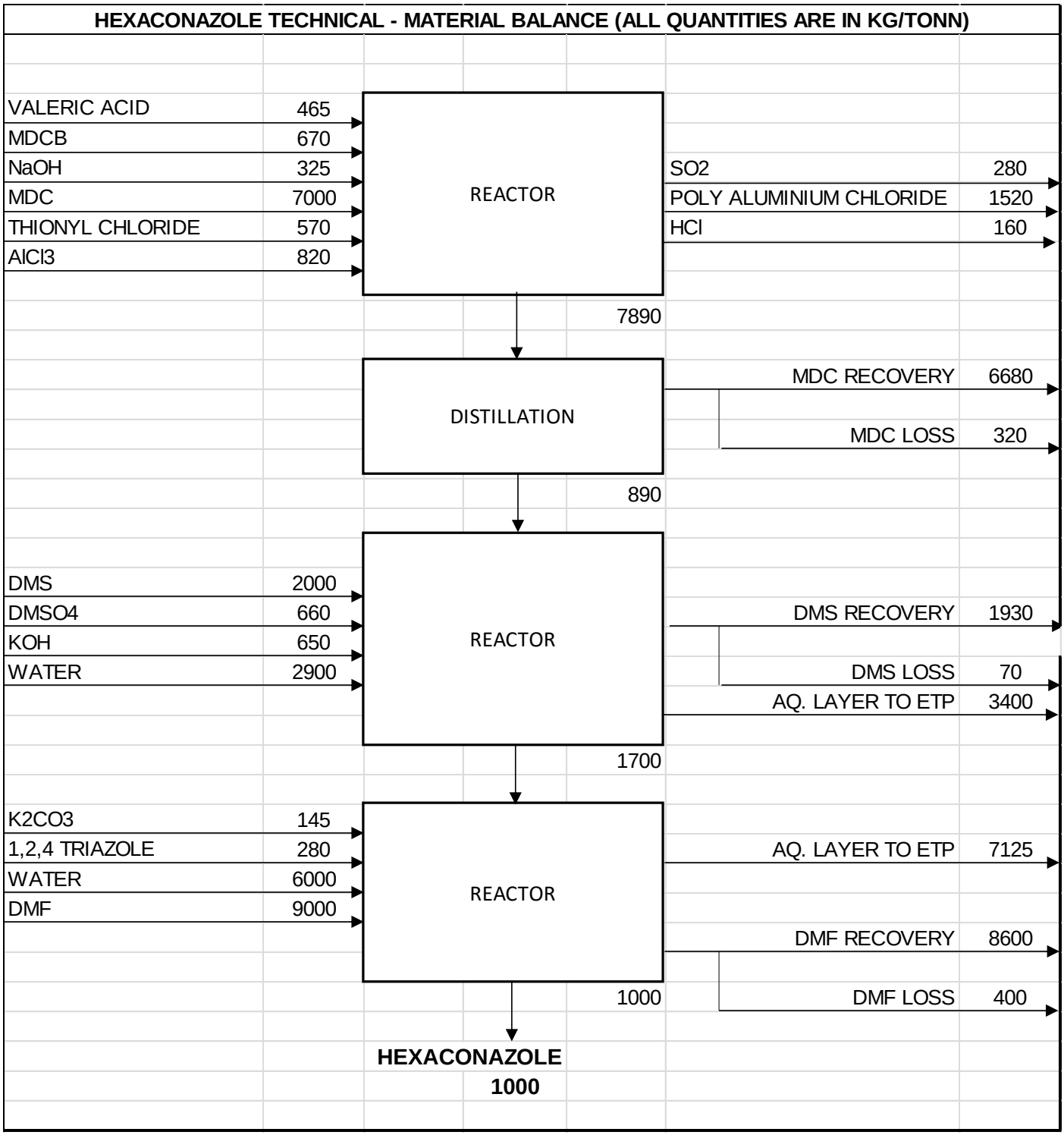
The starting raw material in the manufacture of Hexaconazole is valeric acid. It is converted to valeryl chloride by reacting with thionyl chloride at 50 – 55°C. MDC is used as solvent.
Valeryl chloride is reacted with meta dichloro benzene to yield valerophenone in presence of AlCl3 at 55 – 60°C .
Valerophenone is converted to oxirane by reacting with dimethyl sulphate in presence of KOH and dimethyl sulphide at 30 - 35°C. Dimethyl sulphide is distilled off to obtain the intermediate Oxirane.

Finally oxirane is condensed with 1,2,4-triazole in presence of DMF and potassium carbonate at 85 to 90°C to give crude Hexaconazole. DMF is distilled off and the hot mass is quenched in water. The slurry is cooled, centrifuged and dried to get Hexaconazole Technical. The aqueous ML is sent to ETP.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Hexaconazole		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Valeric Acid	465
2	MDCB	670
3	NaOH	325
4	MDC	7000
5	Thionyl Chloride	570
6	AlCl3	820
7	DMS	2000
8	DMSO4	660
9	KOH	650
10	Water	8900
11	K2CO3	145
12	1,2,4 Triazole	280
13	DMF	9000
Total		**31485**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Hexaconazole	-	-	1000	-	Product
2	Effluent	10525	-	-	-	To ETP
3	HCl	-	-	160	-	To Scrubber
4	Poly aluminium chloride	-	-	1520	-	Byproduct to sale
5	MDC	-	320	6680	-	Recycle
6	DMF	-	400	8600	-	Recycle
7	DMS	-	70	1930	-	Recycle
8	Sulfur Dioxide	-	280	-	-	To scrubber
Total		**10525**	**1070**	**19890**	**0**	
		31485				

(F-5) Tebuconazole

Process Description:

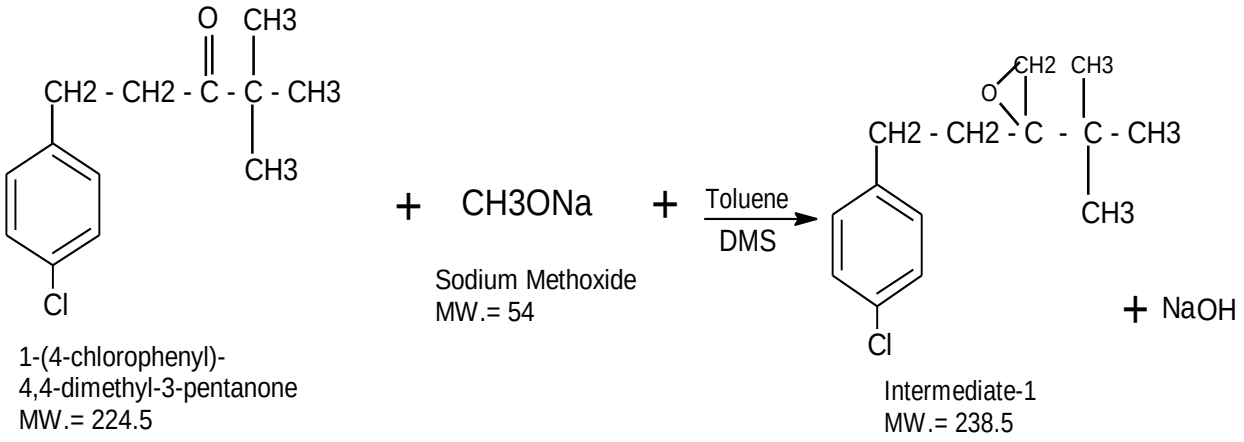
Step -1
1-(4-Chlorophenyl)-4,4-Dimethyl-3-Pentanone is reacted with Sodium methoxide in Dimethyl Sulfide and toluene at 40 – 45°Ctemperature and cooked till the reaction is complete. DMS is distilled out and 2- [2-(4- Chlorophenyl)ethyl]-2-(1,1 – Di methyl ethyl) Oxirane is collected as an intermediate.

Step -2
The Oxirane intermediateis reacted with 1,2,4-Triazole in presence of DMF at 135 – 140°C to get the crude product.

Step -3
DMF is distilled out under vacuum and the reaction mass is taken in water, centrifuged, washed with water and dried to get technical grade Tebuconazole. The aqueous ML is sent to ETP.

Process Reaction:

STEP-1

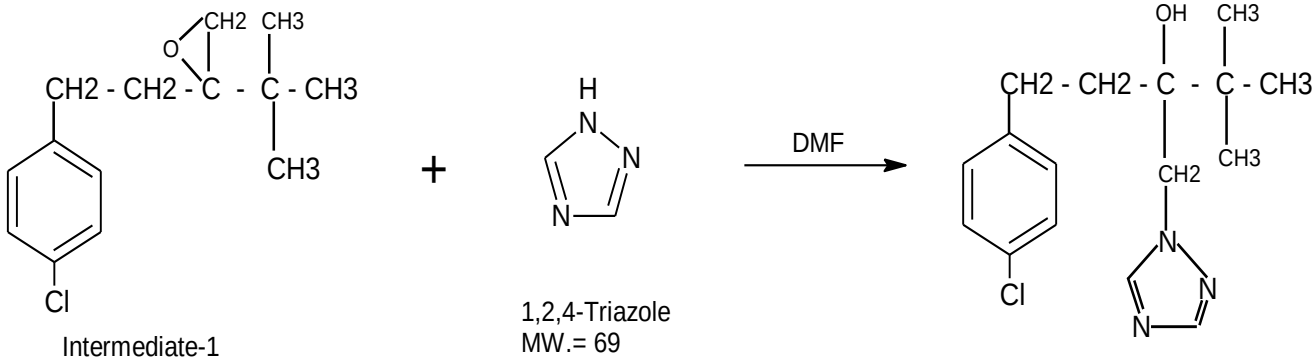


1-(4-chlorophenyl)-4,4-dimethyl-3-pentanone
MW.= 224.5

Sodium Methoxide
MW.= 54

Intermediate-1
MW.= 238.5

STEP-2

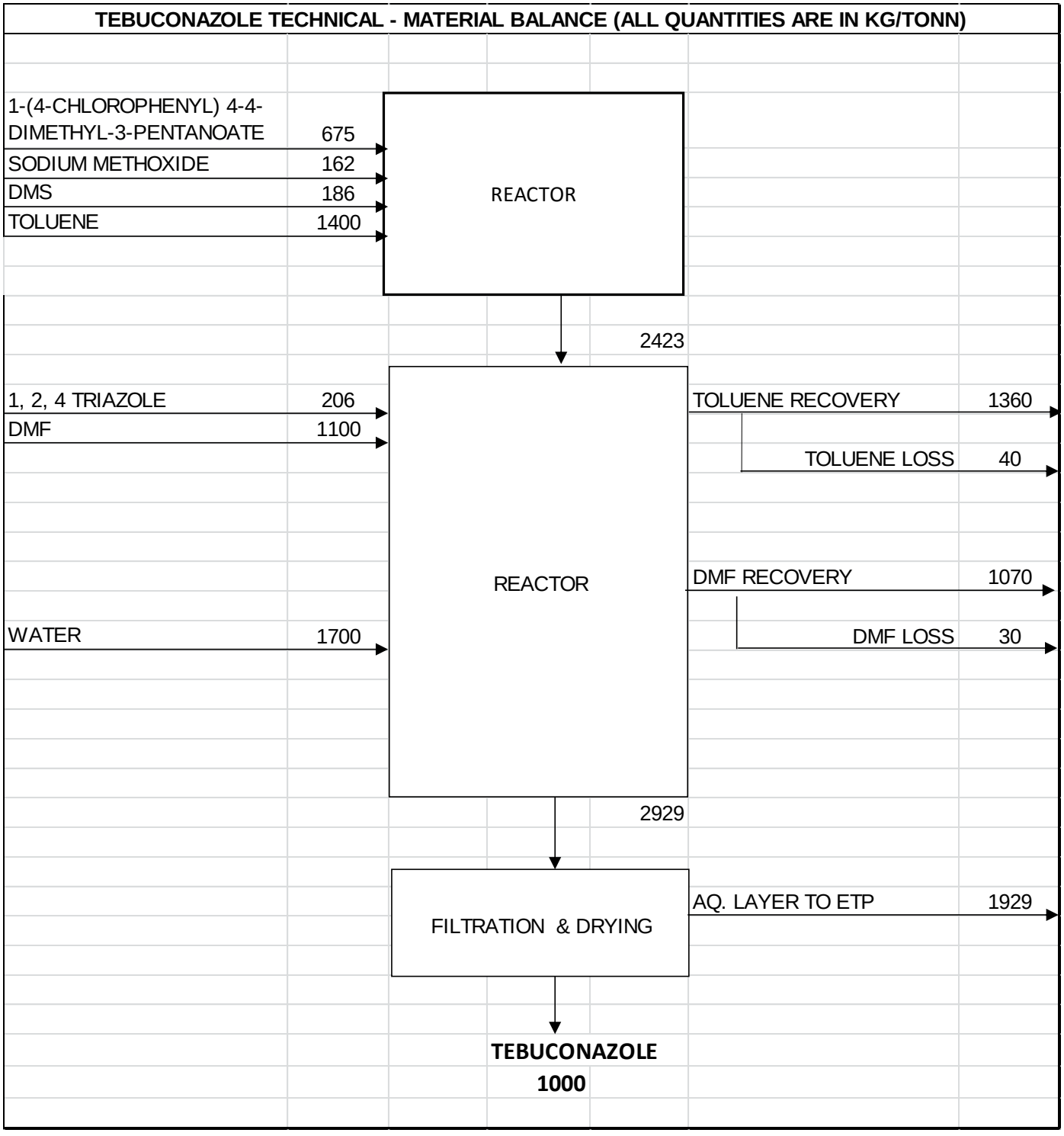


Intermediate-1
MW.= 238.5

1,2,4-Triazole
MW.= 69

TEBUCONAZOLE
MW.= 307.5

Process Flow Diagram:



Material Balance:

Material Balance for Tebuconazole		
S.No.	**Raw Materials**	**Input/MT of Product (KG)**
1	1-(4-Chlorophenyl) 4-4-Dimethyl-3-Pentanoate	675
2	Sodium methoxide	162
3	Dimethyl Sulfide	186
4	Toluene	1400
5	1,2,4-Triazole	206
6	DMF	1100
7	Water	1700
Total		**5429**

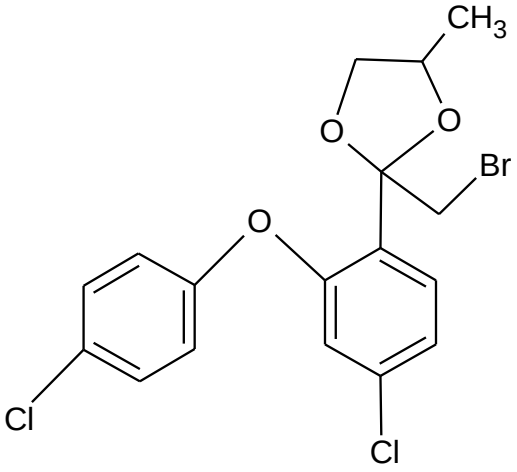
S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/loss**	**Recovery**	**Solid Waste**	
1	Tebuconazole	-	-	1000	-	Product
2	Toluene	-	40	1360	-	Recycle
3	DMF	-	30	1070	-	Recycle
4	Effluent	1929	-	-	-	To ETP
Total		**1929**	**70**	**3430**	**0**	
		5429				

(F-6) Difenconazole

Process Description:

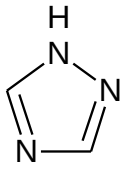
1,2,4-Triazole, Toluene, DMSO, water and potassium hydroxide are charged in the reactor.
Water is removed azeotropically at 90 – 100°C. Toluene is also removed partially.
Then bromoketal is charged and temperature is increased to 110°C and maintained till completion of reaction.
Toluene and DMSO are distilled out.
Toluene is Charged again and the reaction mass is washed with water. Aqueous phase is discarded and Toluene is distilled out of the organic phase to get crude material.
The crude material is crystallised from a mixture of IPE & PE, centrifuged and dried to get Difenoconazole technical.
ML is distilled and the solvent mixture is recycled.

Process Reaction:



Bromoketal
MW.= 418

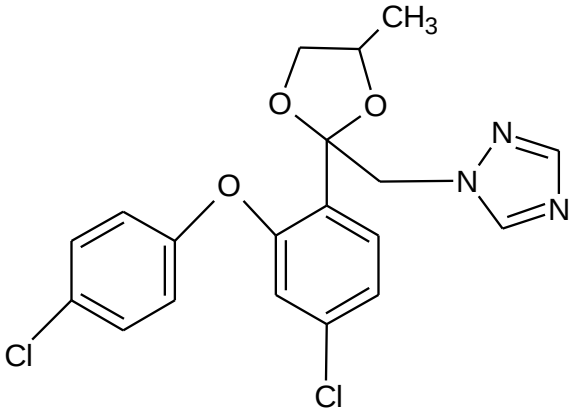
+



1,2,4 Triazole
MW.= 69

+ KOH

Potassium
Hydroxide
MW.= 56



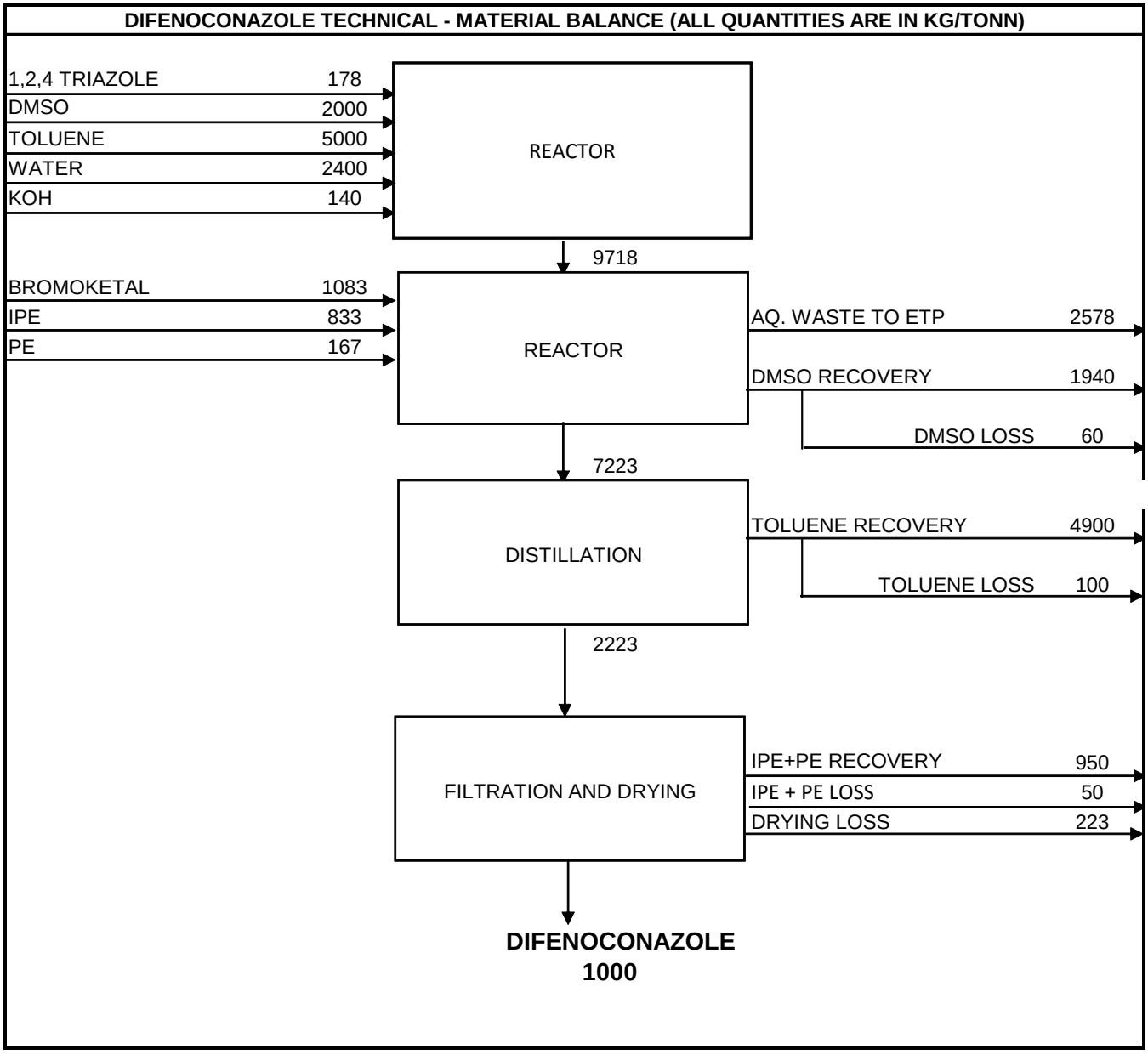
DIFENCONAZOLE
MW.= 406

+ K–Br + H_2O

Potassium
bromide
MW.= 119

Water
MW.= 18

Process Flow Diagram:



Material Balance:

Material Balance for Difenconazole		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	1,2,4 Triazole	178
2	Water	2400
3	Toluene	5000
4	DMSO	2000
5	Bromoketal	1083
6	KOH	140
7	IPE	833
8	PE	167
Total		**11801**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Difenoconazole	-	-	1000	-	Product
2	Effluent	2578	-	-	-	To ETP
3	IPE+PE	-	50	950	-	Recycle
4	Toluene Recovery	-	100	4900	-	Recycle
5	Drying loss	-	223	-	-	Losses
6	DMSO recovery	-	60	1940	-	Recycle
Total		**2578**	**433**	**8790**	**-**	
		11801				

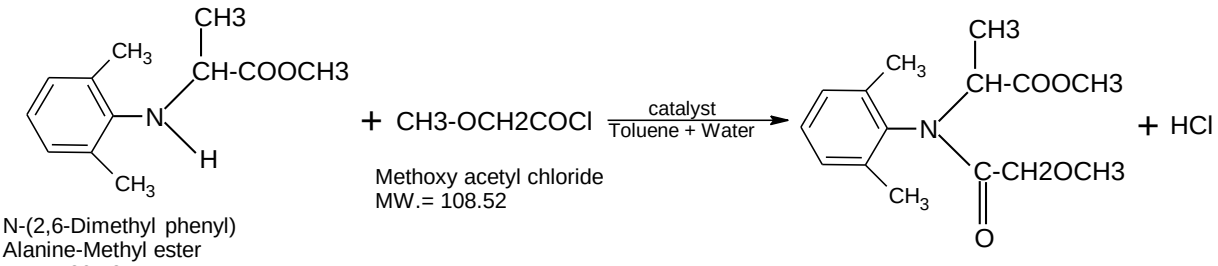
(F-7)Metalaxyl

Process Description:

N-(2, 6 – Dimethyl Phenyl) Alanine – Methyl Ester reacts with Methoxy Acetyl Chloride in presence of catalyst and solvent (toluene) at 70 -75°C to get Metalaxyl solution.

This solution is then washed with water & solvent is distilled out to get Metalaxyl (Tech). Aqueous layer is sent to ETP.

Process Reaction:

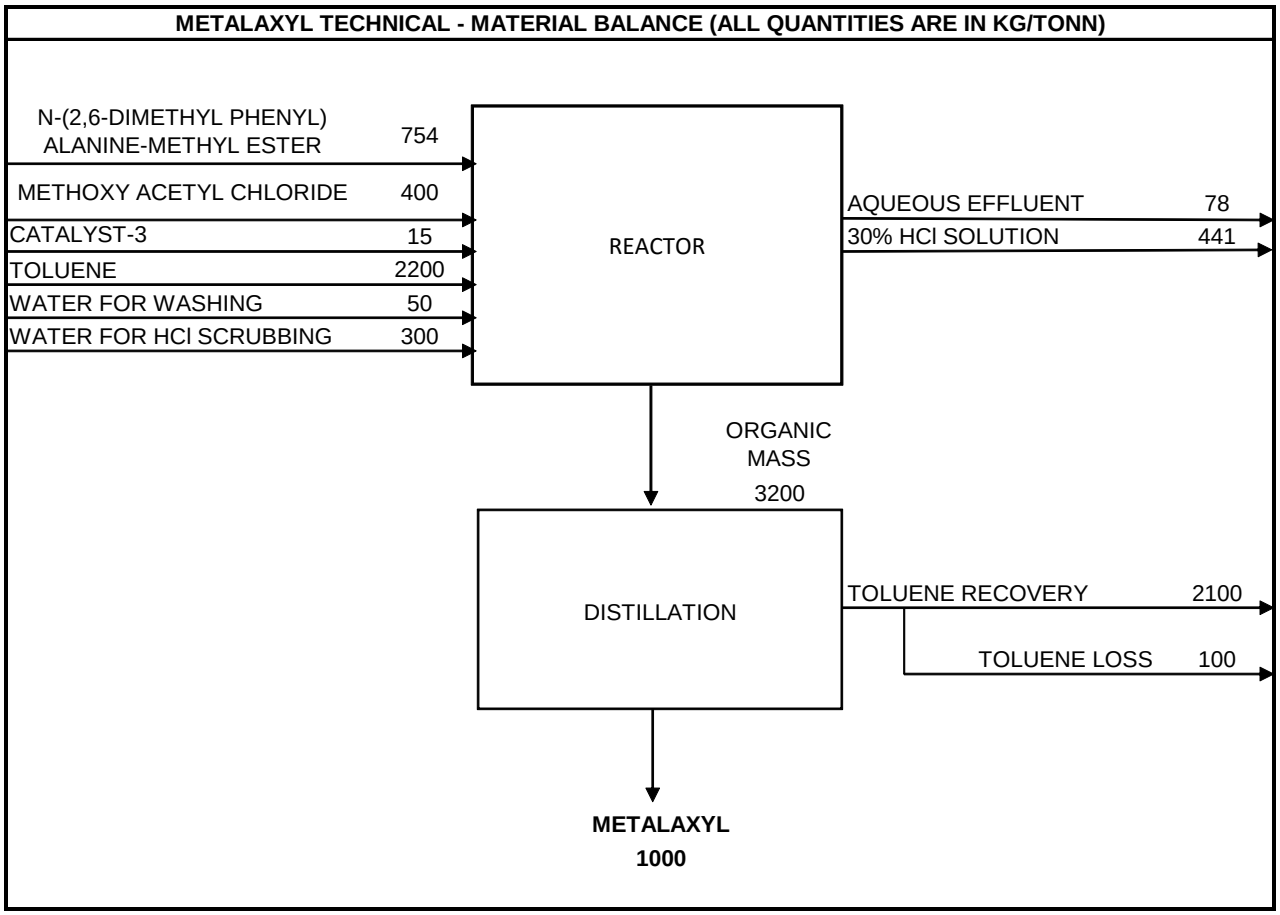


N-(2,6-Dimethyl phenyl) Alanine-Methyl ester
MW.= 207.31

Methoxy acetyl chloride
MW.= 108.52

METALAXYL
MW.= 279.33

Process Flow Diagram:


METALAXYL TECHNICAL - MATERIAL BALANCE (ALL QUANTITIES ARE IN KG/TONN)
N-(2,6-DIMETHYL PHENYL) ALANINE-METHYL ESTER
754
METHOXY ACETYL CHLORIDE
400
CATALYST-3
15
TOLUENE
2200
WATER FOR WASHING
50
WATER FOR HCl SCRUBBING
300
REACTOR
AQUEOUS EFFLUENT
78
30% HCl SOLUTION
441
ORGANIC MASS
3200
DISTILLATION
TOLUENE RECOVERY
2100
TOLUENE LOSS
100
METALAXYL
1000

Material Balance:

Material Balance for Metalaxyl		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	N-(2,6-Dimethyl Phenyl) Alanine-Methyl Ester	754
2	Methoxy Acetyl Chloride	400
3	Catalyst	15
4	Toluene	2200
5	Water	350
Total		**3719**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission /Loss**	**Recovery**	**Solid Waste**	
1	Metalaxyl	-	-	1000	-	Product
2	Aqueous Layer	78	-	-	-	To ETP
3	30% HCl Solution	-	-	441	-	Byproduct
4	Toluene	-	100	2100	-	Recycle
Total		**78**	**100**	**3541**	**-**	
		3719				

(F-8)Carboxin

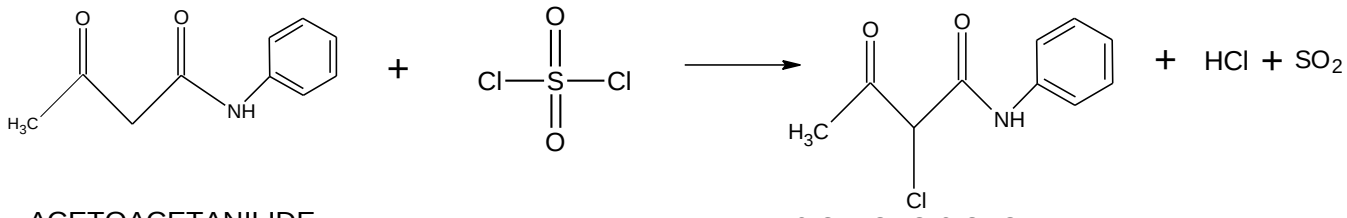
Process Description:

Carboxin is manufactured by reacting acetoacetanilide (AA) with sulfuryl chloride (SO2Cl2) in presence of Toluene at 20 – 25°C to give 2-chloro-3-oxo-N-phenylbutanamide intermediate (2-CPB).
This intermediate is furtherreacted with 2-mercaptoethanol (2-ME) in presence of triethyl amine (TEA) at 30 – 35°C to give 2-(2-hydroxyethylthio)-3-oxo-N-phenylbutanamide (2-HEPB).

Finally it is cyclysed using PTSA at 60 – 65°C to give carboxincrude. Toluene is distilled off from the reaction mass, suspended in water and centrifuged. The cake is recrystallized from Acetone, centrifuged and dried to get Carboxintechnical.

Process Reaction:

STEP-1

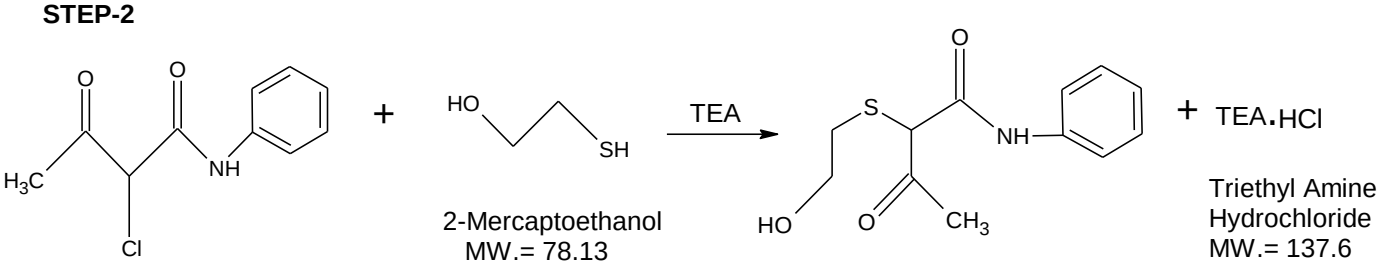


ACETOACETANILIDE
MW.= 177.20

SULFURYL CHLORIDE
MW.= 134.965

2-CHLORO-3-OXO-N-PHENYL BUTANAMIDE
MW.= 211.65

STEP-2



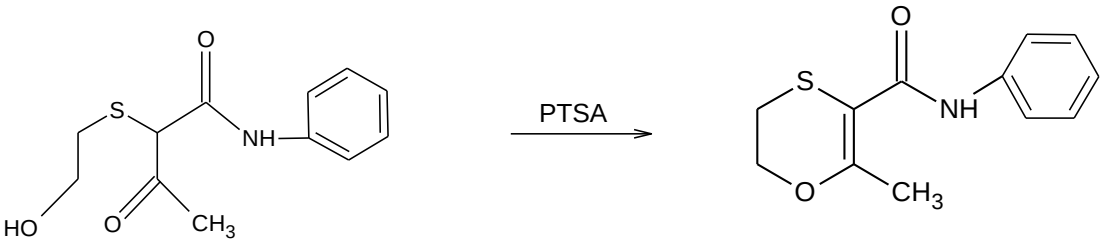
2-CHLORO-3-OXO-N-PHENYL BUTANAMIDE
MW.= 211.65

2-Mercaptoethanol
MW.= 78.13

2-(2-HYDROXYEHTYLTHIO)-3-OX O-N-PHENYLBUTANAMIDE
MW.= 253.30

Triethyl Amine Hydrochloride
MW.= 137.6

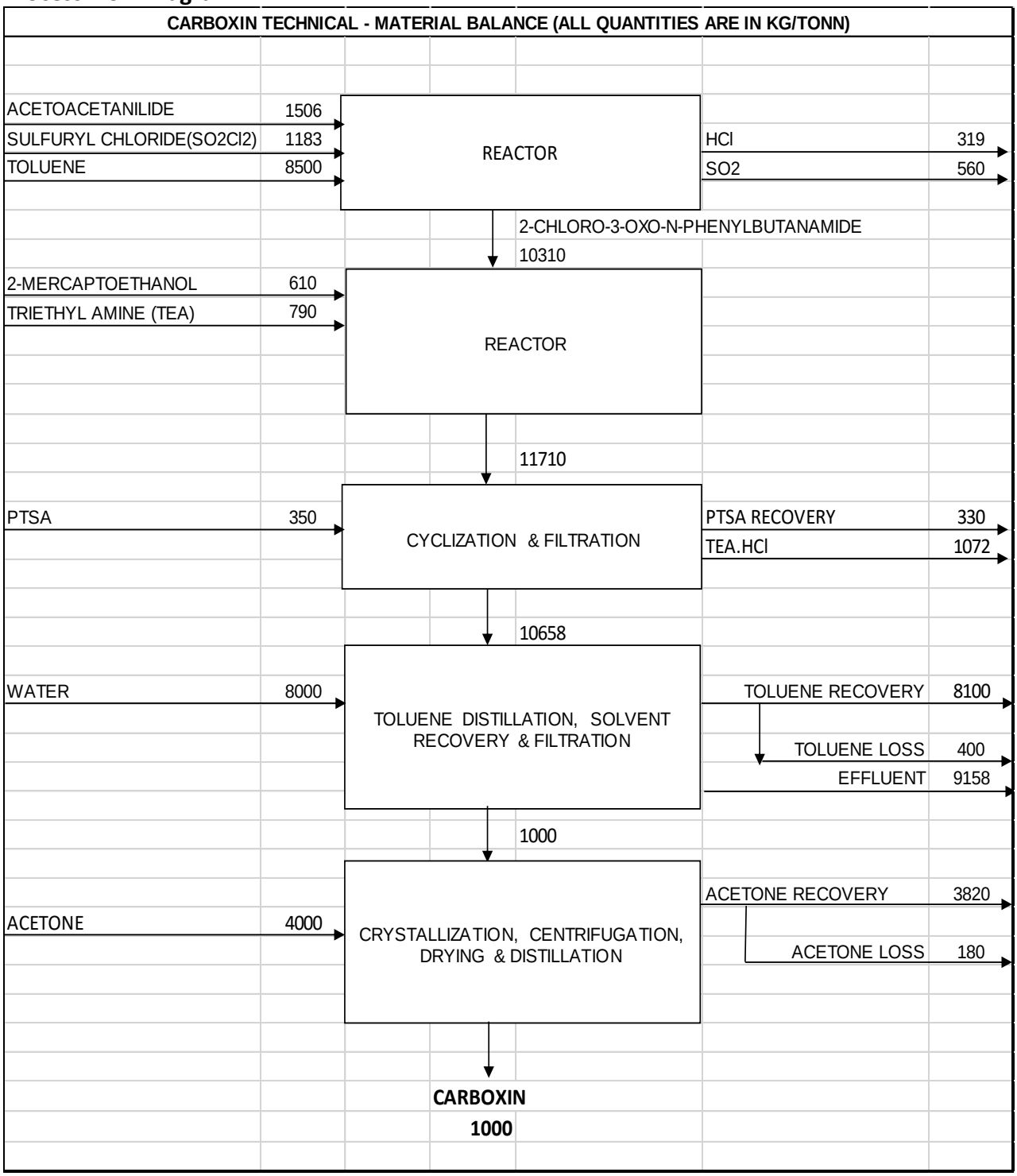
STEP-3



2-(2-HYDROXYEHTYLTHIO)-3-OX O-N-PHENYLBUTANAMIDE
MW.= 253.30

CARBOXIN
MW.= 235.30

Process Flow Diagram:



Material Balance:

Material Balance for Carboxin

S. No.	Raw Materials	Input/MT of Product (KG)
1	Acetoacetanilide	1506
2	Sulfuryl Chloride (SO2Cl2)	1183
3	Toluene	8500
4	2-Mercaptoethanol	610
5	TEA	790
6	PTSA	350
7	Water for Washing	8000
8	Acetone	4000
Total		**24939**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission /Loss	Recovery	Solid Waste	
1	Carboxin	-	-	1000	-	Product
2	HCl	-	-	319	-	To Scrubber
3	SO2	-	560	-	-	To Scrubber
4	Toluene	-	400	8100	-	Recycle
5	PTSA	-	-	350	-	Recycle
6	Aqueous Layer	9138	-	-	-	To ETP
7	Acetone	-	180	3820	-	Recycle
8	TEA.HCl	-		1072	-	For TEA Recovery
Total		**9138**	**1140**	**14661**	-	
		24939				

(F-9) Propineb

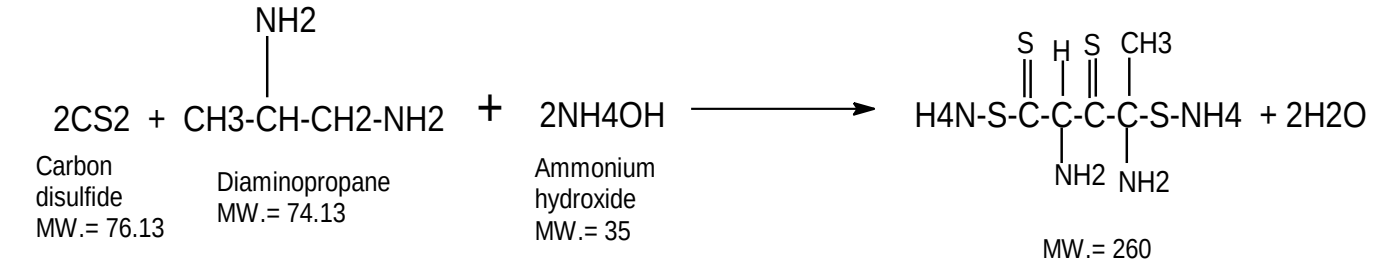
Process Description:

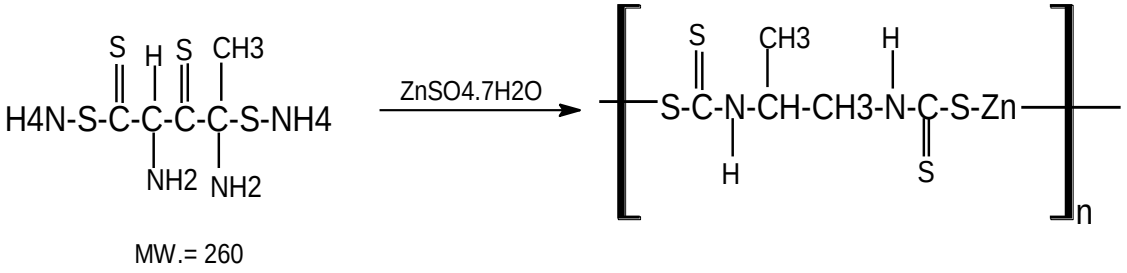
Carbon disulfide is charged into reactor with diaminopropane. Mass is allowed to react at controlled operating conditions (20 – 25°C).

15% ammonia solution is dropped in the reactor gradually. After cooking the mass for 2 hrs, at the same temperature the reaction mass is reacted with zinc sulfate solution in presence of water.

Crude mass is then centrifuged, washed with water and dried to get technical grade Propineb.

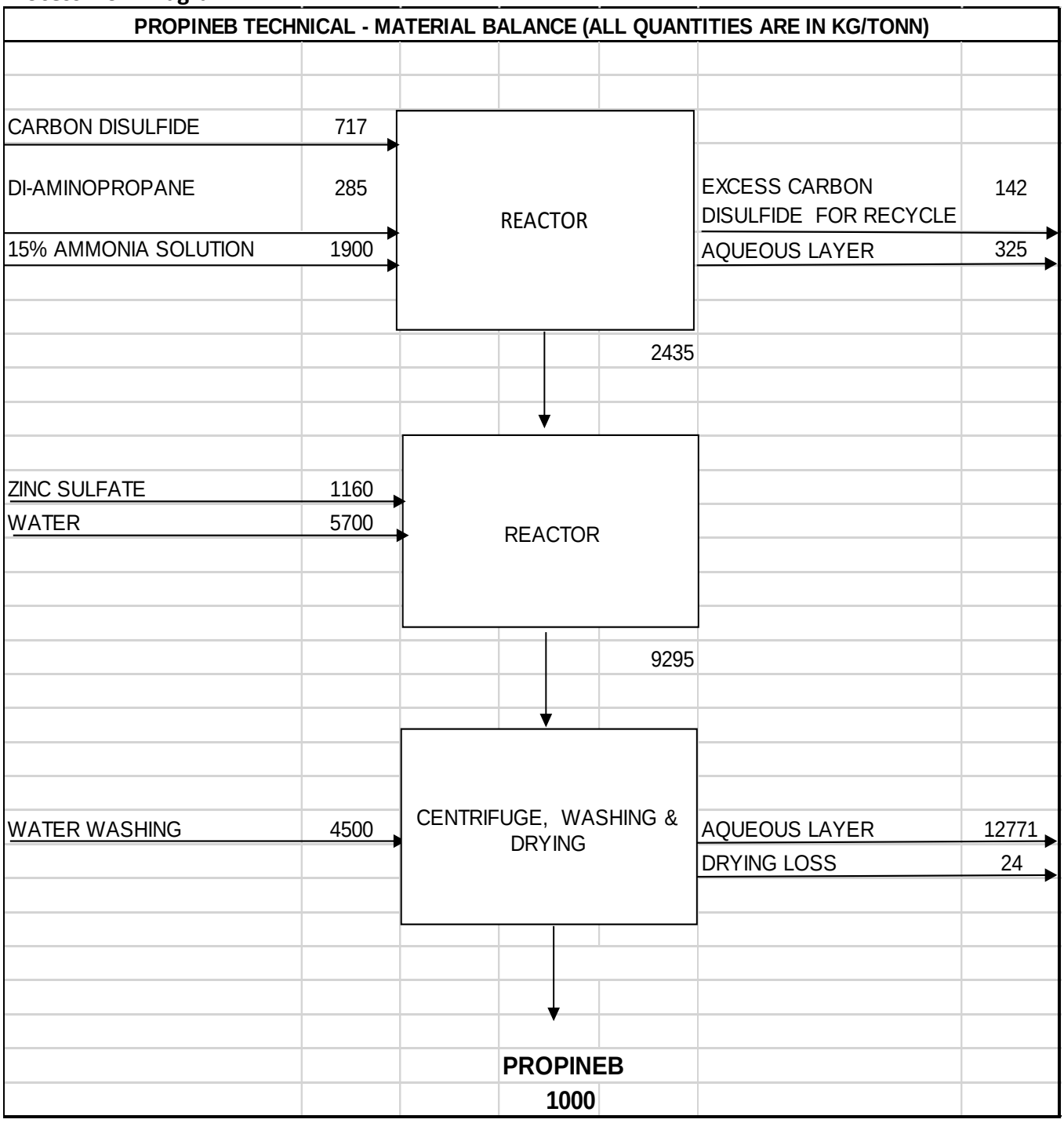
Process Reaction:





PROPINEB
MW.= 289

Process Flow Diagram:



Material Balance:

Material Balance for Propineb

S. No.	Raw Materials	Input/MT of Product (KG)
1	Carbon Disulfide	717
2	Di-Aminopropane	285
3	15% Ammonia Solution	1900
4	Zinc Sulfate	1160
5	Water	10200
Total		**14262**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission /Loss	Recovery	Solid Waste	
1	Propineb	-	-	1000	-	Product
2	Aqueous Layer	13096	-	-	-	To ETP
3	Excess Carbon Disulfide	-	-	142	-	For recycle
4	Drying Loss	-	24	-	-	To Atmos.
Total		**13096**	**24**	**1142**		
		14262				

(F-10)Azoxystrobin

Process Description:

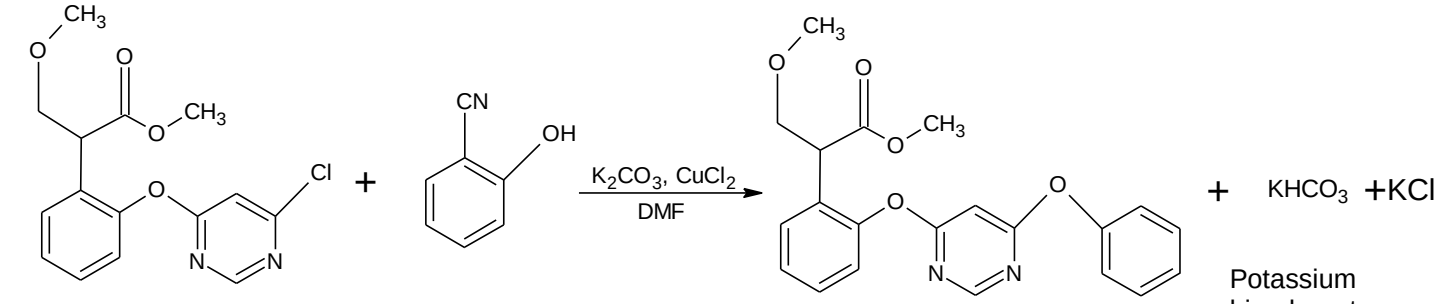
MMCPOA (Methyl-3-methoxy-2-2-6-chloropyrimidine-4-4-iyl-oxyphenyl- acrylate) and anhydrous Potassium carbonate are charged in DMF.

Charge 2 cyano Phenol to the above reaction mass, add catalytic amount of Cuprous Chloride and heat the reaction mass to 100°C for few hours.

Filter the reaction mass to remove inorganics and distil out DMF from reaction mass. Add hexane and wash the reaction mass with dilute caustic to remove unreacted cyano phenol from the reaction mass.

Crystallize the crude with methanol, centrifuge and dry to get technical grade Azoxystrobin as white crystalline solid.

Process Reaction:



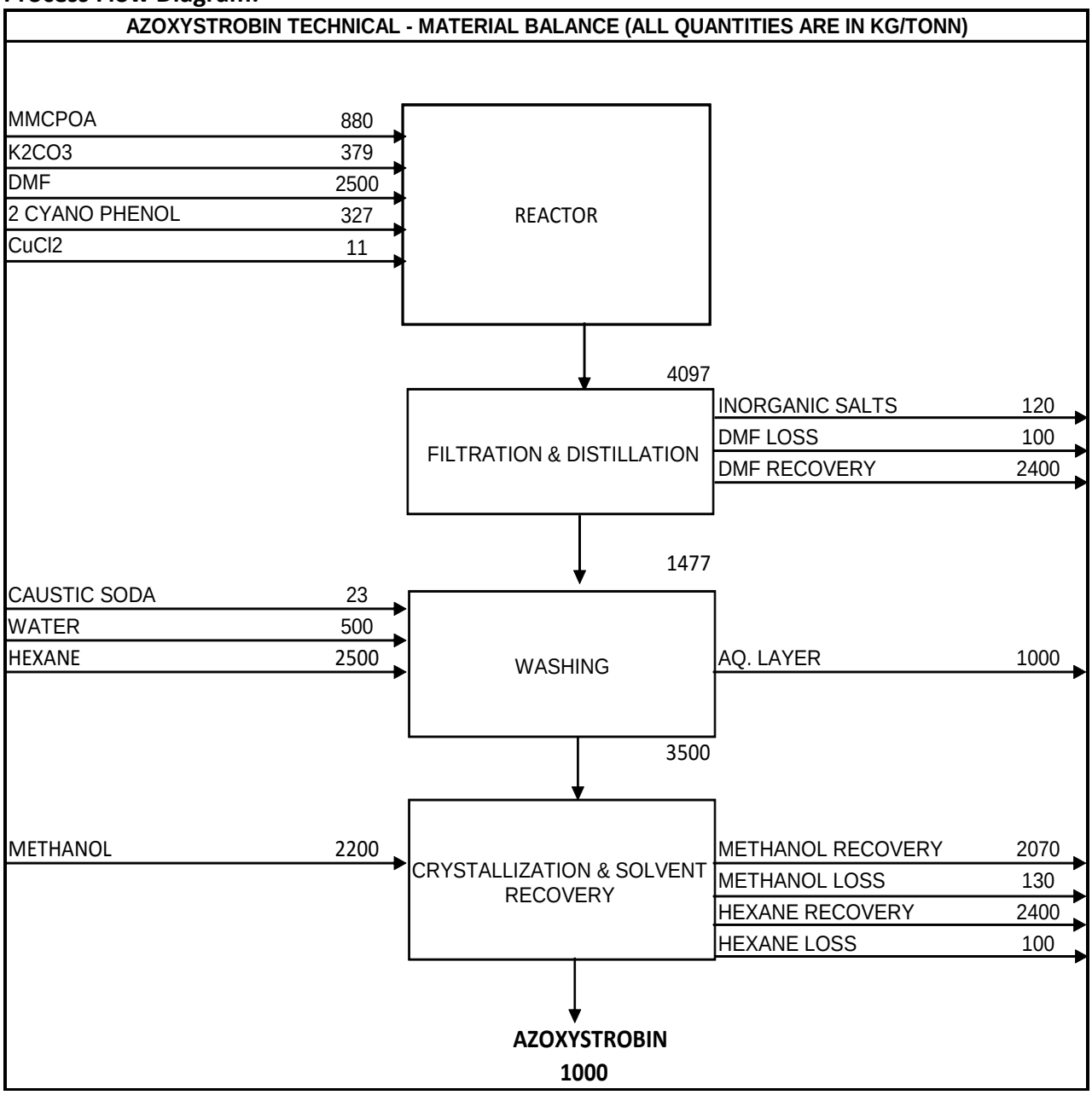
Methyl-3-methoxy-2-2-6-chloropyrimidine-4-4-iyl-oxyphenyl-acrylate
MW.= 320.78

2-CYANO PHENOL
MW.= 119.12

AZOXYSTROBIN
MW.= 403.4

Potassium bicarbonate
MW.= 100

Process Flow Diagram:



Material Balance:

Material Balance for Azoxystrobin		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	MMCPOA	880
2	K2CO3	379
3	DMF	2500
4	2 CYANO PHENOL	327
5	CuCl2	11
6	CAUSTIC SODA	23
7	WATER	500
8	HEXANE	2500
9	METHANOL	2200
Total		**9320**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission /Loss**	**Recovery**	**Solid Waste**	
1	Azoxystrobin	-	-	1000	-	Product
2	DMF	-	100	2400	-	Recycle
3	Aqueous Layer	1000	-	-	-	To ETP
4	METHANOL	-	130	2070	-	Recycle
5	Hexane	-	100	2400	-	Recycle
6	Inorganic Salts	-	-	-	120	To Incineration
Total		**1000**	**330**	**7870**	120	
		9320				

(F-11) Myclobutanil

Process Description:

Stage 1:

4-Chlorophenyl acetonitrile is reacted with n-Butyl bromide in presence of a Phase transfer catalyst and caustic soda solution at 50 – 58°C. After the completion of the reaction the intermediate product is isolated by vacuum distillation.

Stage 2:

The intermediate from stage 1 is reacted with Dibromomethane and NaOH solution at 55 – 65°C. Maintain the reaction for 3 – 4 hrs at the above temperature until the reaction is complete. Separate the organic layer and send the aqueous layer to ETP. The organic layer is distilled to get pure bromo intermediate.

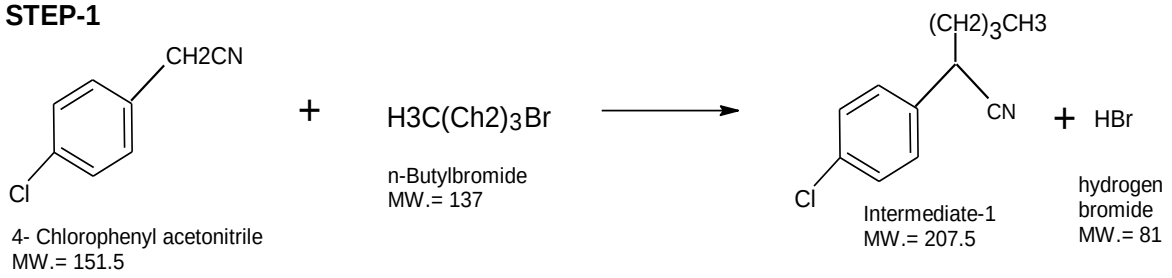
Stage 3:

Charge intermediate, Dimethyl Formamide, 1,2,4-Trizole and NaOH in the reactor and maintain the mass under stirring at 75 – 85°C temperature until the reaction is complete. Recover DMF under vacuum and take the mass in toluene.

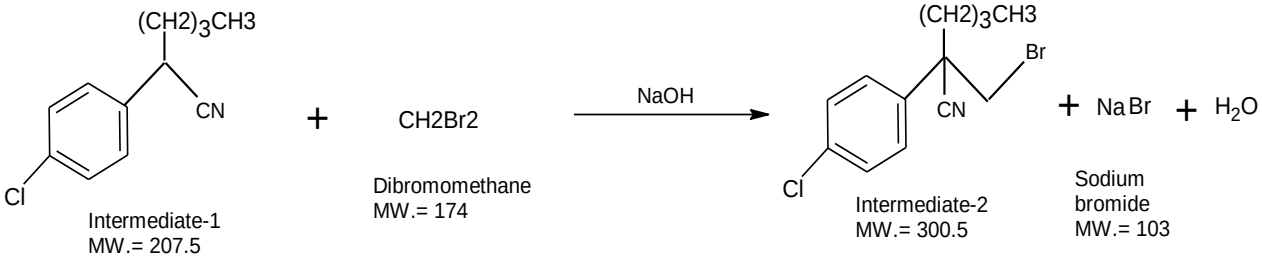
The slurry is crystallised, centrifuged and the cake is dried to get Myclobutanil technical. The toluene solvent is recovered from the ML by distillation and recycled.

Process Reaction:

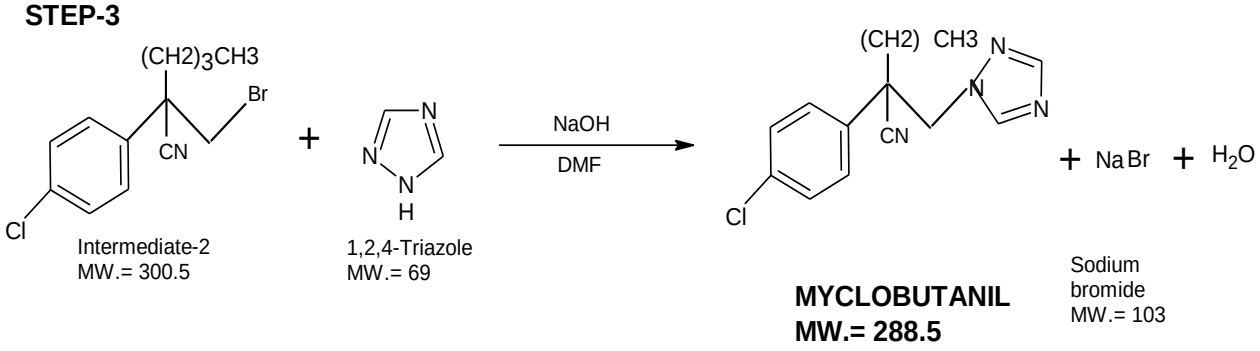
STEP-1



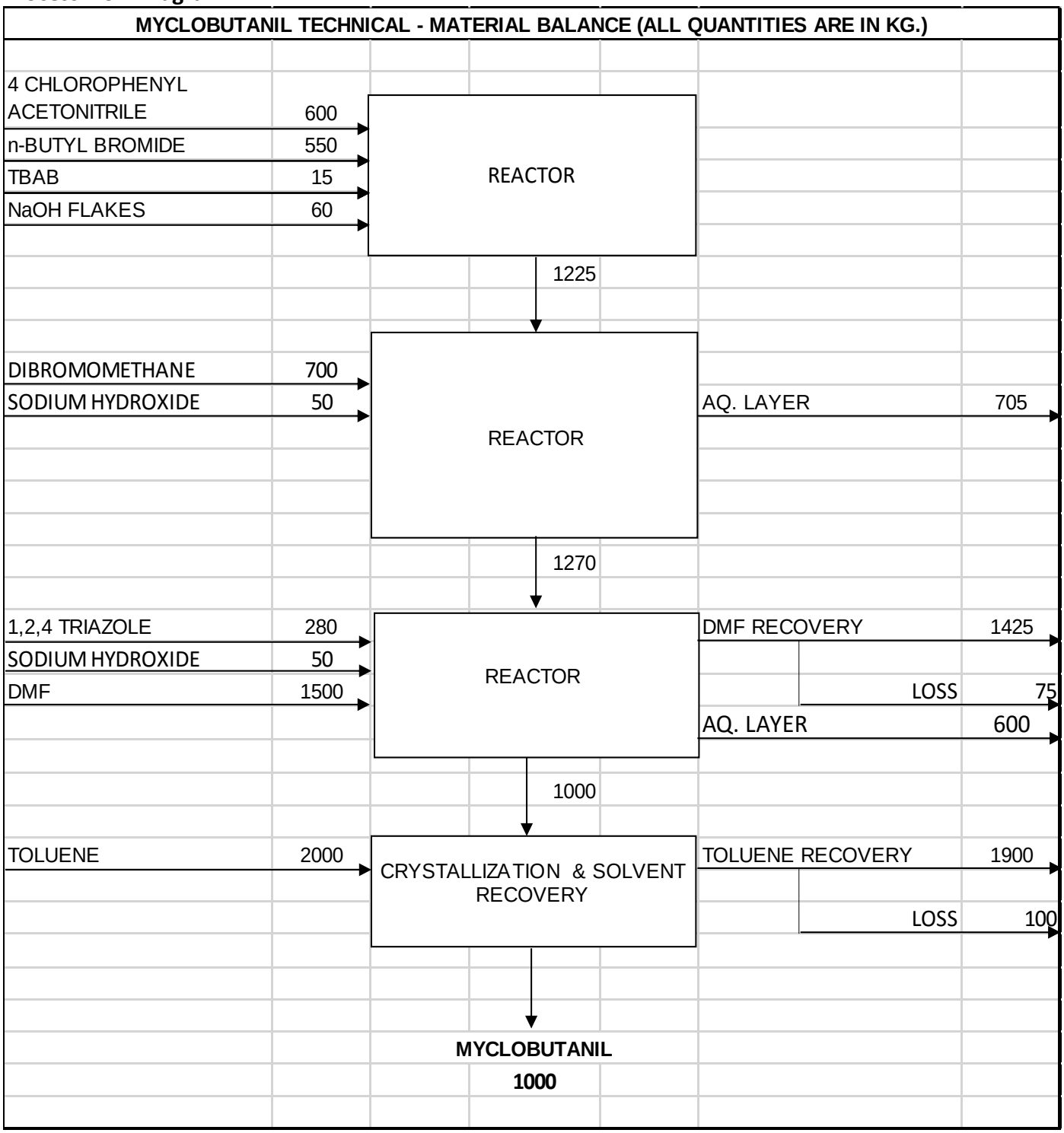
STEP-2



STEP-3



Process Flow Diagram:



Material Balance:

Material Balance for Myclobutanil		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	4 chlorophenyl acetonitrile	600
2	n-Butyl Bromide	550
3	TBAB	15
4	NaOH	160
5	Dibromomethane	700
6	DMF	1500
7	Toluene	2000
8	1,2,4 Triazole	280
Total		**5805**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission	Recovery	Solid Waste	
1	Myclobutanil	-	-	1000	-	Product
2	DMF	-	75	1425	-	Recycle
3	Aqueous Layer	1305	-	-	-	To ETP
4	Toluene	-	100	1900	-	Recycle
Total		**1305**	**175**	**4325**	**-**	
		5805				

(F-12) Carbendazim

Process Description:

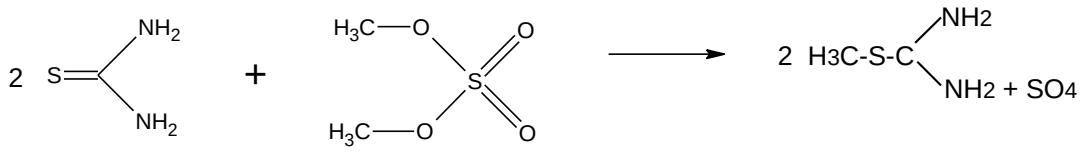
Water, Thiourea and Dimethylsulfate are reacted at a temperature of 20 – 25°C to get SMTU intermediate. This SMTU product is further reacted with MCF and formed Methyl fomate of Thiourea.

The intermediate formed is further reacted with O-phenylenediamaine at about 50 – 60°C in presence of formic acid to give up crude carbendazim at about 40 °C.

The Crude product is centrifuged and washed with water followed by drying to form Carbendazim technical.

Process Reaction:

STEP-1

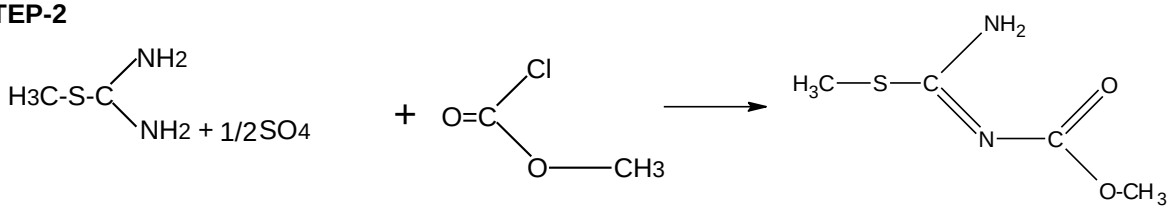


THIOUREA
MW.= 2* 76.12

DIMETHYL SULFATE
MW.= 126.1

INTERMEDIATE-1
MW.= 139.18

STEP-2



INTERMEDIATE-1
MW.= 139.18

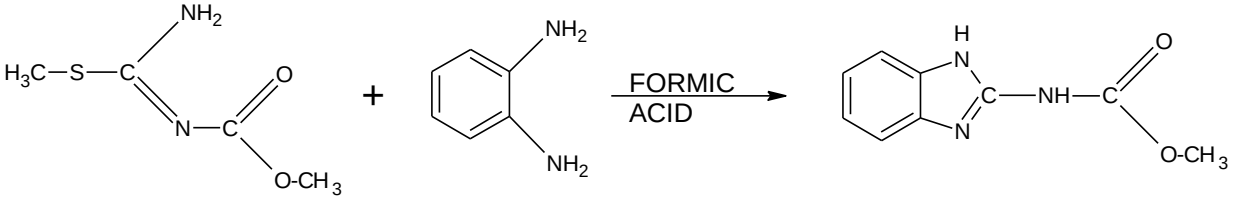
METHYL CHLOROFORMATE
MW.= 94.5

INTERMEDIATE-2
MW.= 148.18

\+

1/2 H_2SO_4 + HCl

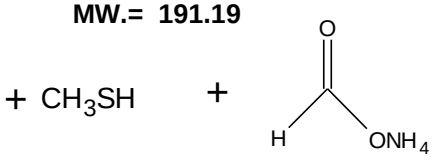
STEP-3



INTERMEDIATE-2
MW.= 148.18

O-PHENYL DIAMINE
MW.= 108.1

CARBENDAZIM
MW.= 191.19

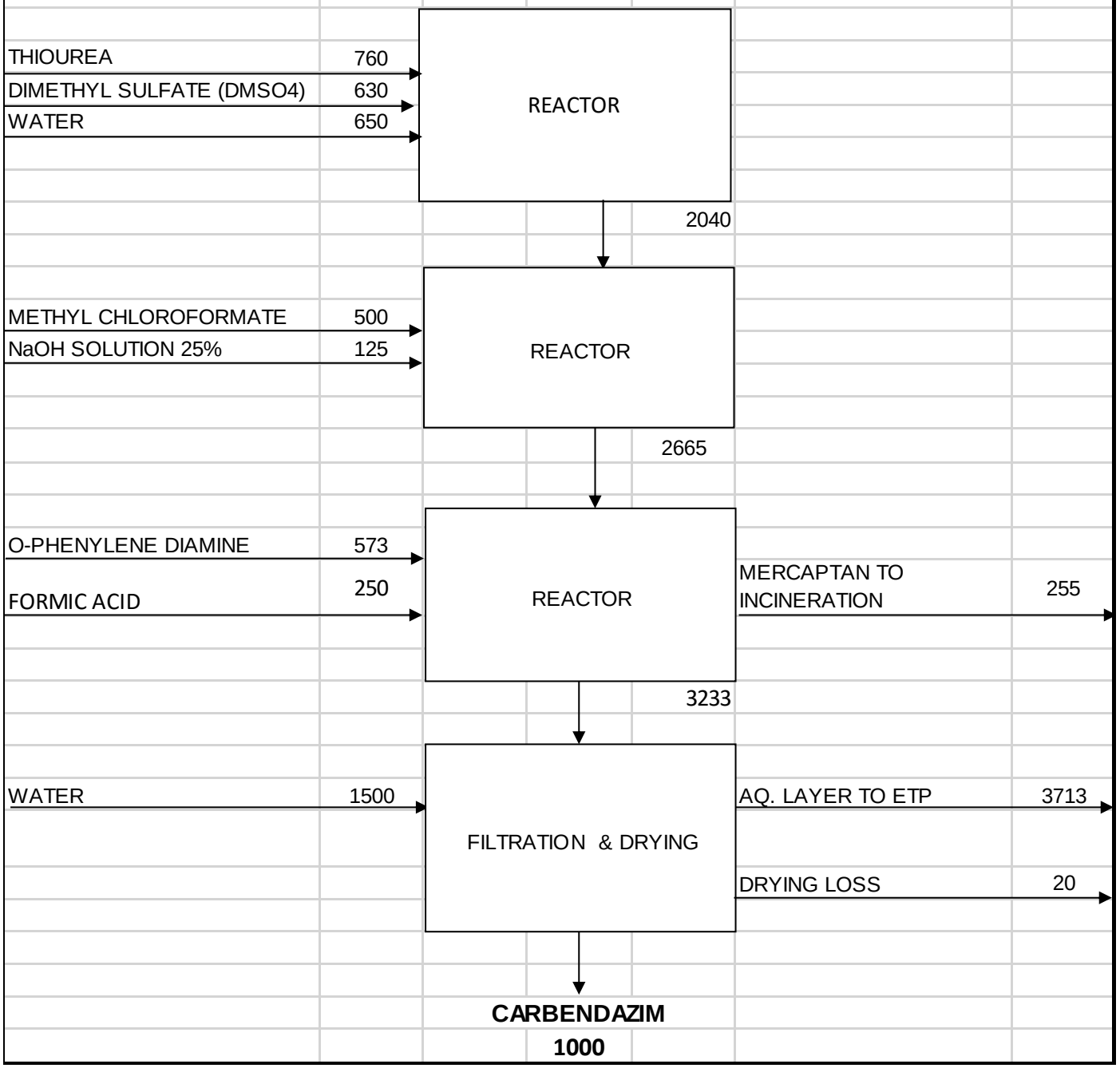


MERCAPTAN
MW.= 48.11

Ammonium Formate
M.W.=63.05

Process Flow Diagram:

CARBENDAZIM TECHNICAL - MATERIAL BALANCE (ALL QUANTITIES ARE IN KG/TONN)



Material Balance:

Material Balance for Carbendazim		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Thiourea	760
2	Dimethyl Sulfate	630
3	Water	2150
4	Methyl Chloroformate	500
5	NaOH Solution 25%	125
6	Formic Acid	250
7	O-Phenylene Diamine	573
Total		**4988**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Carbendazim	-	-	1000	-	Product
2	Aqueous Layer	3713	-	-	-	To ETP
4	Mercaptan	-	255	-	-	To Inceneration
5	Drying Loss	-	20	-	-	To Atmosphere
Total		**3713**	**275**	**1000**		
		4988				

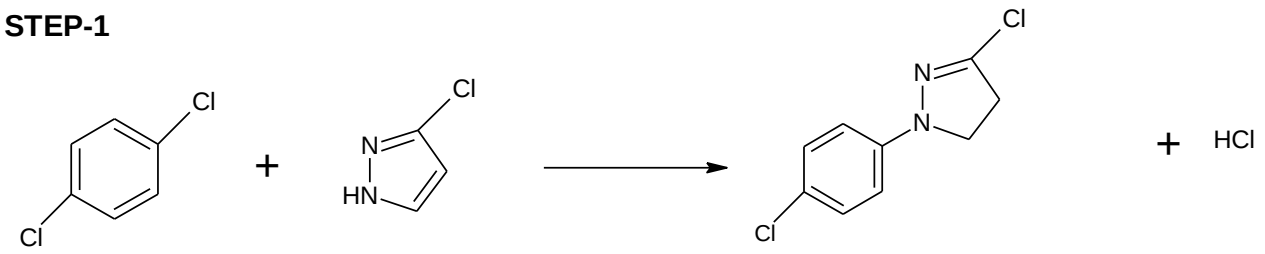
(F-13) Pyraclostrobin

Process Description:

Step – 1
1, 4 Dichloro Benzene reacts with 3-Chloro Pyrazole in presence of catalyst & solvent Xylene to form Intermediate (A) as 3-Chloro 4-Chloro Phenyl Pyrazole.
Step – 2
2-Chloro Benzyl Alcohol reacts with N-MethoxyCarbamate to form the second Intermediate (B), N-methoxy, N-(2-Oxymethyl Phenol) Carbamate.
Step – 3
Intermediates (A) & (B) then undergoes Condensation reaction in presence of Catalyst & Solvent Xylene to give the final product Pyraclostrobin Technical after Filtration, Washing & Drying. Xylene is recovered from the ML and recycled.

Process Reaction:

STEP-1

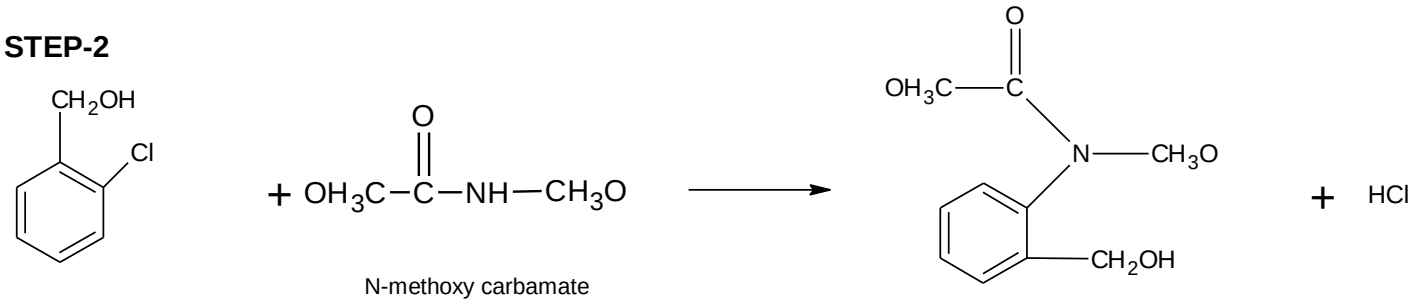


1,4 Dichloro benzene
MW.=147

3- Chloro pyrazole
MW.=102.5

3-Chloro 4- chloro phenyl pyrazole
MW.= 213

STEP-2

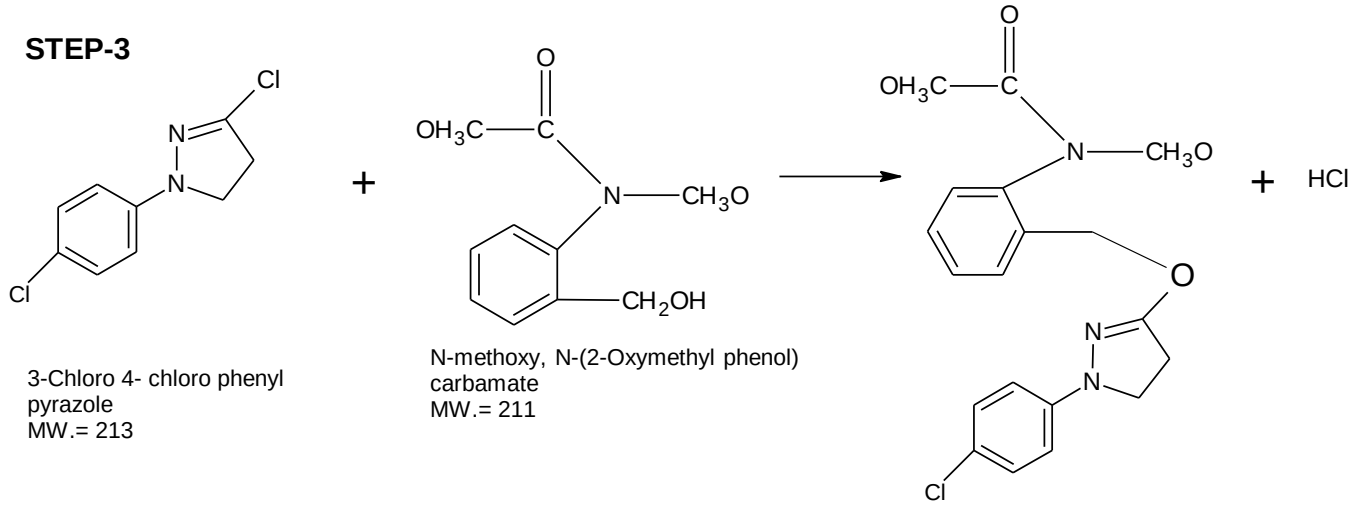


2-Chloro benzyl alcohol
MW.=142.58

N-methoxy carbamate
MW.= 105

N-methoxy, N-(2-Oxymethyl phenol) carbamate
MW.= 211

STEP-3

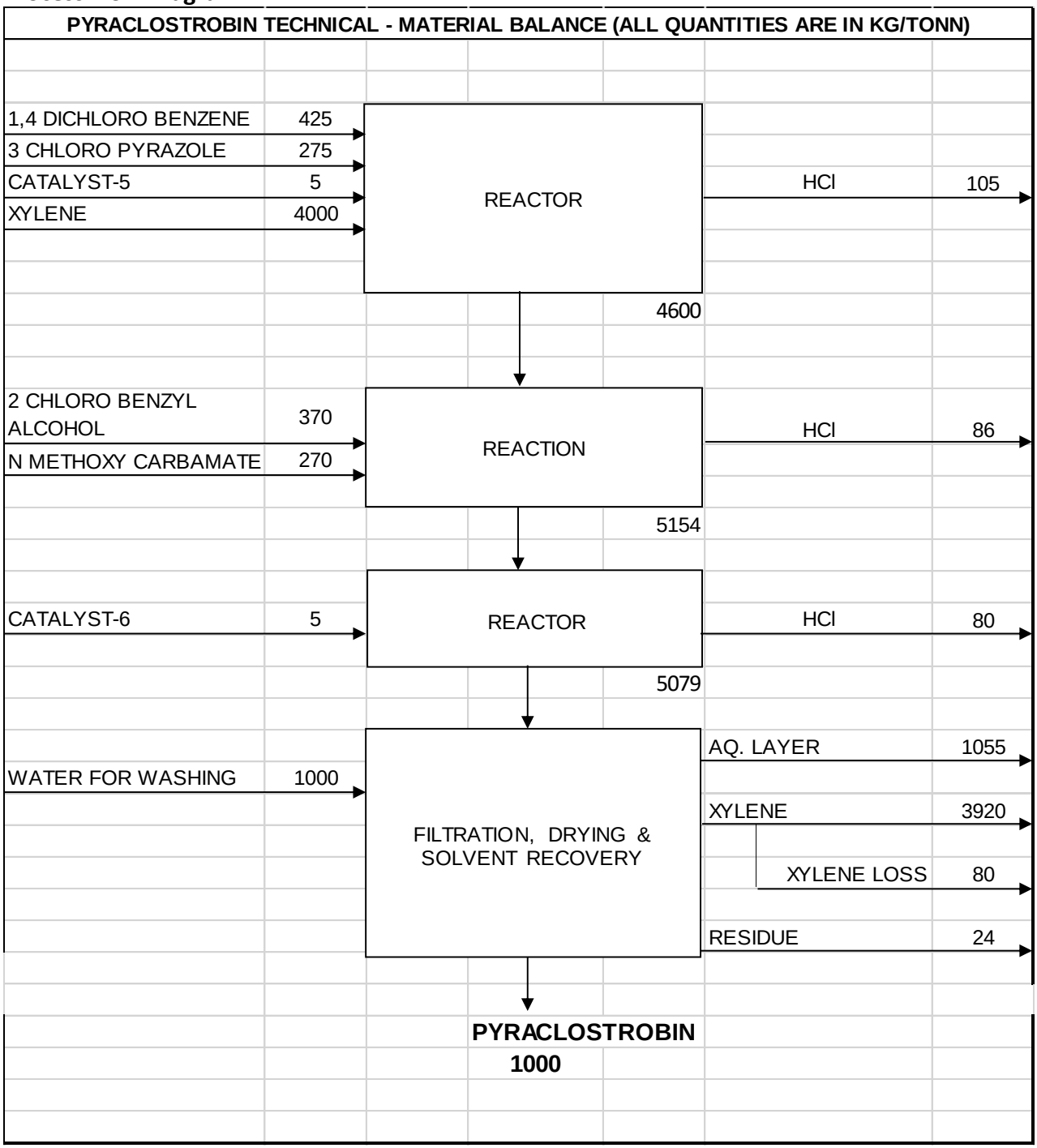


3-Chloro 4- chloro phenyl pyrazole
MW.= 213

N-methoxy, N-(2-Oxymethyl phenol) carbamate
MW.= 211

Pyraclostrobin
MW.=387.82

Process Flow Diagram:



Material Balance:

Material Balance for Pyraclostrobin

S. No.	Raw Materials	Input/MT of Product (KG)
1	1,4 DichloroBenzene	425
2	3 Chloro Pyrazole	275
3	Catalyst-5	5
4	Catalyst-6	5
5	Xylene	4000
6	2 Chloro Benzyl Alcohol	370
7	N-Methoxy Carbamate	270
8	Water Washing	1000
Total		**6350**

.

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission/ loss	Recovery	Solid Waste	
1	Pyraclostrobin	-	-	1000	-	Product
2	Aqueous Layer	1055	-	-	-	To ETP
3	HCl	-	-	271	-	To Scrubber
4	Xylene	-	80	3920	-	Recycle
5	Residue	-	-	-	24	To Incineration
Total		**1055**	**80**	**5191**	**24**	
		6350				

(F-14) Trifloxystrobin

Process Description:

Step -1

2-Methyl Aniline is reacted with Sodium Nitrite and Hydrochloric acid to give 2-Methyl benzene Diazonium salt by diazotization at a low temperature.

Step -2

2-Methyl Benzene Diazonium salt further is reacted with Glyoxylic Acid methyl ester Oxime at 30 – 35°C to give 2-Methyl phenyl glyoxalin acid methyl ester Oxime.

Step -3

2-Methyl Phenyl Glyoxylic Acid methyl ester Oxime is reacted with Dimethyl sulfate in presence of Sodium Hydroxide at 45 – 50°C to give 2-Methyl Phenyl Glyoxylate-o-methyl Oxime.

Step -4

2-Methyl Phenyl Glyoxylate-o-methyl Oxime further on chlorination with chlorine gas in presence of Solvent EDC at 45 – 50°C gives 2-Chloromethyl phenyl Glyoxylate-o-methyl Oxime.

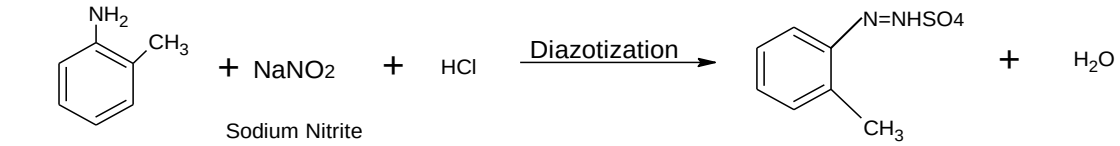
Step-5

2-Chloromethyl Phenyl Glyoxylate-o-methyl Oxime reacted with Sodium [-1- [3- (Trifluoromethyl) Phenyl] Ethylidene]Amine] Oxidamine in presence of Solvent – DMF at 75 – 80°C to give crude product Trifloxystrobin.

The solvent is distilled out under vacuum, the residual mass is taken in water, centrifuged and dried to get TRIFLOXYSTROBIN Technical.

Process Reactions:

STEP-1

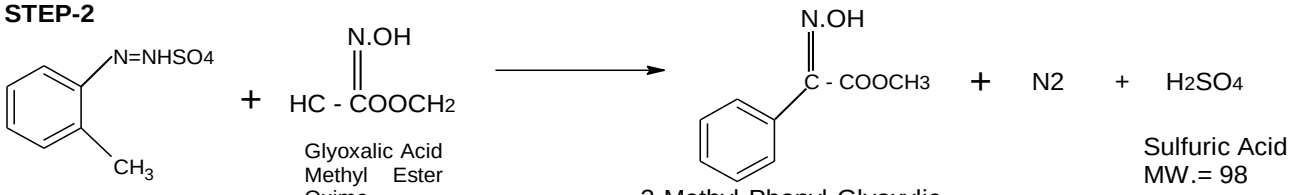


2-Methyl Aniline
MW.= 107

Sodium Nitrite
MW.= 69

2-Methyl Benzone
Diazonium Salt
MW.= 216

STEP-2



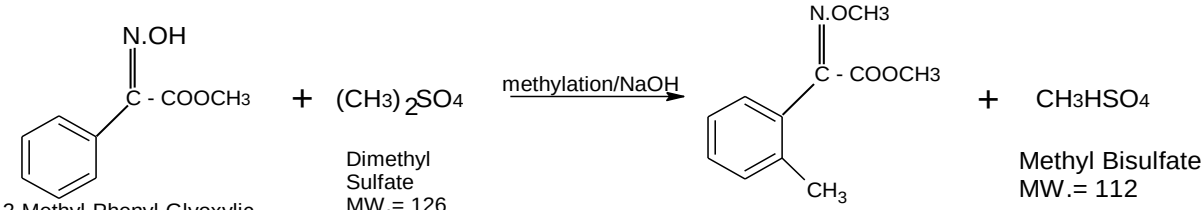
2-Methyl Benzone
Diazonium Salt
MW.= 216

Glyoxalic Acid
Methyl Ester
Oxime
MW.= 103

2-Methyl Phenyl Glyoxylic
Acid Methyl Ester Oxime
MW.= 193

Sulfuric Acid
MW.= 98

STEP-3



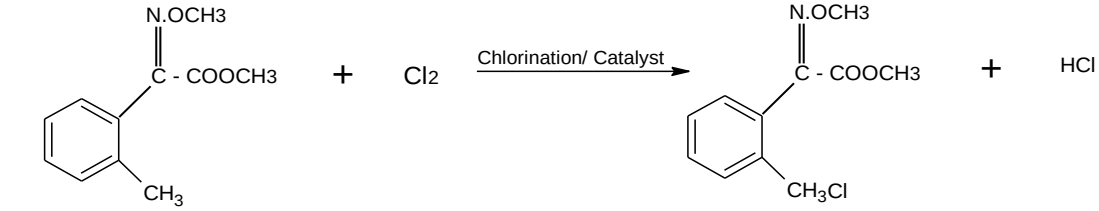
2-Methyl Phenyl Glyoxylic
Acid Methyl Ester Oxime
MW.= 193

Dimethyl
Sulfate
MW.= 126

2-Methyl Phenyl Glyoxylate
O-Methyl Oxime
MW.= 207

Methyl Bisulfate
MW.= 112

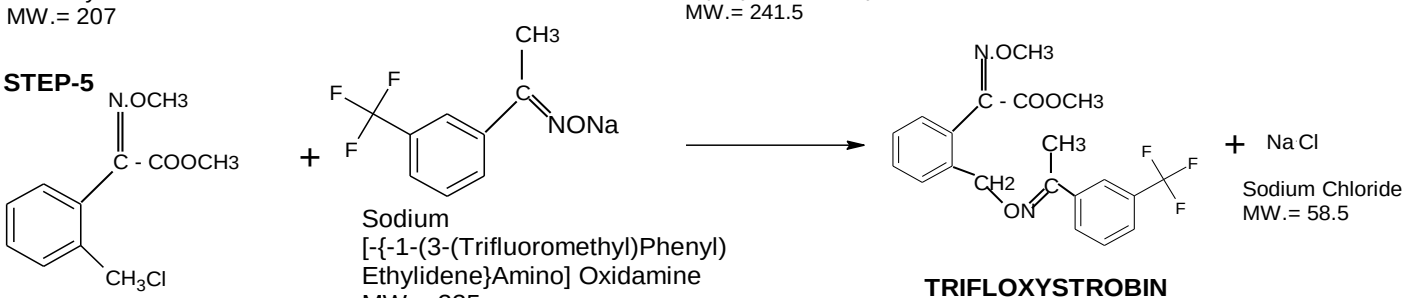
STEP-4



2-Methyl Phenyl Glyoxylate
O-Methyl Oxime
MW.= 207

2-(Chloromethyl)Phenyl
Glyoxylate-O-Methyl Oxime
MW.= 241.5

STEP-5



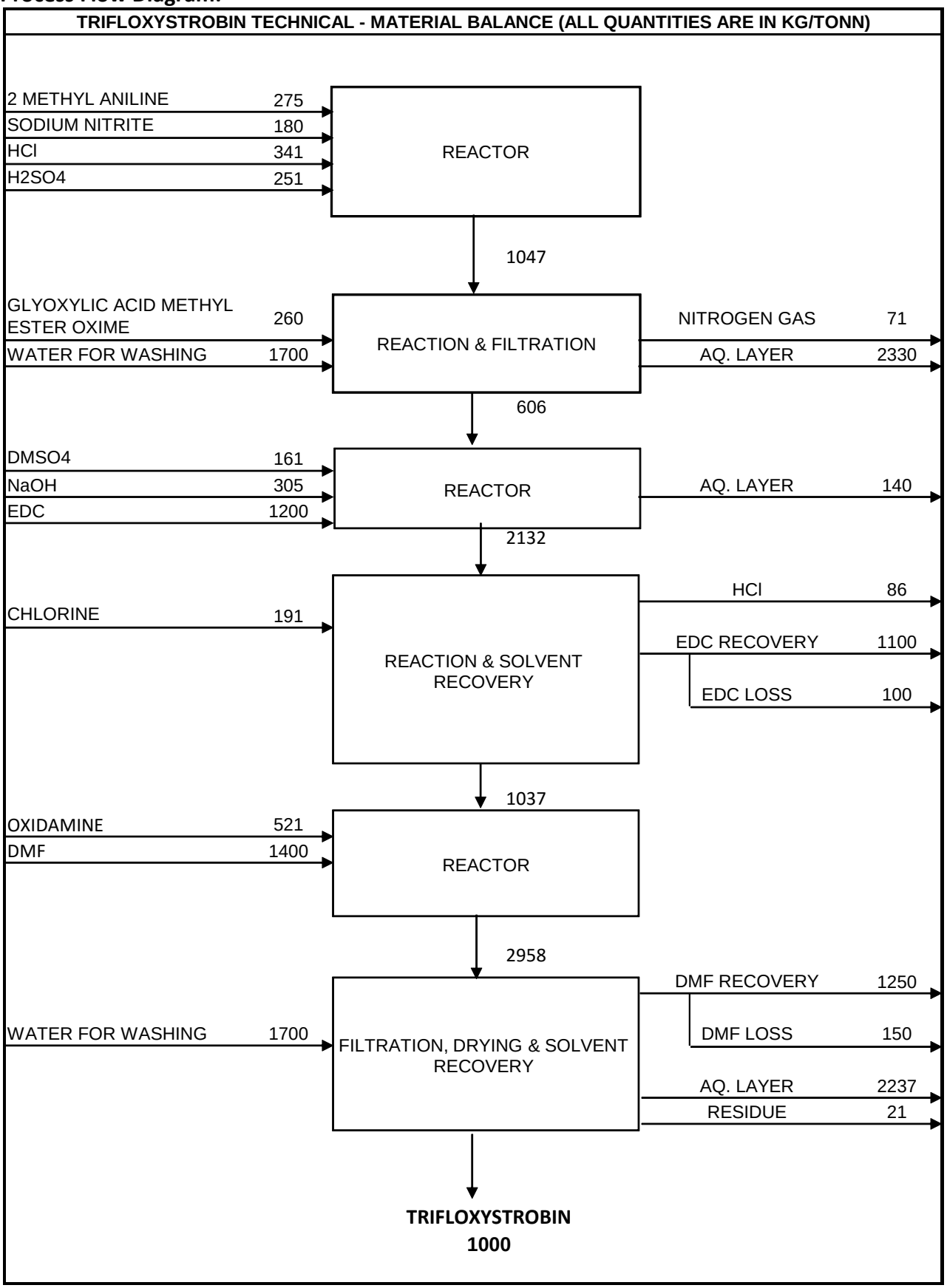
2-(Chloromethyl)Phenyl
Glyoxylate-O-Methyl Oxime
MW.= 241.5

Sodium
[-{-1-(3-(Trifluoromethyl)Phenyl)
Ethylidene}Amino] Oxidamine
MW.= 225

TRIFLOXYSTROBIN
MW.= 408

Sodium Chloride
MW.= 58.5

Process Flow Diagram:



Material Balance:

Material Balance for Trifloxystrobin

S. No.	Raw Materials	Input/MT of Product (KG)
1	2-Methyl Aniline	275
2	Sodium Nitrite	180
3	HCl	341
4	H2SO4	251
5	Glyoxylic Acid Methyl Ester Oxime	260
6	Water	3400
7	DMSO4	161
8	NaOH	305
9	EDC	1200
10	Chlorine	191
11	Oxidamine	521
12	DMF	1400
Total		**8485**

S. No.	Output/MT of Product (KG)					Remarks
	Product	Liquid Effluent	Air Emission/ loss	Recovery	Solid Waste	
1	Trifloxystrobin	-	-	1000	-	Product
2	Aqueous Layer	4707	-	-	-	To ETP
3	Nitrogen gas	-	71	-	-	To atmosphere
4	HCl	-	86	-	-	To Scrubber
5	EDC	-	100	1100	-	Recycle
6	DMF	-	150	1250	-	Recycle
7	Residue	-	-	-	21	To Incineration
Total		**4707**	**407**	**3350**	**21**	
		8485				

(F-15) Fluoxastrobin

Process Description:

Step -1

2- HydroxyPhenacyl Bromide is reacted with Methoxy Amine in presence of catalyst as well as Solvent -

Toluene to form 2- [(1E) -2- Bromo –N- MethoxyEthanimidoyl] Phenol at 60 – 65°C.

Distil out toluene after completion of reaction.

Step -2

2- [(1E) -2- Bromo –N- MethoxyEthanimidoyl] Phenol reacted with potassium Tertiary Butoxide and Tertiary Butyl Nitrate in presence of Butyl Alcohol to form N- Hydroxy –N- Methoxy -1- Benzofuran -2,3-Diamine at 75 – 80°C.

Step -3

N- Hydroxy –N- Methoxy -1- Benzofuran -2,3- Diamine is reacted with Ethylene Oxide in presence of Potassium Hydroxide at 20 – 25°C to give 2- [{(3E) -3 - Methoxyiaino -1- Benzofuran -2-(3H) –ylidene} amino}oxy] Ethanol.

Step - 4

2- [{(3E) -3- Methoxyamino -1- Benzofuran -2-(3H) –ylidene} amino} oxy] Ethanol undergoes Cyclization in presence of Potassium Hydroxide to form 2- [{(E) 5,6 –Di hydro 1,4,2 Dioxazin -3- yl (methoxyimino) methyl) Phenol at 55 – 60°C. Distil off n-Butanol.

Step -5

2- [{(E) 5,6 –Di hydro 1,4,2 Dioxazin -3- yl (methoxyimino) methyl) Phenol is reacted at 80 – 85°C, with 4,6 – Dichloro -5-Fluoro Pyrimidine in presence of Potassium Hydroxide as well as Solvent – Dimethyl Formamide to form (E) -1-[2- {6- Chloro -5- Fluoro Pyrimidine -4- yl) oxy }Phenyl]-1-(5,6 Dihydro -1,4,2 -Dioxazin -3- yl) –N –Methoxymethanimine.

Step -6

(E) -1- [2- {6- Chloro -5- Fluoro Pyrimidine -4- yl) oxy}Phenyl]-1-(5,6 Dihydro -1,4,2 -Dioxazin -3- yl) –N –Methoxymethanimine is reacted at 60 – 65°C, with O–Chloro Phenol in presence of Potassium Hydroxide and Solvent – DMF to form final product as Fluoxastrobin. Distil out DMF, charge water, centrifuge and dry to get Fluoxastrobin technical.

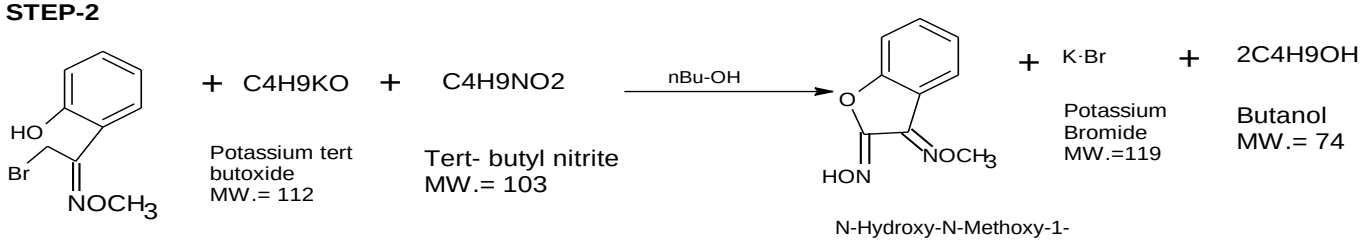
Process Reaction:

STEP-1

2-Hydroxy Phenacyl Chloride
MW.= 215

2-((1E)-2-Bromo-N-Methoxy ethanimidoyl) Phenol
MW.= 244

STEP-2



Potassium tert butoxide
MW.= 112

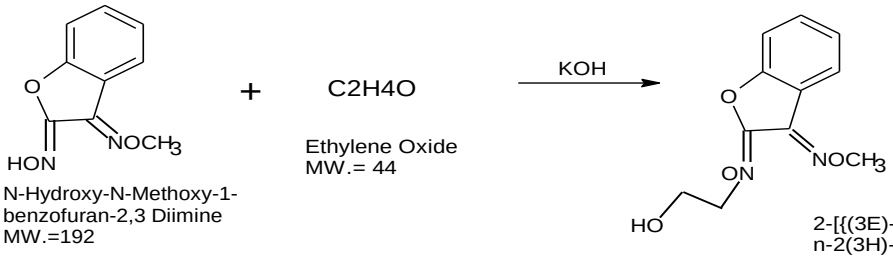
Tert- butyl nitrite
MW.= 103

N-Hydroxy-N-Methoxy-1-benzofuran-2,3 Diimine
MW.=192

Potassium Bromide
MW.=119

Butanol
MW.= 74

STEP-3

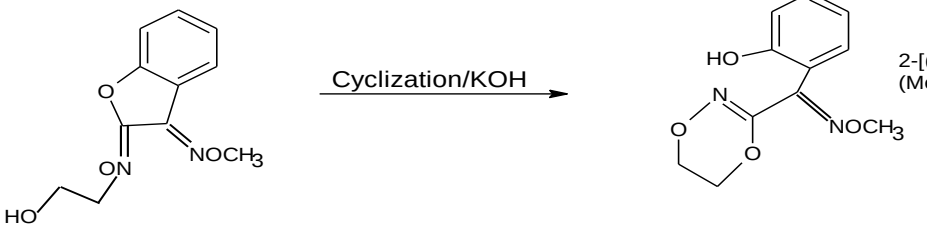


N-Hydroxy-N-Methoxy-1-benzofuran-2,3 Diimine
MW.=192

Ethylene Oxide
MW.= 44

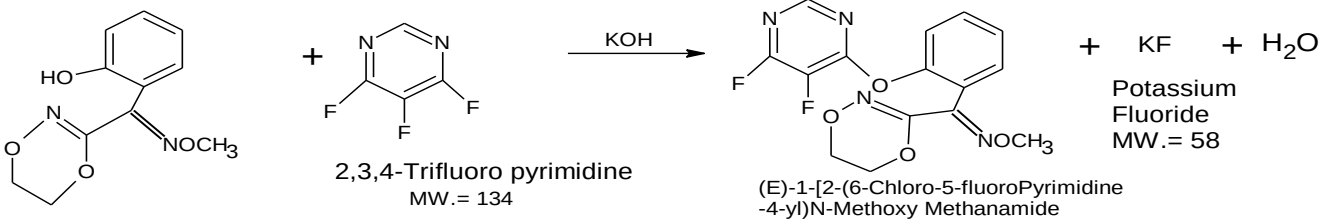
2-[{(3E)-3-Methoxyimino-1-Benzofuran-2(3H)-ylidene Amino}oxy] ethanol
MW.= 236

STEP-4



2-[(E) 5,6-Dihydro-1,4,2 Dioxazin-3-Yl (Methoxyimino)Methyl] Phenol
MW.=236

STEP-5

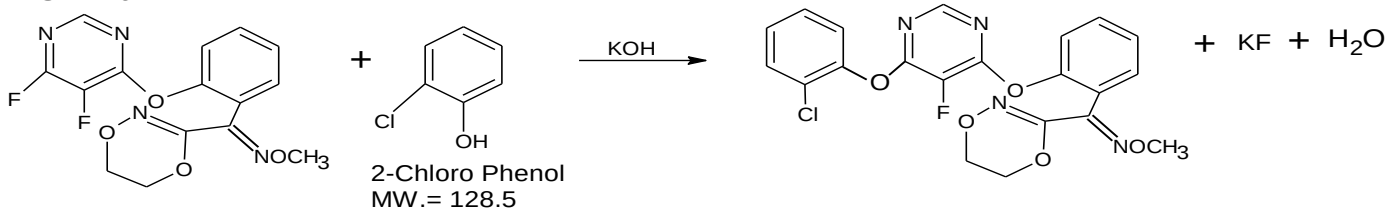


2,3,4-Trifluoro pyrimidine
MW.= 134

(E)-1-[2-(6-Chloro-5-fluoroPyrimidine -4-yl)N-Methoxy Methanamide
MW.=350

Potassium Fluoride
MW.= 58

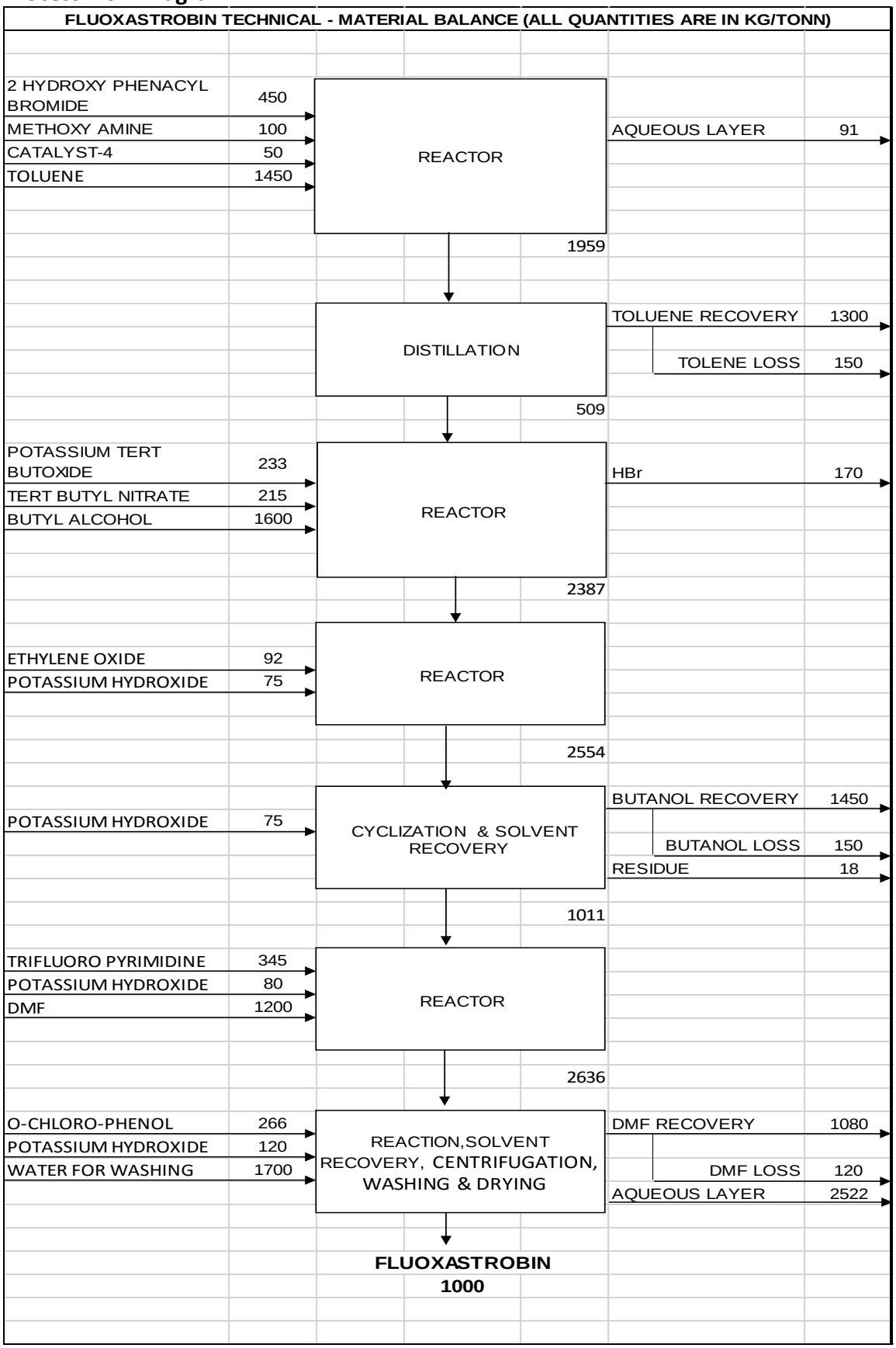
STEP-6



2-Chloro Phenol
MW.= 128.5

FLUOXASTROBIN
MW.= 458.8

Process Flow Diagram:



Material Balance:

Material Balance for Fluoxastrobin		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Hydroxy Phenyl Bromide	450
2	Methoxy Amine	100
3	Catalyst	50
4	Toluene	1450
5	Potassium Tert Butoxide	233
6	Tert Butyl Nitrate	215
7	Butyl Alcohol	1600
8	Ethylene Oxide	92
9	Potassium Hydroxide	350
10	Trifluoro Pyrimidine	345
11	DMF	1200
12	O-Chloro-Phenol	266
13	Water for Washing	1700
Total		**8051**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission /loss**	**Recovery**	**Solid Waste**	
1	Fluoxastrobin	-	-	1000	-	Product
2	Aqueous Layer	2613	-	-	-	To ETP
3	Toluene	-	150	1300	-	Recycle
4	HBr	-	170	-		To Scrubber
5	Butanol	-	150	1450	-	Recycle
6	Residue	-	-	-	18	To Incineration
7	DMF	-	120	1080		Recycle
Total		**2613**	**590**	**4830**	**18**	
		8051				

(F-16) Isoprothiolane

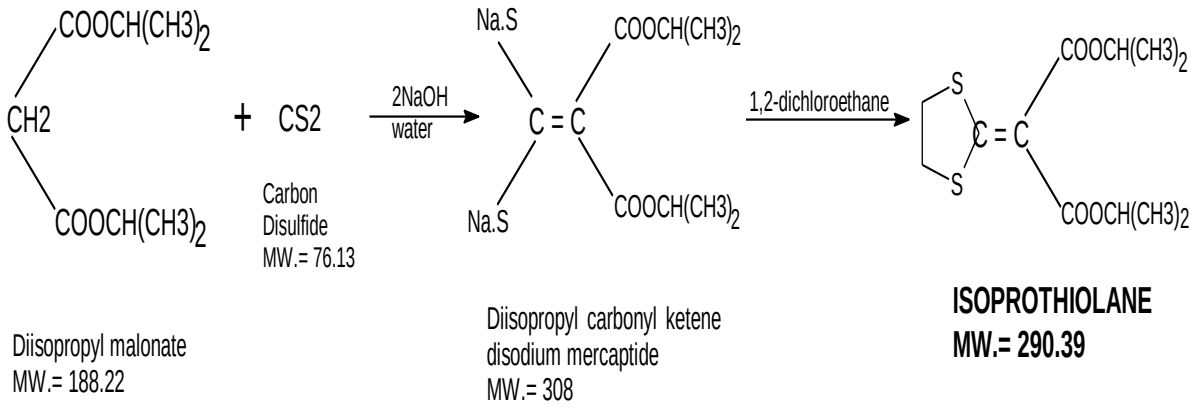
Process Description:

Diisopropyl malonate is reacted with carbon disulphide and NaOH in water medium to get diisopropoxy carbonyl ketene mercaptide disodium salt at a temperature of 10 – 15°C.

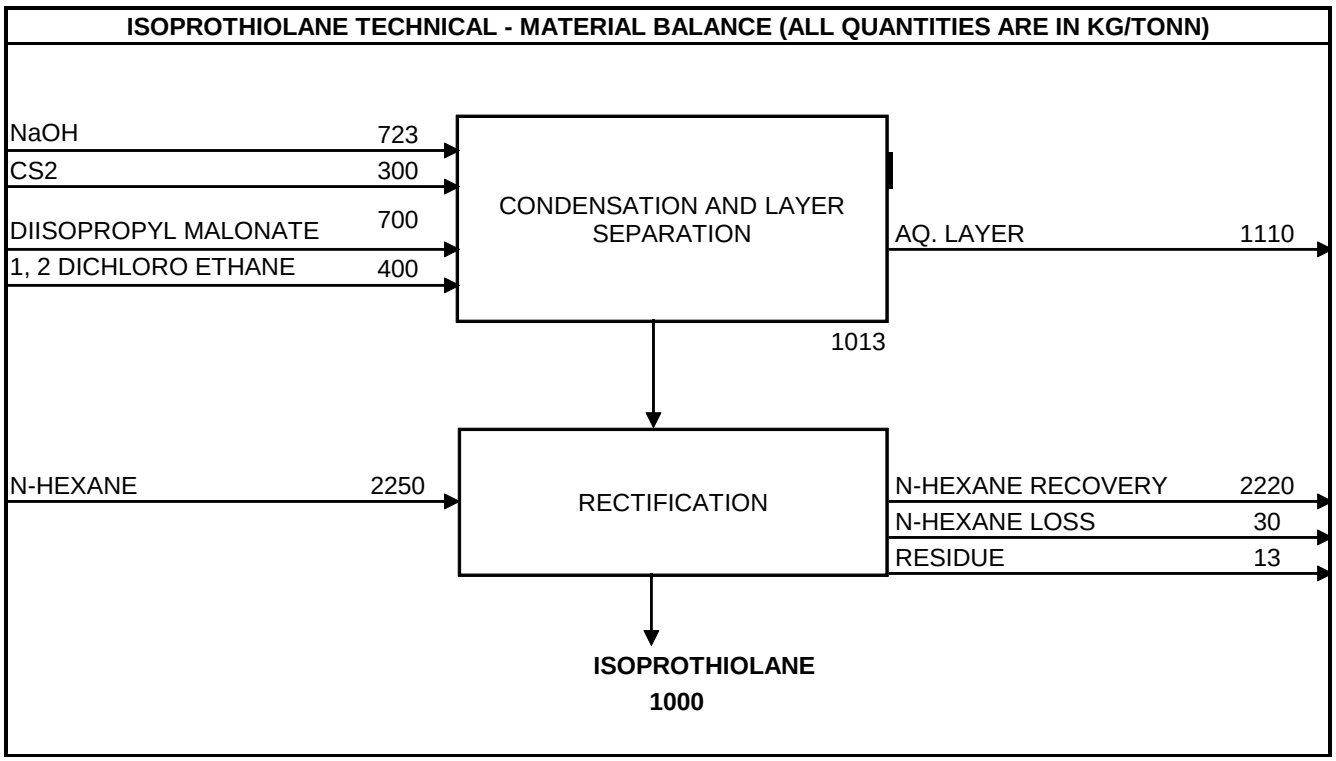
This intermediate is reacted with ethylene dichloride at 70 – 75°C to get crude Isoprothiolane.

This crude Isoprothiolane is centrifuged and purified by re-crystallization from n-hexane to get Isoprothiolane Technical. N-Hexane is recovered from ML and reused.

Process Reaction:



Process Flow Diagram:



Material Balance:

Material Balance for Isoprothiolane		
S. No.	**Raw Materials**	**Input/MT of Product (KG.)**
1	NaOH	723
2	CS2	300
3	Diisopropyl Malonate	700
4	1,2- Dichloro ethane	400
5	N-Hexane	2250
Total		**4373**

S. No.	**Output/MT of Product(KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission/ loss**	**Recovery**	**Solid Waste**	
1	Isoprothiolane	-	-	1000	-	Product
2	Aqueous Layer	1110	-	-	-	To ETP
3	Residue	-	-	-	13	For incineration
4	N-Hexane	-	30	2220	-	Recycle
Total		**1110**	**30**	**3220**	**13**	
		4373				

(PGR-1)Ethephon

Process Description:

Batch amounts of phosphorus trichloride and epoxyethane are charged into the reactor. Complete the reaction to form Tris (2-chloroethyl) phosphite under 1 kg/cm^2 at 20 – 25°C temperature in 5 hrs.

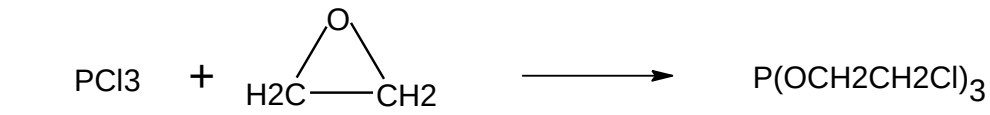
Transfer Tris(2-chloroethyl) phosphite into another reactor and then slowly heat up to 70 - 80°C temperature. When it reaches the temperature of rearranging reaction, Tris(2-chloroethyl) phosphite is converted into phosphodiester. Cool the mass to 50°C.

Put phosphodiester into another reactor, then slowly add HCl gas at 90 – 95°C for 5 hrs. Dichlorethane generated in reaction process distils out through the condenser and is collected as byproduct.

The technical product mass from the reactor is collected in drums.

Process Reaction:

ESTERIFICATION

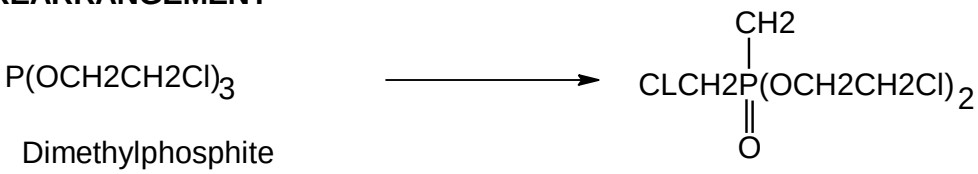


Phosphorus trichloride
MW.= 137.33

Epoxyethane
MW.= 132.15

Dimethylphosphite
MW.= 269.68

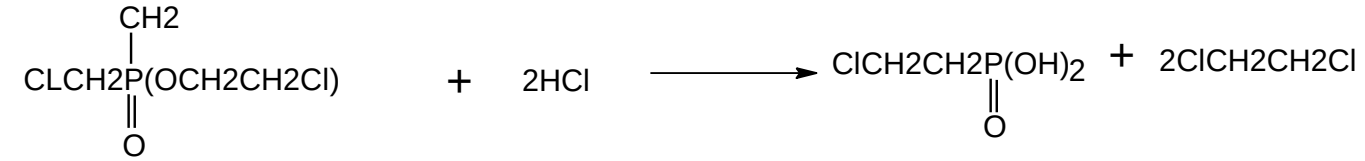
REARRANGEMENT



Dimethylphosphite
MW.= 269.68

Phosphodiester
MW.= 269.68

ACIDIFICATION

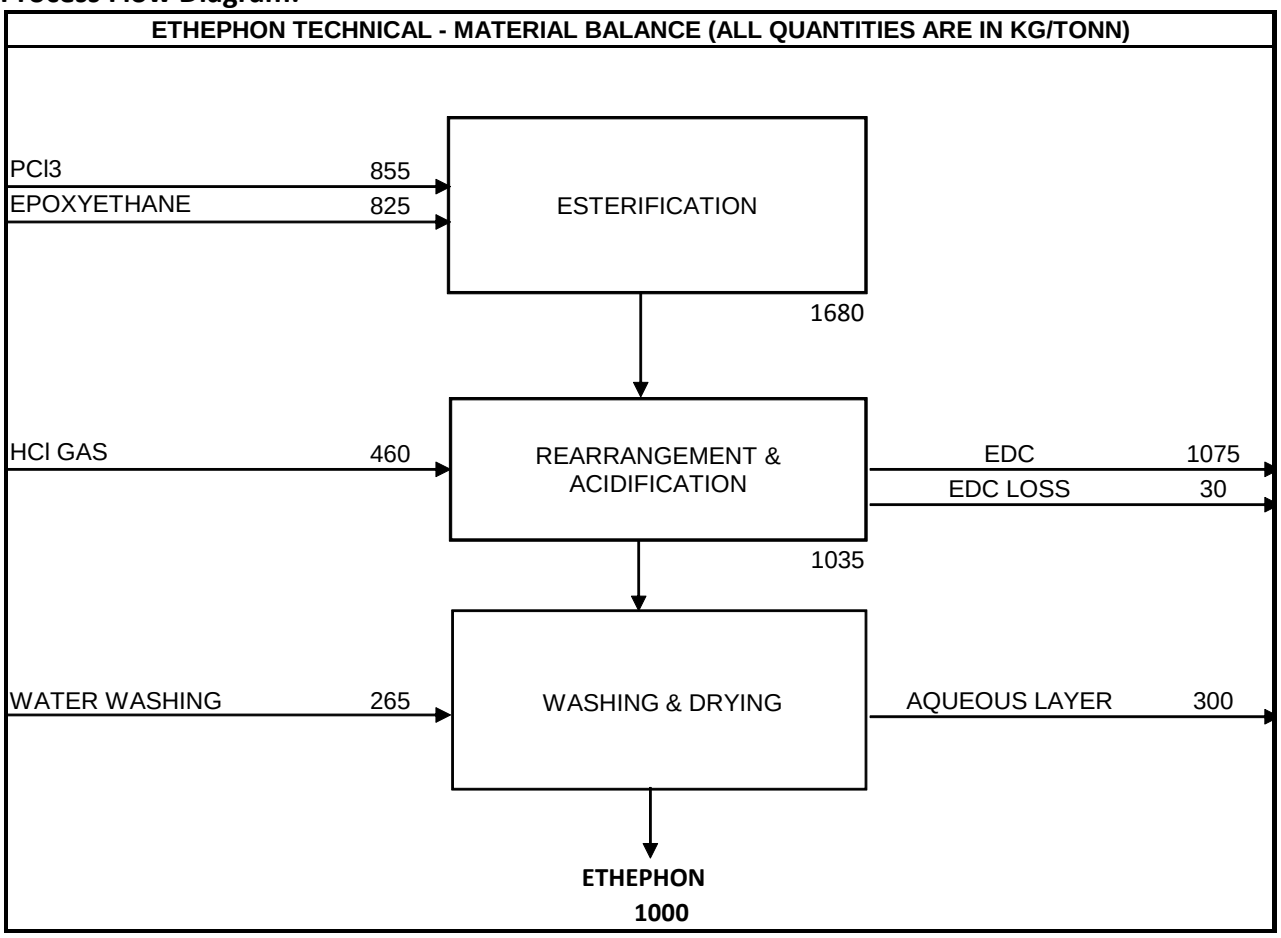


Phosphodiester
MW.= 269.68

Ethephon
MW.= 144.5

Dichloroethane
MW.= 198

Process Flow Diagram:



Material Balance:

Material Balance for Ethephon		
S. No.	**Raw Materials**	**Input/MT of Product (KG)**
1	Epoxyethane	825
2	Phosphorus tetrachloride	855
3	HCl gas	460
4	Water	265
Total		**2405**

S. No.	**Output/MT of Product (KG)**					**Remarks**
	Product	**Liquid Effluent**	**Air Emission /loss**	**Recovery**	**Solid Waste**	
1	Ethephon	-	-	1000	-	Product
2	EDC	-	30	1075	-	Byproduct
3	Aq. Layer	300	-	-	-	To ETP
Total		**300**	**30**	**2075**	-	
		2405				

PRODUCTS TOXICITY AND STORAGE INFORMATION								
S.No.	**Name of Product**	**Production (MT/Annum)**	**Physical State**	**Means of Storage**	**OPERATING CONDITIONS (STORAGE)**		**Carcinogenicity**	**LD 50(mg/kg)**
	HERBICIDE	**1100**			**PRESS. (Kg/cm2)**	**Temp. (°C)**		
1	Metribuzin		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	1090-2300
2	Atrazine		Solid	HDPE Bags	Ambient	Ambient	Inconclusive	3090
3	Sulfosulfuron		Solid	Fiber Drums	Ambient	Ambient	Suspected	980
4	Glyphosate		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	5600
5	Clodinafop Proparogyl		Solid	Fiber Drums	Ambient	Ambient	Suspected	1392
6	Pretilachlor		Liquid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	6049
7	Imazethapyr		Liquid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	>5000
8	Metsulfuron Methyl		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>5000
9	Pyrazosulfuron Ethyl		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>5000
10	Fenoxaprop-p-ethyl		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	3150-4000
11	Glufosinate Ammonium		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	1510-1660
12	Chlorimuron Ethyl		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	4102
13	Bispyribac Sodium		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	2635
14	Oxadiargyl		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>5000
15	Oxyflurofen		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	5000
16	Butachlor		Liquid	MS-LDPE lined drums	Ambient	Ambient	Suspected	2000
	INSECTICIDE	**2500**						
17	Acephate		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	866

18	Thiamethoxam		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	688
19	Indoxacarb		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	268
20	Fipronil		Solid	Fiber Drums	Ambient	Ambient	Suspected	97
21	Diafenthiuron		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	>2000
22	Buprofezin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	2198
23	Dichlorvos		Liquid	MS-LDPE lined drums	Ambient	Ambient	Inconclusive	25-80
24	Lambda Cyhalothrin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	56
25	Imidachloprid		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	450
26	Novaluron		Solid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	>5000
27	Bifenthrin		Solid	MS-LDPE lined drums	Ambient	Ambient	Class C carcinogen-EPA	54
28	Permethrin		Solid	MS-LDPE lined drums	Ambient	Ambient	Inconclusive	430-4000
29	Propargite		Liquid	MS-LDPE lined drums	Ambient	Ambient	Suspected	960
30	Chlorpyriphos		Solid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	95-270
31	Profenofos		Liquid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	358
32	Diflubenzuron		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	4640
33	Acetamiprid		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	330
34	Dinotefuran		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>2000
35	Emamectin Benzoate		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>92
36	Thiocyclam Oxalte		Solid	Fiber Drums	Ambient	Ambient	No relevant data available	195
37	Etoxazole		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>5000
38	Pymetrozine		Solid	Fiber Drums	Ambient	Ambient	Suspected	5820
39	Fenpyroximate		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	245

40	Triazophos		Liquid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	66
	FUNGICIDE	**900**						
41	Tricyclazole		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	314
42	Cymoxanil		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	960
43	Propiconazole		Liquid	MS-LDPE lined drums	Ambient	Ambient	Non carcinogenic	1517
44	Hexaconazole		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	2189
45	Tebuconazole		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>2000
46	Difenconazole		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	1453
47	Metalaxyl		Solid	HDPE Bags	Ambient	Ambient	Inconclusive	669
48	Carboxin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	1300
49	Propineb		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	3708
50	Azoxystrobin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>5000
51	Myclobutanil		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	1600
52	Carbendizim		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	>10000
53	Pyrachlostrobin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	5000
54	Trifloxystrobin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>5000
55	Fluoxastrobin		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	>2000
56	Isoprothiolane		Solid	Fiber Drums	Ambient	Ambient	Non carcinogenic	1190
PLANT GROWTH REGULATOR			**100**					
57	Ethaphon		Solid	HDPE Bags	Ambient	Ambient	Non carcinogenic	3400-4229
-	**R&D Products**	**200**	-	-				
	ToTal	**4800**	-	-				

HAZARDOUS WASTE DETAILS				
S.NO.	**PRODUCT**	**QUANTITY/DAY (IN KG.)**	**HAZARDOUS WASTE TYPE**	**REMARKS**
1	SULFOSULFURON	576	RESIDUE	-
2	IMAZETHAPYR	220	RESIDUE	-
3	PYRAZOSULFURON ETHYL	80	RESIDUE	-
4	CHLORIMURON	210	RESIDUE	-
5	BISPYRIBAC SODIUM	650	RESIDUE	-
6	THIAMETHOXAM	700	RESIDUE	-
7	BUPROFEZIN	120	RESIDUE	-
8	IMIDACLOPRID	242	RESIDUE	-
9	NOVALURON	8	RESIDUE	-
10	ACETAMIPRID	77	RESIDUE	-
11	FENPYROXIMATE	365	INORGANIC SALTS	-
12	DIFLUBENZURON	76	RESIDUE	-
13	AZOXYSTROBIN	120	INORGANIC SALTS	-
14	PYRACLOSTROBIN	24	RESIDUE	-
15	TRIFLOXYSTROBIN	21	RESIDUE	-
16	FLUXASTROBIN	18	RESIDUE	-
17	PROPICONAZOLE	765	RESIDUE	-

Annexure: IV

UPSIDC LETTER

U.P. State Industrial Development Corporation Ltd.

upsidc

Regional Office :
B.D.A. Office Complex Building
Nainital Road, Bareilly
Phone : 2543851
Fax : 0581-2546398,2546891
Website:www.upsidc.com

M/S Best Crop Science LLP,
Surya Estate, 26 Tayal Garden,
barwala Road,
Hisar-125001(Haryana)

Reference No 1502 /SIDC/ ROB/ Dated 6/3/2016

Sub.: Transfer of Plot No. C-6,7&8 Industrial Area Gajraula-II, in favour of M/S Best Crop Science LLP.

Dear Sirs,

Please refer to your letter dated 04.01.2016 regarding above cited subject. In this connection, we have to inform you that your request for transfer of above plot measuring 54691.39 Sq.mts. in your favour for establishment of Industrial unit of Agro chemicals technicals & Formulatios has been considered and approved on the following terms & conditions:-

1. You shall have to pay transfer levy @Rs. 200.00 Per Sq.m. amounting to Rs. 1,09,78,278.00 to be paid within 30 days from the date of issue of this letter failing which this approval will stand automatically cancelled.

2. The amount paid by allottee towards premium shall be credited to the account of the premium against transferee.

3. In case rate of the I.A. is revised with retrospective effect you will be required to pay additional amount of levy as per demand.

4. You will have to deposit necessary stamp papers (Non-returnable) within 30 days from the date of this letter. If any demand of stamp duty is made by the Government/concerned authority in future the transferee will be responsible to provide the same to the Corporation.

5. Transfer of plot shall not be allowed without execution of lease deed.

6. In case the allotment is cancelled for violations of terms & condition of the corporation committed by allottee restoration of allotment, if applied for, can be considered on application as per prevailing policy. Restoration of the allotment shall be considered only one time. No facility for restoration-cum-transfer shall be allowed.

.....contd.....2.....

7. The transferor has already surrendered the plot in favour of UPSIDC Ltd., along with Lease Deed/ Allotment letter after making endorsement on the Lease Deed to the effect that the plot is surrendered to the UPSIDC Ltd. and they will have no claim whatsoever on the plot in future. In case of existence of construction on the plot you shall have to furnish a certified copy of Registered Sale Deed before execution of lease deed.

8. You shall be treated as fresh allottee of the plot and a lease Deed for remaining period will be executed in your favour on new terms & conditions within 30 days from the date of this letter failing which transfer of plot may be cancelled.

9. You have to pay maintenance charges @ Rs. 40/- per sq.mtr. p.a. upto total maximum Rs. 3.00 Lac per year. .

10. You shall be liable to pay lease rent @Rs. 54,891.39 annum during the first 11 years and Rs. 1,37,228.47 annum during the next 30 years after expiry of the first 11 years and Rs 2,74,456.95 annum during next 30 years after expiry of the second 30 years.

11. You will have to adopt Rain Water Harvesting System compulsorily in the building/factory sheds to be constructed in the allotted/ leased out land, failing which allotment shall be cancelled.

12. You will have to bring the unit under production after covering 30% of the allotted area within 3 years from the date of this letter. Further time extension shall be considered only on merits of the case and upon payment of time extension fee as applicable from time to time. Presently it is 5% & 10% of premium rate at transfer for 4th year & 5th year respectively and after 5th year15% per year from the date of transfer.

13. All other terms & conditions as contained in this office allotment letter No. 554-55 dated 17.06.1997 & transfer letter No. 1077-79 dt. 15.07.2009 will remain the same.

14 The above offer shall be valid till the expiry date mentioned in the letter or 30 days from date of issue of letter whichever is earlier. If after expiry of the offer the applicant requests for extension of offer and the reasons for the default submitted by him are found just & proper to the satisfaction of management and the offer is extended, interest shall become payable @14% from the date of this letter. However, if the prevailing rate of the allotted area changes or due to passage of time percentage of levy changes then the offer can only be renewed on new allotment rates/levy only.

Please confirm in writing within 7 (seven) days from the date of this letter, if the above terms and conditions are acceptable to you, and also comply with the same within the stipulated period failing which this offer shall stand automatically withdrawn.

Yours faithfully,

(Tejveer Singh)
REGIONAL MANAGER

No. /As Above dated

Copy to the following for information and necessary action :-

1. The Dy. Manager (I.A), U.P.S.I.D.C.LTD., A-1/4, Lakhanpur, Kanpur. in compliance of H.O. approval letter No.3533/SIDC/IA/C-6,7&8/Gajraula dt. 03-03-2016.
2. M/S Chemtura Chemicals India Pvt. Ltd., C-6,7&8, Industrial Area Gajraula, Distt. Amroha (U.P). with the request to send their acceptance to the above terms & conditions within 7 days from the date of this letter and also to comply with the same within the stipulated period.

REGIONAL MANAGER