FORM-1

for

PROPOSED EXPANSION OF PESTICIDE PRODUCTS IN EXISTING UNIT

of

M/S. GSP CROP SCIENCE (P) LTD.

PLOT NO 1,2, 15 & 16, OPP. STATE BANK OF INDIA,

GIDC IND. ESTATE, NANDESARI,

DIST: VADODARA-391340 (GUJ.)

APPENDIX I

(See paragraph - 6)

FORM 1

(I) Basic Information

Sr. No.	Item	Details
1.	Name of the project/s	GSP Crop Science (P) Ltd.
2.	S. No. in the schedule	5(b)
3.	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	For detail Please refer **Annexure – I and** Plot area – 43473 m^2
4.	New/Expansion/Modernization	Expansion
5.	Existing Capacity/Area etc.	--
6.	Category of Project i.e. 'A' or 'B'	'A'
7.	Does it attract the general condition? If yes, please specify.	No
8.	Does it attract the specific condition? If yes, please specify.	No
9.	Location	
	Plot/Survey/Khasra No.	Plot No. 1,2, 15 & 16
	Village	GIDC Ind. Estate, Nandesari
	Tehsil	Vadodara
	District	Vadodara
	State	Gujarat
10.	Nearest railway station/airport along with distance in kms.	Vadodara – 15 Km
11.	Nearest Town, city, District Headquarters along with distance in kms.	Vadodara – 15 Km
12.	Village Panchayats, Zilla Parishad, Municipal Corporation, local body (complete postal address with telephone nos. to be given)	Not applicable
13.	Name of the applicant	GSP Crop Science (P) Ltd.
14.	Registered Address	M/s. GSP Crop Science (P) Ltd. Plot No. 1,2, 15 & 16, GIDC Ind. Estate, Nandesari, Dist: Vadodara, Gujarat - 391340
15.	Address for correspondence:	M/s. GSP Crop Science (P) Ltd. 404, Lalita Complex, 352/3, Rasala Road, Navrangpura, Ahmedabad-380009 (Gujarat)
	Name	Jayesh Visavadariya
	Designation (Owner/Partner/CEO)	General Manager (Environment)
	Address	M/s. GSP Crop Science (P) Ltd. Plot No. 1, 2, 15 & 16 GIDC Ind. Estate, Nandesari, Dist: Vadodara, Gujarat - 391340

	Pin Code	391340
	E-mail	environment@gspcrop.in
	Telephone No.	+91 79 26466580, 26449936
	Fax No.	+91 79 26448872
16.	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	NA
17.	Interlinked Projects	No
18.	Whether separate application of interlinked project has been submitted?	No
19.	If yes, date of submission	No
20.	If no, reason	No
21.	Whether the proposal involves approval/clearance under: if yes, details of the same and their status to be given. (a) The Forest (Conservation) Act, 1980? (b) The Wildlife (Protection) Act, 1972? (c) The C.R.Z. Notification, 1991?	No
22.	Whether there is any Government Order/Policy relevant/relating to the site?	No
23.	Forest land involved (hectares)	No
24.	Whether there is any litigation pending against the project and/or land in which the project is propose to be set up? (a) Name of the Court (b) Case No. (c) Orders/directions of the Court, if any and its relevance with the proposed project.	No

- **Capacity corresponding to sectoral activity (such as production capacity for manufacturing, mining lease area and production capacity for mineral production, area for mineral exploration, length for linear transport infrastructure, generation capacity for power generation etc.,)**

(II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

Sr. No.	Information/Checklist confirmation	Yes/ No	Details there of with approximate quantities frates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase intensity of land use (with respect to local land use plan)	No	Proposed expansion is within existing unit in Nandesari GIDC Ind. Estate
1.2	Clearance of existing land, vegetation and Buildings?	Yes	Minor site clearance activities shall be carried out to clear shrubs and weed.
1.3	Creation of new land uses?	No	The project site is located on level ground, which does not require any major land filling for area grading work.
1.4	Pre-construction investigations e.g. bore Houses, soil testing?	No	
1.5	Construction works?	Yes	For detail Please refer **Annexure – II**
1.6	Demolition works?	No	There will not be any demolition work at the site.
1.7	Temporary sites used for construction works or housing of construction workers?	No	
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	Yes	For detail Please refer **Annexure – II**
1.9	Underground works mining or tunneling?	No	
1.10	Reclamation works?	No	
1.11	Dredging?	No	
1.12	Off shore structures?	No	
1.13	Production and manufacturing processes?	Yes	For detail Please refer **Annexure -III**
1.14	Facilities for storage of goods or materials?	Yes	Areas for storage of raw materials and finished products will be developed for the proposed expansion project.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	Details of the Liquid Effluent is given as **Annexure – IV** and details of solid waste is given as **Annexure –V**
1.16	Facilities for long term housing of operational workers?	No	

1.17	New road, rail or sea traffic during Construction or Operation?	No	
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	
1.20	New or diverted transmission lines or Pipelines?	No	
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	
1.22	Stream crossings?	No	
1.23	Abstraction or transfers of water form ground or surface waters?	Yes	Water requirement will be met through GIDC Water Supply.
1.24	Changes in water bodies or the land surface Affecting drainage or run-off?	No	
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	By road only.
1.26	Long-term dismantling or decommissioning or restoration works?	No	
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	
1.28	Influx of people to an area either temporarily or permanently?	No	
1.29	Introduction of alien species?	No	
1.30	Loss of native species or genetic diversity?	No	
1.31	Any other actions?	No	

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

Sr. No.	Information/checklist confirmation	Yes/No	Details there of (with approximate quantities frates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	No	
2.2	Water (expected source & competing users) unit: KLD	Yes	Water requirement will meet through the GIDC Water Supply. Water balance is given as **Annexure – IV**
2.3	Minerals (MT)	No	
2.4	Construction material - stone, aggregates, and / soil (expected source - MT)	Yes	Construction materials, like steel, cement, crushed stones, sand, rubble, etc. required for the project shall be procured from the local market of the region.
2.5	Forests and timber (source - MT)	No.	
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	**Fuel** **Existing** Coal : 20 MT/Day or Saw Dust: 30 MT/Day HSD: 5 KL/Day (Emergency) **After Proposed Expansion** Coal : 50 MT/Day or Saw Dust: 60 MT/Day **Energy :** 2 MW from MGVCL.
2.7	Any other natural resources (use appropriate standard units)	No	

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	No	

3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	
3.3	Affect the welfare of people e.g. by changing living conditions?	Yes	Direct/Indirect employment
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.	No	
3.5	Any other causes	No	

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes	No	
4.2	Municipal waste (domestic and or commercial wastes)	No	
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Please refer **Annexure –V**
4.4	Other industrial process wastes	No	
4.5	Surplus product	No	
4.6	Sewage sludge or other sludge from effluent treatment	No	
4.7	Construction or demolition wastes	No	
4.8	Redundant machinery or equipment	No	
4.9	Contaminated soils or other materials	No	
4.10	Agricultural wastes	No	
4.11	Other solid wastes	Yes	Please refer **Annexure –V**

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	**Please refer as Annexure – VI**
5.2	Emissions from production processes	Yes	**Please refer as Annexure – VI**
5.3	Emissions from materials handling storage or transport	No	
5.4	Emissions from construction activities including plant and equipment	No	
5.5	Dust or odors from handling of materials including construction materials, sewage and waste	No	
5.6	Emissions from incineration of waste	No	
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	
5.8	Emissions from any other sources	No	

6. Generation of Noise and Vibration, and Emissions of Light and Heat:

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	The Noise level will be within the prescribed limit. At noisy area, adequate preventive & control measures will be taken. No significant noise, vibration or emission of light & heat from the unit.
6.2	From industrial or similar processes	Yes	-do-
6.3	From construction or demolition	No	
6.4	From blasting or piling	No	
6.5	From construction or operational traffic	No	
6.6	From lighting or cooling systems	Yes	Adequate Lighting shall be provided in unit and also local ventilation system shall be provided.

6.7	From any other sources	No	

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	Yes	For detail please refer **Annexure – VII**
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	
7.3	By deposition of pollutants emitted to air into the and or into water	No	
7.4	From any other sources	No	
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc. from storage, handling, use or production of hazardous substances	Yes	For detail please refer **Annexure – VII**
8.2	From any other causes	No	
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	No	

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting. lities, ancillary development or development stimulated by the project which could have impact on the environment e.g. • Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) • housing development • extractive industry • supply industry • other	Yes	For detail please refer **Annexure – VIII**
9.2	Lead to after-use of the site, which could have an impact on the environment	No	
9.3	Set a precedent for later developments	No	
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	

(II) Environmental Sensitivity

Sr. No.	Areas	Name/ Identity	Aerial distance (within 15km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	-	No protected area within 15 km from the proposed expansion project site.
2	Areas which important for are or sensitive Ecol logical reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Mahi river	Mahi river is around 7 Km away from the project site.
3	Area used by protected, important or sensitive Species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	-	No protected area or sensitive species within 15 km from the proposed expansion project site.
4	Inland, coastal, marine or underground waters	-	Mahi river is around 7 km away from the project site. No costal or marine within 15 km from the proposed expansion project site.
5	State, National boundaries	-	N.A.
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	-	N.A.
7	Defense installations	-	N.A.
8	Densely populated or built-up area	Vadodara	Vadodara is around 15 km from the proposed expansion project site.
9	Area occupied by sensitive man-made land uses Hospitals, schools, places of worship, community facilities)	-	N.A.
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	-	N.A.
11	Areas already subjected to pollution environmental damage. (those where existing legal environmental standards are exceeded)or	-	N.A.
12	Are as susceptible to natural hazard which could cause the project to present environmental problems (earthquake s, subsidence ,landslides, flooding erosion, or extreme or adverse climatic conditions)	-	N.A.

IV). Proposed Terms of Reference for EIA studies: For detail please refer **Annexure – IX**

I hereby given undertaking that, the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage the project will be rejected and clearance give, if any to the project will be revoked at our risk and cost.

Date: 16.07.2015
Place: Nandesari

For **GSP Crop Science (P) Ltd.**

Jayesh Visavadiya
(General Manager)

NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a C.R.Z. map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z. (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be taken to obtain the requisite clearance under the provisions of the C.R.Z. Notification, 1991 for the activities to be located in the CRZ.

2. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC).

3. All correspondence with the Ministry of Environment & Forests including submission of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC Meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project.

LIST OF ANNEXURES

SR. NO.	NAME OF ANNEXURE
I	List of products with their production capacity
II	Layout Map of the Plant
III	Brief Manufacturing Process Description with Chemical and Mass Balance
IV	Details of Water Consumption Wastewater Generation and Treatment Process
V	Details of Hazardous /Solid Waste Generation, Handling and Disposal
VI	Details of Air pollution Control System (Stack & Vent)
VII	Details of Hazardous Chemicals Storage & Handling
VIII	Socio-economic Impacts
IX	Proposed Terms of Reference for EIA studies

ANNEXURE-I

LIST OF PRODUCTS WITH THEIR PRODUCTION CAPACITY

Sr. No.	Name of Product	Existing Capacity (MT/Month)	Proposed Capacity (MT/Month)	After Proposed Expansion (Total) (MT/Month)
1	Chlorpyrifos	100	25	125
2	Glyphosate	50	-50	00
3	Pendimethaline	50	75	125
4	Triazophos	58	-33	25
5	Profenofos	25	25	50
6	Hexaconazole technical	--	20	20
7	Metribuzin	--	50	50
8	Diafenthiuron technical	--	50	50
9	Fipronil	--	10	10
10	Tricyclazole	--	25	25
11	Bifenthrin	--	5	5
12	Fenpyroximate	--	5	5
13	Propanil	--	40	40
14	Azoxystrobin	--	20	20
15	Cyproconazole	--	20	20
16	Carboxin	--	5	5
17	Thiomethoxozim	--	20	20
Total		**283**	**312**	**595**

List of By-Products

Sr. No.	Name of Product	Existing Capacity (MT/Month)	Proposed Capacity (MT/Month)	After Proposed Expansion (Total) (MT/Month)
1	Spent HCl (30%)	15	19	34
2	HBr	8	12	20
3	Poly Aluminium Chloride	--	25	25
4	Liquid Ammonia	--	14	14
5	NaBr	--	4.4	4.4
6	Methyl Acetate	--	30	30
7	Spent Sulphuric Acid (45% - 50%)	--	187.5	187.5
8	Sodium Sulphite (Na_2SO_3)	--	11	11
9	Sodium Formate	--	15	15

LIST OF RAW MATERIALS

Sr. No	RAW MATERIAL	QUANTITY (MT/MT)
Existing		
1	**CHLORPYRIFOS**	
	Acrylonitrite	0.285
	Trichloro acetylchloride	0.850
	Sodium hydroxide	1.000
	DETCI	0.585
	Catalyst	0.038
	4-Methoxy Phenol	0.300
	EDC	0.485
2	**GLYPHOSATE**	
	Diethyl amine	00
	Formic acid	00
	Caustic lye (NaOH)	00
	Phosphorous Chloride	00
	Catalyst	00
	Pt/carbon	00
	Oxygen	00
3	**PENDIMETHALINE**	
	4-4 Nitro Ortho Xylene	0.580
	Diethyl ketone	0.360
	Hydrogen gas	0.450
	Nitric acid	1.010
	Sulfuric acid	0.710
	EDC	0.100
	HCl (30%)	0.190
	Acetone	0.052

	Caustic Lye	0.020
	o-Xylene	0.045
4	**TRIAZOPHOS**	
	1 Phenyl 3-hydroxy 1,2,4 triazole	0.385
	Soda Ash	0.187
	Xylene	0.306
	Acetic Anhydride	0.006
	DETCl	0.476
	Caustic Lye	0.010
5	**PROFENOFOS**	
	Ortho chloro phenol	0.400
	Liquid bromine	0.500
	DETCl	0.600
	Caustic Flake	0.150
	Caustic Lye	0.150
	NPB (N-Propyl bromide)	0.460
	Trimethyl amine	0.670
	Sulphuric Acid	0.035
Proposed		
6	**Hexaconazole technical**	
	Valeric acid	0.465
	Thionyl chloride	0.570
	NaOH	0.325
	MDCB	0.670
	AlCl3	0.820
	MDC	0.320
	DMS	0.200
	DMSO4	0.660
	KOH	0.650
	DMF	0.400
	1,2,4-Triazole	0.280

	K2CO3	0.145
7.	**Metribuzin**	
	ATMT	1.000
	$DMSO_4$	0.652
	H_2SO_4	1.274
	Na_2C0_3	1.600
	NaOH	0.030
8.	**Diafenthiuron Technical**	
	DTU	1.045
	Ortho-xylene	0.200
	TBA	3.250
	Toluene	2.000
	n-hexane	1.000
9	**Fipronil Technical**	
	Fipronil Pyrazole	1.172
	BrSCN	0.513
	Sodium formate	1.425
	SO2 (gas)	0.388
	CF3Br (gas)	0.750
	Trichloro acetic acid	0.185
	Dichloro acetic acid	0.115
	H2O2 (50%)	0.235
	Methanol	0.215
	MDC	0.210
	DMF	0.200
10	**Tricyclazole**	
	AMBT	1.200
	Hydrazine mono hydrate	0.402
	HCl (35%)	0.890
	Formic acid	0.286
	Mix Xylene	0.150

11	**Bifenthrin**	
	NBPC	0.598
	Cyhalothric acid	0.675
	K2CO3	0.380
	TBAB	0.012
	DMF	0.165
	Hexane	0.220
12	**Fenpyroximate**	
	TBB	0.755
	DMPPO	0.647
	KOH	0.172
	DMF	0.190
	MDC	0.225
13	**Propanil**	
	3,4-DCA	0.747
	Propionic acid	0.404
14	**Azoxystrobin Technical**	
	OHPA	1.092
	Toluene	0.500
	PTSA	0.018
	Acetic acid	0.378
	TMOF	1.426
	Acetic anhydride	2.900
	Methanol	0.400
	MDC	0.200
	Methyl formate	2.305
	NaHCO3	0.375
	DCP	0.954
	KHSO4	0.040
	OCP	0.393
	K2CO3	0.636

	DABCO	0.007
	DMF	0.400
	Hexane	0.400
15	**Cyproconazole**	
	Sodium Sulfide	0.296
	Dimethyl sulfate	1.106
	CP-Ketone	0.835
	KOH	0.538
	MDC	0.250
	K2CO3	0.157
	DMF	0.300
	1,2,4-Triazole	0.315
	Toluene	0.200
16	**Carboxin Technical**	
	Acetoacetanilide	1.506
	SO_2Cl_2	1.183
	TEA	0.790
	2-ME	0.610
	PTSA	0.350
	Benzene	0.400
	Acetone	0.180
17.	**Thiomethoxozim**	
	MMCT	1.015
	SOCl2	0.409
	Xylene	0.2

ANNEXURE-II

LAYOUT MAP OF THE PLANT

ANNEXURE-III

BRIEF PROCESS DESCRIPTION

Existing

1. Chlropyrifos

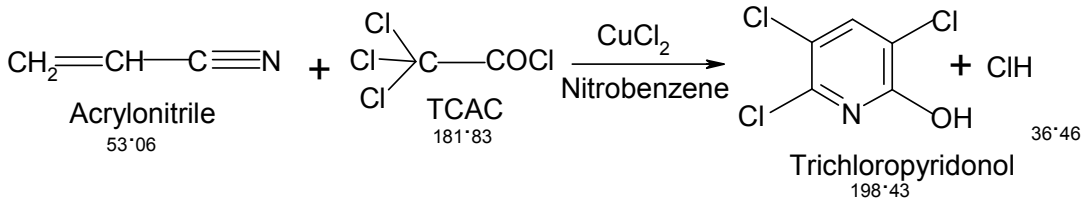
Manufacturing Process

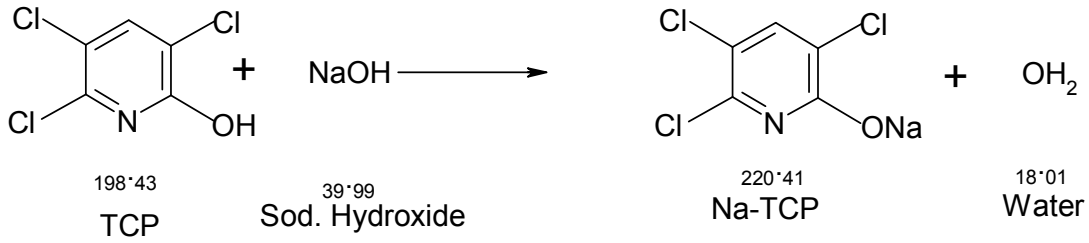
Acrylonitrile react with Trichloro Acetyl Chloride (TCAC) in presence of catalyst and solvent gives Trichloro Pyridinol (TCP), which further reacts with sodium hydroxide (NaOH) gives Sodium Salt of Trichloro Pyridinol (Na-TCP).

Na-TCP synthesized from above stages reacts with Diethoxy Thiophosphoryl Chloride (DETCl) in presence of catalyst and solvent gives Chlorpyrifos Technical, which further purified by concentration and re- crystalization.

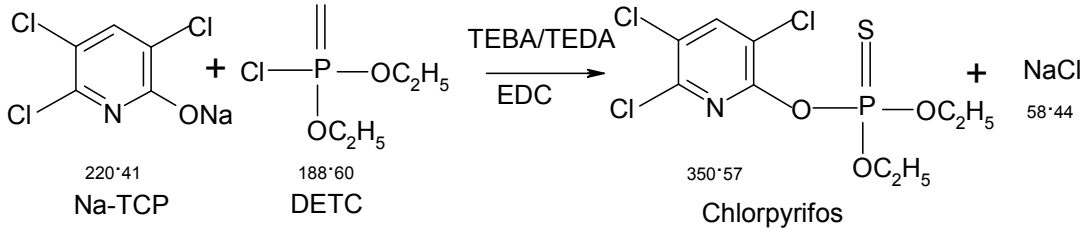
Chemical Reaction:

Stage-I Preparation of Na-TCP

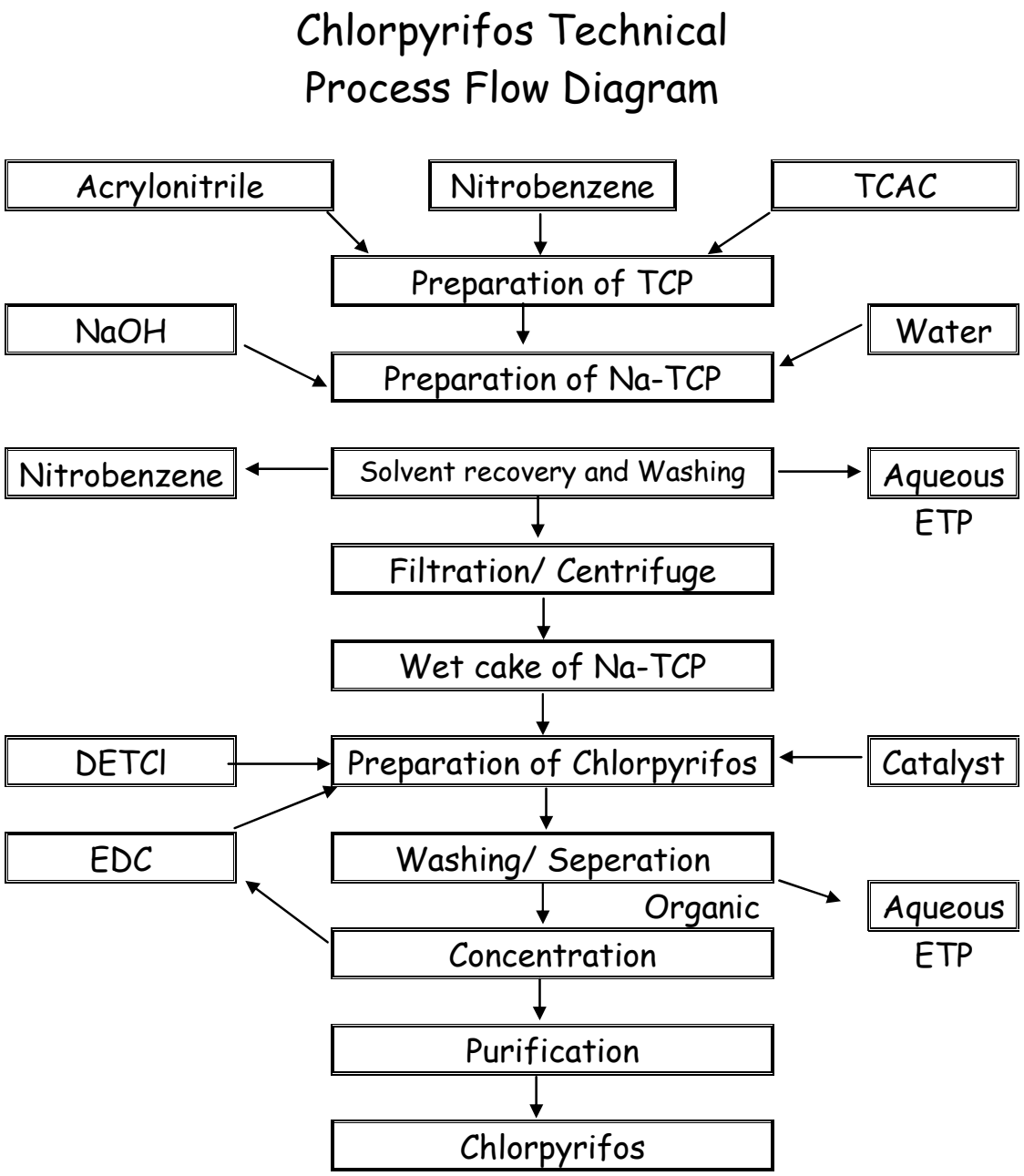




Stage-II Preparation of Chlorpyrifos Technical



Flow Diagram:



Mass Balance:

Inputs in Kg			Outputs in Kg		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
Trichloro Acetylchloride	850	6800	Reaction water	84.06	672.48
ACN	285	2280	HCl	165	1320
Sodium hydroxide	1000	8000	Catalyst	47	376
CuCl	40	320	Organic Impurities	1485.94	11887.52
DETCl	600	4800	Aqueous	14500	116000
EDC	13000	104000	EDC (loss)	600	4800
TEBA	7	56	EDC (Recovered)	12400	99200
Water	14500	116000	Chlorpyrifos Tech	1000	8000
Total Inputs	**30282**	**242256**	**Total Outputs**	**30282**	**242256**

Effluent Load -

Finished Product	8000	Kg of Chlorpyrifos Technical
Effluent		
Gas	-	
Solid waste	376	Kg of Spent Catalyst
Liquid Waste	129800	Kg having following composition
	1.01	% HCl
	9.15	% Organic Impurities
	89.88	% Water

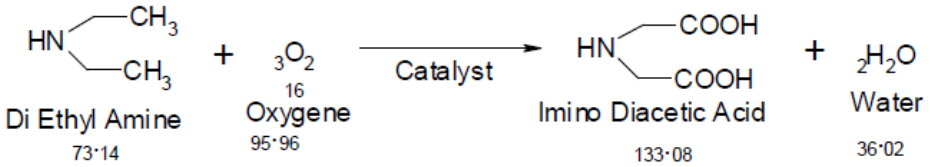
2. Glyphosate

Manufacturing Process

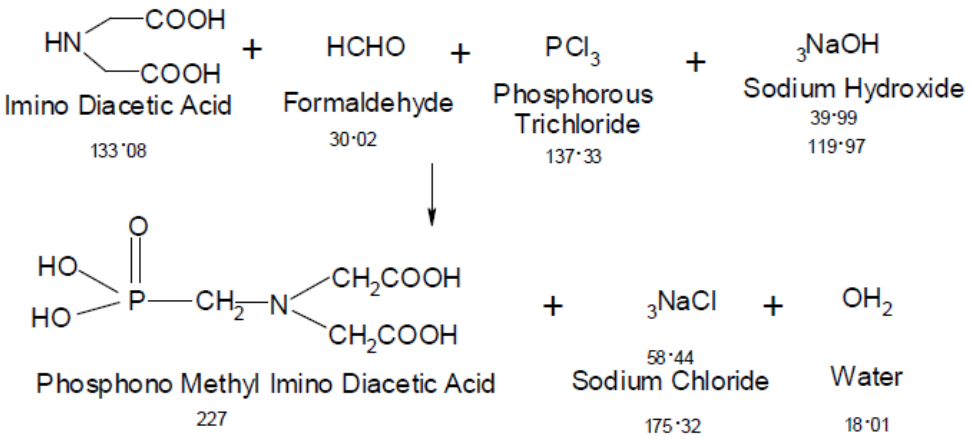
Diethyl amine, on oxidation gives Imino Diacetic Acid (IDA), which further reacts with Formaldehyde and Phosphorus Trichloride in presence of Sodium Hydroxide gives Phosphono Methyl Imino Diacetic Acid (PMIDA) which on further oxidation gives Glyphosate Technical.

Chemical Reaction:

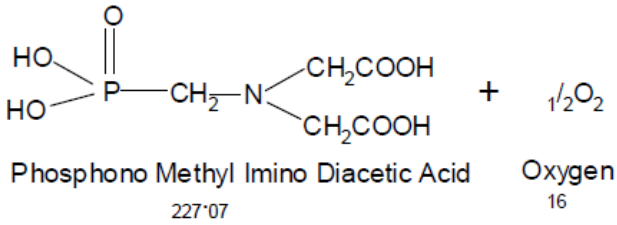
Stage-I :- Preparation of IDA



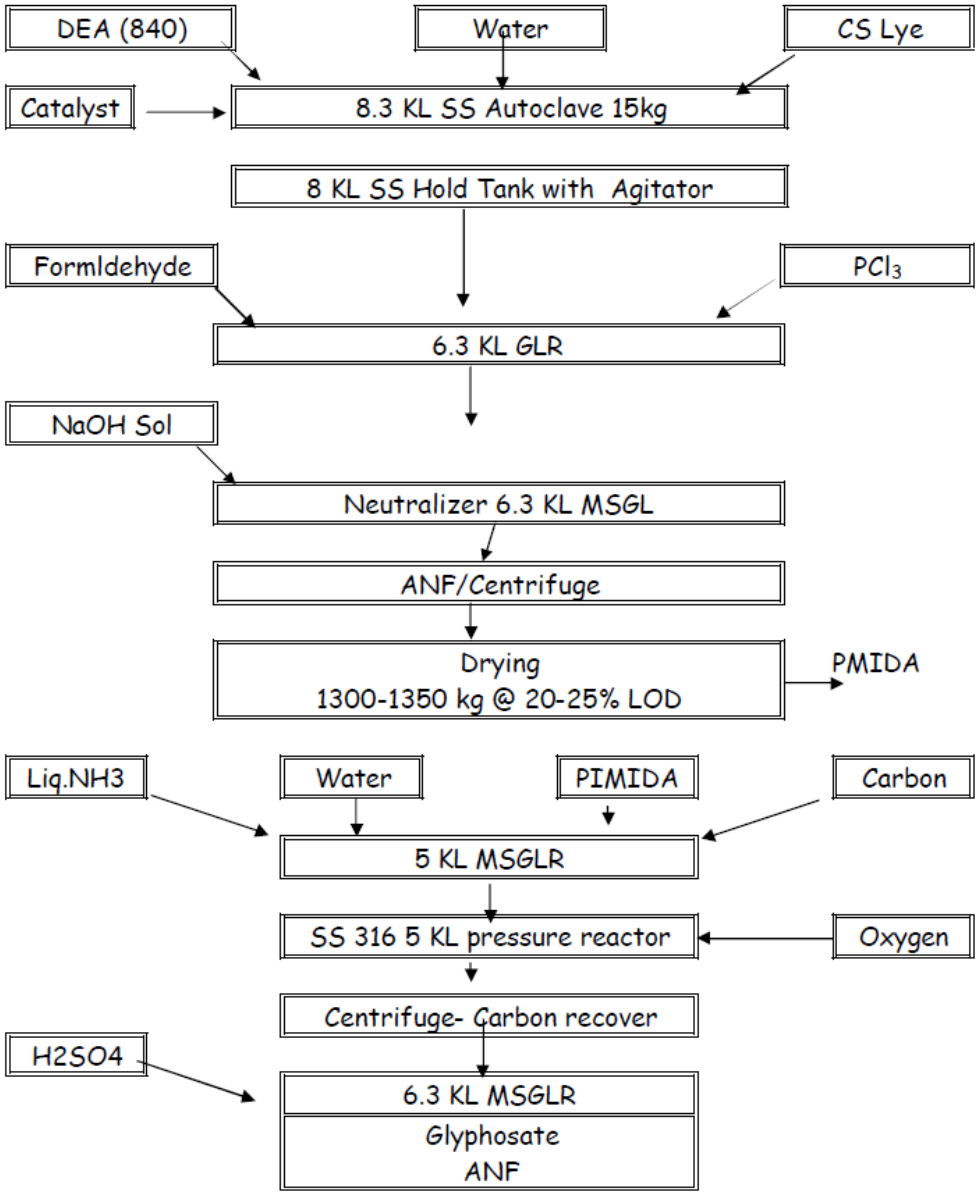
Stage-II:- Preparation of PMIDA



Stage-III :- Preparation of Glyphosate Technical



Flow Diagram:



3. Pendimethalin

Manufacturing Process

Step –1: Hydrogenation :

In a autoclave reactor system 4-Nitro ortho Xylene, diethyl ketone, pt/C (as catalyst) and naphthalene-2-sulfonic acid (as promoter) were charged. Temperature was raised to 70-72 °C. Hydrogen gas pressure(4 kgs) was applied to the autoclave reactor system. After completion of reaction, mass was filtered and subjected for separation. Recover diethyl ketone. N-alkylated xylidene (NAX) intermediate thus obtained is used in 2^{nd} step.

Step –2: Nitration :

First prepare mixed acid with nitric acid, sulfuric acid and water in a reactor. Prepare a mixture of NAX with EDC solvent. Add slowly this mixture in mixed acid at 40 °C. Maintain this temperature for few hours. Check sample for completion of reaction. After completion of reaction stop agitation and settle it for 6 hrs. Separate spent acid from the bottom layer. Give water wash to organic mass and again separate water layer from organic layer. Aq. Ml thus obtained will be acidic in nature.

Step –3: Denitrosation:

Charge organic mass into the glass line reactor and add acetone and 30% hydrochloric acid. Raise the temperature to 70 °C and maintain temperature about 70 ^{o}C for 6 hrsza check sample for completion of reaction. After completion of reaction separate organic layer from aq. layer. Give sodium hydroxide wash to the organic layer .Distilled this organic mass to recover EDC at atmospheric and under vacuum. Final product thus obtained is pendimethalin.

Step –4: Purification:

Pendimethalin thus obtained from step-3 is taken into a reactor and n-hexane is charged. The reaction mass is than heated to reflux at 68 –70 °C for few hours. Hexane is recovered (distilled off) to produce pure pendimethalin of desired specification.

Chemical Reaction

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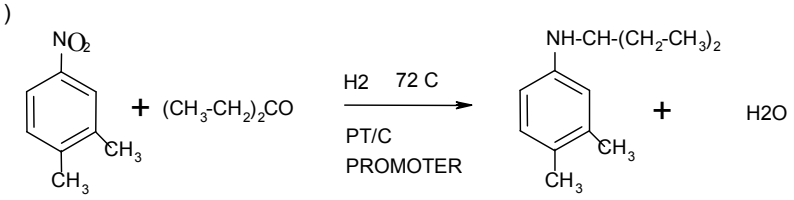

4 Nitro o Xylene DEK NAX

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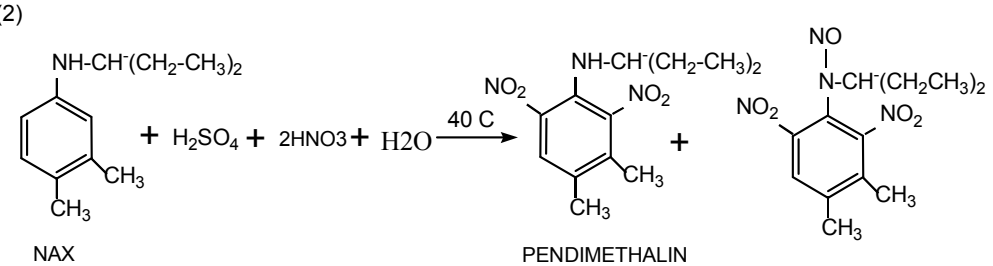
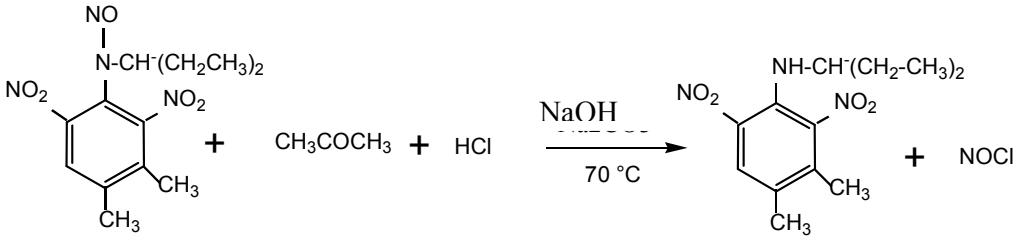
(2)



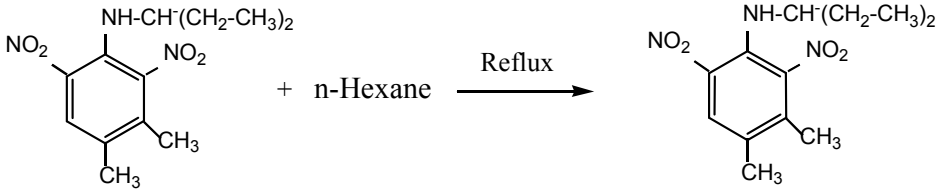
NAX PENDIMETHALIN NITROSO

(3)



DINITROSO ACETONE PENDIMETHALIN

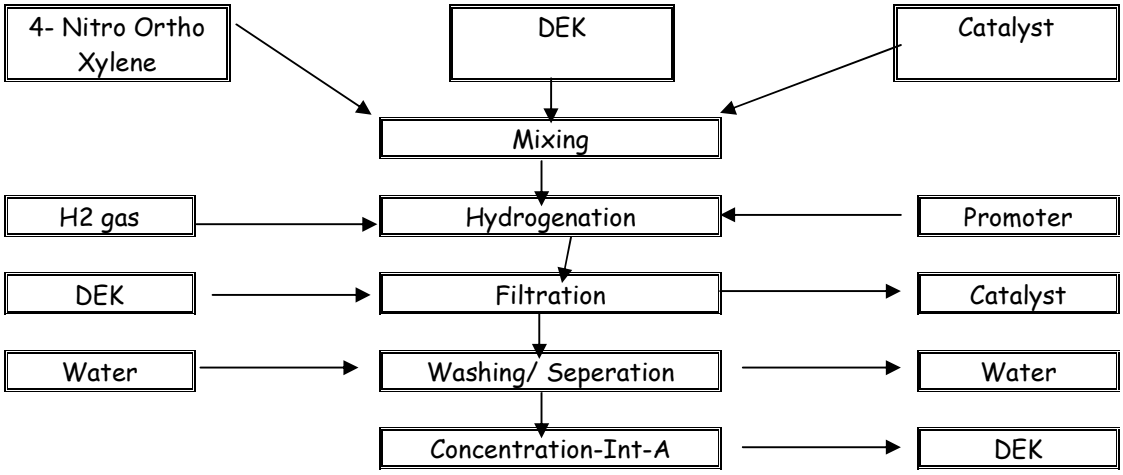
(4)



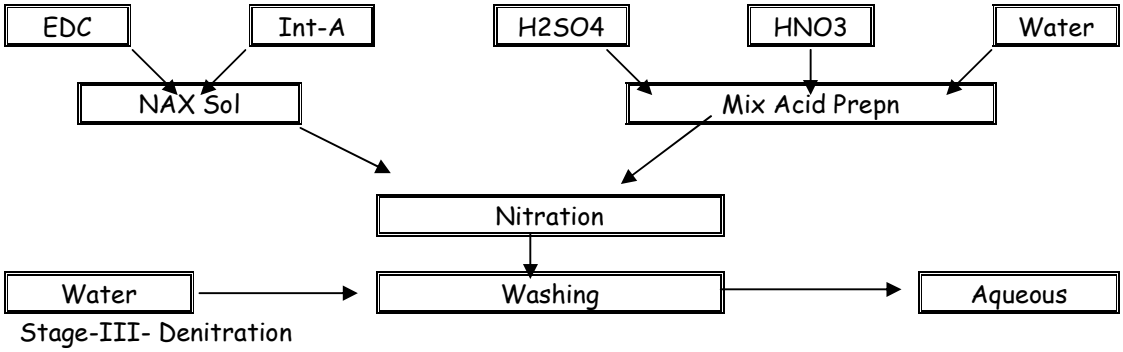
PENDIMETHALIN PENDIMETHALIN

Flow Diagram:

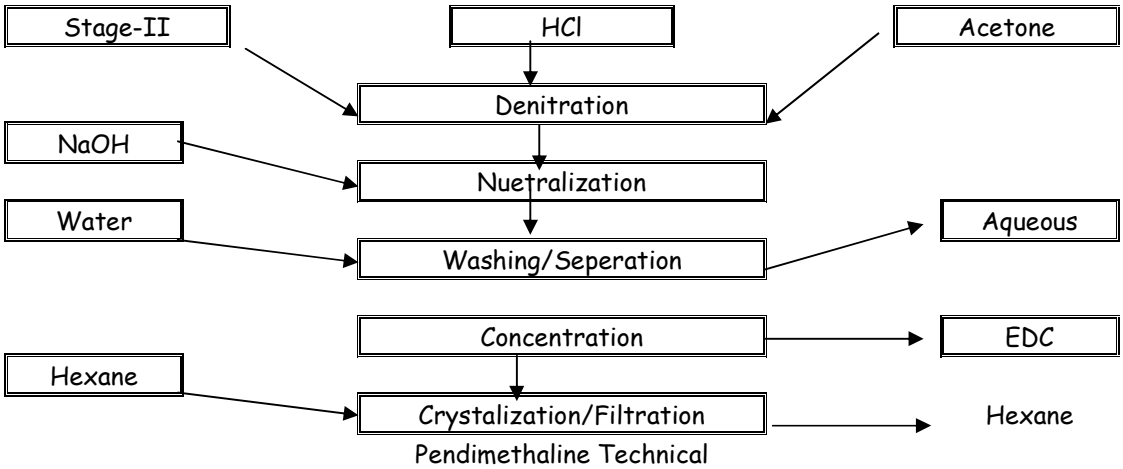
Stage-I Hydrogenation



Stage-II Nitration



Stage-III- Denitration



Pendimethaline Technical

Mass Balance:

Product : Pendimethalin technical 4.00MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	Per MT	Per Day	Name of Product	Per MT	Per Day
4- Nitro O Xylene	580.00	2320.00	Reaction water	210	840.00
Diethyl ketone	360.00	1440.00	EDC (Loss)	100.00	400.00
Hydrogen gas	41.00	164.00	EDC (Recovered)	1900.00	7600.00
Nitric acid	1010.00	4040.00	Spent Sulfuric acid (45%)	1500.00	6000.00
Sulfuric acid	710.00	2840.00	Aqueous	4181.00	16724.00
EDC	2000.00	8000.0	Pendimethalin Technical	1000.00	4000.00
HCl	190.00	760.00	O-Xylene (Loss)	45.00	180.00
Acetone	52.00	208.00	O-Xylene (Recovered)	955.00	3820.00
Caustic	20.00	80.00	Organic Impurities	72.00	288.00
O-Xylene	1000.00	4000.00			
Water	4000.00	16000.0			
Total Inputs	**9963.00**	**39852.00**	**Total Outputs**	**9963.00**	**39852.00**

Effluent Load -

By-Products 6000.00 Kg of Sulphuric Acid
Gas -

Liquid Waste 17852.00 kg having following composition
1.01 % salt
1.61 % Organic Impurities
94.33 % Water

4. Profenofos

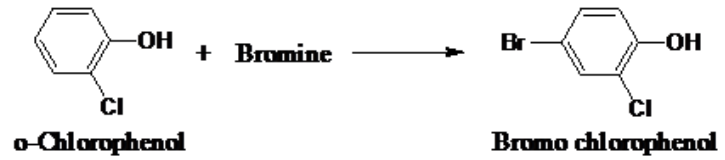
Manufacturing Process:

Reaction of Ortho Chlorophenol with Bromine gives Bromo Chlorophenol(BCP).

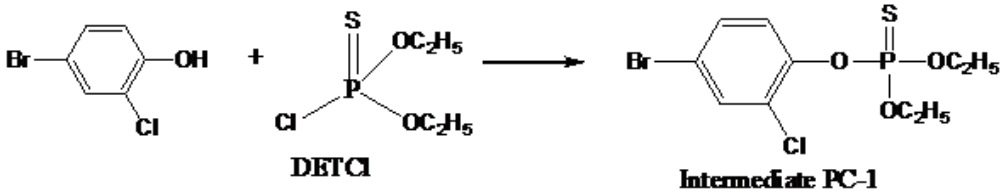
Bromo Chlorophenol(BCP) with DiethyL Thiophosphoryl Chloride(DETCl) in presence of Sodium Hydroxide (NaOH) to yield intermediate PC-1.Intermediate PC-1 and Trimethyl Amine, to give Q-Salt.

Finally reaction of Q-Salt with n-Propyl Bromide gives Profenofos Technical.

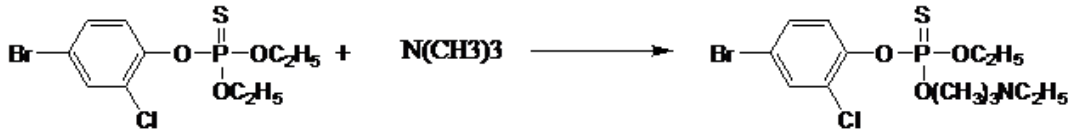
Chemical Reaction:



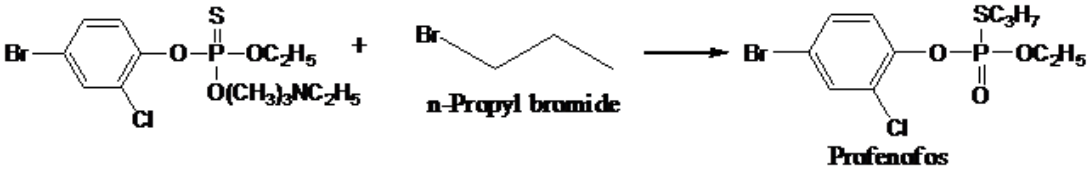
o-Chlorophenol Bromo chlorophenol



DETCl Intermediate PC-1

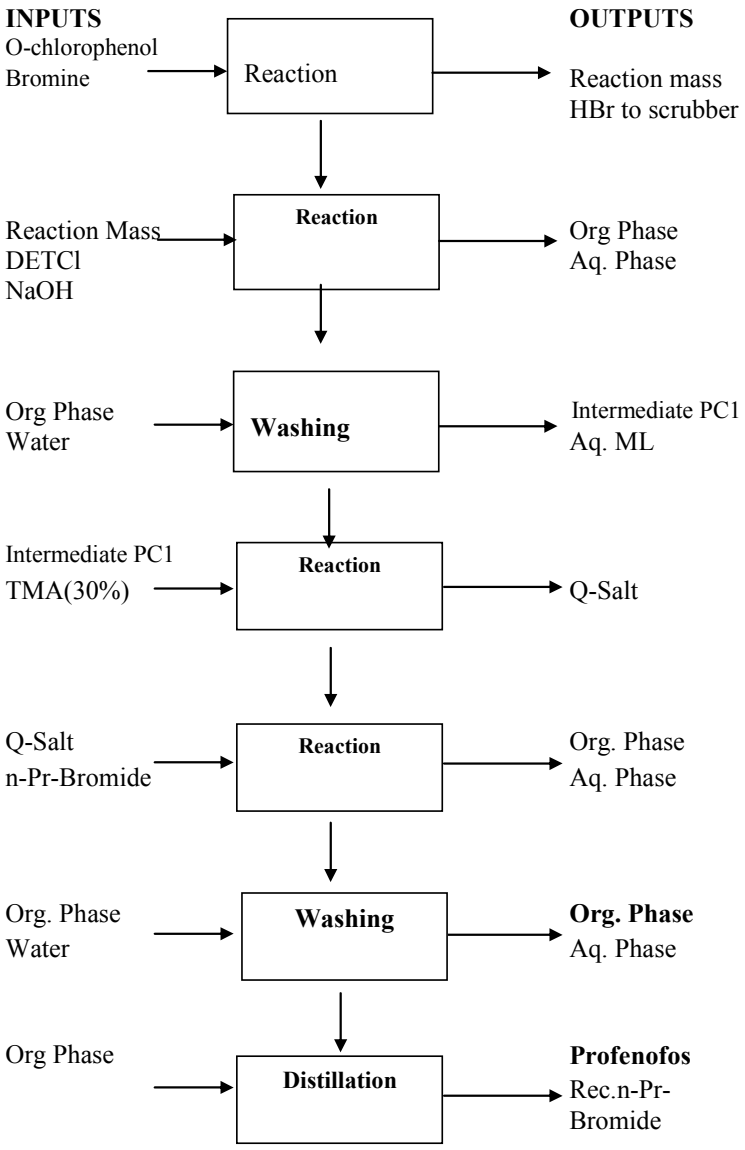


Q-Salt



n-Propyl bromide Profenofos

FLOW DIAGRAM



Mass Balance:

Product : Profenofos technical 2.67 MT/D

Inputs in Kg			Outputs in Kg		
Name of Raw Materials	Per MT	Per Day	Name of Product	Per MT	Per Day
Ortho chloro phenol	398.08	1058.59	Hydrobromic acid	205.97	549.94
Liquid bromine	484.95	1294.82	TMA	212.70	567.90
DETCl	566.27	1511.94	Sodium bromide	261.91	699.30
TMA (30% aq. sol)	709.00	1893.03	Organic impurities	448.89	1198.53
n-propyl bromide	362.90	970.00	Aqueous	5268.43	14063.70
Water	4661.70	12446.74	Profenofos Technical	1000.00	2670.00
NaOH	215.00	574.00			
Total Inputs	7397.90	19749.00	Total Outputs	7397.90	19749.00

Effluent Load -

Finished Product	2670.00	Kg of Pendimethalin Technical	
Effluent Load			
Gas	-		
Saleable By-products	699.30	Kg of Sodium bromide	
	549.94	Kgs of Hydrobromic acid	
Liquid Waste	1580.14	Kgs having following composition	
	3.58	% Organic impurities	
	7.57	% Organic impurity	
	88.84	%Water	
Solid Waste	Nil		

5. Triazophos Technical

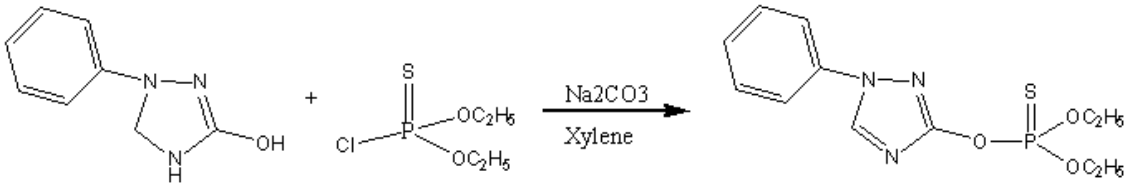
Manufcaturing Process

Process Details:
Triazophos is a organophosphorous type insecticide/nematicide/acaricide. It is manufactured by condensation of O,O-diethylthiophosphoryl chloride (DETCl) with 3-hydroxy-1-phenyl triazole (PHT).

Description:
Reaction of O,O-diethylthiophosphoryl chloride (DETCl) with 3-hydroxy-1-phenyl triazole (PHT) in presence K2CO3 using xylene as solvent during reaction stage. The technical triazophos thus obtained is formulated to 60-62% concentration.

Method of purification and recovery:
Crude triazophos is diluted using xylene as solvent upto 60-62% concentration. Solvent used during the reaction stage is distilled after completion of reaction and reused for next recycle.

Chemical Reaction:

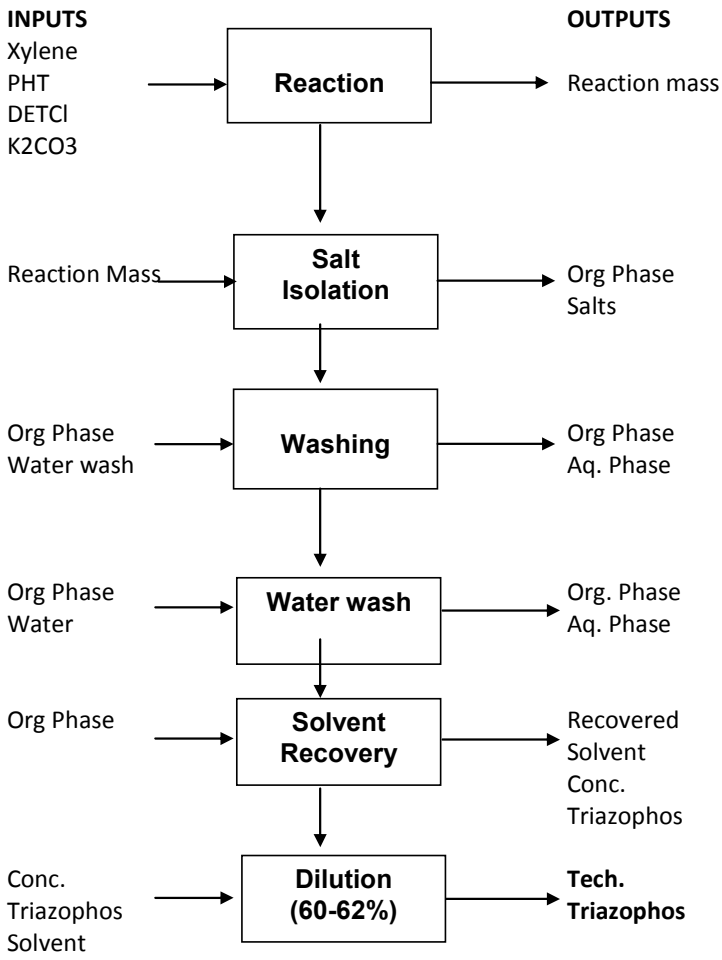


1-Phenyl-3-hydroxy triazole

O,O-Diethylthiophosphoryl-chloride

TRIAZOPHOS

Flow Diagram



Mass Balance:

Inputs in Kg			Outputs in Kg		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
PHT	385	1193.5	Solid waste	268	830.8
Na2CO3	190	589	Aq. effluent	1443	4473.3
DETCl	490	1519			
CuCl	7	21.7			
KCl	7	21.7	Triazophos Technical	1000	3100
KHP	5	15.55			
H3PO4	25	77.5			
NaCl	2	6.2			
Ortho-xylene	400	1240			
Water	1200	3720			
Total Input	**2711**	**8404.10**	**Total Outputs**	**2711**	**8404.10**

Proposed

6. Hexaconazole

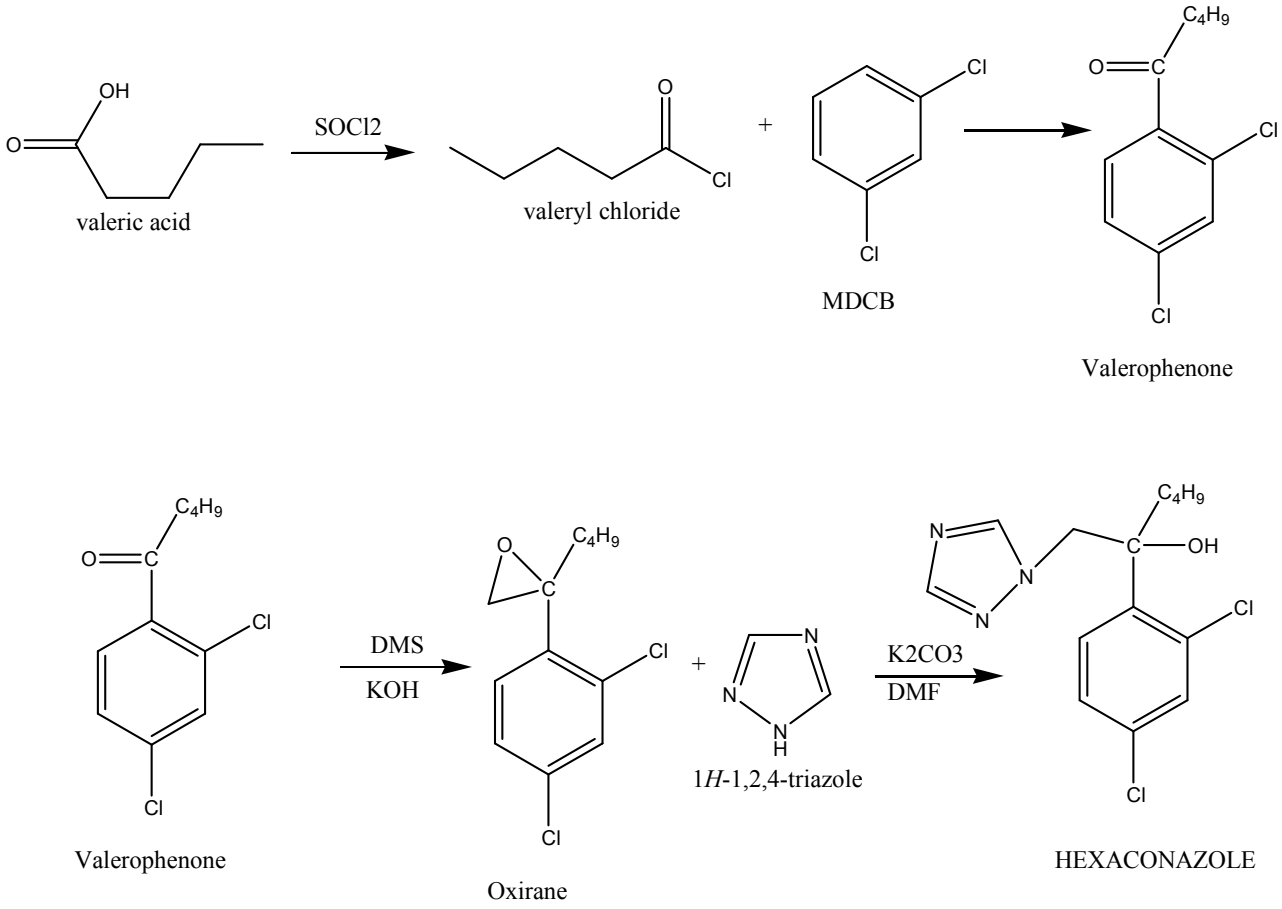
Manufacturing Process:-

Hexaconazole is a conazole class of fungicide. It is manufactured by the condensation of oxirane with 1,2,4-triazole.

Description:
The strating raw material in the manufacture of Hexaconazole is valeric acid. It is converted to valeryl chloride. Valeryl chloride is reacted with meta dichloro benzene to yield valerophenone. Valerophenone is converted to oxirane. Finally oxirane is condensed with 1,2,4-triazole to give Hexaconazole.

Method of purification and recovery:
Crude Hexaconazole is purified using N,N-Dimethyl formamide (DMF) or sometimes Hexane as solvent.

Solvent used during the purification is distilled/or recycled and reused in next batch.
Reaction Mechanism of the Product



Material Balance

Product : Hexaconazole technical 0.83 MT/D

Inputs in Kg			Outputs in Kg		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
Valeric acid	465	386	SO2 (gas)	280.16	232.53
Thionyl chloride	570	473	HCl	159.84	132.67
NaOH	325	269.75	Poly Aluminum chloride	1520	1261.60
MDCB	670	556.10	MDC(loss)	320	265.60
AlCl3	820	680.6	MDC (Recovered)	6680	5545.12
MDC	7000	8510.75	DMS (loss)	200	166
DMS	200	166	DMF (loss)	400	332
DMSO4	660	547.8	DMF (Recovered)	8600	7138
KOH	650	539.5	Effluent	10380	8615.800
DMF	9000	7470.00	Solid waste	145	120.35
1,2,4-Triazole	280	232.40	Hexaconazole Technical	1000	830
K2CO3	145	120.35			
Water	8900	6557			
Total Input	**29685**	**26509.25**	**Total Outputs**	**29685**	**26509.25**

Effluent Load

Finished Product	**830**	**Kg of Hexconazole Technical**
Gas	232.53	Kgs of SO2 (gas)
Saleable By-products	1261.60	Kgs of Poly aluminum chloride
Liquid Waste	8748.40	Kgs having following composition
	1.51	% Hydrochloric acid
	14.04	% of Organic impurities
	84.44	% Water
Solid Waste	120.35	Kgs of solid waste

Note: SO_2 is converted into Sodium Sulphite (Na_2SO_3) – 556 Kg/MT

7. METRIBUZIN

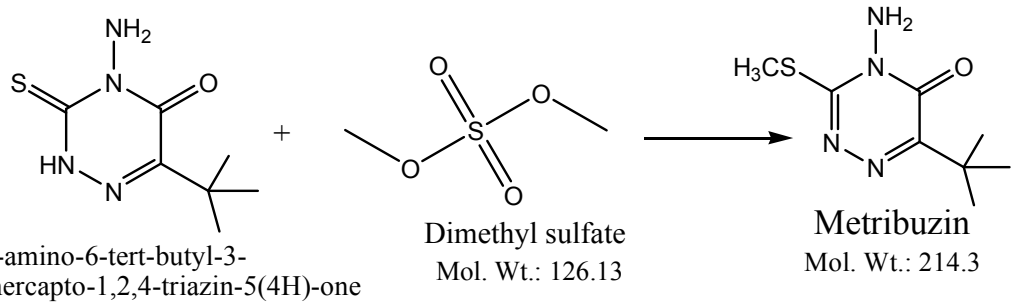
Manufacturing Process:

Metribuzin is a 1,2,4-triazinone class of herbicide. It is manufactured by the reaction of 4-amino-6-tert-butyl-3-mercapto-1,2,4-triazin-5(4H)-one with Dimethyl sulfate

Step – 1

Reaction of 4-amino-6-tert-butyl-3-mercapto-1,2,4-triazin-5(4H)-one (ATMT) with dimethyl sulfate (DMS) in presence of H2SO4 to give Metribuzin technical.

Reaction Mechanism of the Metribuzin



4-amino-6-tert-butyl-3-mercapto-1,2,4-triazin-5(4H)-one
Mol. Wt.: 200.26

Dimethyl sulfate
Mol. Wt.: 126.13

Metribuzin
Mol. Wt.: 214.3

Material Balance

Product : Metribuzin 2.00 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
ATMT	1000	2000	Na2SO4	2140	4280
$DMSO_4$	652	1304	Org. Impurities	752	1504
H_2SO_4	1274	2548	Water	15000	30000
Water	15000	30000	CO2	664	1328
Na2C03	1600	3200	Metribuzin	1000	2000
NaOH	30	60			
Total Input	**19556**	**39112**	**Total Outputs**	**19556**	**39112**

Effluent Load

Finished Product	**2000**	**Kg of Metribuzin Technical**
Effluent Load		
Gas	664	Kgs of CO2 gas
Saleable By-products	Nil	
Liquid Waste	35764	Kg having following composition
	11.91	% Salt
	4.20	% Org Impurities
	83.88	% Water
Solid Waste	Nil	

8. Diafenthiuron Technical

Manufacturing Process:-

Diafenthiuron is a thiourea class Insecticide.

Step-1

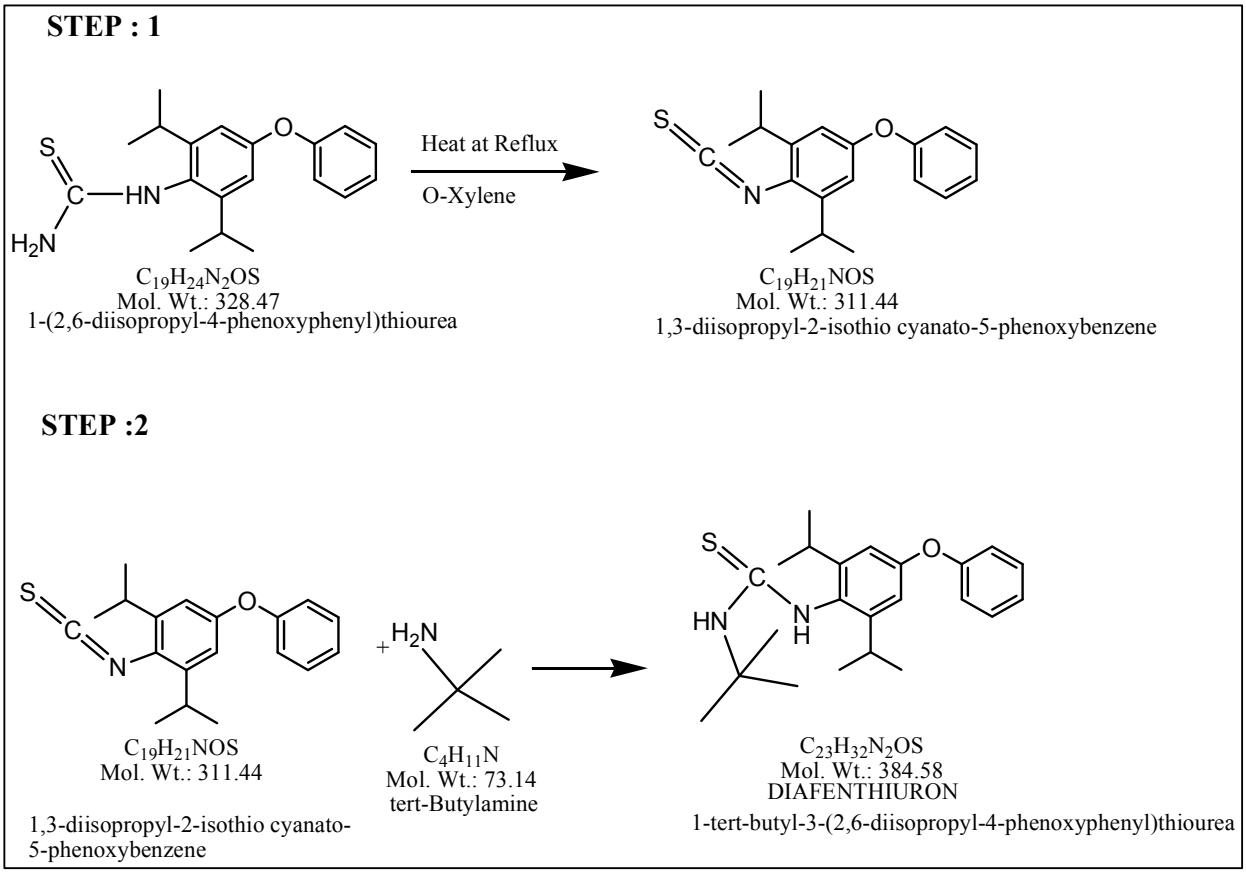
1-(2,6-diisopropyl-4-phenoxyphenyl)thiourea**(DTU)** is heated to reflux in presence of ortho-xylene as solvent to give 1,3-diisopropyl-2-isothiocyanato-5-phenoxybenzene **(DITC)**.

Step-2

Condensation of 1,3-diisopropyl-2-isothiocyanato-5-phenoxybenzene **(DITC)** with tert-butyl amine **(TBA)** in presence of toluene as solvent to give Difenthiuron technical.

Finally purification is carried out in n-hexane to yield pure Diafenthiuron. Recovered n-hexane is distilled and recycled.

Reaction Mechanism of the Product



Material Balance

Product : Diafenthiuron technical 1.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
DTU	1045	1734.7	Ortho-xylene (Loss)	200	332
Ortho-xylene	5100	8466	O- Xylene (Recycled)	4900	8134
TBA	670	1112.20	Toluene (loss)	150	249
Toluene	5000	8300	Toluene (Recycled)	4850	8051
n-hexane	6000	9960	n-Hexane (loss)	250	415
Water	250	415	n-Hexane (Recycled)	5750	9545
			NH3 (gas)	54	89.64
			Water	250	415
			TBA- Toluene (Recycled)	661	1097.26
			Difenthiuron	1000	1660
Total Input	**18065**	**29987.9**	**Total Outputs**	**18065**	**29987.9**

Effluent Load

Finished Product	**1660**	**Kg of Diafenthiuron Technical**
Effluent Load		
Gas	54	Kgs of Ammonia gas which is scrubbed
Saleable By-products	504.64	Kgs of liquid ammonia
	17.76	% NH3
	82.23	% Water
Liquid Waste	711	Kgs of TBA + Toluene (recycled) contains

9.Fipronil Technical

Manufacturing Process:

Step 1

Fipronil is a phenylpyrazole type insecticide.

It is manufactured by reaction of Fipronil pyrazole with Bromothiocyanate at -5 to 0°C using MDC as solvent. The reaction mass is maintained at 0 °C for 6 hrs. Check for unreacted pyrazole, if more than 2%, continue cooking for 2 more hours. After completion of reaction MDC is recovered to give Fipronil thiocyanate.

Step 2

Fipronil thiocyanate thus obtained from step -1 is dissolved using DMF as solvent. Stirr the reaction mass at RT till complete dissolution. Start addition of prior scrubbed SO2 gas in DMF to the reaction mass at around 10-15 °C. Ensure that the reactor is properly blancketed with nitrogen atmosphere during the whole course of reaction. Then start simultaneous addition of CF3Br gas and sodium formate at around 0-5 °C within 5 hrs. The pressure in the reactor is maintained at around 10-11 kg/cm2. The reaction pressure subdues as CF3Br is consumed. Maintain the reaction for 5 hrs. The excess gas is vented/scrubbed and finally the reaction mass is taken for solvent (DMF) recovery. Fipronil sulfide thus obtained is taken for the next step.

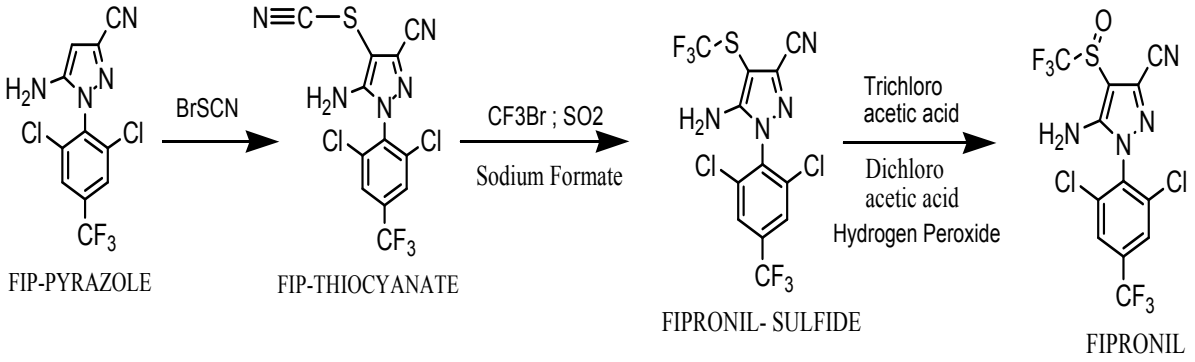
Step 3

Finallly fipronil sulfide reacts with trichloroacetic acid (TCAA) and dichloroacetic acid (DCAA) in presence of hydrogen peroxide at 10 -15 °C. The reaction mass is maintained for 7 hrs. The reaction mass is subjected to water wash. The solids are dissolbved in methanol and purified, dried till constant weight to yield Fipronil technical. In-process and finished product samples are analysed of HPLC.

Method of purification and recovery :

Fipronil is purified using methanol as solvent at 20-25°C. The material is then dried at 60-65°C till constant weight. Second crop is isolated from the methanol filtrate. Lastly methanol is distilled and recycled for next batch. (The ration of Fipronil : Methanol is 1 : 3)

Reaction Scheme of the Product



Material Balance

Product : Fipronil 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
Fipronil Pyrazole	1172	773.52	HBr (gas)	552	364.32
BrSCN	513.8	339.10	NaBr	334	220.44
Sodium formate	1425	940.50	Sodium formate	1170	772.20
SO2 (gas)	388	256.08	Tri chloro acetic acid (Loss)	185	122.10
CF3Br (gas)	756	498.96	Trichloro acetic acid (Recovered)	3813	2516.5
Tri chloro acetic acid	4000	2640.0	Di chloro acetic acid(Loss)	115	75.90
Di chloro acetic acid	1500	990.0	Di chloro acetic acid (Recovered)	1385	914.1
H2O2 (50%)	235	155.10	Reaction water	176.5	116.49
Methanol	5000	3300.00	Methanol (Loss)	215	141.90
MDC	5000	3300.00	Methanol(Recovered)	4785	3158.1
DMF	4500	2970.00	MDC (Loss)	210	138.60
Water	9000	5940	MDC(Recovered)	4790	3161.4
			DMF (Loss)	200	132
			DMF (Recovered)	4300	2838
			Org. Impurities	1259.3	829.81
			Water	9000	5940
			Fipronil	1000	660
Total Input	**33489.8**	**21403.26**	**Total Outputs**	**33489.8**	**21403.26**

Effluent Load

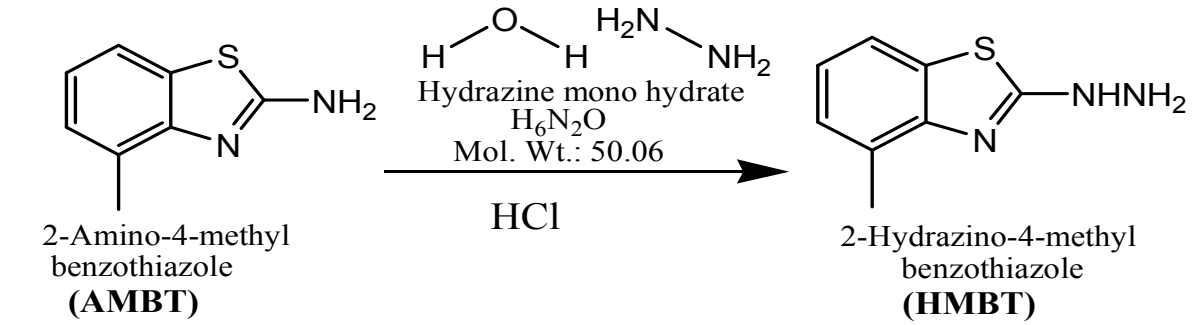
Finished Product	**660**	**Kg of Fipronil Technical**
Effluent Load		
Gas	364.32	Kgs of HBr
Saleable By-products	220.44	Kgs of NaBr.
Liquid Waste	7856.10	Kgs having following composition
	2.53	% Acid mixture
	9.82	% Salt (sodium formate)
	10.56	% Org impurities
Solid Waste	77.09	% Water

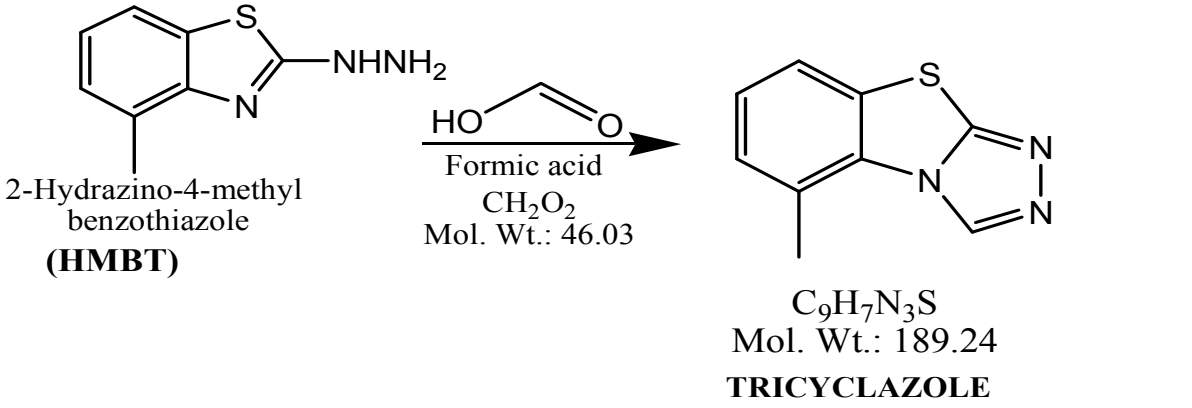
10.TRICYCLAZOLE

Manufacturing Process:-

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 to give 2-hydrazino-4-methyl benzothiazole (HMBT). Finally reaction of HMBT with formic acid yields Tricyclazole technical.

Reaction Scheme of the Product





RAW MATERIALS : 1000 KG OF TRICYCLAZOLE TECHNICAL :-

Sr. No.	Material	Type	Quantity / MT
01	AMBT	Solid	1200
02	Hydrazine mono hydrate	Liquid	402
03	HCl (35%)	Liquid	890
04	Formic acid	Liquid	286
05	Mix Xylene	Liquid	150

Material Balance

Product : Tricyclazole 1.00 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
AMBT	1200	1200	NH4Cl	332.23	332.23
Hydrazine mono hydrate	402	402	HCl (ML)	578.50	578.50
HCl (35%)	890	890	Mix Xylene	150	150
Formic acid	286	286	Reaction water	223.56	223.56
Mix Xylene	150	150	Org Impurities	643.71	643.71
Water	4000	4000	Water	4000	4000
			Tricyclazole	1000	1000
Total Input	**6928**	**6928**	**Total Outputs**	**6928**	**6928**

Effluent Load -

Finished Product	**1000**	**Kg of Tricyclazole Technical**
Effluent Load		
Gas	Nil	
Saleable By-products	Nil	
Liquid Waste	5778	Kg having following composition
	5.74	% Salt
	11.14	% Org impurity
	83.10	% Water
Solid Waste		

11.Bifenthrin

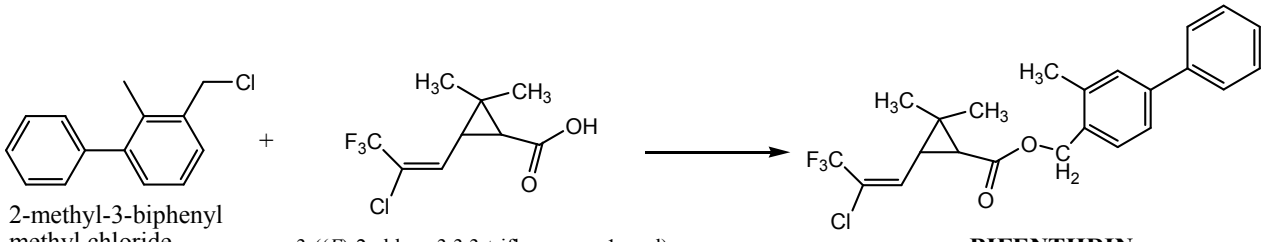
Manufacturing Process

Bifenthrin is a pyrathroid class of insecticide/acaricide. It is manufactured by the reaction of 2-methyl-3-biphenylmethyl chloride with 3-((E)-2-chloro-3,3,3-trifluoroprop-1-enyl)- 2,2-dimethylcyclopropanecarboxylic acid (i.e. cyhalothric acid).

Step – 1

Reaction of 2-methyl-3-biphenylmethyl chloride (MBPC) is reacted with cyhalothric acid in presence of K2CO3 as base TBAB as phase transfer catalyst using DMF as solvent to give bifenthrin.

Reaction Mechanism of the Bifenthrin



2-methyl-3-biphenyl methyl chloride
Mol. Wt.: 216.71

3-((*E*)-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylic acid
(Cyhalothric acid)
Mol. Wt.: 242.62

BIFENTHRIN
Mol. Wt.: 422.87

Raw Materials: 1000 Kgs of Bifenthrin

Sr. No.	Raw Material	Quantity (Kgs)
01	2-methyl-3-biphenylmethyl chloride	598
02	Cyhalothric acid	675
03	K2CO3	380
04	TBAB	12
05	DMF	165
06	Hexane	220

Material Balance

Product : Bifenthrin 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
NBPC	598	394.68	Reaction water	42.56	28.09
Cyhalothric acid	675	445.50	K2CO3	380	250.80
K2CO3	380	250.80	TBAB	12	7.92
TBAB	12	7.92	DMF (loss)	165	108.90
DMF	3500	2310	DMF (Recovered)	3335	2201.1
Hexane	5000	3300	Hexane (loss)	220	145.20
Water	4000	2640	Hexane (Recovered)	4780	3154.8
			Org Impurities	230.44	152.09
			Water	4000	2640
			Bifenthrin	1000	660
Total Input	**14165**	**9348.9**	**Total Outputs**	**14165**	**9348.9**

Effluent Load -

Finished Product	**660**	**Kg of Bifenthrin Technical**
Effluent Load		
Gas	Nil	
Saleable By-products	Nil	
Liquid Waste	3078.9	Kg having following composition
	0.26	% Catalyst
	8.14	% Salt
	4.93	% Org Impurities
	85.74	% Water

12.Fenpyroximate

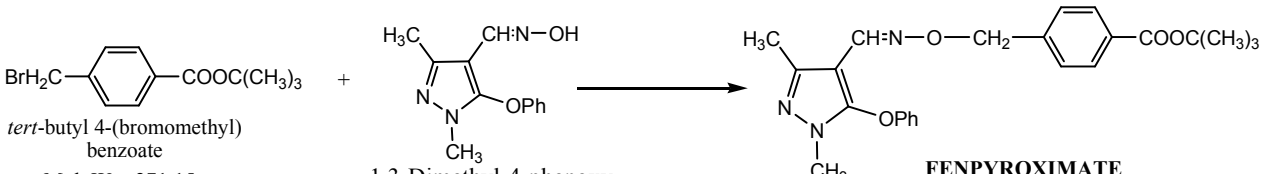
Manufacturing Process

Fenpyroximate is a pyrazole class of acaricide. It is manufactured by the reaction of tert-butyl 4-(bromomethyl)benzoate (TBB) with 1,3-Dimethyl-4-phenoxypyrazole oxime (DMPPO) in presence of KOH and DMF as solvent to give Fenpyroximate.

Step – 1

Reaction of tert-butyl 4-(bromomethyl)benzoate (TBB) with 1,3-Dimethyl-4-phenoxypyrazole oxime (DMPPO) in the presence of KOH by using dimethyl formamide as solvent at 120 °C for 10 hrs. After completion of reaction solvent is recovered and to the residual mass MDC is taken and stirred till complete dissolution. Water is added and the organic phase is thoroughly washed. Layers are separated and MDC is recovered to get fenpyroximate which is dried till constant weight.

Reaction Mechanism of the Fenpyroximate



tert-butyl 4-(bromomethyl) benzoate
Mol. Wt.: 271.15

1,3-Dimethyl-4-phenoxy pyrazoleoxime
Mol. Wt.: 231.25

FENPYROXIMATE
Mol. Wt.: 421.49

Material Balance

Product : Fenpyroximate 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
TBB	755	498.3	DMF (loss)	190	125.40
DMPPO	647	427.02	DMF (Recovered)	3810	2514.6
KOH	172	113.52	MDC (loss)	225	148.50
DMF	4000	2640	MDC (Recovered)	4275	2821.5
MDC	4500	2970	HBr	192.17	126.84
Water	3000	1980	Org Impurities	381.83	252
			Water	3000	1980
			Fenpyroximate	1000	660
Total Input	**13074**	**8628.84**	**Total Outputs**	**13074**	**8628.84**

Effluent Load **-**

Finished Product	**660**	**Kg of Fenpyroximate Technical**
Effluent Load		
Gas		
Saleable By-products	396.34	Kg of HBr Solution
	32	% HBr
	78	%Water
Liquid Waste	1962.49	Kg having following composition
	12.84	% Org impurities
	87.15	% Water

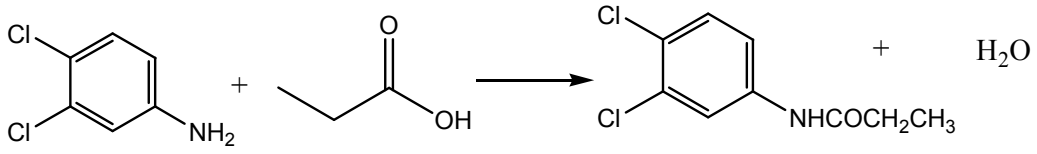
13.Propanil

Manufacturing Process:-

Propanil tech manufacture is a single step process. It involves reaction of 3, 4-Dichloroaniline (DCA) with propionic acid at 140-150°C. Water is formed during the course of reaction.

Excess propionic acid and azeotropic water are removed. The residual mass thus obtained in molten state is Propanil technical.

Reaction Scheme of the Product



3,4-Dichloro aniline Propionic acid Propanil

Material Balance

Product : Propanil 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
3,4-DCA	747	493.02	Reaction water	82.99	54.77
Propionic acid	404	266.64	Org Impurity	68.01	44.89
			Propanil	1000	660
Total Input	**1151**	**759.66**	**Total Outputs**	**1151**	**759.66**

Effluent Load -

Finished Product	**660**	**Kg of Propanil Technical**
Effluent Load		
Gas	Nil	
Saleable By-products	Nil	
Liquid Waste	99.66	Kg having following composition
	45.04	% Org Impurity (Propionic acid)
	54.96	% Water
Solid Waste	Nil	

14.Azoxystrobin

Manufacturing Process

Manufacturing Process

Step - 1

O-Hydroxyphenyl aceticacid is reacted with acetic acid and PTSA as catalyst using toluene as solvent to give 2-benzofuranone.

Step - II

2-Benzofuranone reacts with trimethyl orthoformate and acetic anhydride to give 3-(alpha-methoxy)methylene benzofuran-2(3H)-one **(2-MBF)**

Step - III

3-(alpha-methoxy)methylenebenzofuran-2(3H)-one thus obtained is reacted with methyl formate and 4,6-dichloro pyrimidine in presence of sodium methoxide using methanol as solvent to give methyl 3,3'-dimethoxy{2-(2-(6—chloropyrimidine-4-yl)oxy phenyl}-acrylate. **(Inter-III Di)**

Step - IV

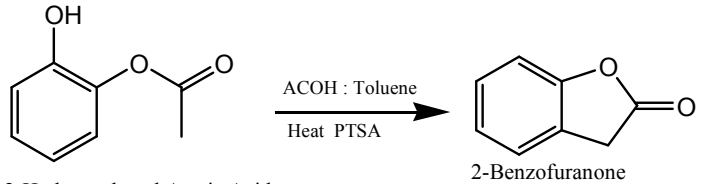
Methyl 3,3'-dimethoxy{2-(2-(6—chloropyrimidine-4-yl)oxy phenyl} acrylate is heated in the presence of KHSO4 using toluene as solvent to give methyl-3- methoxy{2-(2-(6—chloropyrimidine-4-yl)oxy phenyl} acrylate. **(Inter-III Mono).**

Step - V

methyl-3- methoxy{2-(2-(6—chloropyrimidine-4-yl)oxy phenyl} acrylate is lastly reacted with 2-cyano phenol in presence of K2CO3 and DMF as solvent and DABCO as catalyst to yield Azoxystrobin.

Reaction Mechanism of the Azoxystrobin

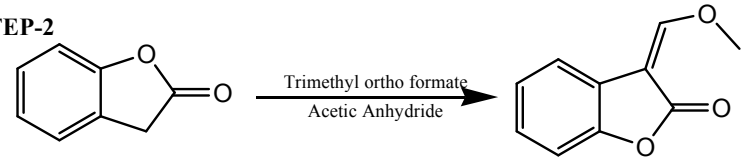
STEP -1



2-Hydroxyphenyl Acetic Acid

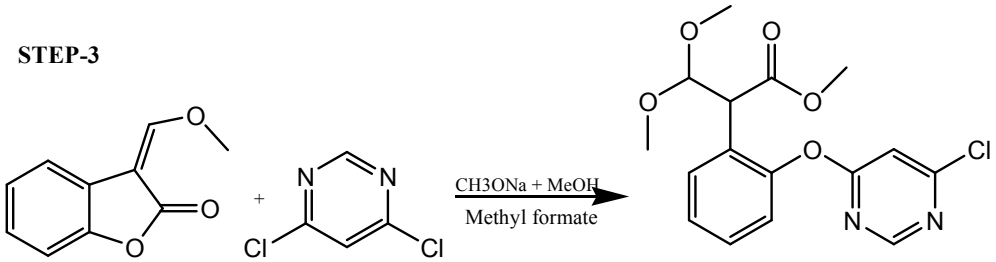
2-Benzofuranone

STEP-2



3-(alpha-Methoxy) Methylene Banzofuran-2(3H)- One

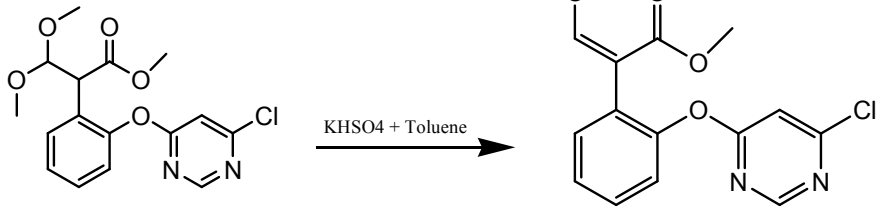
STEP-3



4,6-Dichloro Pyrimidine

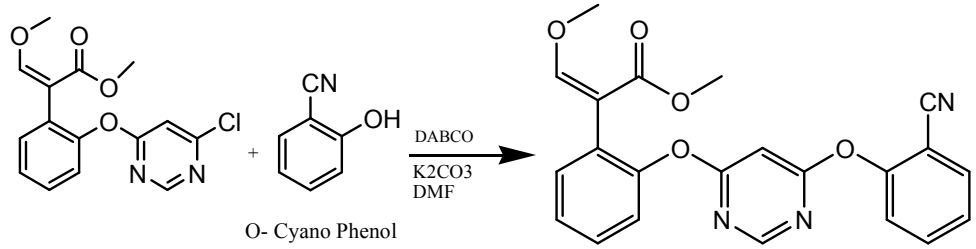
Methyl 3,3-Dimethoxy (2-(2-(6-chloro pyrimidine)-4-yl) oxyphenyl) acrlate

STEP-4



Methyl 3-methoxy (2-(2-(6-chloro pyrimidine)-4-yl) oxyphenyl) acrlate

STEP-5



O- Cyano Phenol

AZOXYSTROBIN

Material Balance

Product : Azoxystrobin 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
OHPA	1092	720.72	Reaction water	410	270.5
Toluene	500	330	Methyl acetate	2314	1527.24
PTSA	18	11.88	PTSA	18	11.88
Acetic acid	378	249.48	Acetic acid	378	249.48
TMOF	1426	941.16	Methanol	400	264
Acetic anhydride	2900	1914	Toluene	500	330
Methanol	400	264	MDC	200	132
MDC	200	132	Methyl formate	1740	1148.40
Methyl formate	2305	1521.30	KCl	280	184.80
NaHCO3	375	247.50	KHSO4	40	26.40
DCP	954	629.64	DABCO	7.6	5
KHSO4	40	26.40	Hexane	400	264
OCP	393	259.38	DMF	400	264
K2CO3	636	419.82	CO2	369	243.54
DABCO	7.6	5	Sodium acetate	503	331.98
DMF	400	264	Water	15000	9900
Water	15000	9900	Org Impurities	3128	2064.48
Hexane	400	264	NaCl	337	222.42
			Azoxystrobin	1000	660
Total Input	**27424.6**	**18100**	**Total Outputs**	**27424.6**	**18100**

Effluent Load -

Finished Product	**660**	**Kg of Azoxystrobin Technical**
Effluent Load		
Gas	243.52	Kgs of CO2 gas
Saleable By-products	1527.24	Kgs Methyl Acetate
Liquid Waste	13266.84	Kgs having following composition
	5.89	% Salt
	1.88	% Acetic acid
	15.56	% Org. impurities
Solid Waste	76.66	% Water

15 Cyproconazole

Manufacturing Process

Step - 1

Dimethyl sulphate is reacted with Sodium sulfide solution in water and the product DIMETHYL SULFIDE is fractionated in high purity and high yields from the reaction vessel.

Step - II

CPKETONE is taken in DIMETHYL SULFIDE and reacted with Dimethyl sulphate and Potassium hydroxide to form OXIRANE in high yields. The product is isolated by solvent extraction from the mass and washing with water followed by solvent stripping.

Step - III

Oxirane thus obtained is reacted with 1,2,4-Triazole in a solvent like DMF, in presence of a base to produce crude CYPROCONAZOLE. The product is isolated by concentration of the solvent and extraction in Toluene.

Step - IV

Crude product is crystallized from Toluene mixture to isolate the final product CYPROCONAZOLE conforming to the desired specifications.

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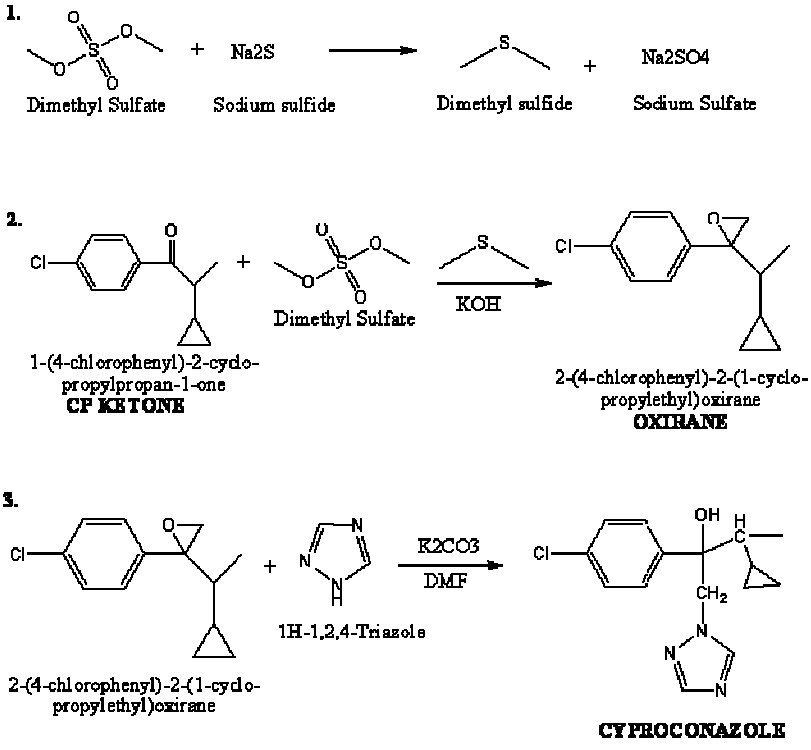
Reaction Mechanism of the Cyproconazole



Material Balance

Product : Cyproconazole 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
Sodium Sulfide	296	195.36	Dimethyl sulfate (loss)	230	151.8
Dimethyl sulfate	1106	729.96	Sodium sulfide	538	355.08
CP-Ketone	835	551.10	K2SO4	691.64	456.48
KOH	538	355.08	MDC (loss)	250	165
MDC	5200	3432	MDC (Recovered)	4950	3267
K2CO3	157	103.62	K2CO3	157	103.62
DMF	6500	4290.00	DMF (loss)	300	198
1,2,4-Triazole	315	207.90	DMF (Recovered)	6200	4092
Toluene	5000	3300.00	Toluene (loss)	200	132
Water	8000	5280	Toluene (Recovered)	4800	3168
			Water of reaction	70.74	46.69
			Org. Impurities	559.62	369.35
			Cyproconazole	1000	660
			Water	8000	5280
Total Input	**27947**	**18445.02**	**Total Outputs**	**27947**	**18445.02**

Effluent Load -

Finished Product	**660**	**Kg of Cyproconazole Technical**
Effluent Load		
Gas	Nil	
Saleable By-products	Nil	
Liquid Waste	6507.6	Kgs having following composition
	5.45	% Na2SO4
	7.01	% K2SO4
	5.67	% Org. Impurities
	81.85	% Water
Solid Waste	157	Kgs K2CO3

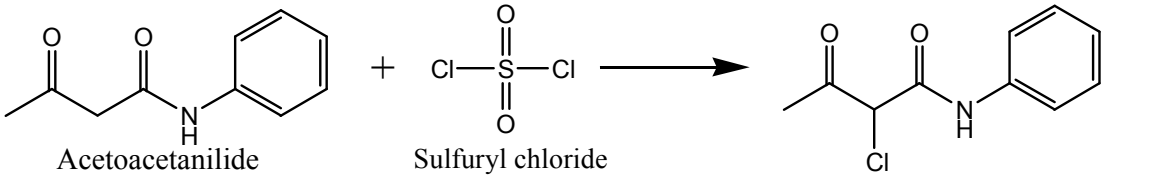
16. Carboxin

Manufacturing Process:-

Carboxin is manufactured by reacting acetoacetanilide (AA) with sulfuryl chloride (SO_2Cl_2) to give 2-chloro-3-oxo-N-phenylbutanamide intermediate (2-CPB). This intermediate is further reacted with 2-mercaptoethanol (2-ME) in presence of triethyl amine (TEA) to give 2-(2-hydroxyethylthio)-3-oxo-N-phenylbutanamide (2-HEPB). Finally it is cyclysed using PTSA to give carboxin technical.

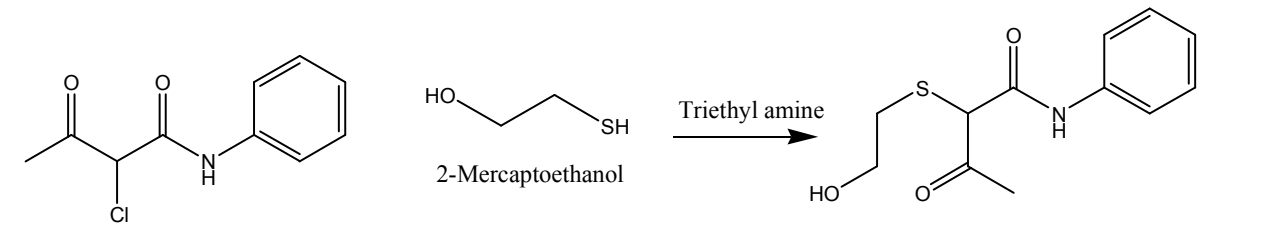
Reaction Scheme of the Product

Step-1:



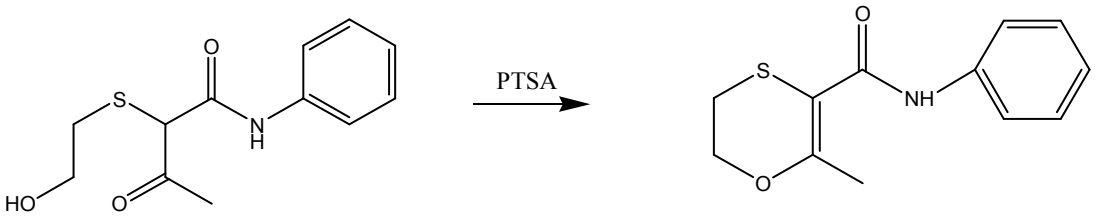
Acetoacetanilide Sulfuryl chloride 2-chloro-3-oxo-*N*-phenylbutanamide

Step-2:



2-chloro-3-oxo-*N*-phenylbutanamide 2-Mercaptoethanol 2-(2-hydroxyethylthio)-3-oxo-*N*-phenylbutanamide

Step-3:



CARBOXIN

Mass Balance

Product : Carboxin 0.66 MT/D

Inputs in Kg			**Outputs in Kg**		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
Acetoacetanilide	1506	994	SO_2 (gas)	560	370
SO_2Cl_2	1183	780.8	HCl (gas)	319	210.54
TEA	790	521.4	TEA. Hydrochloride	1072	707.52
2-ME	610	402.6	PTSA	350	231
PTSA	350	231	Reaction water	76	50.16
Benzene	8500	5610	Benzene (Loss)	400	264
Acetone	4000	2640	Benzene (Recovered)	8100	5346
Water	8000	5280	Acetone (Loss)	180	118.8
			Acetone (Recovered)	3820	2521.2
			Org. Impurity	1062	700.52
			Water	8000	5280
			Carboxin	1000	660
Total Input	**23869**	**16459.8**	**Total Outputs**	**23869**	**16459.8**

Effluent Load -

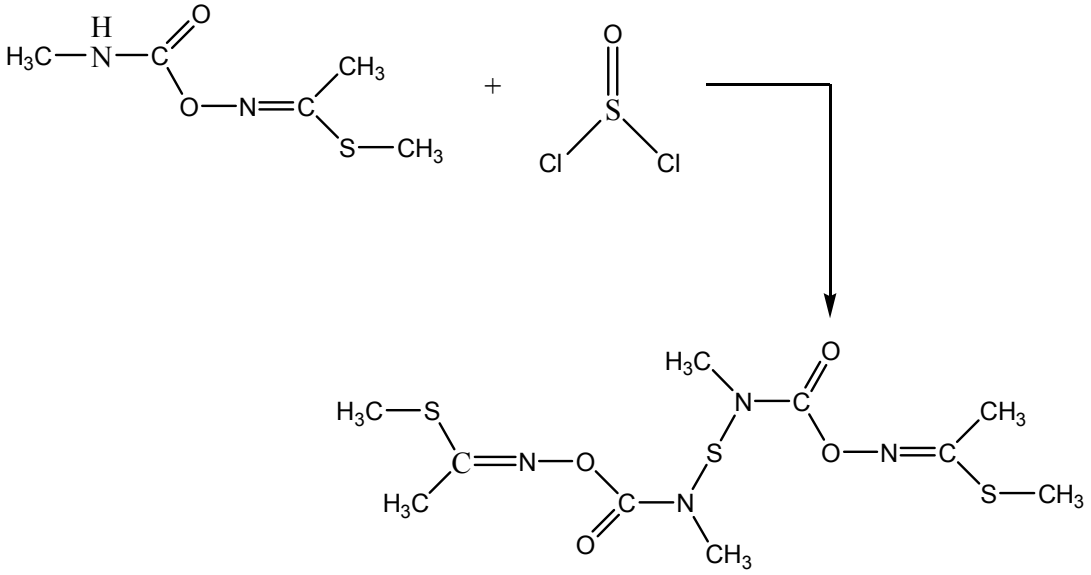
Finished Product	**660**	**Kg of Carboxin Technical**
Effluent Load		
Gas	370	Kgs of SO_2
Saleable By-products	Nil	
Liquid Waste	7179.74	Kgs having following composition
	2.93	% HCl
	13.07	% Salt (of TEA and PTSA)
	9.75	% Org. Impurity
	74.23	% Water
Solid Waste	Nil	

17. Thiomethoxozim

Manufacturing Process

Thiomethoxozim is manufactured by reacting S-methyl-N((methylcarbamoyl)oxy)thioacetate (MMCT) in xylene solution with thionyl chloride ($SOCl_2$) at 10-15 °C. The reaction is maintained at this temperature till complete conversion. After completion of reaction excess thionyl chloride is distilled off. The reaction mass is then filtered to separate the cake. The cake thus obtained is washed with xylene and water. Finally it is dried till constant weight.

Reaction Scheme of the Product



Material Balance

Product : Thiomethoxozim 0.66 MT/D

Inputs in Kg			Outputs in Kg		
Name of Raw Materials	**Per MT**	**Per Day**	**Name of Product**	**Per MT**	**Per Day**
MMCT	1015	669.90	HCl	205.86	135.87
SOCl2	409	269.94	Xylene (Loss)	200	132
Xylene	4300	2838	Xylene (Recovered)	4100	2706
Water	3000	1980	Impurities	218.41	143.97
			Water	3000	1980
			Thiomethoxozim	1000	660
Total Input	**8724**	**5757.84**	**Total Outputs**	**8724**	**5757.84**

Effluent Load -

Finished Product	**660**	**Kg of Thiomethoxozim Technical**
Effluent Load		
Gas	135.87	Kgs of HCl
Saleable By-products	Nil	
Liquid Waste	2123.97	Kg having following composition
	6.78	% Org Impurity
	93.22	% Water
Solid Waste	Nil	

ANNEXURE-IV

DETAILS OF WATER CONSUMPTION & WASTE WATER GENERATION AND TREATMENT & DISPOSAL SCHEME

WATER CONSUMPTION & WASTE WATER GENERATION

Existing

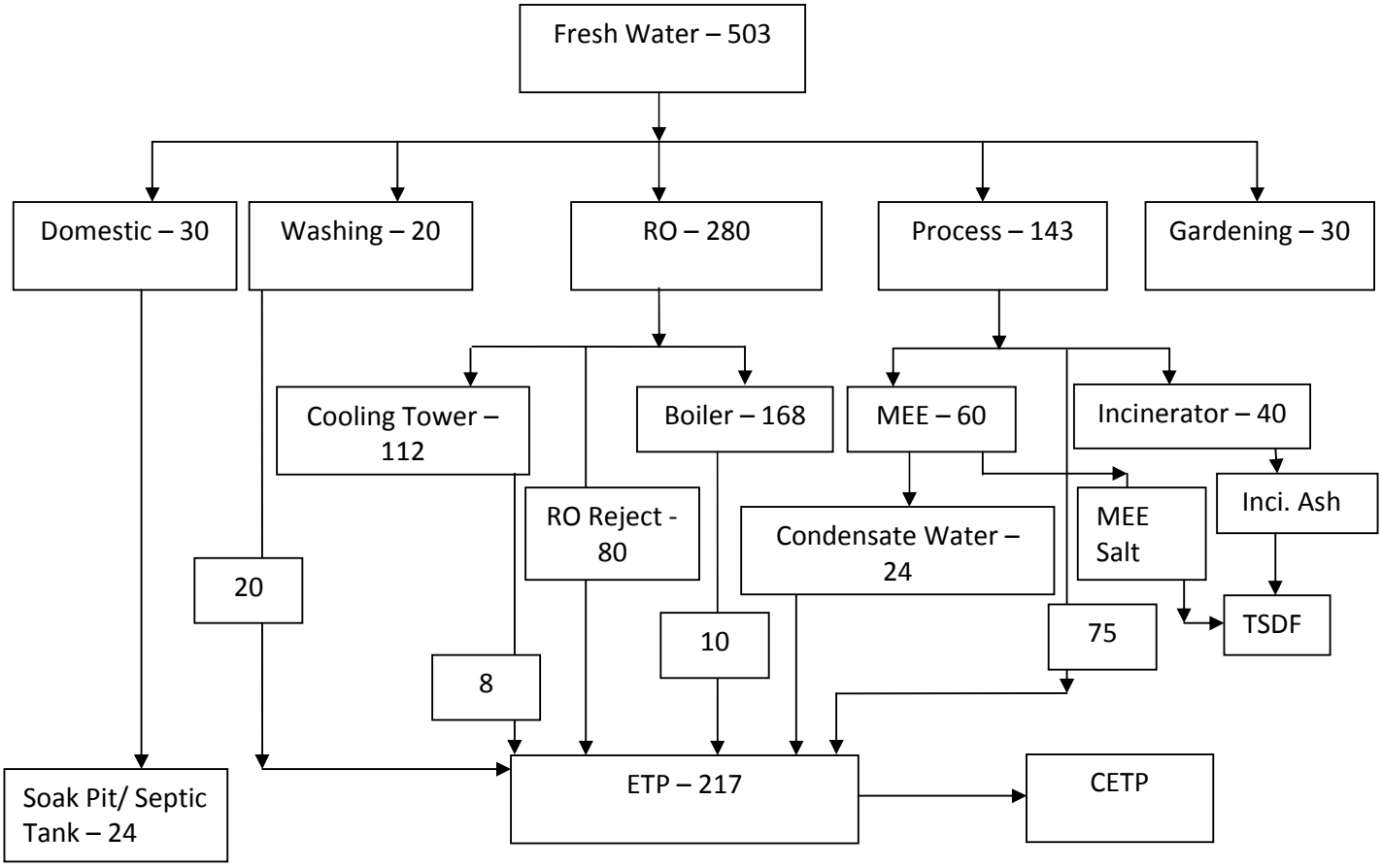
Sr.No.	Purpose of Water	Water Consumption m^3/Day	Waste Water Generation m^3/Day
1.	Domestic	10	8
2.	Industrial		
	Process	28	47
	Cooling Tower	30	20
	Boiler	30	20
	Washing	30	27
	Scrubber	3	--
3.	Gardening	10	--
Industrial Total		**121**	**114**
Total		**141**	**122**

After Proposed Expansion

Sr.No.	Purpose of Water	Water Consumption m^3/Day	Waste Water Generation m^3/Day
1.	Domestic	30	24
2.	Industrial		
	Process	143	175
	Cooling Tower	112	8
	Boiler	168	10
	Washing	20	20
	RO Reject	--	80
3.	Gardening	30	--
Industrial Total		**443**	**293**
Total		**503**	**317**

Note: Water requirement is met through GIDC then water is passed through the RO Plant. Treated RO water (280 KL/Day) is used in cooling tower (112 KL/Day) and boiler (168 KL/Day) purpose.

WATER BALANCE DIAGRAM (Unit – KL/Day)



EFFLUENT TREATMENT SCHEME

- **Non toxic and biodegradable effluent**

Effluent treatment is divided into 4 stages, namely, Pre Primary, Primary, Secondary and Tertiary.

Pre Primary Treatment:

Non toxic and biodegradable effluent (217 m^3/Day) from factory of High, medium and Low COD shall be collected in Collection Tanks-1 (B-101), Collection Tank 2 (B-102), Collection Tank 3 (B-103), Collection Tank 4 (B-104) & Collection Tank 5 (B-105).Tanks shall be provided with floating mixer to keep liquid in suspension. Here, Fenton treatment will be given to effluent by sulfuric acid from Acid Dosing Tank (B-106) with help of Acid Dosing Pump (P-106) and bring down pH up to 3. Then addition of ferrous Sulphate and Hydrogen Peroxide will be done from Ferrous Dosing Tank (B-111 A/B) and H_2O_2 Dosing Tank (B-107) respectively.

Primary Treatment:

After Fenton treatment effluent shall be pumped to Neutralization Tank (B-112) with help of raw effluent pumps 1, 2 & 3 (P-101, P-102, P-103, P-104 & P-105). The Buffer tanks 1 & 2 are provided for the shock load and also if the result will not achieve as per norms then pumping of effluent will be done in the Buffer Tanks 1 & 2 (B-104, B-105).

Then after, effluent shall be pumped to Neutralization in which lime continuous addition and stirring of lime is done from lime dosing tank (B 110 A/B) by help of lime dosing pump (P-110A/B) to maintain the pH of the effluent. The neutralize effluent shall go to Flash Mixing tank (B-113) in which polyelectrolyte is added from PE-dosing Tank (B-108) with help of PE dosing pumps (P-108) to carry out flocculation by using a Flocculator (M-113). With this, the solid particles form chain and remain together and gets denser.

Then effluent is passed to Primary clarifier (B-114) where the suspended solids are allowed to settle down and decanted effluent passes to Aeration Tank-1 (B-115).

Secondary Treatment:

Secondary treatment is done in two stages which consist of two aeration tanks (B-115 & B -117) and two clarifiers (B-116 & B-118), In aeration tank biodegradation of organic matter of the wastewater shall be carried out by bacteria (suspended growth) in the AT and for that oxygen shall be supplied by Triton Process Aerator Mixer Fixed Type (AM-115A/B). Aerators also keep MLSS in suspension. As per requirement nutrient dosing shall be done in aeration tank which is food for bacteria and helps in bacteria multiplication.

The sludge after setting in primary clarifier is sent to Filterpress-1 (F-124 A) for dewatering.

Then after, supernatant wastewater shall go to proposed Secondary Clarifier-1 (B-116) from Aeration Tank-1. Here, the suspended solids shall be settled. Activated sludge shall be removed from bottom of B-116 and pumped by sludge recycle pump P-116 to AT-2 to maintain MLSS and remaining sludge to Filter Press-2 (F-124 B) for dewatering. The Effluent is then send to Aeration Tank 2 (B-117) Here, again biodegradation of left out organic matter of the wastewater shall be carried out by bacteria (suspended growth) in the AT-2 and for that oxygen shall be supplied by Triton Process Aerator Mixer Fixed Type (AM-117A/B). Then after, wastewater shall go to proposed Secondary Clarifier-2 (B-118) from Aeration Tank-2. Here, the suspended solids shall be settled. Activated sludge shall be removed from bottom of (B-118) and pumped by sludge recycle pump-2 (P-118) to B-117 to

maintain MLSS and remaining to Filter Press-2 (124 B). Nutrient will be added in Aeration tank – I and Aeration Tank II for growth of Bacteria.

Tertiary Treatment:

Tertiary treatment is done for final filtering and removing some impurities from Treated Effluent. Overflow (Clear supernatant) of Clarifier shall be collected in Intermediate Sump (B-119). Treated effluent shall be passed through to Pressure Sand Filters (F-120 A/B) and Activated Carbon Filters (F-121 A/B/C) and then collected in Treated Effluent sump (B-123) before final discharge to CETP. If the Effluent norms are not within the limit the instead of Intermediated sump it will be sent to Buffer tank-3 (B-122) and will be sent to Buffer Tank-2 for further treatment. Filtrate from Filter Press 1 & 2 shall be collected in Drain Pit and then pumped to Buffer Tank-1.

Sludge from Filter Press-1 (F-124 A) &filter press-2 (F124 B) shall be collected in Hazardous Waste Storage Area and ultimate disposal to TSDF.

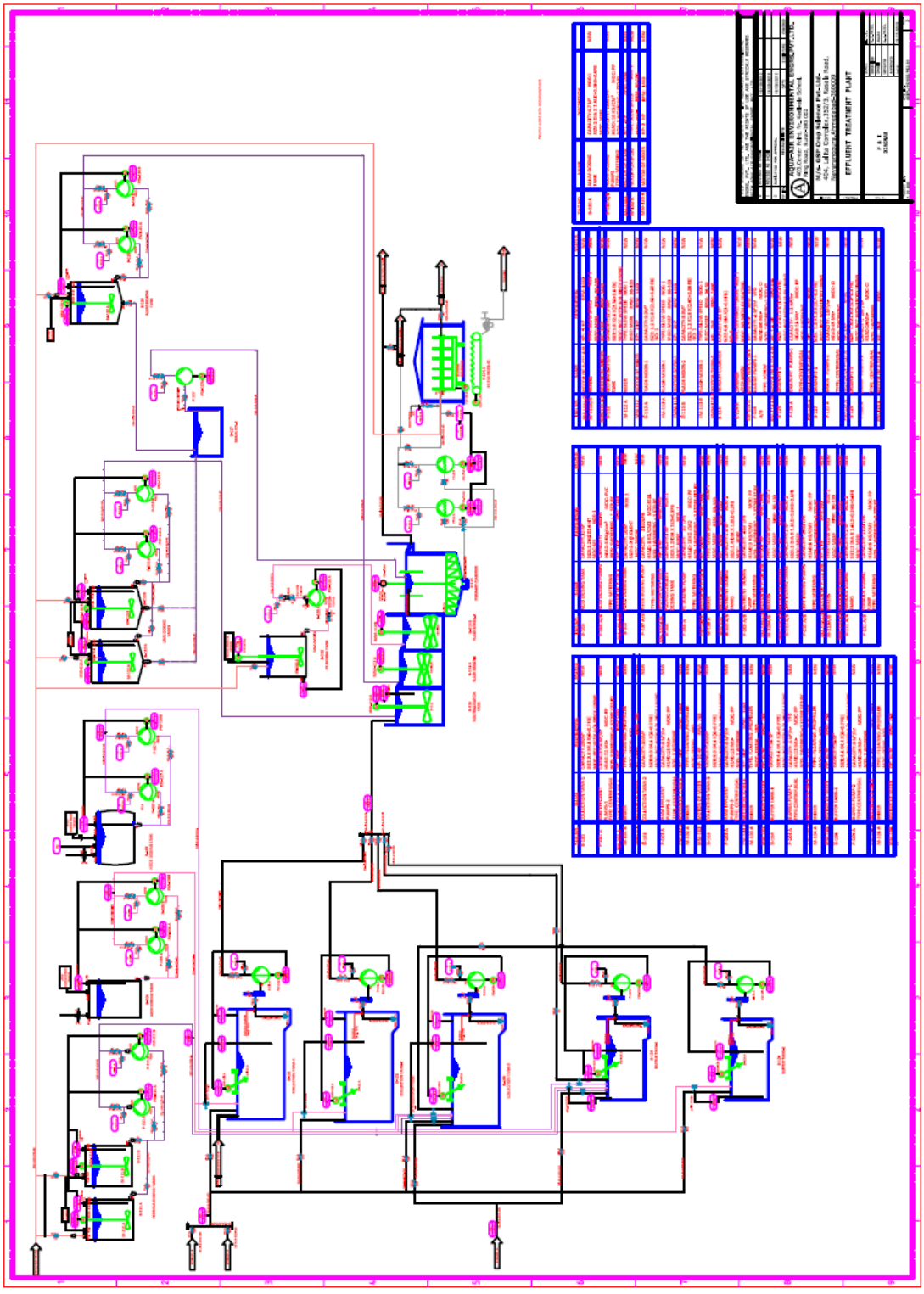
- **Non biodegradable high TDS & high COD effluent:**

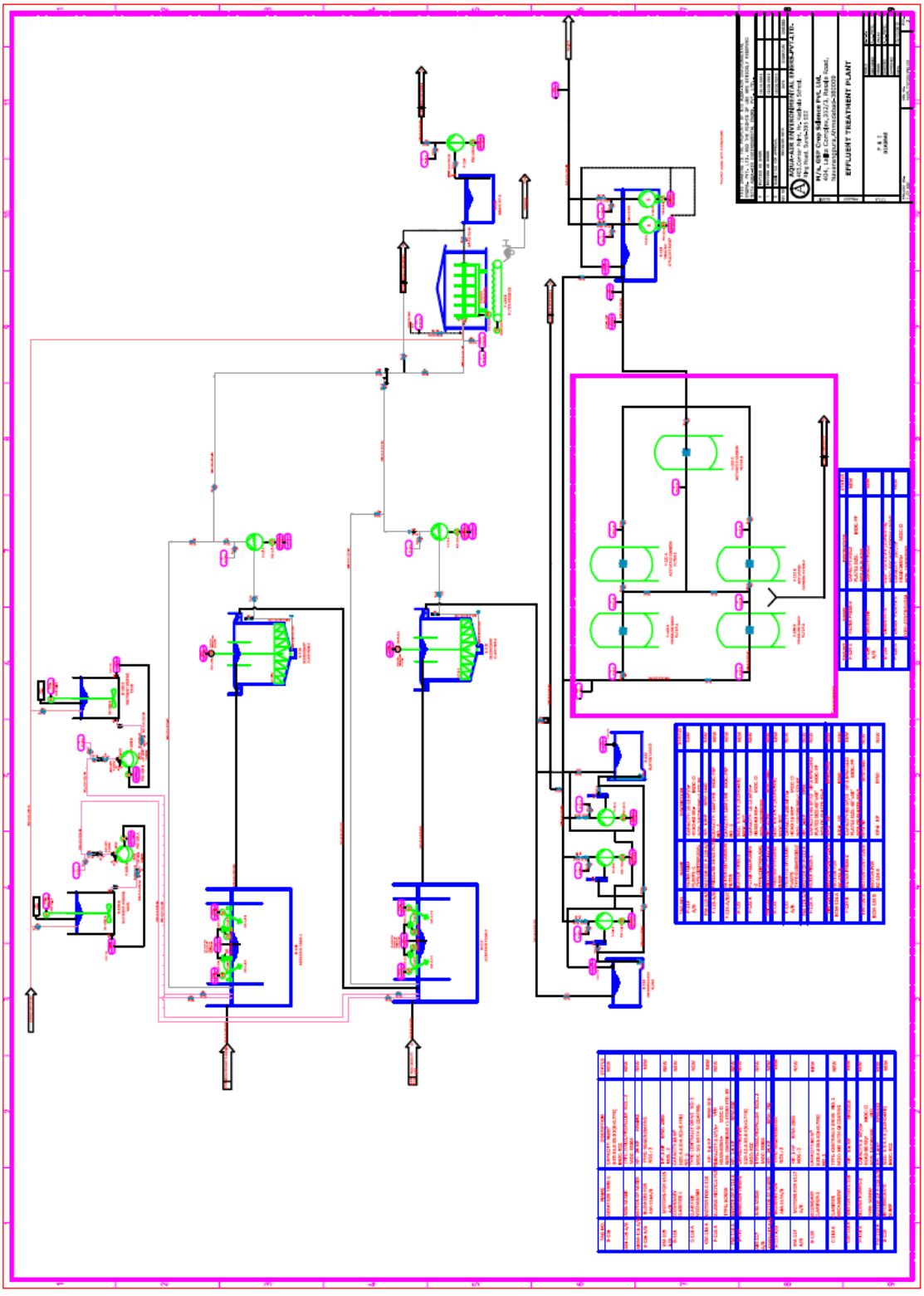
The high TDS (60 m^3/Day) effluent will be collected in ME feed Tank (B-130). The MEE feed effluent will be preheated by using hot condensate coming from the evaporator. The effluent will be feed to continuous multiple Effect Evaporator (M-131) and the effluent concentrated continuously by using stream as heating medium to multiple stages. The evaporated and condensate water will be collected in Condensate Tank (B-132) and recycled to ETP. The solid from the MEE will be collected in Hazardous waste Storage Area and ultimate disposal to TSDF.

The Non biodegradable high COD effluent (40 m^3/Day) will be incinerated in Incinerator after neutralized the effluent. The solid from the incinerator will be collected in Hazardous waste Storage Area and ultimate disposal to TSDF.

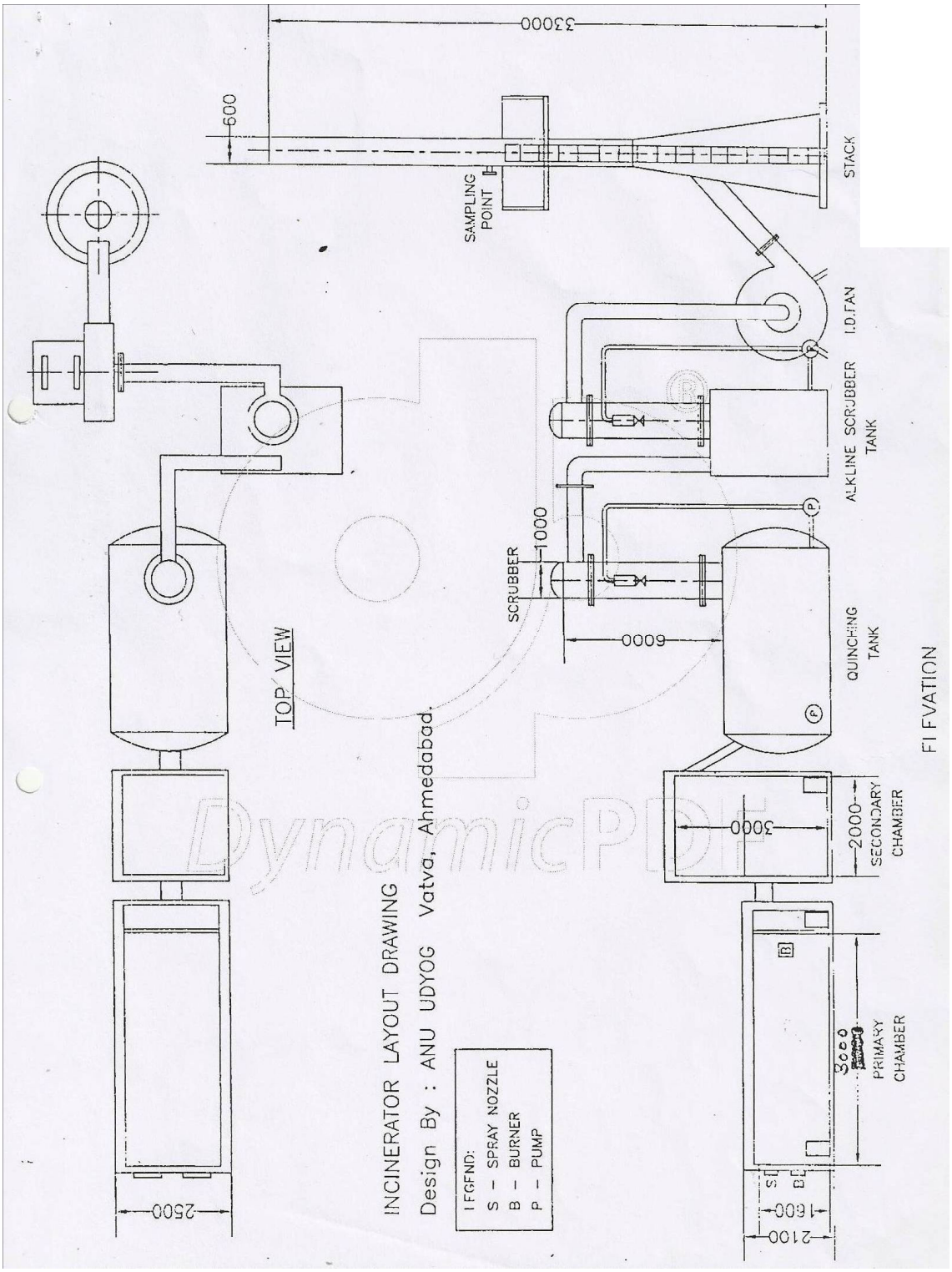
ETP Unit Size:

S.No.	TYPE	Tag No.	QTY	SERVICE	MOC	SIZE & CAPACITY
1	B	B-101	1	Collection Tank -1	RCC with A/A brick lining	9.0m X4.5m x [5.0+0.7FB], 200 m3
2	B	B-102	1	Collection Tank -2	RCC with A/A brick lining	9.0m X4.5m x [5.0+0.7FB], 200 m3
3	B	B-103	1	Collection Tank -3	RCC with A/A brick lining	9.0m X4.5m x [5.0+0.7FB], 200 m3
4	B	B-104	1	Buffer Tank -1	RCC with A/A brick lining	4.5mx4.4mx [5.0m+0.7mFB] ,95 m3
5	B	B-105	1	Buffer Tank -2	RCC with A/A brick lining	4.5mx4.4mx [5.0m+0.7mFB], 95 m3
6	B	B-106	1	Acid Dosing Tank	MS	dia 2.25 m x2.5 m HT, 10m3
7	B	B-107	1	H_2O_2 Dosing Tank	SS316L	dia 2.75 m x 1.7 m HT, 10 m3
8	B	B-108	1	PE Dosing Tank	HDPE	dia 1.2 m x1.0LD +0.5FB, 1m3
9	B	B-109 A/B	2	Nutreint Dosing Tank	HDPE	dia 1.3 m x1.2LD +0.5FB, 1.6m3
10	B	B-110 A/B	2	Lime Dosing Tank	MSEP	dia 2m x1.5 LD+0.3HB +0.5FB, 4.7m3
11	B	B-111A/B	2	Ferrous Dosing Tank	MSRL	dia 2m x1.5 LD+0.3HB +0.5FB, 4.7m3
12	B	B-112	1	Neutralisation Tank	RCC with A/A brick lining	1.8mx1.8mx[2.65m+0.5mFB], 8.60m3
13	B	B-113	1	Flash Mixing Tank	RCC	12.47m3
14	B	B-114	1	Primary Clarifier	RCC	4.8mdia X[3m+0.9 mFB],55 m3
15	B	B-115	1	Aeration Tank -1	RCC	14.0mx9.0mx [6.0m+0.7mFB], 756m3
16	B	B-116	1	Secondary Clarifier-1	RCC	4.6mdia X[3m+0.9 mFB],50 m3
17	B	B-117	1	Aeration Tank -2	RCC	14.0mx9.0mx [6.0m+0.7mFB], 756m3
18	B	B-118	1	Secondary Clarifier-2	RCC	4.6mdia X[3m+0.9 mFB],50 m3
19	B	B-119	1	Intermediate Sump	RCC	6.0mx4.4mx[3m+0.5mFB], 93m3
20	F	F-120 A/B	2	Presure Sand filter	FRP	10m3/hr
21	F	F-121A/B/C	3	Activated Carbon Filter	FRP	10m3/hr
22	B	B-122	1	Buffer Tank-3	RCC	6.0mx4.4mx[3m+0.5mFB], 93m3
23	B	B-123	1	Treated Effluent Sump	RCC	6.6mx5mx[3mLD+0.5mFB], 115m3
24	F	F- 124 A	1	Filter Press -I	PP	40m3/day
25	F	F- 124 B	1	Filter Press -I I	PP	50m3/day
26	B	B-126	1	Drain Pit-1	RCC with A/A brick lining	0.75mX0.75mX(0.7m+0.3mFB)
27	B	B-127	1	Drain Pit-2	RCC with epoxy painting	1.0mX1.0mX(0.7m+0.3mFB)
28	B	B-128	1	Drain Pit-3	RCC with epoxy painting	0.75mX0.75mX(0.7m+0.3mFB)
29	H	H-129	1	Hazardous Waste Storage Area	RCC& Brick masonary	10 mX 8m
30	B	B-130	1	Alum Dosing Tank	MSRL	dia 2m x1.5 LD+0.3HB +0.5FB, 4.7m3
30	B	B-131	1	ME Feed Tank	RCC	3m x 3m x (2.5m LD+0.5mFB)
31	E	E-132	1	MEE Unit	SS & MSEP	30 KL/Day
32	B	B-133	1	ME Condesate Tank	RCC	3m x 3m x (2.5m LD+0.5mFB)


EFFLUENT TREATMENT PLANT



Incinerator Layout drawing showing all the above equipments is shown in Figure-I.



ANNEXURE-V

DETAILS OF HAZARDOUS WASTE GENERATION & DISPOSAL

S.No.	Waste Details	Waste Category	Quantity MT/Month			Mode of Disposal
			Existing	Proposed	Total After Proposed Expansion	
1.	ETP Sludge	34.3	17	43	60	Collection, Storage, Transportation and Disposal at TSDF, NECL, Nandesari
2.	Residue containing Toxic metals/organic /Process waste	26.1	4	16	20	Collection, Storage, Transportation and Disposal at CHWIF, NECL, Nandesari.
3.	Used Oil	5.1	0.42 KL/Month	1 KL/Month	1.42 KL/Month	Collection, Storage, Transportation And Selling to authorized recyclers.
4.	Discarded liners/Bags Carboy Drums Unit in No./Month	33.3	 582 333 42	 300 254 50	 880 587 92	Collection, Storage, Transportation And Selling to authorized recyclers.
5.	Salt from TEE	26.2	22.5	45	67.5	Collection, Storage, Transportation and Disposal at TSDF, NECL, Nandesari.
6.	Distillation Residue	36.4	--	20	20	Collection, Storage, Transportation and Disposal at Common Incineration Site at M/s. NECL, Namdesari or sell to Cement Industry
7	Incineration Ash	36.2	--	21	21	Collection, Storage, Transportation and Disposal at TSDF, NECL, Nandesari.
8	Spent Catalyst	35.2	--	4.7	4.7	Collection, Storage, Transportation

						and Disposal at Common Incineration Site at M/s. NECL, Namdesari or sell to suppliers
9.	Spent HCl (30%)	D2	15	19	34	Collection, Storage, Transportation & Sell to end user
10.	HBr	B26	8	12	20	Collection, Storage, Transportation & Sell to end user
11.	Liquid Ammonia	C1	--	14	14	Collection, Storage, Transportation & Sell to end user
12.	NaBr	B26	--	4.4	4.4	Collection, Storage, Transportation & Sell to end user
13.	Spent Sulphuric Acid (45%)	D2	--	187.5	187.5	Collection, Storage, Transportation & Sell to end user

ANNEXURE-VI

DETAILS OF AIR POLLUTION CONTROL SYSTEM

(A) Details of Flue Gas Stack ; Stack Attached To Boiler

SOURCES OF GASESOUS EMISSIONS	**STACK**		
Fuel Used	Coal		
Quantity of Fuel	850 Kg/hour		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 ppm	94 ppm	150mg/Nm^3
Stack Height	36 meters		
Stack Diameter at the Top	800 MM		
Air Pollution Control System	Cyclone Separator with Bag Filter		

(B) Details of Flue Gas Stack : Stack Attached To Incinerator as per CPCB Guidelines

Sources of Gaseous Emissions	Stack		
Fuel Used	F.O. / L.D.O.		
Quantity of Type	80 Liter/Hr – LDO		
Stack Height	30 Meters		
Stack Diameter at The Top	750 MM		
Air Pollution Control System	Ventury Scrubber		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 ppm	94 ppm	150mg/Nm^3

(C) Details of Process Vent

Sr.No.	Stack attached to	Stack Height	Air Pollution Control System	Parameter	Permissible Limit
Existing					
1	Chlorpyrifos	15 m	Two Stage Water Scrubber	HCl	20 mg/Nm^3
2	Profenophos	15 m	Two Stage Water Scrubber	HBr	5 mg/Nm^3
3	Glyphosate	15 m	Two Stage Water Scrubber	HCl	20 mg/Nm^3
Proposed					
4	Hexaconazole	15 m	Two Stage Alkali Scrubber	SO_2	40 mg/Nm^3
5	Diafenthiuron	15 m	Two Stage Alkali Scrubber	NH_3	175 mg/Nm^3
6	Finpronil	15 m	Two Stage Water Scrubber	HBr	5 mg/Nm^3
7	Thiomethoxozim	15 m	Two Stage Water Scrubber	HCl	20 mg/Nm^3

ANNEXURE-VII

Details of Hazardous Chemicals Storage & Handling

Sr. No.	Name of Hazardous Chemical	Type	MOC	Size KL	No	Dimension
1	Formic Acid	liquid	MS	10	1	4.0 m x 2.0 m
2	Sulphuric Acid	Liquid	MS	20	2	5.3 m x 2.5 m
3	Nitric Acid	liquid	MS	20	1	5.3 m x 2.5 m
4	Bromine	liquid	MS	5	1	2.5 m x 1.5 m
5	MDC	liquid	MS	25	1	3.10 m x 3.65 m
6	Methanol	liquid	MS	20	2	5.3 m x 2.5 m
7	DMF	liquid	MS	10	1	5.0 m x 1.8 m
8	HCl	liquid	HDPE	30	2	5.3 m x 2.5 m
9	o-Xylene	liquid	MS	20	1	5.3 m x 2.5 m
10	Toluene	liquid	MS	20	1	5.3 m x 2.5 m
11	N-Hexane	liquid	MS	20	1	5.3 m x 2.5 m

ANNEXURE – VIII

SOCIO - ECONOMIC IMPACTS

1) Employment Opportunities

The manpower requirement for the proposed project is being expected to generate some permanent jobs and secondary jobs for the operation and maintenance of plant. This will increase direct / indirect employment opportunities and ancillary business development to some extent for the local population.

This phase is expected to create a beneficial impact on the local socio-economic environment.

2) Industries

Required raw materials and skilled and unskilled laborers will be utilized maximum from the local area. The increasing industrial activity will boost the commercial and economical status of the locality, to some extent.

3) Public Health

The company regularly examines, inspects and tests its emission from sources to make sure that the emission is below the permissible limit. Hence, there will not be any significant change in the status of sanitation and the community health of the area, as sufficient measures have been taken and proposed under the EMP.

4) Transportation and Communication

Since the existing factory is having proper linkage for the transport and communication, the development of this project will not cause any additional impact.

In brief, as a result of the expansion there will be no adverse impact on sanitation, communication and community health, as sufficient measures have been proposed to be taken under the EMP. The proposed expansion is not expected to make any significant change in the existing status of the socio - economic environment of this region.

ANNEXURE-IX

PROPOSED TERMS OF REFERENCE FOR EIA STUDIES

1. **Project Description**

- Justification of project.
- Promoters and their back ground
- Project site location along with site map of 5 km area and site details providing various industries, surface water bodies, forests etc.
- Project cost
- Project location and Plant layout.
- Water source and utilization including proposed water balance.
- Product spectrum (proposed products along with production capacity) and process
- List of hazardous chemicals.
- Mass balance of each product
- Storage and Transportation of raw materials and products.

2. **Description of the Environment and Baseline Data Collection**

- Micrometeorological data for wind speed, direction, temperature, humidity and rainfall in 5 km area.
- Existing environmental status Vis a Vis air, water, noise, soil in 5 km area from the project site. For SPM, RSPM, SO_2, NOx.
- Ground water quality at 5 locations within 5 km.
- Complete water balance

3. **Socio Economic Data**

- Existing socio-economic status, land use pattern and infrastructure facilities available in the study area were surveyed.

4. **Impacts Identification And Mitigatory Measures**

- Identification of impacting activities from the proposed project during construction and operational phase.
- Impact on air and mitigation measures including green belt
- Impact on water environment and mitigation measures
- Soil pollution source and mitigation measures
- Noise generation and control.
- Solid waste quantification and disposal.

5. **Environmental Management Plan**

- Details of pollution control measures
- Environment management team
- Proposed schedule for environmental monitoring including post project

6. **Risk Assessment**

- Objectives and methodology of risk assessment

- Details on storage facilities
- Process safety, transportation, fire fighting systems, safety features and emergency capabilities to be adopted.
- Identification of hazards
- Consequence analysis through occurrence & evaluation of incidents
- Disaster Management Plan.

7. Information for Control of Fugitive Emissions

8. Post Project Monitoring Plan for Air, Water, Soil and Noise.

9. Information on Rain Water Harvesting

10. Green Belt Development plan