Prefeasibility Report

1 EXECUTIVE SUMMARY:

<table>
<tr><td>Name & Address of the Industry</td><td>M/s Bayer Vapi Private Limited</td></tr>
<tr><td>If site is outside GIDC Give aerial distance of nearest residential area</td><td>Plot No. 306/3, Phase II, GIDC Estate, District Valsad</td></tr>
<tr><td>Project Status
(New/ Expansion/Amendment)</td><td>Expansion</td></tr>
<tr><td>Product Capacity</td><td>Existing capacity - 17562 MT/Annum
Expansion - 9010 MT/Annum
After expansion – 26572 MT/Annum</td></tr>
<tr><td>Total cost of Proposed Project
(Rs. in lacs)</td><td>58,246 lacs</td></tr>
<tr><td>Plot area
(sq. meter)</td><td>347768 m2</td></tr>
<tr><td>Green belt area,/Tree Plantation area
(sq. meter)</td><td>96920 m2</td></tr>
<tr><td>Source of Water Supply</td><td>GIDC</td></tr>
<tr><td>Water consumption
(KL/day)</td><td>
<table>
<tr><th rowspan="2">Sr No</th><th rowspan="2">Category</th><th colspan="3">Water Consumption (KLD)</th></tr>
<tr><th>Existing</th><th>Additional Proposed</th><th>Total Proposed after Expansion</th></tr>
<tr><td>1</td><td>Industrial</td><td>666.1</td><td>171</td><td>837.1</td></tr>
<tr><td>2</td><td>Utility</td><td>2298.6</td><td>189.2</td><td>2487.8</td></tr>
<tr><td>3</td><td>Gardening</td><td>130</td><td>0</td><td>130</td></tr>
<tr><td>4</td><td>Domestics</td><td>75.2</td><td>24.8</td><td>100</td></tr>
<tr><td>5</td><td>Others</td><td>50</td><td>0</td><td>50</td></tr>
<tr><td colspan="2">Total</td><td>3219.9</td><td>385</td><td>3604.9</td></tr>
<tr><td>6</td><td>Water to be recycled in utility</td><td>0</td><td>555.7</td><td>555.7</td></tr>
<tr><td colspan="2">Total</td><td>3219.9</td><td>-170.7</td><td>3049.2</td></tr>
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</td></tr>
<tr><td>Waste water generation(KL/day)</td><td>
<table>
<tr><th rowspan="2">Sr No</th><th rowspan="2">Category</th><th colspan="3">Wastewater Generation (KLD)</th></tr>
<tr><th>Existing</th><th>Additional Proposed</th><th>Total Proposed after Expansion</th></tr>
<tr><td>1</td><td>Industrial</td><td>653.3</td><td>160</td><td>813.3</td></tr>
<tr><td>2</td><td>Utility</td><td>441.4</td><td>131</td><td>572.4</td></tr>
<tr><td>3</td><td>Gardening</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>Domestics</td><td>60</td><td>0</td><td>60</td></tr>
<tr><td>5</td><td>Others</td><td>50</td><td>0</td><td>50</td></tr>
<tr><td colspan="2">Total</td><td>1204.7</td><td>291</td><td>1495.7</td></tr>
<tr><td colspan="2">Water recycled in utility , etc after treatment</td><td>255.7</td><td>300</td><td>555.7</td></tr>
<tr><td>6</td><td>Wastewater disposed to CETP</td><td>949</td><td>-9</td><td>940</td></tr>
</table>
</td></tr>
<tr><td>,Treatment facility with capacity
(ETP, CETP, MEE, STP etc).</td><td>The effluent generated from proposed plant will be treated in existing Wastewater Pretreatment Plant (WWPT) followed by Conventional ETP. The treated effluent will be used for Gardening/Dust suppression and discharged to CETP.</td></tr>
<tr><td>Reuse/Recycle details</td><td>555.7 KLD Water to be recycled in utility</td></tr>
<tr><td>No. of Boilers/TFH/Furnaces/DG sets etc. with capacities</td><td>Existing – 4 Boilers (10 TPH)
Proposed – 1 Boiler (15 TPH)</td></tr>
<tr><td>Fuel</td><td>Natural gas or FO, HSD</td></tr>
</table>

2 INTRODUCTION

2.1 Brief Description of the Project

The existing unit is manufacturing active ingredients and intermediate at the same plot No.306/3, 2nd Phase GIDC, Vapi, DistrictValsad. It is proposed to enhance the production capacity of active ingredients and intermediates form 17562 TPA to 26572 TPA.

Bayer Vapi Private Limited (formerly known as Bilag Industries Pvt. Ltd.) is a 100 per cent owned subsidiary of Bayer SAS France. The Company's headquarters and production site are located at Vapi in the west coast of India in Gujarat. It is engaged in the manufacture of active ingredients and its intermediates for use in a wide array of agriculture and environment protection products. It is also the single largest Synthetic Pyrethroids production facility in the world.

2.2 Need for the project and its importance to region:

The role of the pesticides in the well-being of human race needs no emphasis. Pesticide usage has become essential in order to maximize agriculture production and reduce public health pestilence. The rapid changes in cropping patterns, increased fertilization and adoption of programs for high yielding varieties have all contributed to increased use of pesticides. Further, pest problems keep on changing with the changing environment. New physiological kinds evolve as a result of mutations to withstand new conditions in nature. Many pest species develop resistant strains when the same Pesticide is used far too often. The problems of pest resurgence and secondary pest out-breaks crop up with the indiscriminate use of pesticides. These associated problems offer a great scope for revolutionizing the use of pesticides. However, in India though the overcall pesticide growth figures may appear impressive, the rate of consumption per hectare of cultivated land is very low in comparison per hectare of cultivated land is very low in comparison to other countries. India used 180 g of pesticides/ha. as against 10,790g, 1870 g and 1490 g/ha used in Japan, Europe and U.S.A. respectively. India spent just Rs. 2.15/ha. on pesticides while Japan and U.S.A spent Rs.110/ha and Rs.35/ha respectively during the same period. India consumed 12 gm. of pesticides per kg. of fertilizer used against 146 gm. in Japan in and 19 gm in U.S.A in . This is one of the major factors that can be attributed to low per hectare yields in our country since the crops and especially the high yielding varieties cannot manifest their production potential in absence of proper pest protection. That the production potential remains suppressed for want of protection can be exemplified by considering how in wheat, a crop comparatively resistant to insect pestilence, we have had a "revolution" where as in paddy which is one of the most heavily infested crops, we have had no break-through. In case of wheat, the per hectare yield in India rose from 827 kg.in to 1338 kg. Corresponding yields of paddy in India on the other hand was 1826 kg. as against 6185 kg. 5326 kg. , 5105 kg.and 4000 kg. in Japan, Egypt, USA and USSR respectively.

Within the country itself, there is a great imbalance between different regions with regard to the use of pesticides. Of the total of approximately Rs.5000 million spent on pesticides in at the farm level, south contributed for about 45 per cent of the total consumption in the rest of the country.

2.3 Employment Generation (Direct and Indirect) due to the project

During construction phase 150 manpowerwill be required per day and during operation 80 additional manpower will be(required after commissiong of project).

The existing man power given in below table

Category	Existing manpower in nos
Dept head	17
Envt operator	50
Firemen operator	26
Lab operation	35
office boy	3
Operator	3
Plant Manager	15
Prod Operator	566
Shift Supervisor	167
Technical Staff	50
Technician	241
Commercial staff	40
Technical Manager	45
Grand Total	**1258**

3 PROJECT DESCRIPTION

3.1 Type of Project including interlinked and interdependent projects,

The Proposed Project comes under 'Section 5(b)' Pesticides industry and pesticides specific intermediates (excluding formulation)

As per EIA notification dated 14th September 2006 and its amendment thereof proposed project comes under in category A.

No interlinked project.

3.2 Location (specific location and project boundary & project lay out) with coordinates

Proposed expansion project of Bayer Vapi Private Limited located at Plot No. 306/3, Phase II GIDC Estate, Vapi-396195 Dist: Valsad

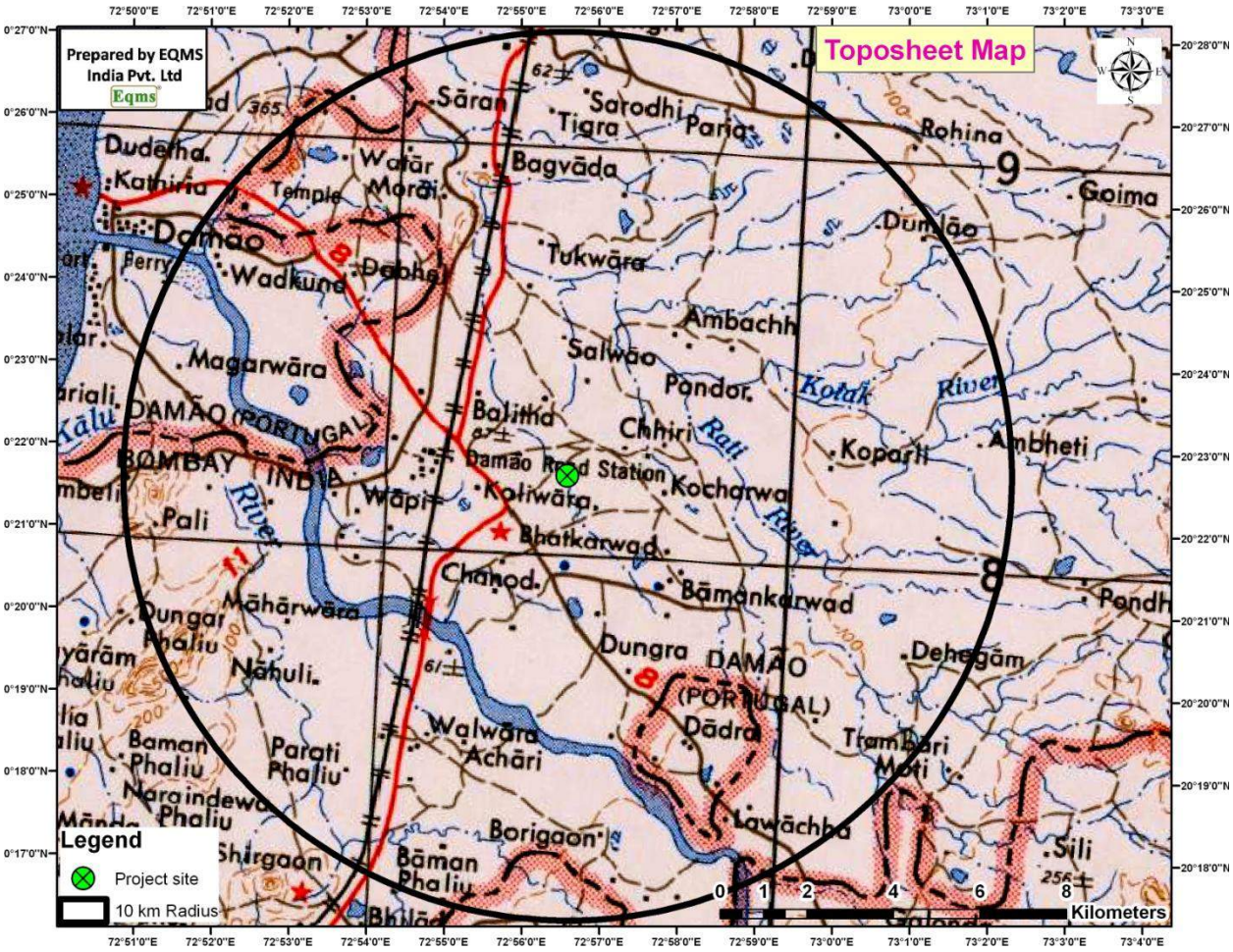


Figure2.1 : Location map

Project Site

The land break of the proposed project marked in below table

SR. NO.	DESCRIPTION	AREA IN Sq. Mt.
1	Constructed Area	**111444**
2	Road Area	**50583**
3	Green belt + Open land for green belt	**96920**
4	Open Land for future expansion	**42500**
5	Miscellaneous Area	**46321**
	Total Plot Area in Sq M	**347768**

Figure2.2 : Plant Layout

3.3 Details of alternate sites considered and the basis of selecting the proposedsite, particularly the environmental considerations considered should behighlighted

There is no interlinked project. This is brownfield expansion of existing plant and as such no alternative site consideration was needed.

Since the objective is to manufacture pesticides, a lush green & friendly environment is being selected for installing the plant. The existing site is located in notified industrial estate where all common environmental infrastructure facilities are available and also site is well connected to rail, road and port.

The project is not likely to cause any significant impact to the ecology of the area since adequate preventive measures will be adopted to control various pollutants within permissible limits. Green belt development around the area has been and shall be taken up as an effective pollution mitigative technique.

3.4 Existing and Proposed Products / Capacities:

Product:

Sr No	Name of Products	Category	Capacity (MT/Annum)		
			Existing	Proposed	Total Proposed after Expansion
1	Cypermethrin	Insecticides	2496	0	2496
2	Alphamethrin	Insecticides	480	0	480
3	Deltamethrin	Insecticides	504	0	504
4	Permethrin	Insecticides	1374 (Either individual or total production of 2 products)	0	1374 (Either individual or total production of 2 products)
5	Transfluthrin	Insecticides			
6	D Trans Allethrin	Insecticides	180	-180	0
7	Acrinathrin	Insecticides	45	0	45
8	Imidacloprid	Insecticides	720	0	720
9	Beta Cyfluthrin	Insecticides	982.32 (Either individual or total production of 2 products)	0	982.32 (Either individual or total production of 2 products)
10	Cyfluthrin	Insecticides			
11	Ethofumesate	Herbicide	1560 (Either individual or total production of 2 products)	1740 (Either individual or total production of 2 products)	3300 (Either individual or total production of 3 products)
12	NC 9770	Intermediate			
13	Aclonifen	Herbicide	0	3300	
14	Triafamone	Herbicide	0	180 (Either individual or total production of 2 products)	180 (Either individual or total production of 2 products)
15	Sulphonyl Indole	Intermediate			

16	MetaphenoxyBenzaldehyde	Intermediate	3000	0	3000
17	NaCMTS	Intermediate	1200	0	1200
18	Cypermethric Acid Chloride (CMAC)/ Cypermethric Acid (CMA)	Intermediate	2400	0	2400
19	Cypermethric Acid Chloride from DV Ester	Intermediate	600 (Either individual or total production of 2 products)	0	600 (Either individual or total production of 2 products)
20	Acid Chloride Preparation	Intermediate			
21	Metaphenoxy Benzyl Alcohol	Intermediate	1200	0	1200
22	Becisthemic Acid	Intermediate	180	0	180
23	Chrysanthemic Acid	Intermediate	180 (Either individual or total production of 2 products)	0	180 (Either individual or total production of 2 products)
24	Allethrolones	Intermediate			
25	TCA	Intermediate	410.4 (Either individual or total production of 2 products)	129.6	540 (Either individual or total production of 2 products)
26	RTCMA	Intermediate			
27	DM Base	Intermediate	50.4	0	50.4
28	Fipronil	Insecticides	0	540	540
29	Ethiprole	Insecticides	0	1020	1020
30	Fluopyram	Fungicide	0	3000 (Either individual or total production of 2 products)	3000 (Either individual or total production of 2 products)
31	PYACN	Intermediate			
32	Tembotrione	Herbicide	0	1020	1020
33	Pyrasulfotle	Herbicide	0	300	300
34	Amid Chloride	Intermediate	0	1020	1020
35	Flumethrin	Insecticides	0	60	60
36	R & D Products	Not Specified	0	180	180
	Total Capacity		**17562.12**	**9009.6**	**26571.72**

By Product: -

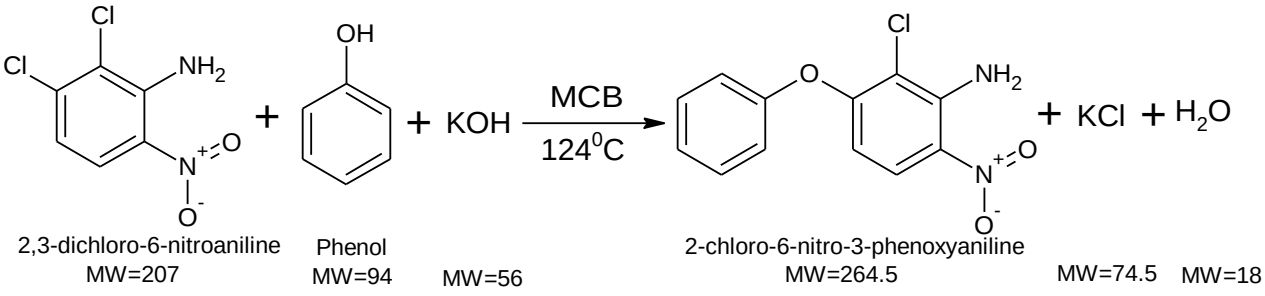
Sr No	**Name of by Products**	**Capacity (MT/Annum)**		
		Existing	**Proposed**	**After Expansion**
1	Aluminium chloride solution	15768	0	15768
2	Recovered Methanol	1669.2	0	1669.2
3	Potassium Chloride	543.6	0	543.6
4	Potassium Bromide/Sodium bromide	6654	0	6654
5	Sodium by- Sulphate	4076.4	0	4076.4
6	Sodium by- Sulphate solution	1620	0	1620
7	Organic Solvent	2095.2	1800	3895.2

8	Ammonia Solution	541.56	0	541.56
9	Ammonium Chloride Crystal	1620	0	1620
11	Potassium Chloride solution.	3000	0	3000

3.5 Technology and Process Description of New Products:

Manufacturing Process:

Aclonifen

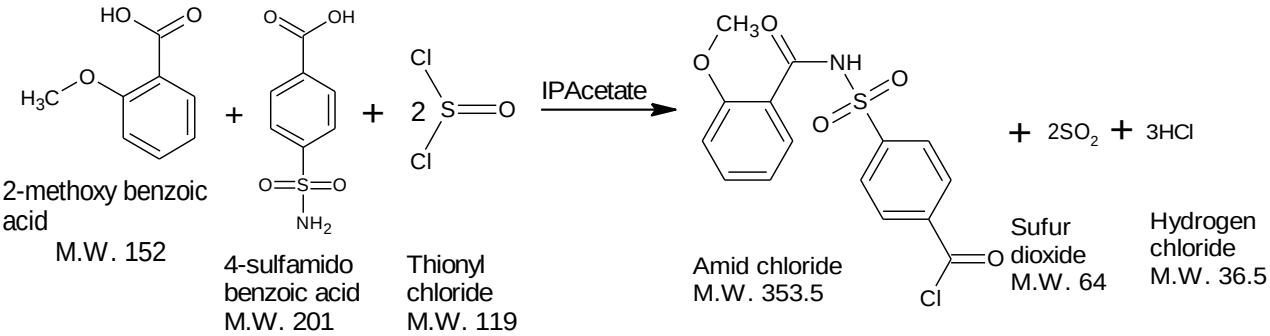


2,3-dichloro-6-nitroaniline MW=207 | Phenol MW=94 | MW=56 | 2-chloro-6-nitro-3-phenoxyaniline MW=264.5 | MW=74.5 | MW=18

The manufacturing process for Aclonifen technical material is a single-step batch process.

Aclonifen is prepared by adding DCONA to a mixture of phenol and mono chlorobenzene in the presence of potassium hydroxide. After completion of reaction, water is added to the reaction mixture. Two phases is separated. Organic layer washed with water and combined aqueous layer sent for phenol recovery. Organic layer concentrated under vacuum to get crude Aclonifen. The crude Aclonifen is crystallized in methanol. The slurry is filtered and washed with methanol and water to give technical Aclonifen.

Amidchloride:

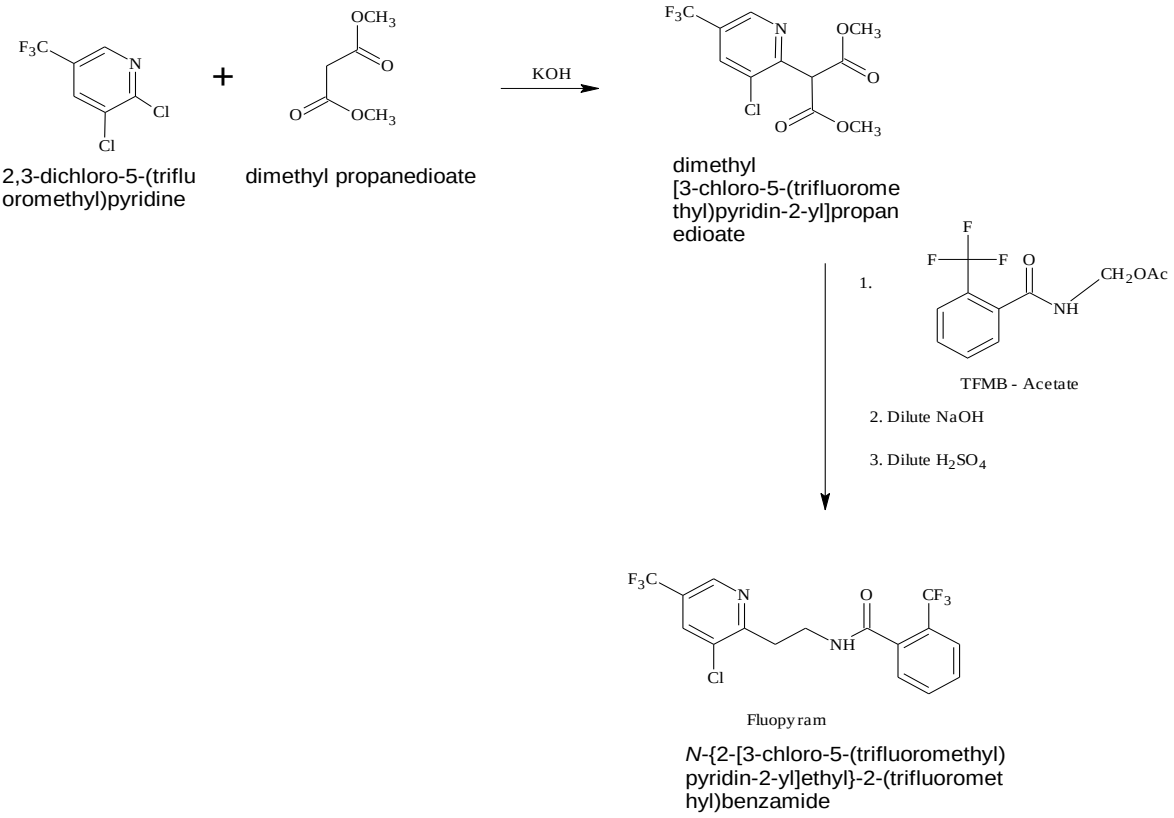


2-methoxy benzoic acid M.W. 152 | 4-sulfamido benzoic acid M.W. 201 | Thionyl chloride M.W. 119 | Amid chloride M.W. 353.5 | Sufur dioxide M.W. 64 | Hydrogen chloride M.W. 36.5

The manufacturing process for Amid chloride is a single-step batch process.

Thonyl chloride is added to Suspension of 2-Methoxybenzoic acid and 4-Sulfamidobenzoic Acid in Isopropyl Acetate (IPAC). HCl and SO2 gas liberated during the reaction which is scrubbed in scrubbers. Excess TC and some IPAC is distilled off. IPAC + TC is recycled in subsequent batches. After every 5 batches IPAC + TC mixture is washed with water, dehydrated and recycled. Stirring is continued to complete the conversion. Once the conversion is complete, the mixture is diluted with isopropyl acetate, cooled, filtered and washed with IPAC. Wet cake is dried under vacuum and packed in FIBC. Mother Liquor and washing mother liquor is taken for IPAC recovery for recycling.

Fluopyram



2,3-dichloro-5-(trifluoromethyl)pyridine

dimethyl propanedioate

dimethyl [3-chloro-5-(trifluoromethyl)pyridin-2-yl]propanedioate

TFMB - Acetate

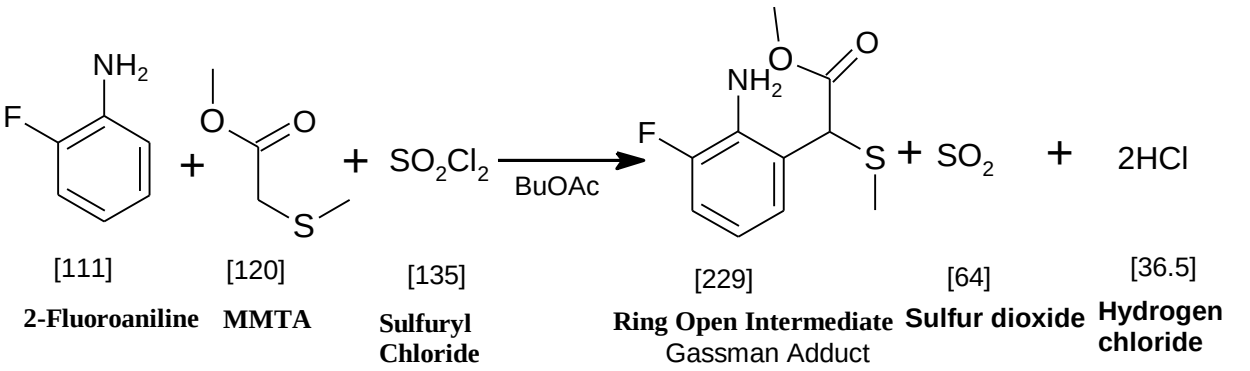
Fluopyram

N-{2-[3-chloro-5-(trifluoromethyl)pyridin-2-yl]ethyl}-2-(trifluoromethyl)benzamide

In a suitable flask equipped with a distillation apparatus DMAC, Toluene, KOH, is heated under vacuum and water is removed azeotropically. PyCl and Dimethyl malonate are added slowly at elevated temperature. TFMB acetate is added in the reaction mass to give Di-ester intermediate which is then Saponified with NaOH solution & treated with H_2SO_4 to give Fluopyram. Product is isolated by filtration, washed and dried to give Fluopyram as white to grey-beige solid.

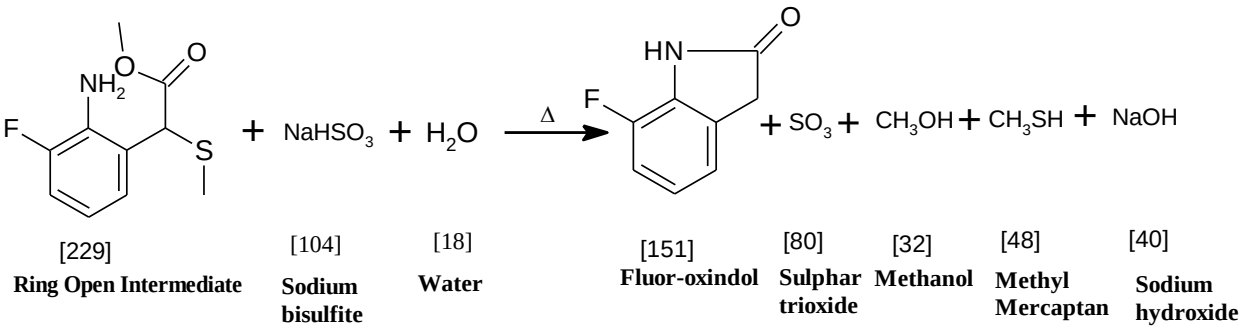
Triafamone:

Step-1 : Preparation of Ring open Intermediate



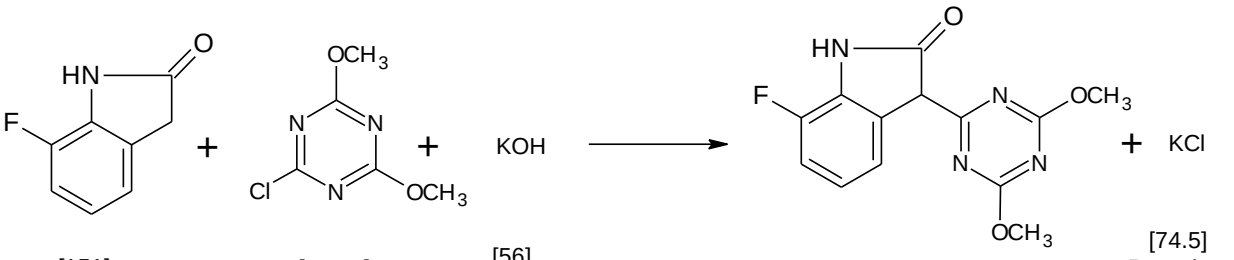
2-Fluoroaniline and Methyl-Methylthioacetate (MMTA) are reacted by adding Sulfurylchloride in presence of solvent Butyl acetate at low temperature to form Gassman adduct and Mercapto-Indolinone (80-20%) by Gassman Reaction. Reaction mass is drowned in water to separate excess 2-Fluoroaniline in aqueous phase which is recovered by adding caustic soda lye, extracted with Butyl acetate, dehydrated and recycled. Gassman adduct and Mercapto-Indolinone in solvent Butyl Acetate is taken for next step.

Step - 2: Preparation of Fluoroxindol



Mixture of Gassman adduct and Mercapto-Indolinone in solvent Butylacetate phase is treated with aqueous $NaHSO_3$ (17% w/w) at 100°C where unconverted Gassman adduct is completely cyclized to Mercapto-Indolinone and it is further reduced to form Fluoroxindol. Methylmercaptan and SO_3 gases are generated as by-product which is scrubbed in 4.0 Normal Caustic soda lye solution. Solvent Butyl acetate is then distilled in atmospheric condition. Slurry of Fluoroxindol in water is filter, water washed and dried to get dry Fluoroxindol powder.

Step-3: Triazoindolinone



[151] **Fluor-oxindol**

[175.5] **Chlorodimethoxy Triazine**

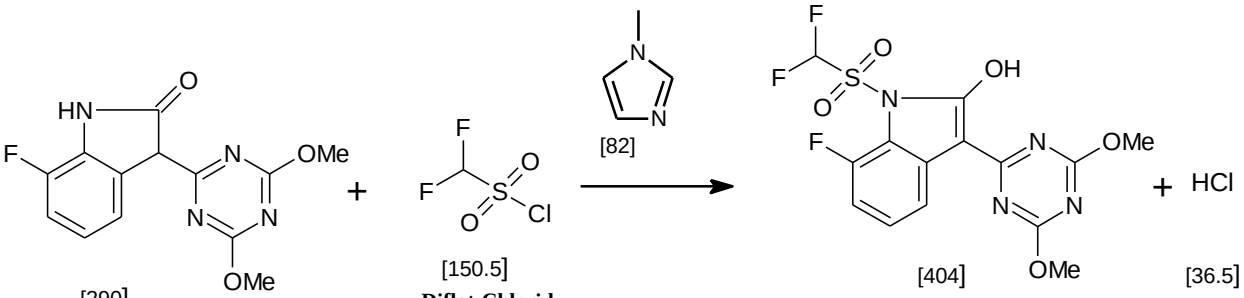
[56] **Potassium Hydroxide**

[290] **Triazoindolinon**

[74.5] **Potassium Chloride**

Fluoroxindole reacts with 2-chloro-4,6-dimethoxy-1,3,5-triazine in presence of solvent Acetone by adding 50% Potassium Hydroxide solution which is then neutralized with Acetic acid followed by filtration. Wet cake is washed with water followed by Acetone and then dried to get dry Triazo-indolinone powder. Main mother liquor is taken for Acetone recovery which is then recycled and residue is incinerated.

Step-4: Sulfonylindol



[290] **Triazoindolinon**

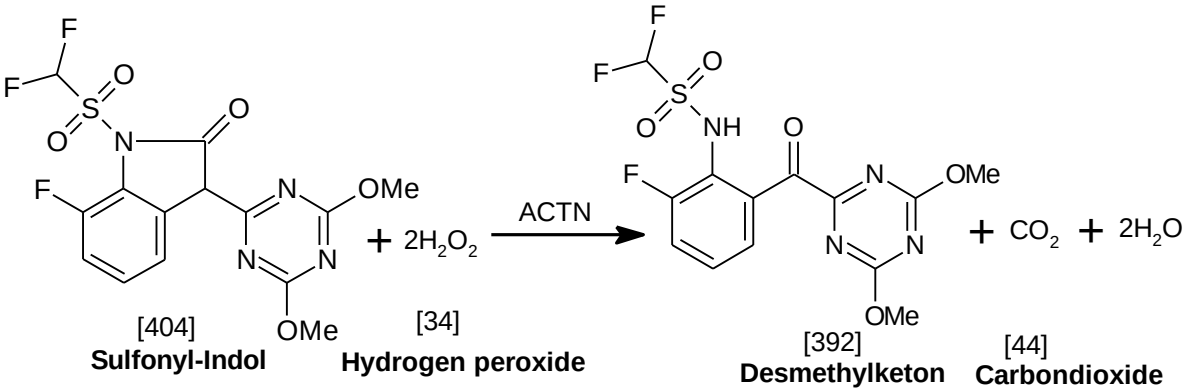
[150.5] **Diflat-Chlorid**

[404] **Sulfonylindol**

[36.5] **Hydrogen chloride**

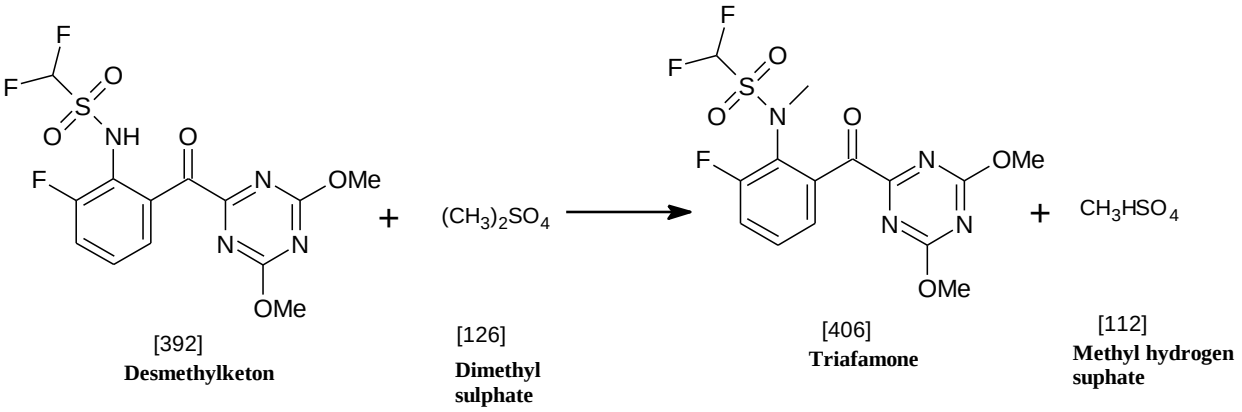
Triazo-indolinone is Sulfonylated with Diflatchloride in presence of Acid-scavenger N-Methylimidazole and solvent as a MDC to get key intermediate sulfonyl-indole. Reaction mass is treated with dilute HCl to make amine-hydrochloride. Solvent MDC is distilled and then slurry in water is filtered, water washed followed by washing with Methanol and dried to get dry Sulfonyl-indole. N-Methylimidazole is recovered from main mother liquor by continuous extraction and distillation for recycling.

Step-5: Des methyl ketone



Sulfonylindole is oxidized by adding 35% Hydrogen peroxide solvent Acetonitrile in presence of FeSO4 and 20% KHCO3 to get Desmethyl-ketone. CO2 and Oxygen generated during reaction. Excess Hydrogen peroxide is destroyed by adding Sodium sulphite. Organic by product Desmethyl alcohol is removed by filtration. Filtrate contain Desmethylketone in Acetonitrile is taken for next step without isolation. Solid separated from filter is sent for incineration.

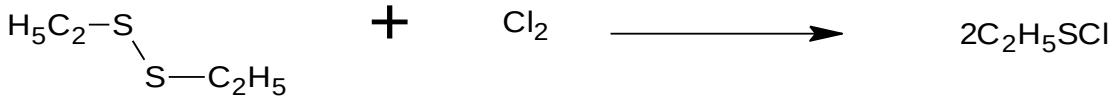
Step-6: Triafamone



Desmethyl-ketone in-situ reacted with Dimethylsulphate in solvent Acetonitrile to get Triafamone. Sodium acetate and potassium carbonate is added. Aqueous phase is removed and sent for treatment. Acetonitrile is recovered from Organic phase. Butanol is added after Acetonitrile recovery for crystallization. Triafamone slurry in Butanol is filtered, washed, dried and packed in Drum / FIBC. Butanol is recovered and recycled from Mother liquor. Distillation residue is subject to incineration.

Ethiprole

Step-1: CES Preparation:-

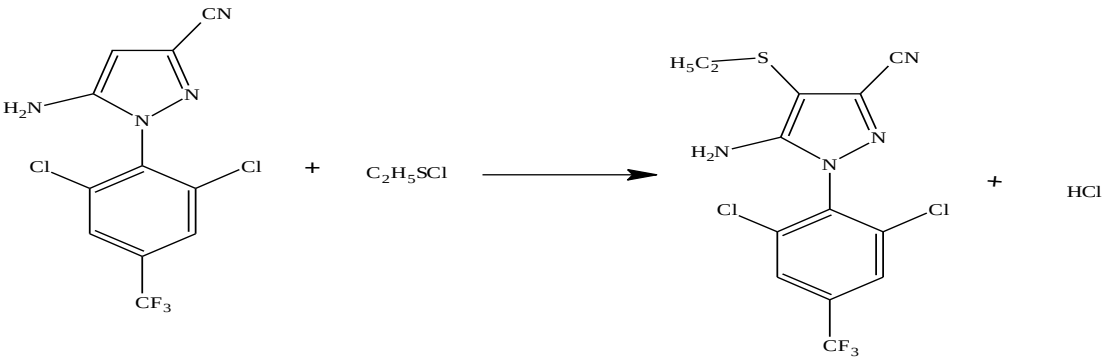


Ethane sulfinyl chloride

Diethyldisulfide (DEDS) in dichloromethane (DCM) solution is treated with chlorine below 0°C to prepare ethane sulfinyl chloride (CES). The reaction mass is cooled & gaseous chlorine is passed to the reaction mass till the expected weight gain. Reaction mixture is stirred for additional 30 min & then used as such in next step.

Step-2: Sulfenylation reaction:

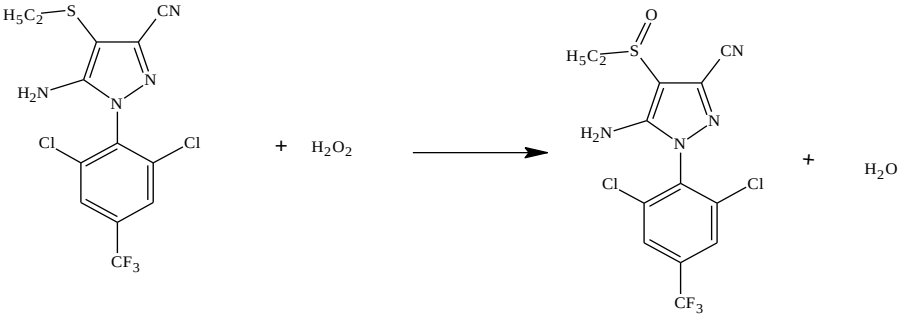
Reaction Scheme:



Pyrazole **Ethane sulfinyl chloride** **Pyrazole sulfide**

Pyrazole is treated with CES to give Pyrazolesulfide as an intermediate. HCl (g) is by-product of reaction which is to scrubbed in a suitable scrubbing medium. After completion of reaction, solvent is recovered , Acetic acid is added and the mass is as such used in next step..

Step-3: Preparation of Ethiprole:

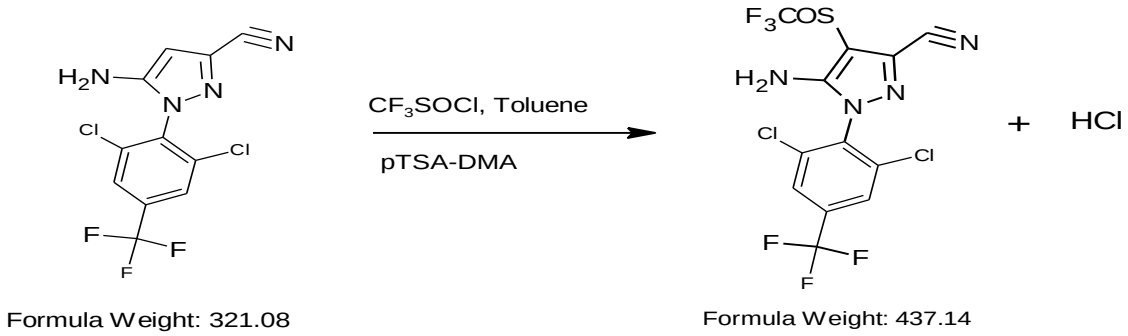


Pyrazole sulfide **Ethiprole**

Aq. hydrogen peroxide is added to the above reaction mass by controlling temperature below 40°C & reaction mass is further stirred till the completion of reaction. After completion of

reaction ,Aq. solution of sodium bisulphite is added for destruction of unreacted hydrogen peroxide. Aq. Caustic lye solution is added at elevated temperature & slowly water is added to the reaction mass. Reaction mass is cooled, filtered & washed with water. Wet product is dried and packed.

Fipronil

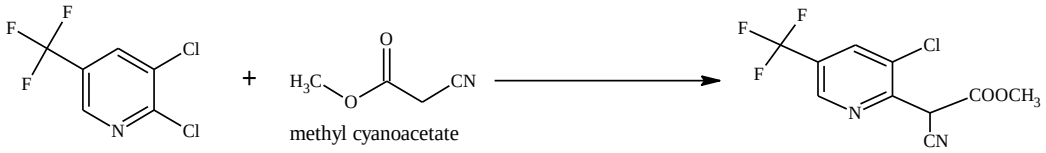


Formula Weight: 321.08

Formula Weight: 437.14

In a suitable flask equipped with a distillation apparatus was charged with p-Toluene sulphonic acid in Toluene & DMA solution was added slowly. The mixture was distilled to remove water followed by addition of TEA &Trifluoromethanesulfinylchloride. After completion of reaction, mass was basified, filtered and washed with water & EDC. Wet fipronil was recrystallized in EDC, filtered, washed and dried under vacuum.

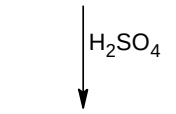
PYACN

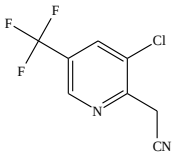


2,3-dichloro-5-(trifluoromethyl)pyridine

methyl cyanoacetate

Methyl [3-chloro-5-(trifluoromethyl)pyridin-2-yl](cyano)acetate (PYACN-A)



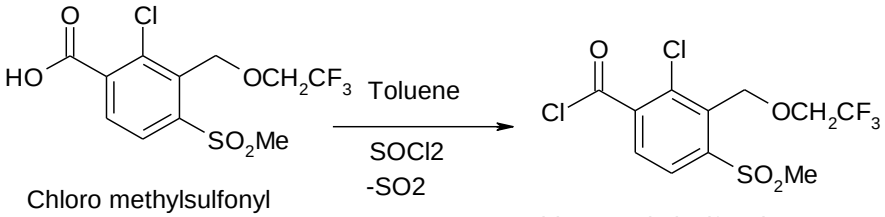


[3-chloro-5-(trifluoromethyl)pyridin-2-yl] acetonitrile PYACN

In a suitable flask equipped with a distillation apparatus DMAC, Toluene, NaOH are heated under vacuum and water is removed. PyCl and Methylcyanoacetate are added slowly to the mass to produce PYACN-A as an intermediate. Intermediate is treated with H_2SO_4 at elevated temperature to give PYACN as crude product. Pure product is obtained by further distillation process.

TEMBOTRIONE :

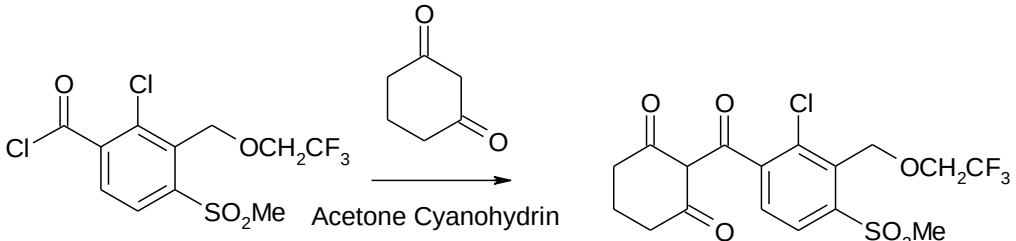
Step1. Chloromethylsulfonyl benzoic acid (AE0456148) is taken with Toluene & SOCl2 is added at 100C. During the reaction SO2 &HCl gas generated is scrubbed in caustic solution. After the reaction is complete excess SOCl2 is distilled with some Toluene under vacuum (80% Toluene). Product is then taken for next step.



Chloro methylsulfonyl benzoic acid.

Chloro methylsulfonyl benzoyl chloride

Step 2 & 3. To the mixture of 1,3 Cyclohexane dione in Toluene parallel addition of Acid chloride & mixture of TEA & Cyanohydrin (ACH) is done at 40C. Condensation & Rearrangement reaction takes place simultaneously. Water and HCl addition is done to remove TEA HCl ,ACH&aqs layer separated. Organic layer is extracted with NaOHsoln as Sodium salt. Further Aqueous layer is acidified by HCl for Crystallisation of product. Solid product Tembotrione (AE0172747)is filtered & dried under vacuum.

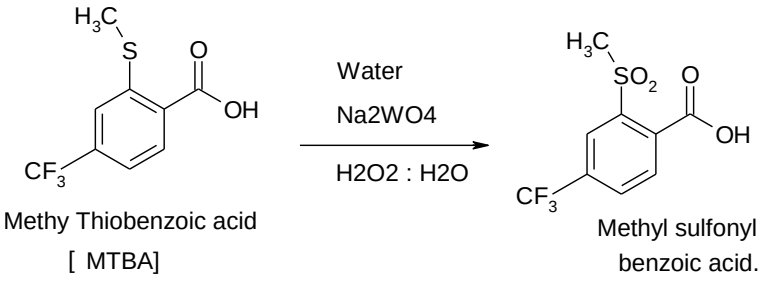


Acyl chloride 747
$C_{11}H_9Cl_2F_3O_4S$
Mol wt: 365.15

AE 0172747
$C_{17}H_{16}ClF_3O_6S$
Mol wt : 440.82

PYRASULFOTOL :

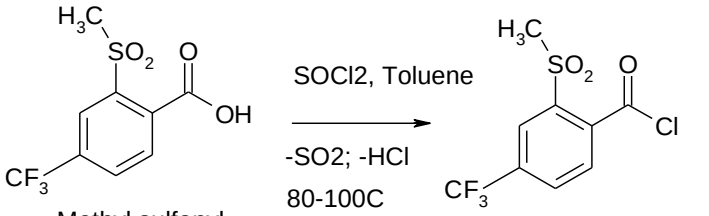
Step 1. To the aqueous solution of catalyst (Sodium tungstate) Methyl thio benzoic acid (MTBA) is charged . To this mixture Hydrogen peroxide is added at higher temperature (80-100C) & maintained until the reaction is complete. Aqueous layer is then separated & recycled five times. Product in Organic layer is taken for next step.



Methy Thiobenzoic acid [MTBA]

Methyl sulfonyl benzoic acid.

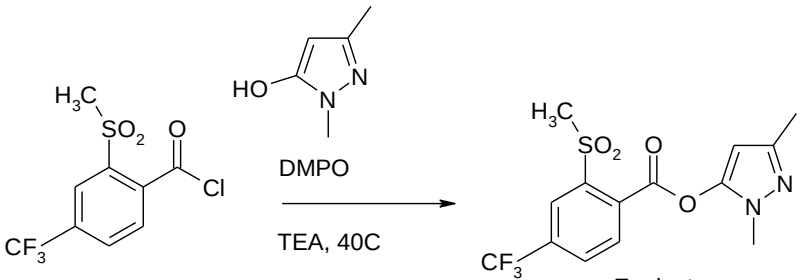
Step 2. To the molten Organic layer toluene is added & then slowly Thionyl chloride is added at 100C. During the reaction SO2 &HCl gas liberated is scrubbed in caustic solution. After the reaction is complete excess Thionyl chloride & some Toluene is distilled out &recycled .



Methyl sulfonyl benzoic acid.

Methyl sulfonyl benzoyl chloride

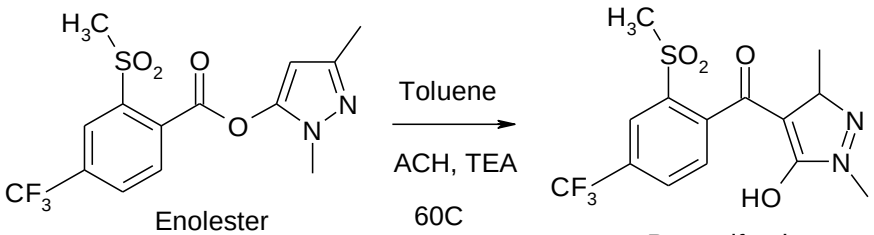
Step 3. To the Acid chloride in Toluene DMPO is charged &Triethyl amine (TEA) is added slowly at 40-50C & maintained for 3-4 hours. After 4 hours the total reaction mass is taken for next step.



Acid Chloride

Enolester
AE 0364897

Step 4. To the reaction mass containing Enolester is added TEA & Cyanohydrin (ACH) mixture for rearrangement reaction. Reaction mass is then maintained for 3-4 hours at 60C for completion of reaction. After completion of reaction water is added and product is filtered as solid powder & aqueous mother liquor is taken for TEA recovery**.** Toluene is separated from aqueous layer & distilled & recycled.



Enolester
AE 0364897

Pyrasulfotole
AE 0317309

3.6 Raw Materials:

Sr No	Name of by Products	Souce
1	Cypermethric Acid chloride	Indigenous
2	Hexane	Indigenous/Imported
3	MetaphenoxyBenzaldehyde	Indigenous
4	Sodium Cyanide	Indigenous/Imported
5	Triethyl Amine	Indigenous/Imported
6	Sodium Hypochlorite	Indigenous
7	Acetonitrile	Indigenous/Imported
8	Acrylonitrile	Indigenous
9	Carbon Tetra Chloride	Indigenous/Imported
11	Caustic lye	Indigenous
12	Caustic flakes	Indigenous
13	Sodium Bicarbonate	Indigenous
14	Sufuric acid	Indigenous
15	Thionyl Chloride	Indigenous
16	Hydrochloric acid	Indigenous
17	Aluminimum Chloride	Indigenous
18	Benzaldehyde	Indigenous
19	Bromine	Indigenous
20	Caustic Potash Flakes	Indigenous
21	Chlorine	Indigenous
22	Ethylene Dichloride	Imported
23	Hydrochloric acid	Indigenous
24	Mono Ethylene Glycol	Indigenous/Imported
25	Phenol	Indigenous
27	Soda Ash	Indigenous
28	Sodium Thiosulfate	Indigenous
29	Sulphuric Acid	Indigenous
30	Toluene	Indigenous/imported
31	Isopropyl alcohol	Imported
32	Methanol	Indigenous
33	TCA	Indigenous
34	Hydrogen	Indigenous
35	Cypermethrin	Indigenous
36	Di Iso propyl Ether (DIPE)	Indigenous/Imported
37	Diene	Indigenous/Imported
38	Sodium Nitrile	Indigenous/Imported
39	DMB	Indigenous/Imported
40	GL 100	Indigenous/Imported

41	Cyclohexane	Indigenous/Imported
42	Dimethyl Formamide	Indigenous/Imported
43	2- Methyl furan	Indigenous/Imported
44	PhosphrousOxychloride	Indigenous
45	Tetra Hydro Furan (THF)	Indigenous
46	Butanediol	Imported
47	N004	Imported
48	Dicyclo hexyl carbodiimide	Indigenous/Imported
49	Hexafluoro isopropanol	Indigenous/Imported
50	Lithium Bromide	Indigeneous
51	Methyle Dichloride	Indigeneous
52	PhosphrousTrichloride	Indigenous
53	TBBA	Indigenous
54	CMP	Indigenous
55	EDA	Indigenous
56	Guinidine Nitrate	Indigenous/Imported
57	Potassium Carbonate	Indigenous
58	Propynitrile	Indigenous
59	TFBA	Indigenous
60	Fluorinated MetaphenoxyBenzaldehyde	Indigenous
61	Sodium Bisulphite	Indigenous
62	DV Ester	Indigenous
63	Xylene	Indigenous
64	Acetic Anhydride	Indigenous
65	Sulphuric Acid	Indigenous
66	PTSA	Indigenous
67	L Base	Indigenous
68	Formic Acid	Indigenous
69	Formalin	Indigenous
70	Isobutrldehyde	Indigenous/Imported
71	Benzoquinone	Indigenous/Imported
72	Morpholine	Indigenous
73	Mesyl Chloride	Indigenous
74	Ethanol	Indigenous
75	Dimethyl Melonate	Indigenous/Imported
76	Potassium Hydroxide	Indigenous
77	TBAB	Indigenous/Imported
78	Chloromethyl Acetate	Indigenous/Imported
79	Sodium Methoxide Solution	Indigenous/Imported
80	2,3-DICHLORO-6-NITROANILINE (DCONA)	Indigenous
81	Potasium Hydroxide (48 %)	Indigenous
82	Mono Chloro Benzene	Indigenous
83	MMTA	Indigenous
84	2-Fluoro aniline	Indigenous/Imported
85	Butyl acetate	Indigenous
86	Sulfuryl Chloride	Indigenous
87	Acetone	Indigenous
88	Chlorodimethoxytriazine	Indigenous/Imported
89	Acetic acid	Indigenous
90	Dichloromethane	Indigenous
91	N-Methylimidazole	Indigenous/Imported
92	Diflate chloride	Indigenous/Imported
93	Ferrous Sulpahte	Indigenous
94	Potassium bicarbonate	Indigenous

95	Hydrogen Peroxide	Indigenous
96	Sodium Carbonate	Indigenous
97	Dimethyl Sulphate	Indigenous
98	Sodium Acetate	Indigenous
99	Butanol	Indigenous/Imported
100	Diethyldisulfide (DEDS)	Indigenous/Imported
101	Pyrazole	Indigenous/Imported
102	DMF	Indigenous/Imported
103	Ethyl Acetate	Indigenous/Imported
104	Dimethyl Amine	Indigenous/Imported
105	Trifluoromethanesulfinyl chloride	Indigenous/Imported
106	2-methoxy benzoic acid	Indigenous/Imported
107	4-sulfamoyl benzoic acid	Indigenous/Imported
108	Isopropyl acetate (IPAC)	Indigenous/Imported
109	Baytocol P Acid	Indigenous/Imported
110	FPBA	Indigenous/Imported
111	2,3-DiChloro-5-trifluoromethylpyridine (PyCl)	Indigenous/Imported
112	Dimethyl Acetamide	Indigenous/Imported
113	TFMB Amide	Indigenous/Imported
114	Methyl Tertiary Butyl Ether	Indigenous/Imported
115	Aluminimum Nitrate	Indigenous/Imported
116	Formaldehyde	Indigenous/Imported
118	OrthoDichlobenzene	Indigenous/Imported
119	2,2,2-trifluoroethanol	Indigenous/Imported
120	Potassium Cyanide	Indigenous
121	1,3-Cyclohexadione	Indigenous/Imported
122	Ethanol	Indigenous
123	Chloromethylsulfonyl benzoic acid	Indigenous/Imported
124	Methyl thio Benzoic acid (MTBA)	Indigenous/Imported
125	Sodium Tungstate	Indigenous/Imported
127	Acetonecyanohydrin (ACH)	Indigenous/Imported

3.7 Additives and Chemicals

No

3.8 Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.

The transportation of raw materials will be done by road complying with all safety requirements as per MSIHCrule.

3.9 Availability of water its source, energy/power requirement and source should be given

Water will be source through GIDC. The water breakup given in below table:-

Sr No	Category	Water Consumption (KLD)		
		Existing CCA	Additional Proposed	Total Proposed after Expansion
1	Industrial	666.1	171	837.1
2	Utility	2298.6	189.2	2487.8
3	Gardening	130	0	130

4	Domestics	75.2	24.8	100
5	Others	50	0	50
Total		**3219.9**	**385**	**3604.9**
6	Water to be recycled in plants	0	555.7	555.7
Total		**3219.9**	**-170.7**	**3049.2**

3.9.1 Fuel

Sr No	Category	Unit	Existing	Aditional Proposed	Total Proposed after Expansion	Resource Availability
1.	Natural Gas	SM3/Hr	5006	1150	6156	GSPC
2.	OR FO	Kg/hr	5926	0	5926	Local Dealer
3.	HSD	Lit/hr	1684.3	750	2434.3	Local Dealer

3.9.2 Quantity of waste to be generated (liquid and solid) and scheme for their management /disposal

Wastewater generation

Sr No	Category	Wastewater Generation (KLD)		
		Existing	Additional Proposed	Total Proposed after Expansion
1	Industrial	653.3	160	813.3
2	Utility	441.4	131	572.4
3	Gardening	0	0	0
4	Domestics	60	5	65
5	Others	50	0	50
Total		**1204.7**	**296**	**1500.7**
Water recycled in plants after treatment		**255.7**	**300**	**555.7**
6	**Wastewater disposed to CETP**	**949**	**-4**	**945**

Hazardous Waste Generation and disposal Details

Sr No	Type of waste	Category	Capacity (MT/Annum)			Facility
			Existing	Proposed	Total Proposed after Expansion	
1	Chemical Sludge from wastewater Treatment (ETP sludge+Waste left after Evaporation)	34.3	5304.7	8500.3	13805	Collection, Storage, Transportation, disposal at authorised TSDF
2	Distillation Residues	20.3	2545	4455	7000	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own

						incineration/Co-processing
3	Ash from Incineration of Hazardous waste	36.2	118.2	207	325	Collection, Storage, Transportation, disposal at authorised TSDF
4	Oil and grease skimming residue	34.4	30.2	0	30.2	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
5	Used Oil	5.1	22.2	7.8	30	Collection, Storage, Transportation, disposal by selling registered Re-Refiners/ Recyclers/ incineration at CHWIF/Own incineration
6	Spent Solvents	20.2	2095	950	3045	Collection, storage, transportation, disposal at CHWIF/Own Incineration/Sale to authorised vendor/End users/Co-Processing
7	Discarded Containers/barrel/liners/contaminated with wastes/chemicals	33.3	565.8	34.2	600	Collection, Storage, Decontamination & Sale to authorised vendors
8	Spent Catalyst	35.2	13.98	0	13.98	Collection, Storage, Transportation, disposal at CHWIF/Offsite recovery at units from where catalyst is procured/other units doing recovery
9	Date Expired and off-Specification Pesticides	29.3	What so Ever Generated		What so Ever Generated	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration/Co-processing
10	Spent Resin	34.2	12	0	12	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own

						incineration
11	Used filter cloth and filter material	35.1	12		12	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
12	Oil filter	5.2	0	2	2	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
13	Spent Carbon	35.3	0	20	20	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration/Co-processing
14	Solid waste from surface preparation for painting	21.1	0	5	5	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
15	Process waste	29.1	0	723	723	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration/Co-processing
16	Waste from containment/cleanup of spills	29.1				Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
17	Contaminated cotton waste	29.1				Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
18	Used PPEs	29.1				Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration
19	Waste Insulation material	29.1	0	160	160	Collection, Storage, Transportation, disposal at

						authorised TSDF
20	Bricks/refractory	29.1				Collection, Storage, Transportation, disposal at authorised TSDF
21	Inorganic Acid (30 % HCl)	D2 (Schedule II)	827.3	0	827.3	Collection, Storage, Transportation and sale to authorised vendor/end users
22	Inorganic Acid (Dilute H2SO4)	D2 (Schedule II)	451.1	0	451.1	Collection, Storage, Transportation and sale to authorised vendor/end users
23	Flue gas cleaning residue	34.1	0	30	30	Collection, Storage, Transportation, disposal by incineration at CHWIF/Own incineration/Co-processing

4 SITE ANALYSIS

4.1 Connectivity

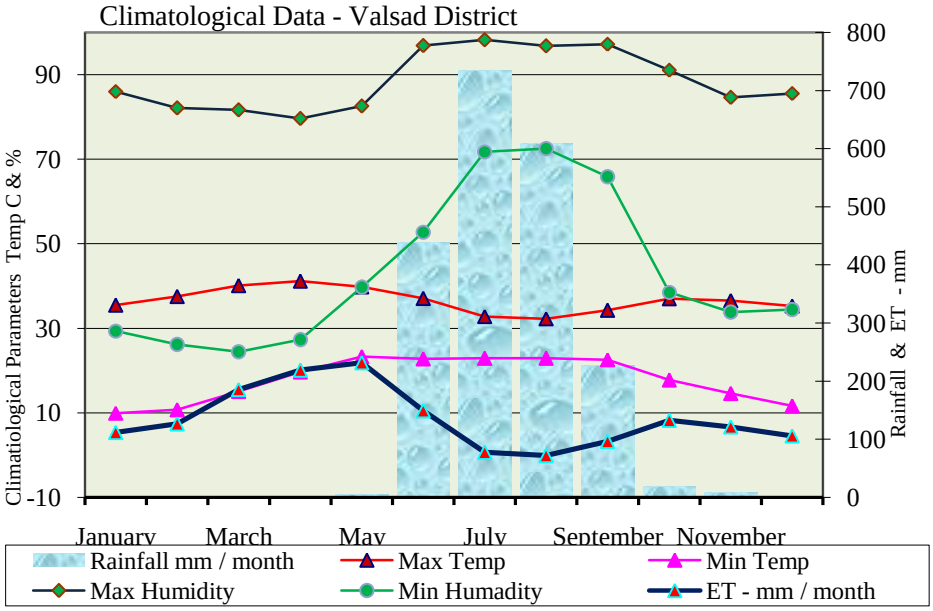
Village	Village :Vapi, Taluka Pardi, District: Valsad, State: Gujarat
Tehsil / Taluka / Mandal	Valsad
District	Valsad
State	Gujarat
Nearest railway station / airport / along with distance in km.	Railway station: 06 KM National Highway:03KM
Nearest town, city, district headquarters along with distances in km	Valsad, 23 KM from Vapi

4.2 Climatic data from secondary sources

Valsad district is located in south of *tropic of Cancer,* comes under heavy rainfall areas of South Gujarat, having sub-tropical climate with moderately high humidity. The main seasons prevailing in the district are (a) monsoon - mid of June to October, (b) winter - November to February, and (c) summer – March to June. Various climatological data recorded over a decade (2000-2009) are analysed and presented in table and also depicted graphically in figure

Climate Data of Valsad District **(Source : WRI, GOG, Valsad)**

Month	Max Temp (°C)	Mini Temp (°C)	Max Humidity (%)	Min Humidity (%)	Wind Spd. Km / hr	Eto (mm/ month)	Rainfall (mm)
January	35.4	9.9	86.0	29.4	1.8	111.3	0.0
February	37.5	10.7	82.1	26.1	2.0	126.3	0.0
March	40.1	15.1	81.6	24.4	2.5	185.5	1.4
April	41.2	19.6	79.6	27.3	2.9	218.7	0.0
May	39.8	23.3	82.6	39.7	3.9	231.7	4.6
June	37.1	22.7	96.9	52.7	4.1	148.8	437.4
July	32.8	22.9	98.2	71.7	3.5	77.3	734.5
August	32.2	22.9	96.8	72.5	2.7	71.7	608.2
September	34.2	22.6	97.2	65.8	1.6	96.1	227.3
October	37.0	17.8	91.1	38.5	1.3	132.6	18.6
November	36.5	14.6	84.6	33.8	1.3	121.0	7.1
December	35.3	11.6	85.5	34.4	1.3	105.7	0.8
Total	**-**	**-**	**-**		**-**	**-**	**2039.9**
Average	**36.6**	**17.8**	**88.5**	**43.0**	**2.4**	**135.6**	**-**



4.3 Temperature:

The maximum daily temperature during the year ranges from 32.2 °C in August to 41.2 °C in April while minimum temperature ranges from 9.9 °C in January to 23.3°C in May. Maximum humidity ranges from 98.2 % to 79.6 % while minimum range is from 24.4 to 72.5 %. The wind speed ranges from 1.3 to 4.1 km / hrs, where asevapo - transpiration ranges from 71.7 to 231.7 mm / month; total for the year is around 1626 mm which is 79 % of annual rainfall. Rainfall analysis is discussed in detail in following section.

4.4 Rainfall

Valsad district receives much of its rainfall from the south-west monsoon during the period between June & September; its maximum intensity being in the month of July & August. Total rainy days ranges from 40 to 55 days / year. Long term annual rainfall data of 11 rain-gauge stations of the district from year 1981-2009 are statistically analyzed and presented in table. The distribution of mean annual rainfall over the Valsad district, as isohyets is given in figure .

Table - Statistical Analysis of Rainfall Data Rainfall in mm

Name of Stations	No. of Years	Average Annual RF	Standard Deviation	Coefficient of Variation	Highest RF – Year		Lowest RF - Year	
Umargam	1996-2009	1804.69	365.667	20.26%	2149.00	2007	1015.00	1999
Madhuban	1982-2002	2322.05	634.6427	27.33%	3453.10	2004	1350.90	1987
Vapi	1993-2002	2248.70	452.2538	20.11%	3133.00	1994	1578.00	1995
Paria	2000-2009	2348.72	435.5821	18.55%	3132.90	2005	1614.50	2002
Pardi	1981-2007	2032.82	541.2992	26.63%	3344.00	1994	1360.00	1997
Dhrampur	1981-2007	2519.45	694.6873	27.57%	4282.00	1994	1566.00	1986
Valsad	1981-2009	1895.79	527.4254	27.82%	3232.00	1994	1200.30	1987
Jhuj	1981-2007	2075.96	616.5653	29.70%	3537.40	1994	1360.20	1987
Bhilad	2000-2009	2416.78	303.3411	12.55%	2784.30	2005	1883.00	2002

5 PROPOSED INFRASTRUCTURE

5.1 Industrial Area (processing area)

Not Applicable

5.2 Residential Area (non-processing area)

Not Applicable

5.3 Green belt

33% of total plot area will be developed as greenbelt.

5.4 Drinking water management (source & supply of water)

Water is sourced from GIDC .

5.5 Sewage system

The site has adequate facility for transportation and treatment of sewage. The sewage is being treated along with industrial effluent in existing Effluent Treatment Plant

5.6 Industrial waste management

Generated waste has been categorized in below categories

- Domestic waste&Industrial waste:
- Solid waste (Non hazardous)
- Hazardous waste

Domestic and Industrial waste:

The domestic and industrial wastwater is being treated in Wastewater Preatment (WWPT) Plant followed by conventional Effluent Treatment Plant.

The facility has full-fledged wastewater pretreatment plant (WWPT) and effluent treatment plants to treat wastewater (Domestic+industrial) generated from plant. The wastewater has been segregated and treated based on characteristics of wastewater. The wastewater pretreatment plant comprised of Evaporators for treatment of high COD and high TDS streams, Fenton oxidation plant to treat streams having low biodegradability, stripper to separate low boiling liquid organic components in the wastewater and Fenton treatment for streams containing unreacted sodium cyanide. The ETP plant consists of primary, secondary and tertiary treatment plants. The treated wastewater is discharged to Common Effluent Treatment Plant Operated by Vapi Waste and Effluent Management Company Limited. (VWEMCL).

In proposed Scenario, effluent generated from the facility including proposed expansion will be led to existing wastewater pretreatment Plant and conventional Effluent Treatment Plant (ETP). A part of treated effluent will be discharged to Common Effluent Treatment Plant Operated by Vapi Waste and Effluent Management Company Limited. (VWEMCL) and balance will be treated in Reverse Osmosis (RO), Evaporators and Agitated Thin Film Dryer (ATFD) plant to recover water for recycling and reuse. There will not be any additional hydraulic load on Common Effluent Treatment Plant due to proposed expansion.

Solid waste (Non hazardous)

There is no solid waste generated in the conventional manufacturing process.

Hazardous waste :

Different categories of hazardous waste will be generated as per Hazardous Wastes (Management, Handling and Trasboundry Movement Rules), 2008 is mentioned in 3.9.2 chapter of this report along with mode of disposal.

The site is eqippped with Two incinerators having capacity 2.18 Mkcal/hr and 6.5 Mkcal/hr to meet existing as well as furture requirement,

5.7 Power requirement & supply/ source

The power requirement will 33000 KVA after expansion and sourced from Dakshin Gujarat Vij Company Limited. To meet the emergency power requirement for critical operations for ensuring safety, additional 02 Nos DG sets having capacity 1500 KVA will be as stand by power back up

One new 15 TPH boiler will be installed for additional steam requirement.

6 REHABILITATION AND RESETTLEMENTS (R& R) PLAN

6.1 Policy to be adopted (central/state) in respect of the project affected persons including home oustees, land oustees and landless labourers (a brief outline to be given)

Not Applicable

7 PROJECT SCHEDULE AND COST ESTIMATE

7.1 Likely date of start of construction and likely data of completion (time schedule for the project to be given)

This is a tentative schedule in which flexibility can be exercised depending upon the market demand.Estimated project cost along with analysis in terms of economic viability of the project.
Cost of Estimates of the Expansion Project is 58,246Lacs. Project work will be start after getting the environmental clearance.

Sr. No.	Description	Project Cost (Rs in Lacs)
1	Civil Cost	8380
2	Process Equipment & Utility Cost	16087
3	Electricals Cost	1769
4	Piping Cost	3854
5	Erection Cost	4704
6	Instrumentation Cost	8007
7	Insulation Cost	2347
8	Detailed Eng	4433
9	Safety & Fire Hydrant	1100
10	Infrastructure	240
11	Environment	2030
A	**Sub Total**	52951
B	Contingency @ 10 %	5295
C	**Total Project Cost**	58,246