FORM-1

FOR

PROPOSED PESTICIDE INTERMEDIATES AND SPECIALTY CHEMICALS IN EXISTING UNIT

OF

M/s. ACETO CHEM PVT. LTD. (UNIT-II)

PLOT NO. 274/3/1, GIDC ESTATE, PANDESARA,

DIST: SURAT – 394 221, GUJARAT

Prepared By:

NABL Accredited Testing Laboratory
ISO 9001:2008 Certified Company

Aqua-Air Environmental Engineers P. Ltd.
403, Centre Point, Nr. Kadiwala School, Ring Road, Surat - 395002

APPENDIX I

(See paragraph - 6)

FORM 1

(I) Basic Information

Sr. No.	Item	Details
1.	Name of the project/s	Aceto Chem Pvt. Ltd. (Unit-II)
2.	S. No. in the schedule	5(b) & 5(f)
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**
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. 274/3/1
	Village	GIDC Estate, Pandesara,
	Tehsil	Choryasi
	District	Surat
	State	Gujarat
10.	Nearest railway station/airport along with distance in kms.	Surat: 10 Km
11.	Nearest Town, city, District Headquarters along with distance in kms.	Surat: 10 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	Aceto Chem Pvt. Ltd. (Unit-II)
14.	Registered Address	M/s. Aceto Chem Pvt. Ltd. (Unit-II) Plot No. 274/3/1, GIDC Estate, Pandesara, Dist: Surat, Gujarat – 394 221
15.	Address for correspondence:	M/s. Aceto Chem Pvt. Ltd. (Unit-II) Plot No. 274/3/1, GIDC Estate, Pandesara, Dist: Surat, Gujarat – 394 221
	Name	Mr. Bansibhai D. Patel
	Designation (Owner/Partner/CEO)	Director
	Address	M/s. Aceto Chem Pvt. Ltd. (Unit-II) Plot No. 274/3/1, GIDC Estate, Pandesara, Dist: Surat, Gujarat – 394 221
	Pin Code	394 221
	E-mail	rnd@acetochemindia.com
	Telephone No.	0261 –2890998/88
	Fax No.	0261 – 2892345

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 thereof 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 Pandesara GIDC Industrial 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	No	
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 are given as **Annexure – V** and details of solid waste are given as **Annexure –VI.**
1.16	Facilities for long term housing of operational workers?	No	
1.17	New road, rail or sea traffic during	No	

	Construction or Operation?		
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 is met through Surat Municipal Corporation (SMC).
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 is met through the SMC. 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** Natural Gas: 82 SCM/day (Existing) Diesel: 30 Lit/Hr (Existing) Natural Gas: 82 SCM/day (Total Proposed) Diesel: 75 Lit/Hr (Total Proposed) **Energy :** 90 HP from DGVCL.
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)	Yes	For detail please refer **Annexure – VIII**
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 –VI**
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 –VI**

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 – VII**
5.2	Emissions from production processes	Yes	**Please refer as Annexure – VII**
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	Yes	**Please refer as Annexure – VII**
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 – VIII**
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 – VIII**
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 – IX**
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 5 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	--	--
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 5 km from the proposed expansion project site.
4	Inland, coastal, marine or underground waters	--	--
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	Surat	Pandesar GIDC is located within Municipal limit of Surat.
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 – X**

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
V	Effluent Treatment Scheme
VI	Details of Hazardous /Solid Waste Generation, Handling and Disposal
VII	Details of Air pollution Control System (Stack & Vent)
VIII	Details of Hazardous Chemicals Storage & Handling
IX	Socio-economic Impacts
X	Proposed Terms of Reference for EIA studies

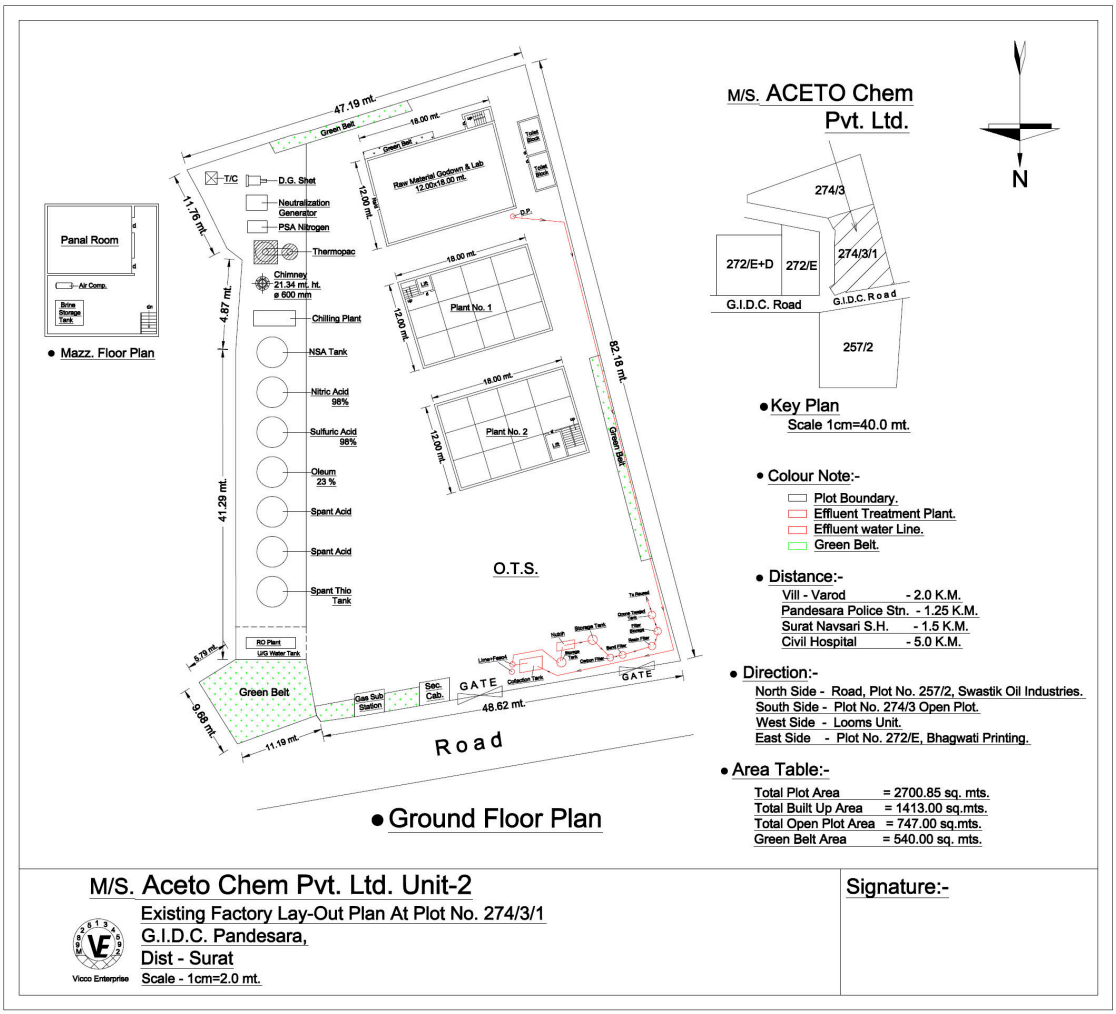
ANNEXURE – 1

LIST OF PRODUCTS WITH THEIR PRODUCTION CAPACITY

Sr. No.	Product Name	Production	
		Existing	Proposed Total
		MT/Month	MT/Month
1	Nytrosyl Sulphuric Acid ***(from Sulfur) ****	132.08	132.08
2	Nytrosyl Sulphuric Acid ***(from Sodium Thio Sulphate Solution and Spent Acid (H2SO4)) *****	468	468
3.1	4-Methoxy Acetophenone	0	60
3.2	4-Methyl Acetophenone		
4.1	Diethyl Ketone	0	100
4.2	Methyl Propyl Ketone		
4.3	Dipropyl Ketone		
4.4	Propiophenone		
5	Alpha Nitro Napthalene	0	100
6	Alpha Napthylamine	0	165
7	Phenyl Alpha Naphthylamine (PANA)	0	90
8	Epichlorohydrin Based Polyamide resin	0	116
9	3,5-Dichloroaniline	0	50
10	Bis-(2-Chloroethyl)-amine	0	30
	Total	**600.08**	**1311.08**
	By Products		
1	Sulphur	50.74	50.74
2	Sodium Sulphate	242.728	242.728
3	Di Ethyl Ketone	Nil	79
4	Acetic Acid	Nil	30.5

ANNEXURE – 2

PLANT LAYOUT



ANNEXURE – 3

MANUFACTURING PROCESS, CHEMICAL REACTION WITH MASS BALANCE

1. NITROSYL SULFURIC ACID (NSA) FROM SULFUR (OR SULFUR DIOXIDE GAS)

Process Description:

First make mix acid of Oleum 23 % and concentrate Nitric Acid . Charge Sulfur in to the mix acid from this process reaction takes place and generation SO_2 Gas (or charge Sulphur Dioxide gas in to the mix acid). SO_2 react with concentrate Nitric Acid and Oleum convert in to Sulphuric A cid after this reaction product will be Nitrosyl Sulfuric Acid (NSA).

Reaction Mechanism

$6\ HNO3 + 2S \longrightarrow 3N_2O_3 + 2SO_3 + 3H_2O$

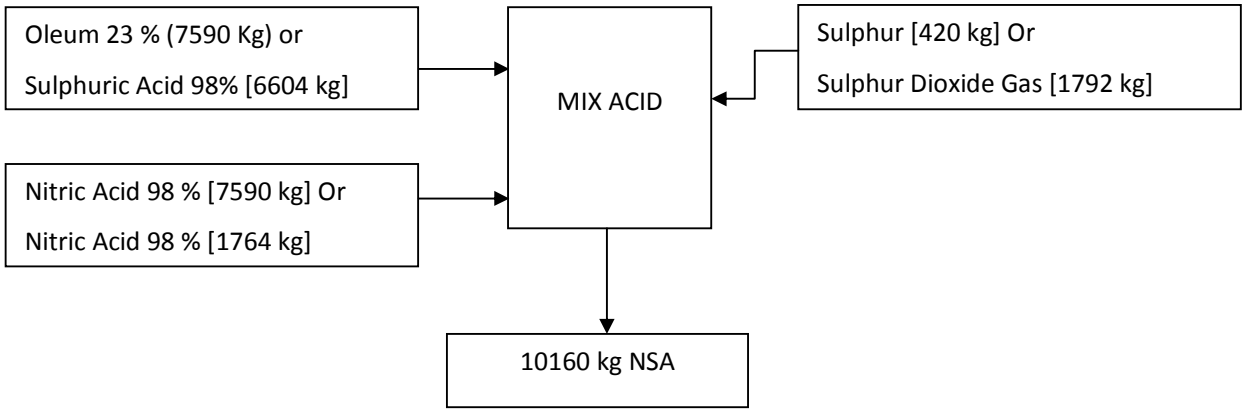
$N_2O_3 + 2SO_3 + H_2O \longrightarrow 2NOHSO_4$

$6HNO_3 + 8H_2SO_4 + 4SO_3 + 2S \longrightarrow 6NOHSO_4 + 8H_2SO_4$

OR

$H_2SO_4 + HNO_3 + SO_2 \longrightarrow NOHSO_4 + H_2SO_4$

Flow Chart



Nytrosyl Sulphuric Acid from Sulfur				
INPUT	**KG**	**PROCESS**	**KG**	**OUTPUT**
Oleum 23 % *or* Sulphuric Acid 98 %	7590 *or* 6604	**Mix Acid Vessel**	10160	NSA
Nitric Acid 98 %	2151 *or* 1764		1	SO_2
Sulphar *or SO2 Gas*	420 *or* 1792			
Total	**10161**		**10161**	**Total**

PRODUCT [2]
NITROSYL SULPHURIC ACID (NSA) AND SULPHUR RECOVERY FROM SODIUM

THIOSUIPHATE SOLUTION

1. Process Description with Chemical Reaction:

Nytrosyl Sulphuric Acid from the spent sodium thio solution shall be manufactured only after getting permission from the Central Pollution Control Board [i. e. utilization of the hazardous wastes under Rule 11 of the Hazardous Waste (Management, Handling & Transboundary) Rules, 2008].

Sulfur and Sodium Sulphate shall be generated, only from the manufacturing of Nytrosyl Sulphuric Acid from Sodium Thio Sulphate Solution (used as a raw material).

Take Sodium Thiosuiphate Solution. Now take this solution in one vessel and add spent acid in it, Reaction takes place and SO_2 librates, Scrub this gas in another vessel which is having mix acid of H_2SO_4 and HNO_3.

Mix Acid Vessel which has scrubbed SO_2 gas will make NITROSYL SULFURIC ACID [NSA].

$$SO_2 + HNO_3 \longrightarrow NOHSO_4$$

[NSA]

After completion of Spent Addition heat the solution till SO_2 librates then cool the mass and filter. Dry the residue to obtain SULPHUR.

Filtrate will be collected separately, neutralize this solution and make concentrate by distillation water, then cool the mass, and Filter it.

Residue will be dried and Product will be SODIUM SULPHATE, Filtrate will be used again.

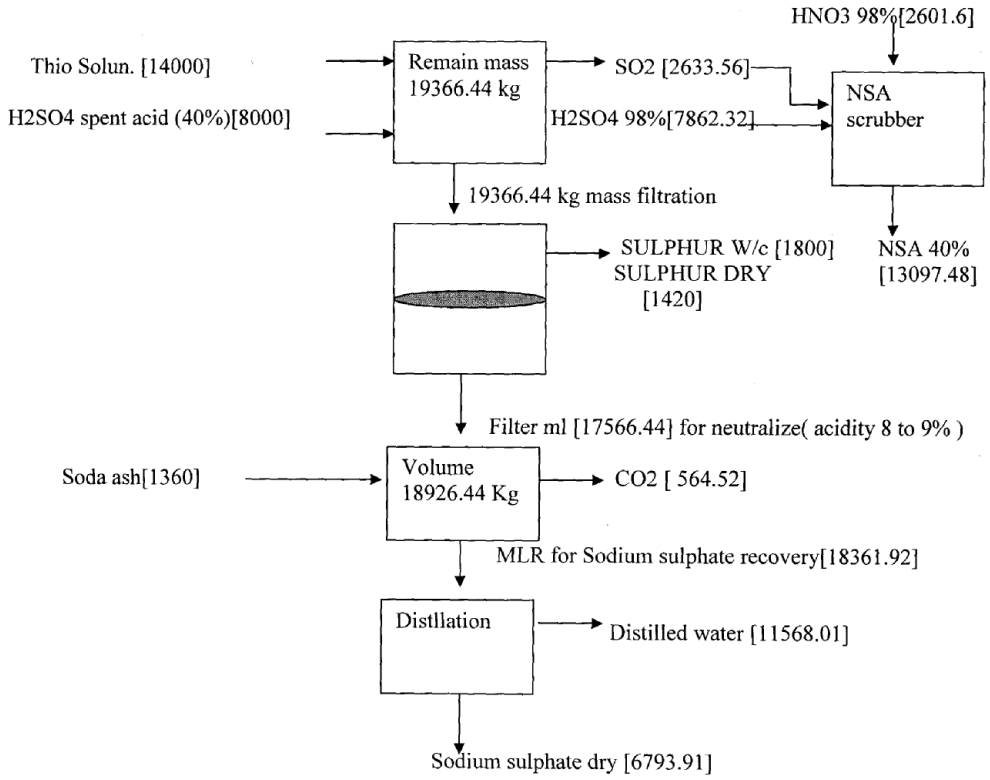
$$Na_2S_2O_3 + H_2SO_4 \longrightarrow SO_2 + S + H_2O + NA_2SO_4$$

Flowchart:

Material balance

MATERIAL BALANCE FOR SULPHUR RECOVERY

~~For 1.0 kg of product~~



Nytrosyl Sulphuric Acid

INPUT	KG	PROCESS	KG	OUTPUT
Thio Solution	14000	**Acidification Vessel**	2633.56	SO_2
Spent H_2SO_4 (40 %)	8000		19366.44	Reaction Mass
Total	**22000**		**22000**	**Total**

→

INPUT	KG	PROCESS	KG	OUTPUT
SO_2	2633.56	**NSA Scrubber**	13097.48	NSA 40 %
H_2SO_4 98 %	7862.32			
HNO_3 98 %	2601.6			
Total	**13097.48**		**13097.48**	**Total**

↓

Reaction Mass	19366.44	**Filtration**	1800	Sulfur W/C
			17566.44	Reaction Mass
Total	**19366.44**		**19366.44**	**Total**

→

Sulfur W/C	1800	**Dryer**	1420	Sulfur Dry
			380	Water Evaporated
Total	**1800**		**1800**	**Total**

↓

Reaction Mass	17566.44	**Neutralization Vessel**	564.52	CO_2
Soda Ash	1360		18361.92	Reaction Mass
Total	**18926.44**		**18926.44**	**Total**

↓

Reaction Mass	18361.92	**MEE & Centrifuge**	***6793***	***Sodium Sulphate***
			11568	Condensate Water
			0.92	M. L. to recycled
Total	**18361.92**		**18361.92**	**Total**

Mass Balance:

INPUT :	**kg/batch**	**Kg/month**	**Specific Consumption**
Thio Solution	14000.00	500248.90	1.069
Spent H_2SO_4 (40 %)	8000.00	285856.52	0.611
Soda Ash	1360.00	48595.61	0.104
H_2SO_4 98 %	7862.32	280936.93	0.600
HNO_3 98 %	2601.60	92960.54	0.199
Total	**33823.92**	**1208598.49**	

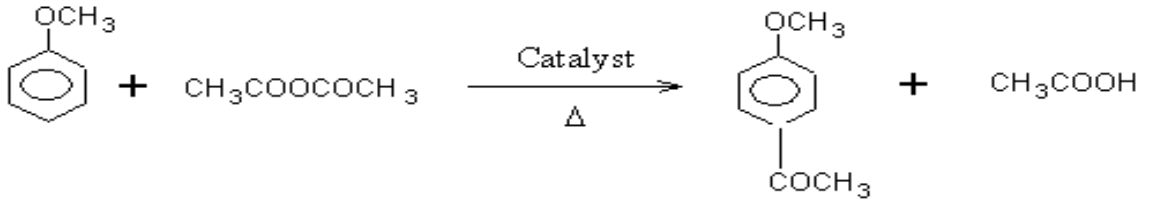
OUTPUT :	**kg/batch**	**Kg/month**
Sodium Sulphate	**6793.00**	**242727.91**
Condensate Water	11568.00	413348.52
M. L. to Recycled in MEE	0.92	32.87
NSA 40 %	**13097.48**	**468000.00**
Sulfur Dry	**1420.00**	**50739.53**
Water Evaporated	380.00	13578.18
CO_2	564.52	20171.47
Total	**33823.92**	**1208598.49**

PRODUCT [3.1]
4- METHOXY ACETO-PHENONE

1. Process Description:

Catalyst 60. Kg is kept in stirred reactor. To this, total required Anisole 3459.54 kgs and Acetic Anhydride 723.40 kgs, are added over a period of 1 hour under constant stirring. After closing the reaction autoclave, the process temperature is raised to 120-130^{o}C slowly and stepwise with constant stirring and maintain for 4-5 hours. The reaction process is terminated by putting off the heating. The autoclave was allowed to cool till the temperature of the mass drops down to below 50^{o}C. The reaction mixture is drained out through the bottom drain valve of the autoclave in nutch filter for separation of catalyst. Finally, reaction mixture is taken for filtration. The wet cake is washed with small amount of anisole. The reaction mixture is subjected to fractional distillation to separate all the components. Anisole is recovered and recycled; acetic acid is recovered of desired grade. Finally 4-MAP is distilled out.

2. Reaction Mechanism



Anisole Acetic anhydride 4-Methoxy Acetophenone Acetic Acid

3. Flow Chart

INPUT	Kg		OUTPUT	Kg
Anisol	3459.54	**Acetylation Reaction**	Reaction Mass	4242.94
Catalyst	18.00			
Catalyst [Recover]	42.00			
Acetic Anhydride	723.40			
Total	**4242.94**		**Total**	**4242.94**

↓

INPUT	Kg		OUTPUT	Kg
Reaction Mass	4242.94	**Filtration**	Catalyst [Recover]	42.00
			Reaction Mass	4182.94
			Catalyst to TSDF	18.00
Total	**4242.94**		**Total**	**4242.94**

↓

INPUT	Kg		OUTPUT	Kg
Reaction Mass	4182.94	**Distillation -1**	Acetic Acid (By Product)	401.00
			loss	24.50
			Anisol	2679.30
			loss	34.13
			Reaction Mass	1044.01
Total	**4182.94**		**Total**	**4182.94**

↓

INPUT	Kg		OUTPUT	
Reaction Mass	1044.01	**Distillation-2**	**4 Methoxy acetophenone**	**1000.00**
			loss	6.53
			Residue	37.48
Total	**1044.01**		**Total**	**1044.01**

Mass Balance

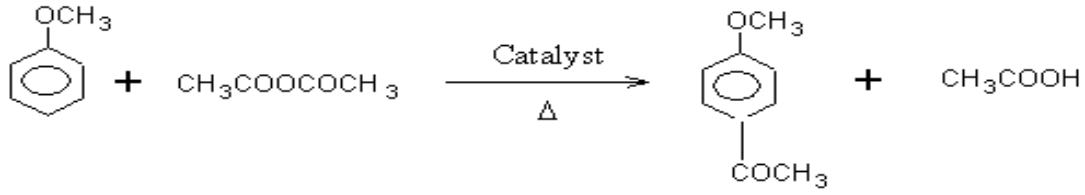
4 - Methoxy Acetophenone					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Anisol	3459.54		4 - Methoxy Acetophenone	1000
2	Acetic anhydride	723.4		loss	6.53
3	catalyst	60		Catalyst	42
4				Catalyst - Loss	18
5				Acetic Acid	405
6				Loss	20.5
7				Anisol	2679.3
8				Loss	34.13
9				Residue to TSDF	37.48
	TOTAL	**4242.94**		**Total**	**4242.94**

PRODUCT [3.2]
4-Methyl Acetophenone

process Description:

Catalyst is kept in stirred reactor. To this, total required Toluene and Acetic Anhydride, are added over a period of 2 hour under constant stirring. After closing the reaction autoclave, the process temperature is raised to 120-130^{o}C slowly and stepwise with constant stirring and maintain for 4-5 hours. The reaction process is terminated by putting off the heating. The autoclave was allowed to cool till the temperature of the mass drops down to below 50^{o}C. The reaction mixture is drained out through the bottom drain valve of the autoclave in nutch filter for separation of catalyst. Finally, reaction mixture is taken for filtration. The reaction mixture is subjected to fractional distillation to separate all the components. Toluene is recovered and recycled; acetic acid is recovered of desired grade. Finally 4-MAP is distilled out.

Reaction Mechanism



Anisole Acetic anhydride 4-Methoxy Acetophenone Acetic Acid

Flowchart

INPUT	Kg	Acetylation Reaction	OUTPUT	Kg
Toluene	24029.9		Reaction Mass	26763.30
Catalyst	18.00			
Catalyst [Recover]	42.00			
Water	9.20			
Acetic Anhydride	2664.20			
Total	**26763.30**		**Total**	**26763.30**

↓

INPUT	Kg	Filtration	OUTPUT	Kg
Reaction Mass	26763.30		Catalyst [Recover]	42.00
			Catalyst to TSDF	18.00
			Reaction Mass	26703.30
Total	**26763.30**		**Total**	**26763.30**

↓

INPUT	Kg	Distillation -1	OUTPUT	Kg
Reaction Mass	26703.30		4 Methyl acetophenone (Crude)	1050.00
			Toluene	22144.00
			loss	1165.00
			Acetic anhydride	1812.70
			Acetic Acid	505.02
			Loss	26.58
Total	**26703.30**		**Total**	**26703.30**

INPUT	Kg	↓ Distillation -2	OUTPUT	Kg
4 Methyl acetophenone	1050.00		4 Methyl acetophenone	1000.00
[Crude]			Loss	6.53
			Residue	43.47
Total	**1050.00**		**Total**	**1050.00**

Mass Balance

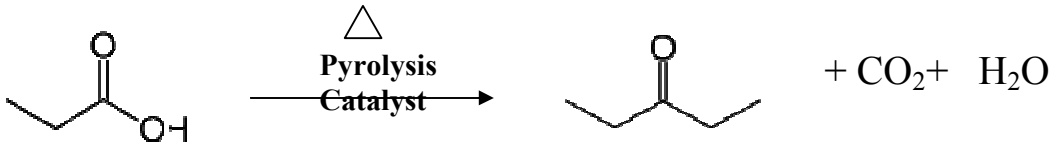
4-Methyl Acetophenone					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Toluene	24029.9		4-Methyl Acetophenone	1000
2	Catalyst	60		Catalyst	42
3	Water	9.2		Toluene	22144
4	Acetic Anhydride	2664.2		Loss	1216.11
				Acetic anhydride	1812.7
				Acetic acid	505.02
				Residue	43.47
	TOTAL	**26763**		**Total**	**26763**

PRODUCT [4.1]
Diethyl Ketone

Process Description

Propionic acid is vapourized in the vapourizer and feed to catalyst bed at higher temperature to get the desired product i.e. Diethyl Ketone which is found in the vapour form. The vapour is cool down in the heat exchanger. Carbon Dioxide is vent off and Water is separate out from DEK through phase separation.

Reaction Mechanism



1. **F**

Propionic acid **Diethyl Ketone** **Carbon Dioxide** **Water**

INPUT	KG	PROCESS	KG	OUTPUT
Propionic Acid	1.76		1	Diethyl Ketone
			0.54	CO2 gas
		Pyrolysis Reaction	0.22	Water
Total	**1.76**		**1.76**	**Total**

Mass Balance

4.1…… Diethyl Ketone					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Propionic Acid	176000		Product	100000
				CO_2 gas	54000
				Water	22000
	TOTAL	**176000**		**Total**	**176000**

PRODUCT [4.2]
Methyl Propyl Ketone

Process Description

Butyric acid and Acetic acid are vapourized in the vapourizer in equal propotion and feed to catalyst bed at higher temperature to get the desired product i.e. Methyl propyl ketone which is found in the vapour form. The vapour is cool down in the heat exchanger. Carbon Dioxide is vent off and Water is separate out from MPK through phase separation.

Reaction Mechanism

Butyric acid **Acetic acid** **Methyl propyl Ketone** **Carbon Dioxide** **Water**

Flowchart

INPUT	KG	PROCESS	OUTPUT	KG
Butyric acid	1.03	Pyrolysis Reaction	1	MPK
Acetic acid	0.69		0.51	CO2 GAS
			0.21	WATER
Total	1.72		1.72	

Mass Balance

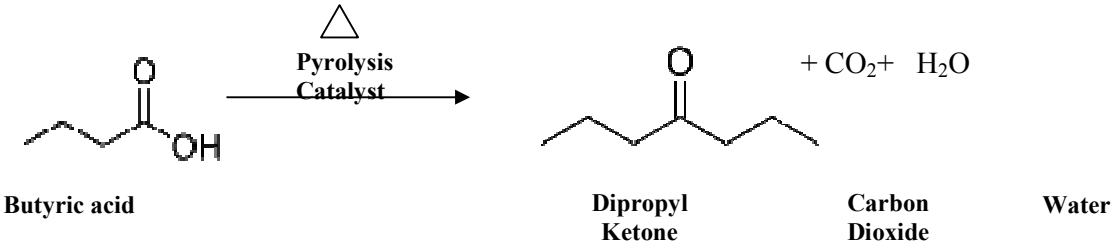
Methyl Propyl Ketone					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Butyric acid	103000		Methyl Propyl Ketone	100000
2	Acetic Acid	69000		CO2 Gas	51000
				Water	21000
	TOTAL	**172000.00**		**Total**	**172000**

PRODUCT [4.3]
Dipropyl Ketone

Process Description

Butyric acid is vapourized in the vapourizer and feed to catalyst bed at higher temperature to get the desired product i.e. Dipropyl Ketone which is found in the vapour form. The vapour is cool down in the heat exchanger. Carbon Dioxide is vent off and Water is separate out from DPK through phase separation.

Reaction Mechanism



Flowchart

INPUT	KG	PROCESS	KG	OUTPUT
Butyric acid	1.54	Pyrolysis Reaction	1	DPK
			0.4	CO2 GAS
			0.14	WATER
Total	1.54		1.54	Total

Mass Balance

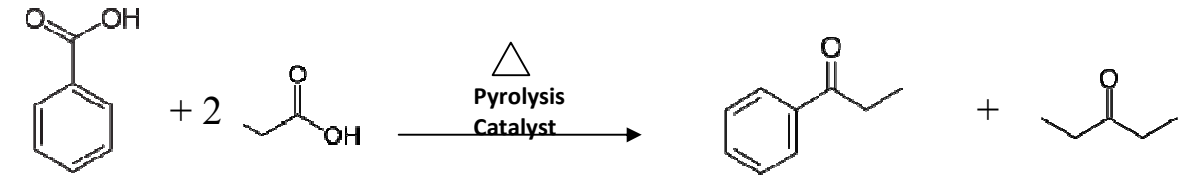
4.3…… Dipropyl Ketone					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Butyric Acid	154000		Dipropyl Ketone	100000
				Water	14000
				CO2 Gas	40000
	TOTAL	**154000.00**		**Total**	**154000.00**

PRODUCT [4.4]
Propiophenone

Process Description

Benzoic acid and Propionic acid are vapourized in the vapourizer in equal molar proportion and feed to catalyst bed at higher temperature to get the desired product i.e. Ethylphenyl ketone and Diethyl Ketone which is found in the vapour form. The Ethyl phenyl and Diethy Ketone are separate out in the column due to their boiling point difference in the Fractional column. Carbon Dioxide is vent off and Water is separate out from DEK through phase separation.

Reaction Mechanism



Benzoic acid **Propionic acid** **Propiophenone** **Diethyl Ketone**

Flowchart

INPUT	KG	PROCESS	OUTPUT	KG
Benzoic acid	0.51	Pyrolysis Reaction	0.56	Propiophenone
Propionic acid	0.76		0.44	DEK
			0.18	CO2 GAS
			0.09	WATER
Total	1.27		1.27	Total

Mass Balance

4.4……. Propiophenone					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Benzoic acid	54212.598		Propiophenone	59528
2	Propionic acid	80787.402		Diethyl Ketone	46772
				CO2 Gas	19134
				Water	9567
	TOTAL	**135000**		**Total**	**135000**

PRODUCT [5]

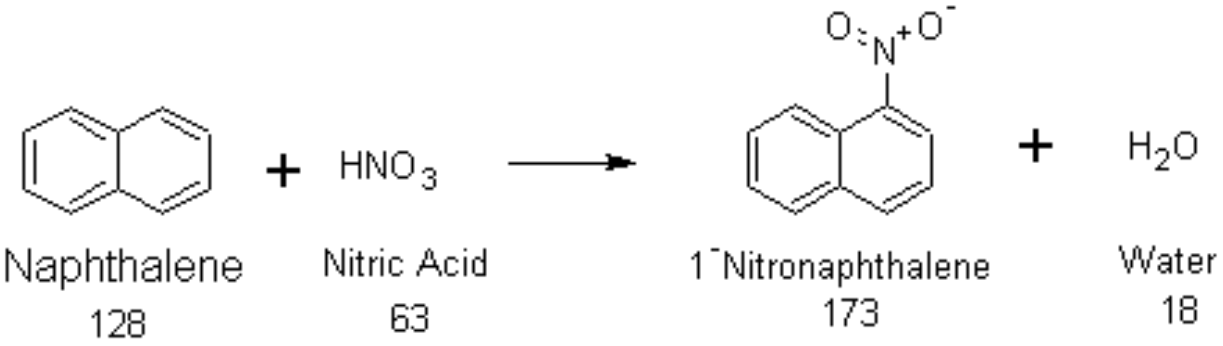
ALPHA NITRONAPHTHALENE

1. Process Description

Nitric Acid 60%is taken in the reactor and Naphthaleneis charged into reactor at desired flow rate and temperature. Output from the Reaction will contain 1-Nitronaphthalene [ANN] along with Dilute Nitric Acid 40-42% [Spent Acid].

Spent Acid is then removed through layer separation and then top organic mass is separate out. Organic layer is nothing but our finished product i.e. Alpha Nitro Naphthalene.

2. Reaction Mechanism



3. Flow Chart

INPUT	KG	PROCESS	KG	OUTPUT
Naphthalene	520.00		694.00	1-Nitro Naphthalene
Nitric Acid 60%	853.13		642.00	Dilute acid for recover [42%]
		Nitration	37.13	Evaporation loss
Total	**1373.13**		**1373.13**	**Total**

4. Mass Balance

5. Alpha Nitro Napthalene					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Napthalene	520		Alpha Nitro Napthalene	694
2	Nitric Acid 60%	853.13		Dilute Acid (Nitric Acid)	642
				Eva. Loss	37.13
	TOTAL	**1373**		**Total**	**1373**

PRODUCT [6]
ALPHA NAPHTHYLAMINE

1. Process Description

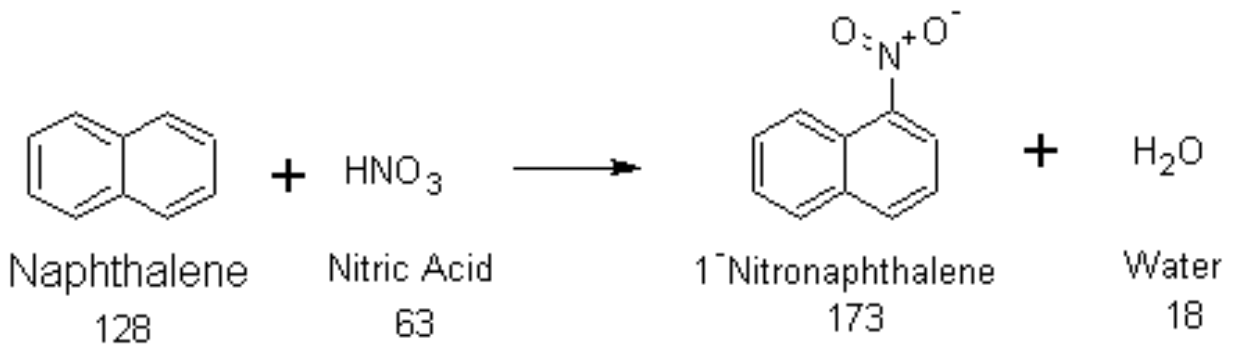
Nitric Acid 60% is taken in the reactor and Naphthalene is charged into reactor at desired flow rate and temperature. Output from the Reaction will contain 1-Nitronaphthalene [ANN] along with Dilute Nitric Acid 40-42% [Spent Acid].

Spent Acid is then removed through layer separation and then top organic mass is separate out. Organic layer is nothing but our finished product i.e. Alpha Nitro Naphthalene.

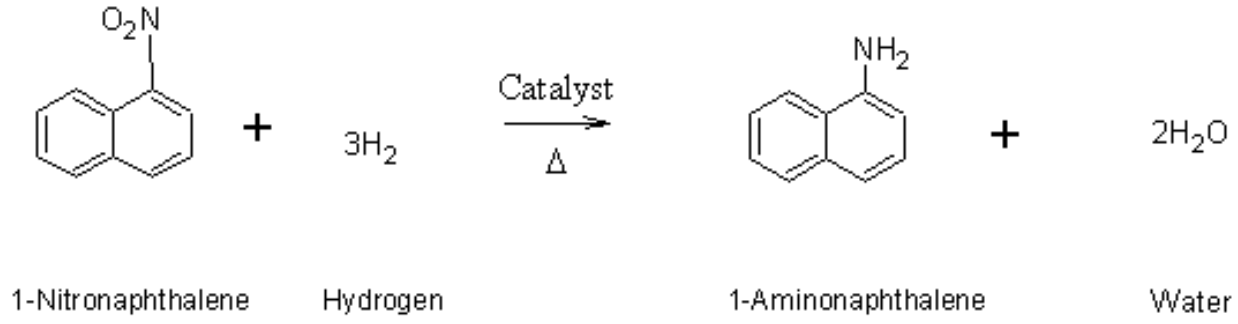
Selected Catalyst is kept in stirred reactor with Solvent. To this, total required 1-Nitronaphthalne and is added over a period of 1 hour under constant stirring. After closing the reaction autoclave, the process temperature is raised up to 80-90^{o}C slowly and stepwise with constant stirring and maintain for 1 hours. Hydrogen gas is passed through the reaction. Check for reaction completion. The reaction process is terminated by putting off the heating. The autoclave was allowed to cool till the temperature of the mass drops down to below 50^{o}C. The reaction mixture is drained out through the bottom drain valve of the autoclave in filter for separation of catalyst. Finally, reaction mixture is taken for filtration. The reaction mixture is subjected to fractional distillation to separate all the components. Solvent is recovered and recycled;. Finally 1-Aminonaphthalene is recovered.

2. <u>Reaction Mechanism</u>

Step : 1 : Nitration Of Naphthalene :



Step : 2 : Reduction Of Alpha Nitro Naphthalene :



3. Flow Chart

INPUT	KG	PROCESS	KG	OUTPUT
Naphthalene	**520.00**	**Nitration**	**694.00**	**1-Nitro Naphthalene**
Nitric Acid 60%	**853.13**		**642.00**	**Dilute acid for recover [42%]**
			37.13	**Evaporation loss**
Total	**1373.13**		**1373.13**	**Total**

↓

INPUT	Kg		Kg	OUTPUT
1-Nitro Naphthalene	694.00		1738.07	Reaction Mass
IPA / METHANOL	950.00	**Hydrogenation**		
Hydrogen	24.07			
Catalyst	70.00			
Total	**1738.07**		**1738.07**	**Total**

↓

INPUT	Kg		Kg	OUTPUT
Reaction Mass	1738.07		*60.00*	Catalyst [recover]
		Filtration	10.00	Catalyst to TSDF
			1668.07	Filtrate Reaction Mass
Total	**1738.07**		**1738.07**	**Total**

↓

INPUT	Kg		Kg	OUTPUT
Reaction Mass	1668.07		903.00	IPA / METHANOL OR
			47.00	loss
		Distillation	144.42	Distilled water
			545.00	**Product ANA**
			28.65	Residue
Total	**1668.07**		**1668.07**	**Total**

4. Mass Balance

6. Alpha Naphthylamine					
By Using IPA / Methanol					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Napthalene	520		Alpha Naphthylamine	545
2	Nitric Acid 60%	853.13		Dilute Acid (Nitric Acid)	642
3	IPA / Methanol	950		Eva Loss	37.13
4	Hydrogen	24.07		Catalyst	60
5	catalyst	70		Catalyst Loss	10
6				IPA / Methanol	903
7				Loss	47
8				Distilled Water	144.42
9				Residue to TSDF Site	28.65
	TOTAL	**2417.20**		**Total**	**2417.20**

Using Aniline / ODCB as a Solvent :-

INPUT	KG	PROCESS	KG	OUTPUT
Naphthalene	520.00		694.00	1-Nitro Naphthalene
Nitric Acid 60%	853.13		642.00	Dilute acid for recover [42%]
		Nitration	37.13	Evaporation loss
Total	**1373.13**		**1373.13**	**Total**

↓

INPUT	Kg		Kg	OUTPUT
1-Nitro Naphthalene	694.00		2088.07	Reaction Mass
ANILINE/ODCB	1300.00	**Hydrogenation**		
Hydrogen	24.07			
Catalyst	70.00			
Total	**2088.07**		**2088.07**	**Total**

↓

INPUT	Kg		Kg	OUTPUT
Reaction Mass	2088.07		*60.00*	Catalyst [recover]
		Filtration	10.00	Catalyst to TSDF
			2018.07	Filtrate Reaction Mass
Total	**2088.07**		**2088.07**	**Total**

↓

INPUT	Kg		Kg	OUTPUT
Reaction Mass	2018.07		1274.00	ANILINE/ODCB
			26.00	loss
		Distillation	144.42	Distilled water
			545.00	**Product ANA**
			28.65	Residue
Total	**2018.07**		**2018.07**	**Total**

5. Mass Balance

6. Alpha Naphthylamine					
By Using Aniline / ODCB					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Napthalene	520		Alpha Naphthylamine	545
2	Nitric Acid 60%	853.13		Dilute Acid (Nitric Acid)	642
3	Aniline / ODCB	1300		Eva. Loss	37.13
4	Hydrogen	24.07		Catalyst	60
5	catalyst	70		Catalyst Loss	10
6				Aniline / ODCB	1274
7				Loss	26
8				Distilled Water	144.42
9				Residue to TSDF Site	28.65
	TOTAL	**2767.20**		**Total**	**2767.20**

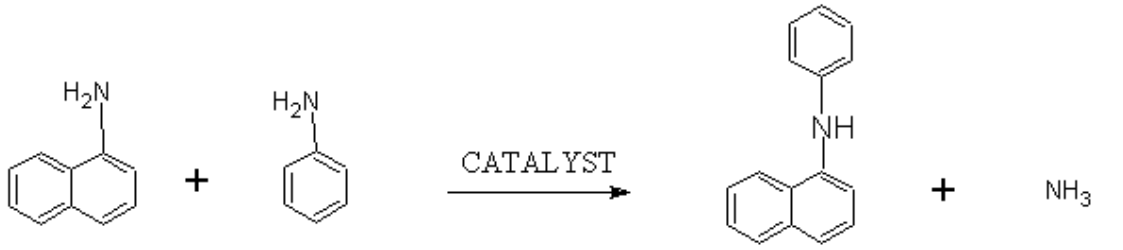
PRODUCT [7]

PHENYL ALPHA NAPHTHYLAMINE [PANA]

1. Process Description

Selected Catalyst is kept in stirred reactor with Aniline. To this, total required 1-Aminonaphthalne 4000 kg is added over a period of 1 hour under constant stirring. After closing the reactor, the process temperature is raised up to 280°C slowly and stepwise with constant stirring. Ammonia Gas will liberate during reaction which is scrubbed in Scrubber. The reaction process is terminated by putting off the heating. The reactor was allowed to cool till the temperature of the mass drops down to below 50°C. The reaction mixture is transfer to distillation reactor and fractional distillation is done through which Aniline, Low Boiler and PANA will distilled out. Residue will be discharged from bottom which will be disposed to solid waste disposal site.

2. Reaction Mechanism



3. Flow Chart

INPUT	KG	PROCESS	KG	OUTPUT
Aniline [Fresh]	2600.00	**Condensation**	9724.50	Reaction Mass
Aniline (Recovered]	3500.00		475.50	Ammonia to Scrubber
Alpha Naphthylamine	4000.00			
Catalyst	100.00			
Total	**10200.00**		**10200.00**	**Total**

↓

INPUT	KG		KG	OUTPUT
Reaction Mass	9724.50		5600.00	Phenyl Alphanaphthylamine
			3500.00	Aniline [Recovered]
		Distillation	21.50	Loss
			3.00	Evaporation loss
			600.00	Distillation Residue
Total	**9724.50**		**9724.50**	**Total**

4. Mass Balance

7. Phenyl Alpha Napthylamine					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	Aniline (Fresh)	2600		Phenyl Alpha Napthylamine	5600
2	Aniline (Recovered)	3500		Ammonia	475.5
3	Alpha Napthylamine	4000		Aniline	3500
4	Catalyst	100		Eva. Loss	24.5
				Distillation Residue	600
	TOTAL	**10200**		**Total**	**10200**

PRODUCT [8]

EPICHLOROHYDRIN BASED POLY AMIDE RESIN

1. Process Description

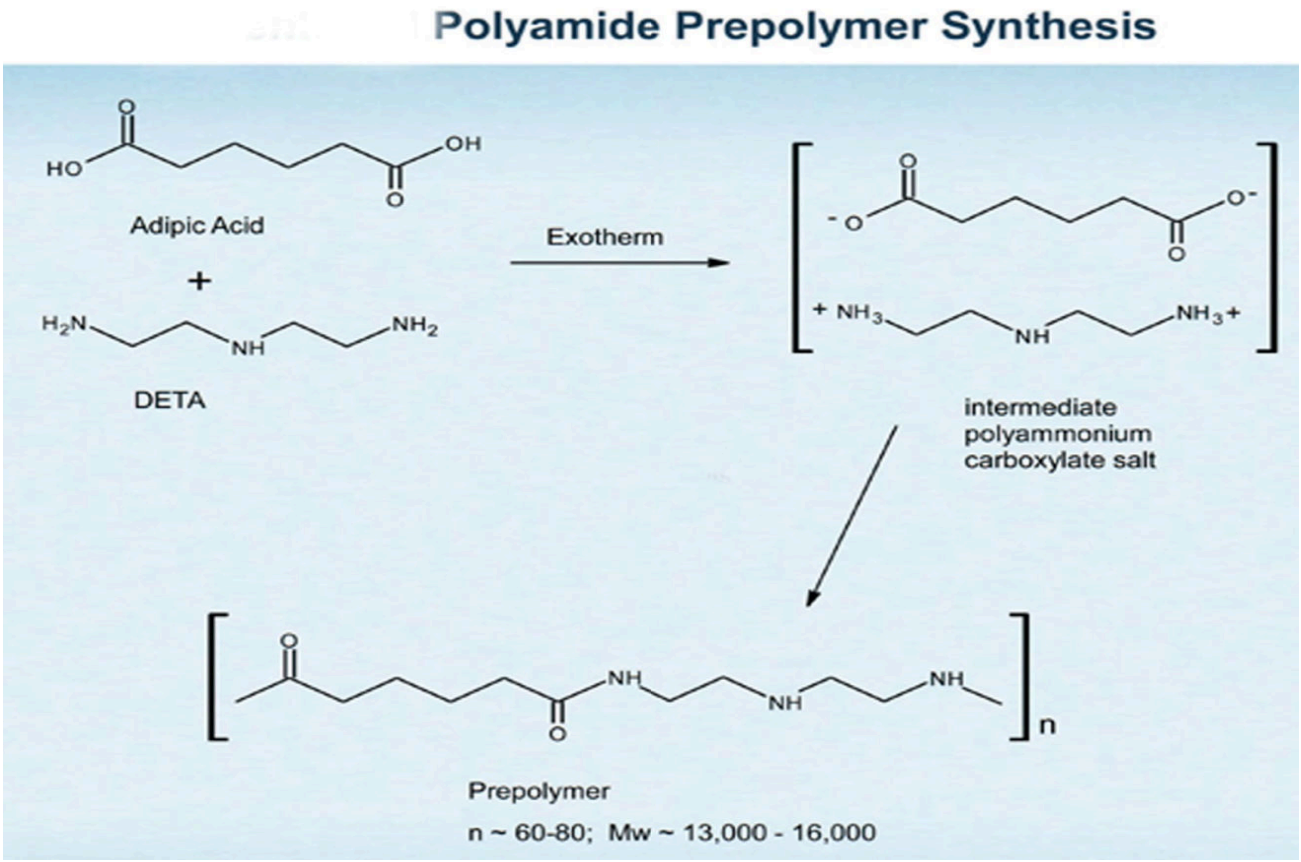
Take Diethylene triamine (DETA) in the reactor and Charge Adipic Acid in DETA . Heat the reaction Mixture to 125Deg.C. Maintain temperature 3 Hours. Now, Cool the reaction mass 90 Deg.C.

After that Dilute the reaction Mass with water and Add Epichlorohydrin in above reaction mass and stir 45 mins.

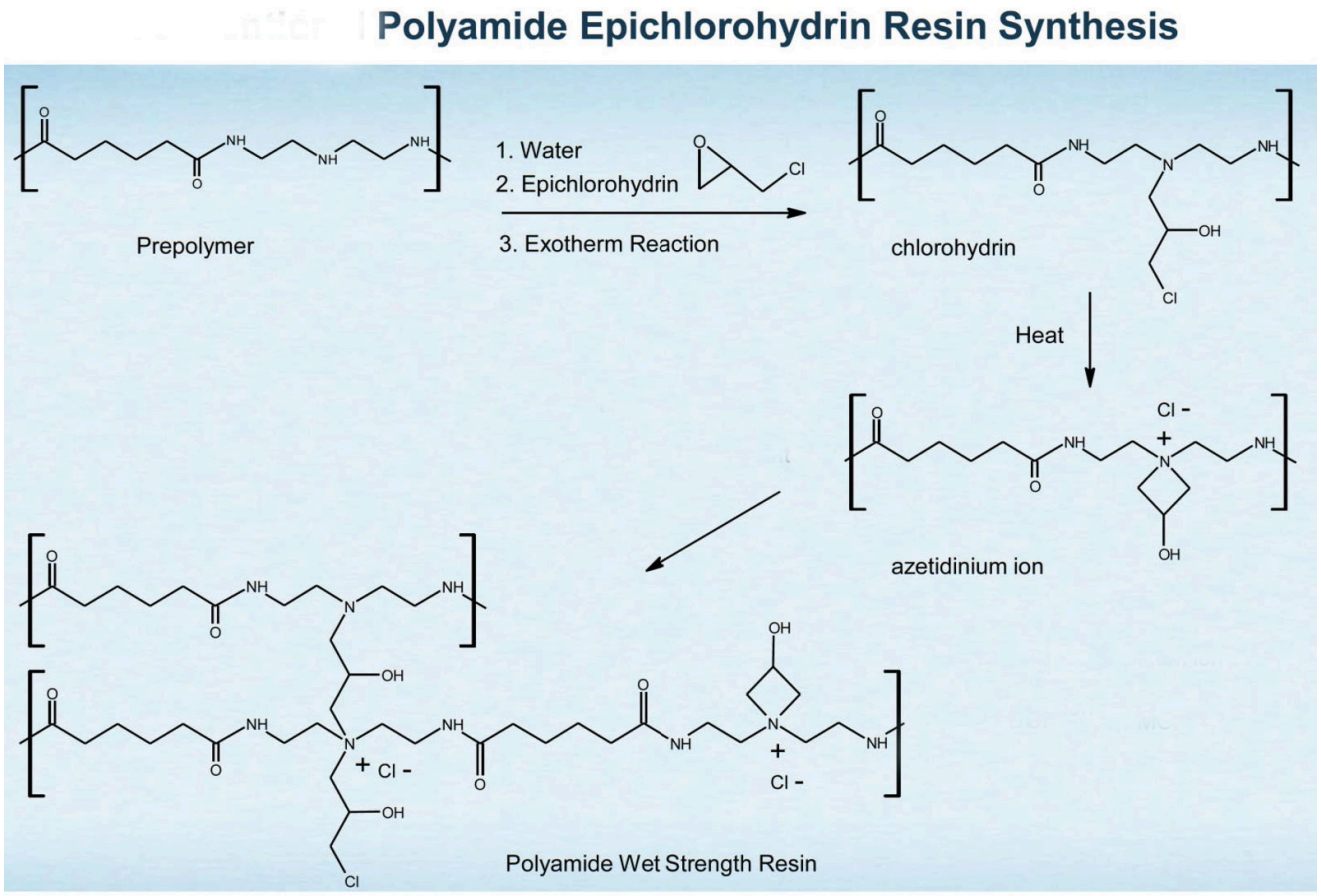
Reaction take Place and Product will be EPICHLOROHYDRIN BASED POLY AMIDE RESIN.

2. <u>Reaction Mechanism</u>

PROCESS REACTION : STEP - 1:



PROCESS REACTION : STEP -
2:



3. <u>Flow Chart</u>

INPUT	KG		KG	OUTPUT
DETA	585	**Prepolymer Reaction**	2765	Reaction mass
Adipic Acid	780			
Water	1400			
Total	**2765**		**2765**	**Total**

↓

INPUT	KG		KG	OUTPUT
Reaction Mass	2765	**Polyamide Epichlorohydrin Reaction**	11600	PAR
EPI	351			
WATER	8484			
Total	**11600**		**11600**	**Total**

4. Material Balance

ECH based Polyamide Resin					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	DETA	585		ECH based Polyamide Resin	11600
2	Adipic Acid	780			
3	Water	9884			
4	EPI	351			
	TOTAL	**11600**		**Total**	**11600**

PRODUCT [9]
3,5 – Dichloroaniline

Process Description

PNA is charged into reactor containing desired quantity of MCB as a solvent. PNA is chlorinated to 2,6 DCPNA with the help of chlorine gas and HCl is obtained as a byproduct.

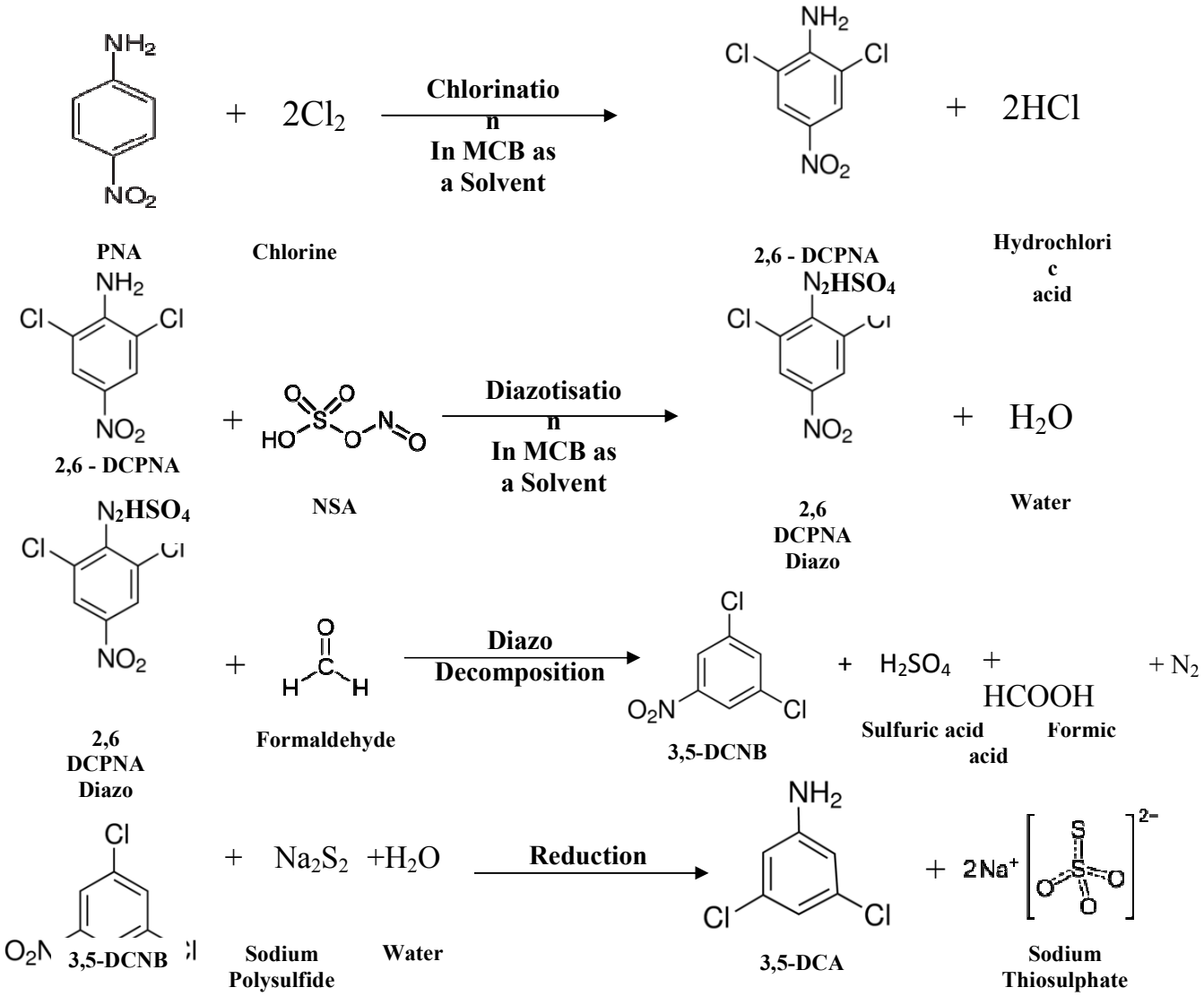
2,6 DCPNA in MCB is then diazotized with the help of Nitrosyl sulfuric acid at low temperature. Obtained reaction mass is then separate out into two layer i.e. 1. Organic layer consist MCB and trace amount of organic impurities and 2. Aqueous layer consist Diazo of 2,6 DCPNA. MCB is recycle for next chlorination.

This Aqueous layer then drawn into solution of Formaldehyde to give 3,5 DCNB. Here spent acid is separate out and used for generation of NSA.

3,5 DCNB then reduced by charging it into the polysulfide solution made by Caustic lye and sulphur. After 5-6 hours of reflux. Reaction mass is cool down and then phase separation is carried out. In Organic layer, we obtain Crude 3,5-DCA and Sodium thio solution is obtained in aqueous layer which can be sale.

Crude 3,5 DCA is further distilled out to achieve better quality.

Reaction Mechanism



Flowchart

INPUT	KG	PROCESS	KG	OUTPUT
PNA	666	**Chlorination**	4329	Reaction Mass
Chlorine	685		352	HCL to Scrubber
MCB	3330			
Total	**4681**		**4681**	**Total**

↓

INPUT	KG		KG	OUTPUT
Reaction Mass	4329	**Diazotization**	5944	Reaction Mass
NSA	1200			
NSA [RECOVER]	415			
Total	**5944**		**5944**	**Total**

↓

INPUT	KG		KG	OUTPUT
Reaction Mass	5944	**Layer Saperation**	3444	MCB **
			2500	2,6-DCPNA DIAZO
Total	**5944**		**5944**	**Total**

↓

INPUT	KG		KG	OUTPUT
2,6-DCPNA DIAZO	2500	**Diazo Decomposition**	**751**	**3,5-DCNB**
HCHO	495		2135	Spent Acid
			109	N2
Total	**2995**		**2995**	**Total**

↓

3,5-DCNB	751	**Reduction**	4261	Reaction Mass
Sulphur	405			
Caustic Lye 48%	1055			
water	2050			
Total	**4261**		**4261**	**Total**

↓

Reaction Mass	4261	**Layer Separation**	575	Organic layer
Wash Water	600		3681	Thio layer for sale
			625	Washing Layer for MEE
Total	**4861**		**4861**	**Total**

↓

Reaction Mass	575	**Distillation**	477	3,5 DCA
			98	Residue TO TSDF Site
Total	**575**		**575**	**Total**

MCB RECOVERY **

INPUT	KG		KG	OUTPUT
MCB	3444	**Washing**	3429	MCB
NSA	400		415	NSA [recover]
Total	3844		3844	Total

INPUT	KG		KG	OUTPUT
MCB	3429	**Distillation**	3243	MCB
			118	MCB vent Loss
			68	Residue
Total	3429		3429	Total

Mass Balance

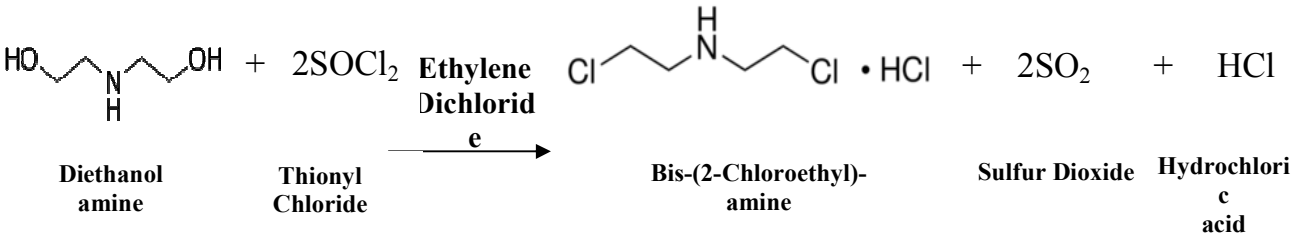
9. 3,5-Dichloroaniline					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	PNA	666		3,5-Dichloroaniline	477
2	Chlorine	685		Gaseous Emission (HCl)	352
3	MCB	3330		MCB	3243
4	NSA	2015		Loss	118
5	HCHO	495		Spent Acid (H2SO4)	2135
6	Sulphur	405		N2	109
7	Caustic Lye	1055		Thio Layer	3661
8	Water	2650		Residue	166
				NSA	415
				Effluent to ETP	625
	TOTAL	**11301**		**Total**	**11301**

PRODUCT [10]
Bis-(2-Chloroethyl)-amine Hydrochloride

Process Description

Diethanolamine is charged into the reactor having desired quantity of Ethylene dichloride as a solvent. Then charge Thionyl chloride into it. Reaction is exothermic. After completion of reaction, reaction mass is cool down to room temperature and then filtered. Mother liquor consisting Ethylene dichloride is recycle where as sulfur dioxide and hydrochloric acid gas fumes are scrubbed in appropriate scrubbers.

Reaction Mechanism



Diethanol amine | **Thionyl Chloride** | **Bis-(2-Chloroethyl)-amine** | **Sulfur Dioxide** | **Hydrochloric acid**

Flowchart

INPUT	KG	PROCESS	KG	OUTPUT
DEA	590.00		2000.00	Reaction Mass
Thionyl Chloride	1340.00		204.00	HCl to Scrubber
Ethylene Dichloride [Recovered]	950.00	**Condensation**	716.00	SO2 to Scrubber
Ethylene Dichloride [Fresh]	50.00		10.00	Evaporation Loss to Scrubber
Total	**2930.00**		**2930.00**	**Total**
↓				
Reaction Mass	2000.00		1000.00	Bis-(2-Chloroethyl)-Amine HCl
			950.00	EDC [Recovered]
		Filtration	50.00	Loss
Total	**2000.00**		**2000.00**	**Total**

Mass Balance

10. Bis-(2-Chloroethyl)-amine Hydrochloride					
Sr. No.	**Input**	**Kg**		**Output**	**Kg**
1	DEA	590		Bis-(2-Chloroethyl)-amine Hydrochloride	1000
2	Thionyl Chloride	1340		HCl	204
3	Ethylene Dichloride (Recovered)	950		SO2	716
4	Ethylene Dichloride (Fresh)	50		Eva Loss	60
				EDC	950
	TOTAL	**2930**		**Total**	**2930**

ANNEXURE-IV

WATER CONSUMPTION AND WASTEWATER GENERATION

Existing

Sr. No.	Description	Water Consumption	Waste Water Generation
		KL/Day	KL/Day
1	Cooling	20.0	1.5
2	Washing	0.5	0.5
	Total Industrial	**20.5**	**2.0**
3	Domestic	5.0	5.0
	Grand Total	**25.5 (Fresh: 11.5 KL/Day + Recycle: 14 KL/Day)***	**7.0**

Note :-* 14 KL/day of Condensate water is generated only from the manufacturing of Nytrosyl Sulphuric Acid (from spent sodium thio sulfate solution and Spent H_2SO_4 (used as raw materials)), otherwise only fresh water is used in to Cooling Tower.

Source of Water: SMC

Total after Proposed Expansion:

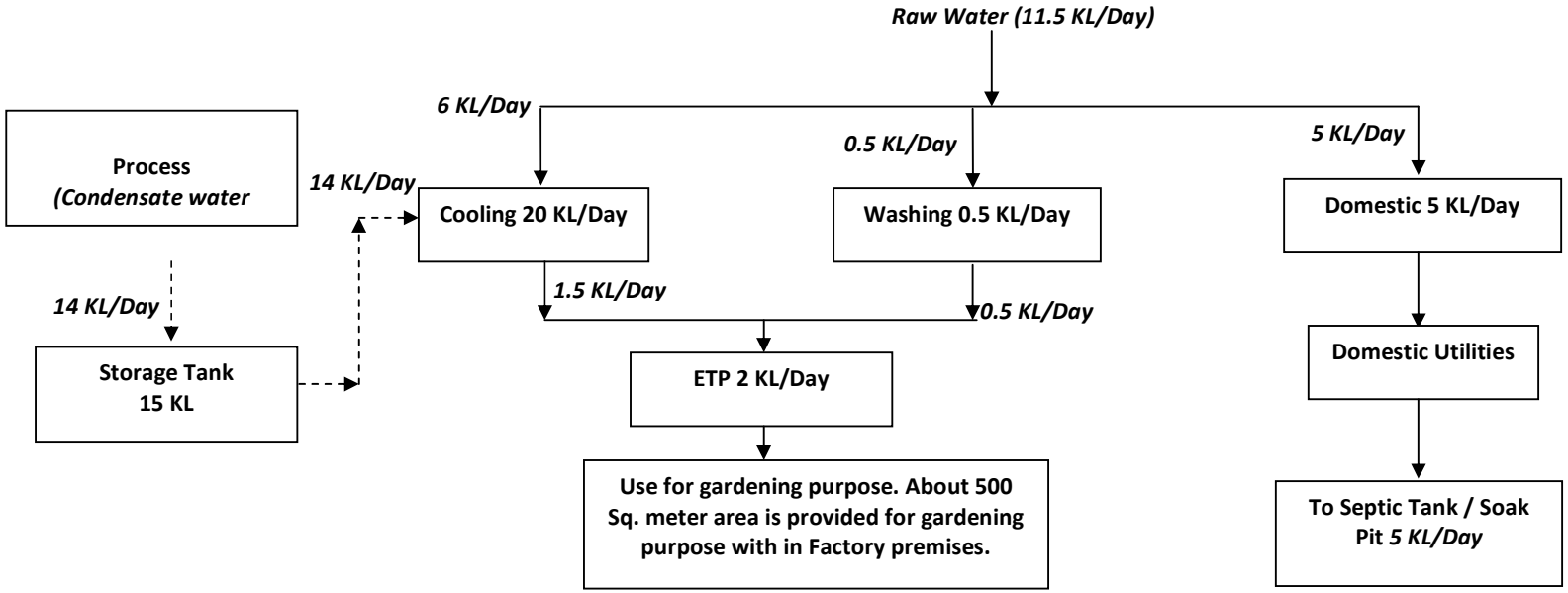
Sr. No.	Description	Water Consumption	Waste Water Generation
		KL/Day	KL/Day
1	Process	13.0	2.0
2	Cooling	30.0	2.0
3	Washing	2.0	2.0
4	Scrubber	10.0	8.0
	Total Industrial	**55.0**	**14.0**
5	Domestic	10.0	10.0
	Grand Total	**65.0**	**24.0**

Note :- * For the first time 65 KL/Day of fresh water shall be use, than after 14 KL/Day condensate water, 14 KL/Day treated effluent and 37 KL/Day of fresh water shall be used.

**** The Condensate water is generated only from the manufacturing of Nytrosyl Sulphuric Acid (from spent sodium thio sulfate solution and Spent H_2SO_4)**

Source of Water: SMC

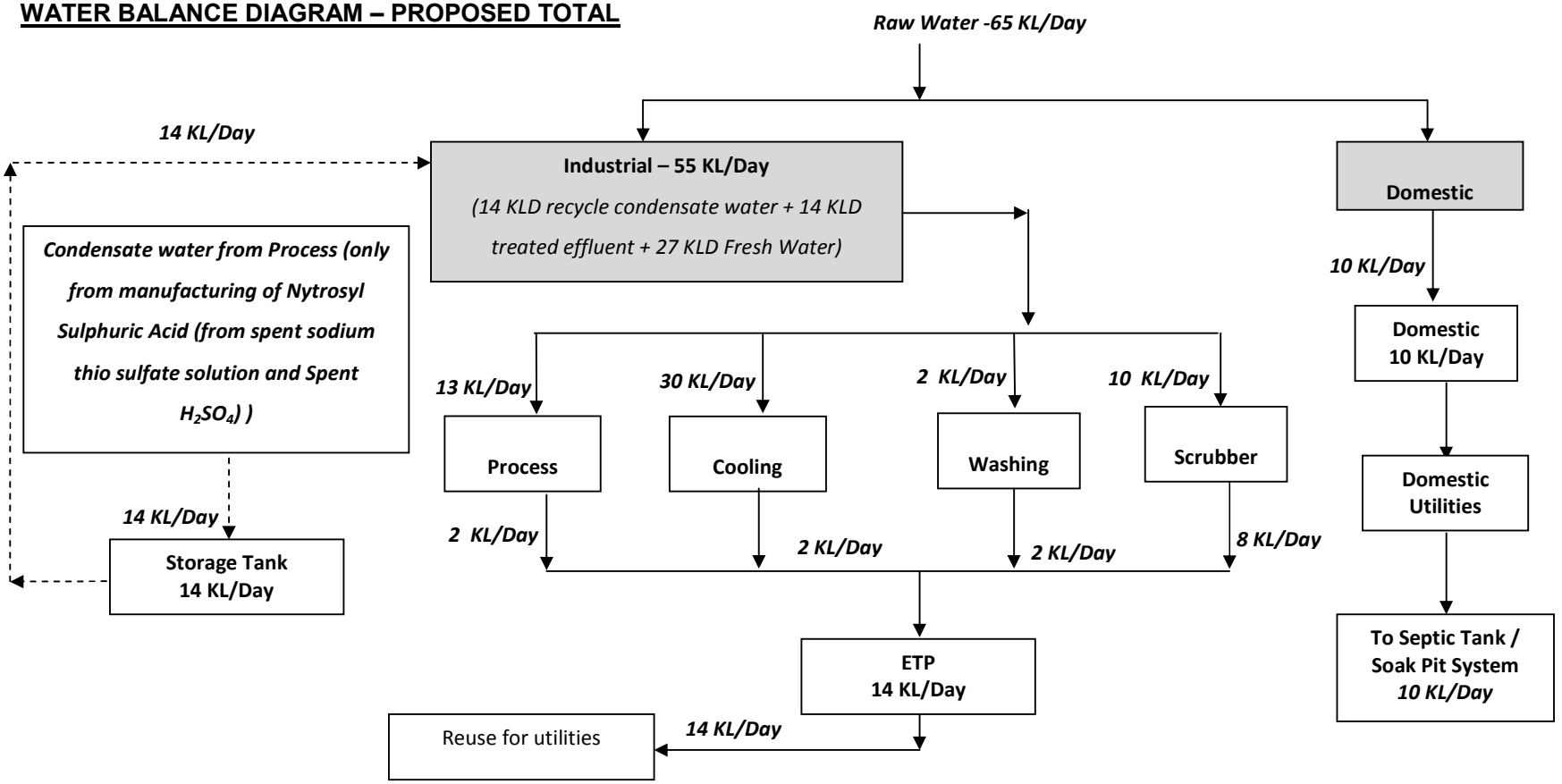
Water Balance Diagram (Existing):



Note :-* The Condensate water is generated only from the manufacturing of Nytrosyl Sulphuric Acid from spent sodium thio sulfate solution and Spent H_2SO_4 (used as raw materials), otherwise only fresh water is used in to Cooling Tower.

Source of Water: SMC

WATER BALANCE DIAGRAM – PROPOSED TOTAL



Note :- * For the first time 65 KL/Day of fresh water shall be use, than after 14 KL/Day condensate water, 14 KL/Day treated effluent and 37 KL/Day of fresh water shall be used.

**** The Condensate water is generated only from the manufacturing of Nytrosyl Sulphuric Acid (from spent sodium thio sulfate solution and Spent H_2SO_4)**

ANNEXURE-V:

EXISTING ETP DETAILS & DIAGRAM

DETAILS OF EFFLUENT TREATMENT PLAN - EXISTING

We have installed Effluent Treatment Plant having primary and tertiary treatment facilities for the treatment of effluent generated from the cooling tower blow down and floor washing.

Mostly the effluent is neutral in nature, however pH correction is done if required in primary treatment Plant.

Raw industrial effluent from the industrial unit is collected in collection-cum-equalization tank. Lime and Acid solution tank is provided for the neutralization ***(if required)*** of industrial effluent. Than the neutralized effluent is sent to nutch filter to remove the SS load in the form of ETP sludge, Filtrate effluent is collected in to primary treated effluent collection tank and the treated effluent is used for gardening purpose within factory premises after passing through Dual Media Filter. About 500 Sq. Meter area is provided for gardening purpose.

The dewatered sludge from Nutch Filter is collected and packed in HDPE / Plastic bags and stored in a proper solid / hazardous waste storage area.

The specification of ETP is as under …

ETP Flow Rate: 2 KL/Day – from cooling tower blow down and floor washing

No.	Treatment Unit	Qty.	Brief Specification
1.	Chemical Dosing Tank	2	Capacity: 100 Liters MOC: HDPE
2.	Collection / Equalization Tank (for cooling tower blow down and Floor washing effluent water)	1	Capacity: 5,000 Liters MOC: HDPE chemical grade
3.	Primary Settling Tank	1	Capacity: 5,000 Liters MOC: HDPE chemical grade
4	Nutch Filter	1	Capacity: 2 m2 MOC: HDPE With Cloth
4	Primary treated effluent storage tank	1	Capacity : 5000 Liters MOD: HDPE
5.	Recycling Plant	1	Type: Dual media consisting of activated carbon filter and sand filter Size: 1.0 m Φ x 1 m Capacity: 2 m^3/hr MOC: HDPE

DETAILS OF EFFLUENT TREATMENT PLAN – PROPOSED TOTAL

We have installed Effluent Treatment Plant having primary and tertiary treatment facilities for the treatment of effluent generated from the from process, cooling, washing and scrubber.

Raw industrial effluent from the industrial unit is collected in collection-cum-equalization tank. Lime and Acid solution tank is provided for the neutralization of industrial effluent. Than the neutralized effluent is sent to nutch filter to remove the SS load in the form of ETP sludge, Filtrate effluent is collected in to primary treated effluent collection tank.

The primary treated effluent first pass through sand filter, carbon filter and resin filter and given ozone treatment and than reuse for utilities.

The dewatered sludge from Nutch Filter is collected and packed in HDPE / Plastic bags and stored in a proper solid / hazardous waste storage area.

The specification of ETP is as under …

ETP Flow Rate: 14 KL/Day

No.	Treatment Unit	Qty.	Brief Specification
1.	Chemical Dosing Tank	2	Capacity: 100 Liters MOC: HDPE
2.	Collection / Equalization Tank (for industrial effluent)	1	Capacity: 5,000 Liters Retention time : 8.57 Hr MOC: HDPE chemical grade
3.	Primary Settling Tank	1	Capacity: 5,000 Liters Retention time : 8.57 Hr MOC: HDPE chemical grade
4	Nutch Filter	1	Capacity: 2 m2 MOC: HDPE With Cloth
4	Primary treated effluent storage tank	1	Capacity : 5000 Liters MOC: HDPE
5.	Sand Filter	1	Size: 1.0 m Φ x 1 m Capacity: 2 m^3/hr MOC: HDPE

6.	Carbon Filter	1	Size: 1.0 m Φ x 1 m Capacity: 2 m^3/hr MOC: HDPE
7.	Ozone Treatment	1	Capacity : 70 gm/hr
8.	Treated Water Storage Tank	1	Capacity : 15 KL MOC: HDPE

MODE OF DISPOSAL		
INDUSTRIAL:		
EXISTING :-	16 KL/Day	Out of total 16 KL/Day of effluent ... 1. About 14 KL/Day of Condensate water *(is generated only from the manufacturing of Nytrosyl Sulphuric Acid(from spent sodium thio sulphate solution and Spent H2SO4 (as a raw material))* is recycled back in to cooling tower. 2. And remaining 2 KL/Day waste water generated from cooling tower blow down and floor washing is treated in ETP and the treated effluent is used for gardening purpose. About 500 Sq. Meter area is provided for gardening purpose.
PROPOSED TOTAL :-	28 KL/Day	Out of total 28 KL/Day of effluent ... 1. About 14 KL/Day of Condensate water *is generated only from the manufacturing of Nytrosyl Sulphuric Acid(from spent sodium thio sulphate solution and Spent H2SO4 (as a raw material))* is recycled back in to cooling tower. 2. And remaining 14 KL/Day waste water generated from process (from manufacturing of 3, 5, DCA), cooling, washing & Scrubber shall be treated in ETP and the treated effluent shall be reuse in to utilities.
DOMESTIC :		
EXISTING :-	5 KL/Day	The domestic waste water is discharged in to the septic tank / soak pit system.
PROPOSED TOTAL :-	10 KL/Day	

1. Laboratory Treatability Studies

Effluent shall be generated from the Process (from the manufacturing of 3, 5 Di Chloro Aniline), Cooling, Washing & Scrubber

The stream wise characteristic of effluent is as under…

No.	Parameter	Process (3, 5 DCA)	Cooling	Washing	Scrubber	Composite Sample
	Quantity, KL/Day	2	2	2	8	14
1.	pH	4.9	7.9	7.1	8.8	7.87
2.	Oil and Grease, mg/l	12	0.5	7.8	1.9	4.00
3.	COD, mg/l	1350	160	450	980	840
4.	BOD_3, mg/l	240	45	90	190	162
5.	Suspended Solids, mg/l	110	110	180	130	131
6.	Phenolic Compound, mg/l	BDL	BDL	BDL	BDL	BDL
7.	TDS	1600	1200	1400	2200	1857

The above characteristics effluent shall be given Primary & Tertiary Treatment and will reuse in to utilities after given ozonization treatment.

2. Primary Treatment

For study of primary treatment on effluent i. e. neutralization, flocculation and settlement effluent sample was treated with Lime as neutralizing agent and $FeSO_4$ as flocculating agent. Various parameters were studied such as lime dose, $FeSO_4$ dose, settling time, influent and effluent suspended solids and COD. The summary of the result is tabulated herewith in below Table.

Table: Summary of Primary Treatment Study

Initial COD: 840 mg/L

	Run 1	Run 2	Run 3
Effluent Sample taken, ml	500	500	500
Lime Dose mg/L	100	150	175
$FeSO_4$ Dose mg/L	50	65	75
COD after neutralization with $FeSO_4$ mg/L	476.78	358.85	317.52
% reduction of COD	43.24	57.28	62.20

Observation:

1. Reduction of 62.20 % in COD load is found at primary treatment level with Lime dose of 175 mg/L and $FeSO_4$ dose of 75 mg/L.

After primary treatment, characteristic of effluent is as under:

Parameter	Primary Treated effluent
pH	7.15
Oil and Grease, mg/L	0.8
COD, mg/L	317
BOD_3, mg/L	89
Suspended Solids, mg/L	57
Phenolic Compound mg/L	BDL
TDS, mg/L	1920

The primary treated effluent shall be given tertiary treatment by passing through sand filter, carbon filter and resin filter. The characteristics of tertiary treated effluent shall be as under ….

Parameter	Tertiary Treated effluent
pH	7.10
Oil and Grease, mg/L	BDL
COD, mg/L	302
BOD_3, mg/L	75
Suspended Solids, mg/L	30
Phenolic Compound mg/L	BDL
TDS, mg/L	1920

The above characteristics effluent shall be reused in to utilities after given ozonization treatment. The characteristics of final treated effluent shall be as under ….

Parameter	Tertiary Treated effluent
pH	7.10
Oil and Grease, mg/L	BDL
COD, mg/L	65
BOD_3, mg/L	20
Suspended Solids, mg/L	22
Phenolic Compound mg/L	BDL
TDS, mg/L	1922

ANNEXURE-VI

DETAILS OF HAZARDOUS WASTE STORAGE, TREATMENT AND DISPOSAL

CAT. NO.	TYPE OF SOLID / HAZARDOUS WASTES	SOURCE OF WASTE	QUANTITY GENERATED			METHOD OF DISPOSAL
			Existing	Additional	Proposed Total	
5.1	Used Oil	Plant and Machinery	0.085 MT/Year i. e. 100 Liters/Year	Nil	0.085 MT/Year i. e. 100 Liters/Year	Collection / storage / transportation / sent to registered recycler
33.1	Discarded containers / barrels / liners/ Carboys/Bags	Raw material packaging	4.8 MT/Year i. e. 600 Nos/Year	1.6 MT/Year i. e. 200 Nos/Year	6.4 MT/Year i. e. 800 Nos/Month	Collection / Storage / Transportation / Supplier / Sent To Registered Recycler
35.3	ETP Sludge	From ETP	100 Kg/Year	500 Kg/Year	600 Kg/Year	Collection / Storage / Transportation / Sent To TSDF Site for Secured Land Filling
29.5	Catalyst	From Process	Nil	4.1 MT/Month	4.1 MT/Month	Collection / Storage / Transportation / Given Back to Manufacturer for Re-Generation
	CATALYST SHALL BE GENERATED FROM THE MANUFACTURING OF 4 - METHOXY ACETOPHENONE, 4-METHYL ACETOPHENONE & ALPHA NAPTHYLAMINE.					
29.6	Spent Acid ***(H_2SO_4)***	----	286 MT/Month	Nil	286 MT/Month *	Reception / Storage / Transportation / used as a raw material for the manufacturing of Nytrosyl Sulphuric Acid (from Sodium Thio Sulphate Solution and Spent Acid (H_2SO_4))
		From manufacturing of 3,5-Dichloroaniline	Nil	224 MT/Month	224 MT/Month	Reuse For The Manufacturing of Nytrosyl Sulphuric Acid (From Sodium Thio Sulphate Solution And Spent Acid (H_2SO_4))
---	Sodium Thio Sulfate Solution	----	501 MT/Month	Nil	501 MT/Month*	Reception / usage / storage / transportation / use as a raw material for the manufacturing of nytrosyl sulphuric acid (from sodium thio sulphate solution and spent acid (H_2SO_4))

		From manufacturing of 3,5-Dichloroaniline	Nil	384 MT/Month	384 MT/Month	Reuse For The Manufacturing of Nytrosyl Sulphuric Acid (From Sodium Thio Sulphate Solution And Spent Acid (H_2SO_4)) / 3, 5 DCA
	**** Presently, Industry has applied under the rule 11 [i.e. utilization of the hazardous wastes as a supplementary resource or for energy recovery, or after processing under rule 11 of the hazardous waste (management, handling & transboundary) rules, 2008] for the reception (from actual generator) & usage of spent h_2so_4 & spent sodium thio sulphate solution as a raw material for the manufacturing of nytrosyl sulphuric acid from sodium thio sulphate solution & spent h_2so_4 on dated 9/3/2016. permission for the same is awaited.*** ***Now as per proposed proposal, industry has proposed to manufacture about 50 MT/Day of 3, 5 Di Chloro Aniline. From the manufacturing of this product Spent H_2SO_4 and Spent Sodium Thio Sulphate Solution shall be generate. If industry will manufacture 3, 5 Di Chloro Aniline within premises, in such case industry will receipt the balance quantity (as per manufacturing of 3, 5, Di Chloro Aniline quantity). If industry will manufacture 50 MT/Day of 3, 5 Di Chloro Aniline, than industry will receipt about balance quantity i. e. 62 MT/Month of Spent H2 SO4 and 117 MT/Month of Spent Sodium Thio Sulphate Solution from actual generator.***					
29.4	Spent Solvent ***(Anisol)***	From the manufacturing of 4 - Methoxy Acetophenone	Nil	161 MT/Month	161 MT/Month	Collection / storage / reuse in to next batch in same process
29.4	Spent Solvent ***(IPA OR Methanol)***	From manufacturing of Alpha Napthylamine	Nil	274 MT/Month	274 MT/Month	Collection / storage / reuse in to next batch in same process
	OR					
	Spent Solvent ***(Aniline OR ODCB)***	From manufacturing of Alpha Napthylamine	Nil	386 MT/Month	386 MT/Month	
	If industry will use IPA / methanol as a raw material for the manufacturing of alpha napthylamine, then IPA / methanol shall be recovered, accordingly if industry will use aniline / ODCB, then only aniline / ODCB shall be recovered.					
29.4	Spent Solvent ***(MCB)***	From manufacturing 3,5-Dichloroaniline	Nil	340 MT/Month	340 MT/Month	Collection / Storage / Reuse in to Next Batch in same process
29.4	Spent Solvent ***(Aniline)***	From manufacturing Phenyl Alpha Naphthylamine	Nil	56.6 MT/Month	56.6 MT/Month	Collection / Storage / Reuse in to Next Batch in Same Process

29.4	Spent Solvent ***(Toluene)***	From manufacturing of 4-Methyl Acetophenone	Nil	1329 MT/Month	1329 MT/Month	Collection / Storage / Reuse in to Next Batch in Same Process
29.4	Spent Solvent ***(EDC)***	From manufacturing of Bis-(2-Chloroethyl)-amine	Nil	28.5 MT/Month	28.5 MT/Month	Collection / Storage / Reuse in to Next Batch in Same Process
29.1	Distillation Residue	From Process	Nil	38.5 MT/Month	38.5 MT/Month	Collection / Storage / Transportation / Sent To Cement Industries for Co-Processing of CHWIF
	Distillation residue generated from the manufacturing of 4-Methoxy Acetophenone, 4-Methyl Acetophenone, Alpha Napthylamine, Phenyl Alpha Naphthylamine (Pana), 3,5-Dichloroaniline					
---	Acetic Anhydride	From manufacturing of 4-Methyl Acetophenone	Nil	109 MT/Month	109 MT/Month	Collection / Storage / Transportation / Reuse in to Next Batch in Same Process

Details of Solid / Hazardous Waste Storage Area:

The Solid / Hazardous Waste Storage Area shall be 5.0 m x 5.5 m x 4.0 m in size, covered with roof from the top, has impervious flooring with leachate collection system and is closed from the four sides by boundary.

ANNEXURE – VII

DETAILS OF STACK AND VENT

The details of stack provided for stand by D. G. Set is as under…

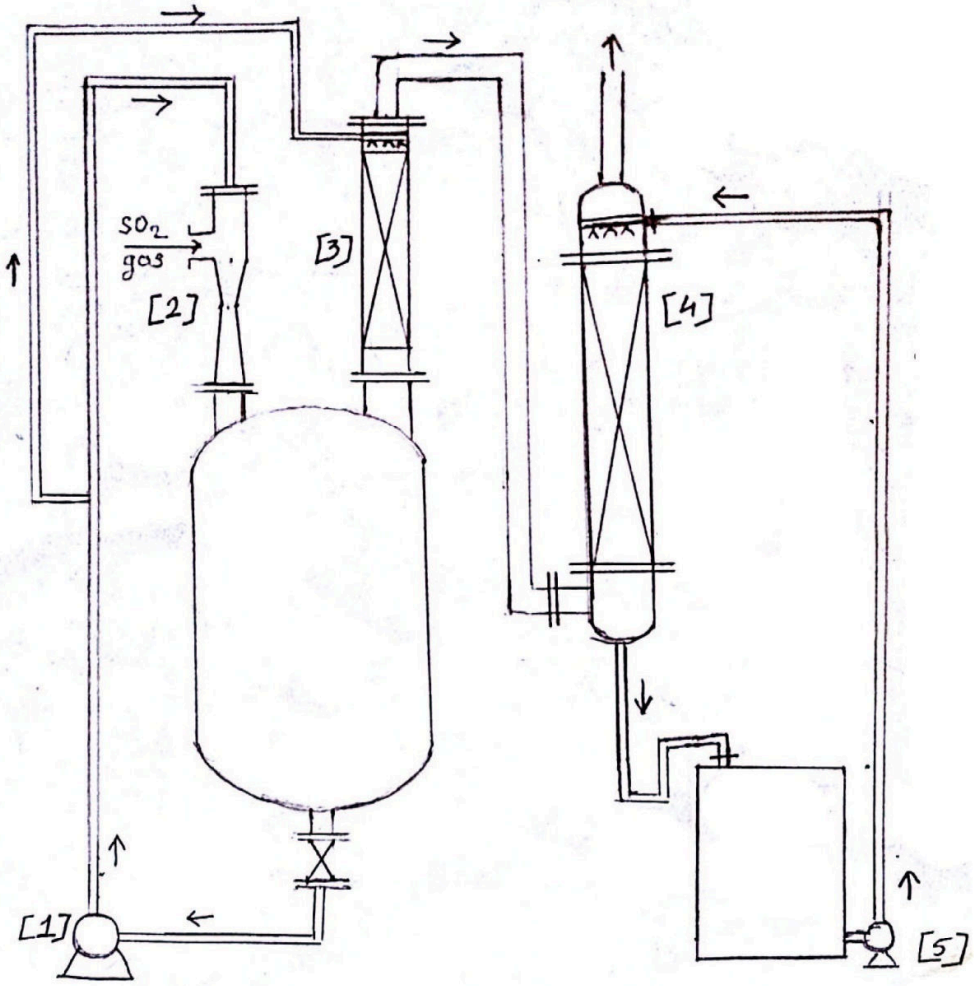
FLUE GAS EMISSION				
Sr. No.	**Stack Attached To**	**Stack Height**	**Fuel Consumption**	**Air Pollution Control System**
A	**EXISTING**			
1.	Thermo pack Unit Cap.: 600 U	Height-12 meter	Natural Gas 82 SCM/Hr.	As natural gas is used as a fuel, adequate stack height is provided.
2.	D. G. Set (Stand By) Capacity: 250 KVA	Height-7 meter	Diesel: 30 Liter/Hr.	As diesel is used as a fuel, adequate stack height is provided.
B	**ADDITIONAL**			
1.	D. G. Set (Stand By) Capacity: 365 KVA *	Height-7 meter	Diesel: 45 Liter/Hr.	As diesel shall be used as a fuel, adequate stack height is provided.
	**** Industry shall remove the existing D. G. Set having capacity of 250 KVA and will install D. G. Set having capacity of 365 KVA.***			
C	**PROPOSED TOTAL**			
1.	Thermo pack Unit Cap.: 600 U	Height-12 meter	Natural Gas: 82 SCM/Hr.	As natural gas is used as a fuel, adequate stack height is provided.
2.	D. G. Set (Stand By) Capacity: 365 KVA	Height-7 meter	Diesel: 45 Liter/Hr.	As diesel shall be used as a fuel, adequate stack height is provided.

PROCESS GAS EMISSION				
Sr. No.	**Vent Attached To**	**Vent Height & Diameter**	**Pollutants**	**Air Pollution Control System**
A	**Existing**			
1.	Acidification Vessels	12 meter	SO_2	Two Stage Scrubber (i.e. Ventury Scrubber & Vertical column packed scrubber) is provided.
2.	Acidification Vessels			
B	**Additional**			
	There shall be no change in existing process gas emission.			

The details of APCM are as under…

- **TECHNICAL SPECIFICATION OF SCRUBBER:**

1st Stage :- **VENTURY SCRUBBER**	
MOC :	SS 316
Scrubbing Capacity :	200 Kg SO_2 Gas/Hrs
Scrubbing Solution :	Mix Acid of H_2SO_4 98% & HNO_3 98%
Jet Capacity :	13 M^3/Hrs 50 MTR Head
2nd Stage :- **VERTICAL SCRUBBER**	
MOCL :	SS 316
Type :	Pack column with Poll Ring
Scrubbing Capacity :	50 Kg SO_2 Gas/Hrs
Scrubbing Solution :	Mix Acid of H_2SO_4 98% & HNO_3 98%
Pump Capacity :	5 M^3/Hrs 50 MTR Head
3nd Stage :- **VERTICAL SCRUBBER**	
MOCL :	SS 316
Type :	Pack column with Poll Ring
Scrubbing Capacity :	50 Kg SO_2 Gas/Hrs
Scrubbing Solution :	Caustic Soda Lye Solution
Pump Capacity :	5 M^3/Hrs 50 MTR Head



1. S.S. 316 Pump @ 20 m^3/hr, 50 mtr Head
2. Ventury Scrubber
3. Vertical Packed column Scrubber [Acidic]
4. Vertical Packed column Scrubber [Alkaline]
5. S.S. 316 Pump @ 5 m^3/hr, 20 mtr Head

ANNEXURE – VIII

DETAILS OF HAZARDOUS CHEMICALS STORAGE & HANDLING

Sr. No.	Raw Materials	Storage Capacity (MT)	Type of Storage & MOC	No. of Vessel	Vessel Capacity (MT)	Type of Hazard
1.	Sulfuric acid (98%)	20	MS Tank	1	20	Corrosive
2.	Nitric Acid	20	AluminiumTank	1	20	Corrosive
3.	NSA (Nitrosyl Sulfuric Acid)	20	MS Tank	2	10	Corrosive
4.	Spent Acid	20	HDPE Tank	1	20	Corrosive
5.	Sodium Thio Sulphate	20	HDPE Tank	1	20	Corrosive
6.	IPA/ODCB/MCB/EDC	20	MS Tank			
7.	Hydrogen	1	Rack	1	20	Explosive
8.	SO_2	9	Tonner	10	900 Kg	Toxic

ANNEXURE-IX

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 proposed project 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 project is not expected to make any significant change in the existing status of the socio - economic environment of this region.

ANNEXURE-X

PROPOSED TORs

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.
- Existing infrastructure facilities
- Water source and utilization including proposed water balance.
- List of Products and their capacity
- List of hazardous chemicals with their toxicity levels.
- Mass balance of each product along with the batch size
- 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.
- Study of Data from secondary sources.
- 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.**

- 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.
- Control of fugitive emissions

5. **Environmental Management Plan**

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

6. **Risk Assessment**

- Details on storage facilities
- Identification of hazards

- Consequence analysis
- Recommendations on the basis of risk assessment done
- Disaster Management Plan.

7. **Information for Control of Fugitive Emissions**
8. **Post Project Monitoring Plan for Air, Water, Soil and Noise.**
9. **Occupational Health and Safety Program for the Project.**