FORM-I

PROPOSED EXPANSION OF SPECIALTY CHEMICALS & AGROCHEMICAL INTERMEDIATES MANUFACTURING PLANT

of

M/s. ANUPAM RASAYAN INDIA LTD. (UNIT- 4)

PLOT NO. 907/3 & 907/4, JHAGADIA INDUSTRIAL ESTATE, JHAGADIA, DIST: BHARUCH – 393 110, GUJARAT

CONSUTANT

NABL Accredited Testing Laboratory
ISO 9001:2008 Certified Company
Aqua-Air Environmental Engineers P. Ltd.
(Pollution Control Consultants & Engineers)
403, Centre Point, Nr. Kadiwala School,
Ring Road, Surat – 395002

APPENDIX I

(See paragraph - 6)

FORM 1

Sr. No.	Item	Details
1.	Name of the project/s	M/s. Anupam Rasayan India Ltd. (Unit-4)
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** The proposed expansion is for addition of new products without increase in tonnage.
4.	New/Expansion/Modernization	Expansion
5.	Existing Capacity/Area etc.	7500 MT/Month & 53997 m^2
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. 907/3 & 907/4
	Village	Jhagadia Industrial Estate
	Tehsil	Jhagadia – 393 110
	District	Bharuch
	State	Gujarat
10.	Nearest railway station/airport along with distance in kms.	Railway Station: Ankleshwar (15 km) Airport: Surat (70.7 km)
11.	Nearest Town, city, District Headquarters along with distance in kms.	Dadheda Village (1-2 km) Bharuch (18 km)
12.	Village Panchayats, Zilla Parishad, Municipal Corporation, local body (complete postal address with telephone nos. to be given)	Dadheda, Taluka: Jhagadia – 393 110, Dist: Bharuch (Gujarat)
13.	Name of the applicant	M/s. Anupam Rasayan India Ltd. (Unit -4)
14.	Registered Address	Plot No. 907/3 & 907/4, Jhagadia Industrial Estate, Jhagadia, Dist: Bharuch – 393 110, Gujarat
15.	Address for correspondence:	
	Name	Mr. Anand Desai
	Designation (Owner/Partner/CEO)	Managing Director
	Address	M/s. Anupam Rasayan India Ltd. (Unit -1) Plot No. 8110, GIDC Estate, Sachin, Dist: Surat, Gujarat
	Pin Code	394230
	E-mail	haresh.bhagat@anupamrasayan.com bhagatharesh@yahoomail.com

	Telephone No.	0261 – 2399343, 2399313
	Fax No.	0261 – 2398996
	Mobile No.	+919227880188
16.	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	NA
17.	Interlinked Projects	NA
18.	Whether separate application of interlinked project has been submitted?	NA
19.	If yes, date of submission	NA
20.	If no, reason	NA
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)	NA
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.	NA

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

(II) Activity

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

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of with approximate quantities frates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase intensity of land use (with respect to local land use plan)	No	Proposed expansion project is within the GIDC Estate, Jhagadia. Expected cost of the project is Rs. 40 Crores. Total Plot Area = 27,178.98 m^2
1.2	Clearance of existing land, vegetation and Buildings?	No	--
1.3	Creation of new land uses?	No	The land is for industrial purpose.
1.4	Pre-construction investigations e.g. bore Houses, soil testing?	No	
1.5	Construction works?	Yes	A new building for production will be constructed as per layout plan attached as **Annexure - II**.
1.6	Demolition works?	No	
1.7	Temporary sites used for construction works or housing of construction workers?	No	
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	Yes	A new building for production will be constructed as per layout plan attached as **Annexure - II**.
1.9	Underground works mining or tunneling?	No	
1.10	Reclamation works?	No	
1.11	Dredging?	No	
1.12	Off shore structures?	No	
1.13	Production and manufacturing processes?	Yes	For detail Please refer **Annexure –III**
1.14	Facilities for storage of goods or materials?	Yes	Specified storage area shall be provided for storage of goods, Raw materials & Finished products.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	For detail please refer **Annexure – IV & V.**
1.16	Facilities for long term housing of operational workers?	No	
1.17	New road, rail or sea traffic during Construction or operation?	No	
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in Traffic movements?	No	

1.20	New or diverted transmission lines or Pipelines?	No	
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	
1.22	Stream crossings?	No	
1.23	Abstraction or transfers of water form ground or surface waters?	No	No ground water shall be used. The treated raw water shall be supplied by GIDC Jhagadia Authority.
1.24	Changes in water bodies or the land surface Affecting drainage or run-off?	No	Site is located in G.I.D.C., Jhagadia. There is no water body within the project premises.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	No	For operation phase, local people will be employed.
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	This is a well developed GIDC Estate and due to project, 100 people shall be employed.
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	GIDC land of 27,178.98 m2.
2.2	Water (expected source & competing users) unit: KLD	Yes	The entire water requirement will be met through GIDC. Water available from GIDC. For detail please refer **Annexure – VI**
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	For detail please refer **Annexure – IV**

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?	No	
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	Yes	Please refer **Annexure – VI**
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	For details Please refer **Annexure – VII**
5.2	Emissions from production processes	Yes	For details Please refer **Annexure – VII**
5.3	Emissions from materials handling storage or transport	Yes	All liquid raw materials are procured in tankers and shall be transferred through a closed circuit pipe lines. Solid raw materials are charged through close pipeline into reactors and the dust collection hopper is connected to a bag filter and ID fan. Also all the hazardous chemicals storage tanks will be provided with flame arrestors & breather valves for safety.
5.4	Emissions from construction activities including plant and equipment	Yes	During construction work, only dust contamination will be there, water sprinklers shall be utilized whenever necessary.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	No	Solvent vapors are cooled in appropriate condensers are passed through trap vessel fitted with condensers. Carbon adsorbers are provided to the vent of the formulation vessels. All the waste are stored in designated place and are transported to TSDF site in approved closed vehicles owned by the TSDF authority.
5.6	Emissions from incineration of waste	No	
5.7	Emissions from burning of waste in open air e.g. slash materials, construction debris)	No	
5.8	Emissions from any other sources	No	

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

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	All machinery / equipment are well maintained, are having proper foundation with anti vibrating pads wherever applicable and noise levels are maintained within permissible limits. DG set are having acoustic enclosure.
6.2	From industrial or similar processes	Yes	
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	No	--
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	Hazardous material are stored in designated storage area with bund walls for tanks. Other materials are stored in bags/drums on pallets with concrete flooring and no spillage is likely to occur. All liquid raw materials are transported through pumps and closed pipelines and no manual handling is involved. For details please refer **Annexure – VIII**
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	Yes	Treated Effluent is reused in process.
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	There is no history of flood in GIDC Jhagadia. The buildings are designed considering seismic zone III. The land is plain terrain – no scope of landslide. This area is having moderate rainfall and there is no history of cloudburst.

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. utilities, 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	

10. Environmental Sensitivity

Sr. No.	Areas	Name/ Identity	Aerial distance (within 5 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	-	The proposed additional new products without increase in tonnage.
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	
4	Inland, coastal, marine or underground waters	-	No costal, marine or underground waters within 5 km from the proposed project except river Narmada flows at 7 km away.
5	State, National boundaries	-	
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	-	Public transportation
7	Defense installations	-	N.A.
8	Densely populated or built-up area	-	Dadheda Village
9	Area occupied by sensitive man-made land uses Hospitals, schools, places of worship, community facilities)	No	
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	No	
11	Areas already subjected to pollution environmental damage. (those where existing legal environmental standards are exceeded) or	-	NA
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence ,landslides, flooding erosion, or extreme or adverse climatic	-	NA

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

Date: April 10, 2017

Place: Jhagadia

For Anupam Rasayan Pvt. Ltd. (Unit-4)

Haresh Bhagat
(Head Regulatory & New Project)

NOTE:

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

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

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

LIST OF ANNEXURES

SR. NO.	NAME OF ANNEXURE
I	List of Products with their Production Capacity
II	Layout Map of the Plant
III	Brief Manufacturing Process Description
IV	Water, Fuel & Energy Requirements
V	Description of Effluent Treatment Plant with flow diagram
VI	Details of Hazardous Waste Generation & Disposal
VII	Details of Air Pollution Control System
VIII	Details of Hazardous Chemicals Storage & Handling
IX	Noise level at Different places within the premises
X	Socio-Economic Impacts
XI	Proposed Terms of Reference for EIA studies

ANNEXURE-I

LIST OF PRODUCTS WITH THEIR PRODUCTION CAPACITY

Sr. No.	Name of Products	CAS No.	Existing Capacity (MT/Month)	Additional Capacity (MT/Month)	Total capacity (MT/Month)
1.1	1,4 Dioxane	123-91-1	1000	0	1000
1.2	2- Methyl 1,3 Dioxolane	497-26-7			
2.0	**CHLORO BENZENE COMPOUNDS**				
2.1	Chloro Benzene (MCB)	108-90-7	2500	0	2500
2.2	Para Di Chloro Benzene (PDCB)	106-46-7			
2.3	Ortho Di Chloro Benzene (ODCB)	95-50-1			
2.4	1- Amino 2,4,6 Trichloro Benzene/ 2,4,6 Tri Chloro Aniline	634-93-5	0		
2.5	2,6 Di Chloro Benzoxazole	3621-82-7	0		
2.6	2,3,4,5,6 Penta Chloro Pyridine	2176-62-7	0		
2.7	3,7 Di Chloro 8- Methyl Quinoline	84086-96-4	0		
3.0	**CHLORO PHENOLCOMPOUNDS**				
3.1	Para Chloro Phenol (PCP)	106-48-9	500	0	500
3.2	Ortho Chloro Phenol (OCP)	95-57-8			
3.3	2,4 Di Chloro Phenol	120-83-2			
3.4	2,6 Di Chloro Phenol	87-65-0			
3.5	4- Bromo 2,5 Di Chloro Phenol	1940-42-7	0		
4.0	**Meta Di Chloro Benzene (MDCB)**	541-73-1	400	0	400
5.0	**NITRO COMPOUNDS**				
5.1	Nitro Benzene	98-95-3	800	0	800
5.2	Meta Di Nitro Benzene (MDNB)	99-65-0			
5.3	2,4 Di Chloro 3,5 Dinitro Benzotrifluoride	29091-09-6	0		
5.4	2,3,4 Tri Chloro Nitro Benzene	17700-09-3	0		
5.5	4- Nitro Ortho Xylene	99-51-4	0		

6.0	**Calcium Chloride**	10043-52-4	1800	0	1800
7.0	**AMINO BENZOIC ACID / ESTERS**				
7.1	3-Amino-4-Chloro Benzoic Acid Methyl Ester	40872-87-5	500	0	500
7.2	3-Amino 4-Methyl Benzoic Acid Isopropyl Ester (AMBI)	21447-47-2			
7.3	3-Amino 4-Methyl Benzoic Acid(2' - Chloro Ethyl Ester) (AMBC)	2458-12-0			
7.4	5-Amino-2-Methyl Benzene Sulphonic Acid Phenyl Ester	1089339-15-0			
7.5	Benzene Sulphonic Acid 3-Amino Phenyl Ester	13653-12-4			
7.6	2-Cyano-3,4,5,6-Tetrachloro Benzoic Acid Methyl Ester	10276-78-2			
7.7	Benzene Sulphonic Acid 2-Methyl-5-Nitrophenyl Ester	85896-03-5			
7.8	4- Methyl Benzoic Acid Methyl Ester	99-75-2			
7.9	3,5 Di Amino 4- Chloro Benzoic Acid Iso Butyl Ester	32961-44-7			
7.10	3,4,5 Tri Methoxy Benzoic Acid	118-41-2	0		
7.11	1- Methyl 3,4,5 Tri Methoxy Benzene / 3,4,5 Tri Methoxy Toluene	6443-69-2	0		
7.12	5- Methyl 2,3 Pyridine Di Carboxyllic Acid	53636-65-0	0		
7.13	3,4,5 Tri Methoxy Benzaldehyde	86-81-7	0		
Total			**7500**	**0**	**7500**

List of By-Products:

Sr. No.	Name of By-Products	CAS No.	Existing Capacity (MT/Month)	Additional Capacity (MT/Month)	Total Capacity (MT/Month)
1.	Dilute Sulphuric Acid	7664-93-9	753.3	0.0	753.3
2.	30 % HCl Solution	7647-01-0	3375.0	0.0	3375.0
3.	35 -40 % Nitrosyl Sulphuric Acid / Sodium Nitrite Solution	7780-78-7	986.0	0.0	986.0
4.	$POCl_3$	10025-87-3	265.0	0.0	255.0
5.	Caustic Soda Solution (30% to 40%)	1310-73-2	470.0	0.0	470.0
6.	Ammonium Chloride	12125-02-9	55.0	0.0	55.0
7.	Ammonium Sulphate Salt	7783-20-2	150.0	0.0	150.0
8.	20-28 % HBr Solution	10035-10-6	0.0	10920.0	10920.0
9.	Sodium Bromide Salt	7647-15-6	0.0	3570.0	3570.0
10.	Sodium Sulphate	7647-15-6	0.0	6093.0	6093.0
11.	8-10 % Sodium Hypochlorite Solution	7681-52-9	00	600.0	600.0
12	2- Methyl 1,3 Dioxolane	497-26-7	0.0	25.0	25.0
13	$MnSO_4$ Salt	7785-87-7	0.0	650.0	650.0
14.	30 -40 % Dilute Nitric Acid	7697-37-2	0.0	20.0	20.0
15.	Sulphur Dichloride	105454-99-0	0.0	1090.0	1090.0
Total			**6054.3**	**11209.0**	**17253.3**

LIST OF RAW MATERIALS: UNIT - 4

SR. NO.	PRODUCT NAME	CAPACITY (MT/MT)
Group – 1		
1,4 Dioxane		
1	DEG/PEG	1.34
2	Catalyst 1	0.001
3	Caustic	0.125
4	Catalyst 2	0.05
Group – 2 Chloro Benzene Compound		
Chloro Benzene		
1	Benzene	2.08
2	Anhydrous Ferric Chloride	0.01
3	Chlorine Gas	0.640
Ortho Di Chloro Benzene & Para Di Chloro Benzene		
1.	Chloro Benzene	2.3
2.	Anhydrous Ferric Chloride	0.01
3.	Chlorine Gas	0.510
4.	10% Soda Ash Solution	0.1
1- Amino 2,4,6 Trichloro Benzene/ 2,4,6 Tri Chloro Aniline		
1	Aniline	0.575
2	EDC	0.050
3	Chlorine	1.450
4	Caustic	1.050
2,6-Dichloro Benzoxazole		
1	2-Mercapto-6-Chlorobenzoxazole	1.250
2	EDC	0.050
3	Chlorine	0.460
1-Methyl 3,4,5 Tri Methoxy Benzene / 3,4,5-Tri Methoxy Toluene		
1	Para Cresol	0.630
2	EDC	0.040

3	Bromine	1.870
4	Sodium Methoxide	0.625
5	Methanol	0.050
6	Di Methyl Sulphate	1.430
7	Caustic Lye	0.465
2,3,4,5,6- Penta Chloro Pyridine		
1	Pyridine	0.350
2	Chlorine Gas	1.720
3	Catalyst - FeCl3	0.025
4	Dilute NaOH solution	1.780
3,7 Di Chloro 8- Methyl Quinoline		
1	7-Chloro 8-Methyl Quinoline	0.800
2	EDC	0.050
3	Chlorine Gas	0.710
4	Dilute Caustic for NaOCl	0.822
Group – 3 Chloro Phenol Compound		
Ortho Chloro Phenol & Para Chloro Phenol		
1.	Phenol	2.2
2.	Anhydrous Ferric Chloride	0.01
3.	Chlorine Gas	0.560
4.	10% Soda Ash Solution	0.01
2,4 Di Chloro Phenol		
1.	Para Chloro Phenol	2.25
2.	Anhydrous Ferric Chloride	0.012
3.	Chlorine Gas	0.440
4.	10% Soda Ash Solution	0.2
2,6 Di Chloro Phenol		
1.	Ortho Chloro Phenol	2.25
2.	Anhydrous Ferric Chloride	0.012
3.	Chlorine Gas	0.440
4.	10% Soda Ash Solution	0.2

4- Bromo 2,5 Di Chloro Phenol		
1	2,5-DCP	0.702
2	Bromine Liquid	0.690
3	EDC	0.030
Group – 4 MDCB		
1,3 Di Chloro Benzene		
1.	1,3 Di Nitro Benzene	2.33
2.	Catalyst	0.01
3.	Chlorine Gas	1.0
4.	Sulphuric Acid 98 %	1.35
5.	10% Soda Ash Solution	0.2
Group – 5 Nitro Compound		
Nitro Benzene		
1.	Benzene	0.665
2.	Nitric Acid	0.540
3.	Sulphuric Acid	0.300
4.	Solvent - EDC	1.5
1,3 Di Nitro Benzene		
1.	Nitro Benzene	0.755
2.	Nitric Acid	0.385
3.	Sulphuric Acid	0.260
4.	Solvent - EDC	1.5
2, 4-Dicholo -3, 5-Dinitro Benzo Tri Fluoride		
1.	2,4-DCBTF	0.740
2.	H2SO4(98%)	0.372
3.	HNO3(98%)	0.450
4.	Solvent - EDC	0.030
5.	Sodium Bi Carbonate soln. (NaHCO3)	0.010
2, 3, 4-Tri Chloro Nitro Benzene		
1	1,2,3-TCB	0.778
2	H2SO4(98%)	0.472

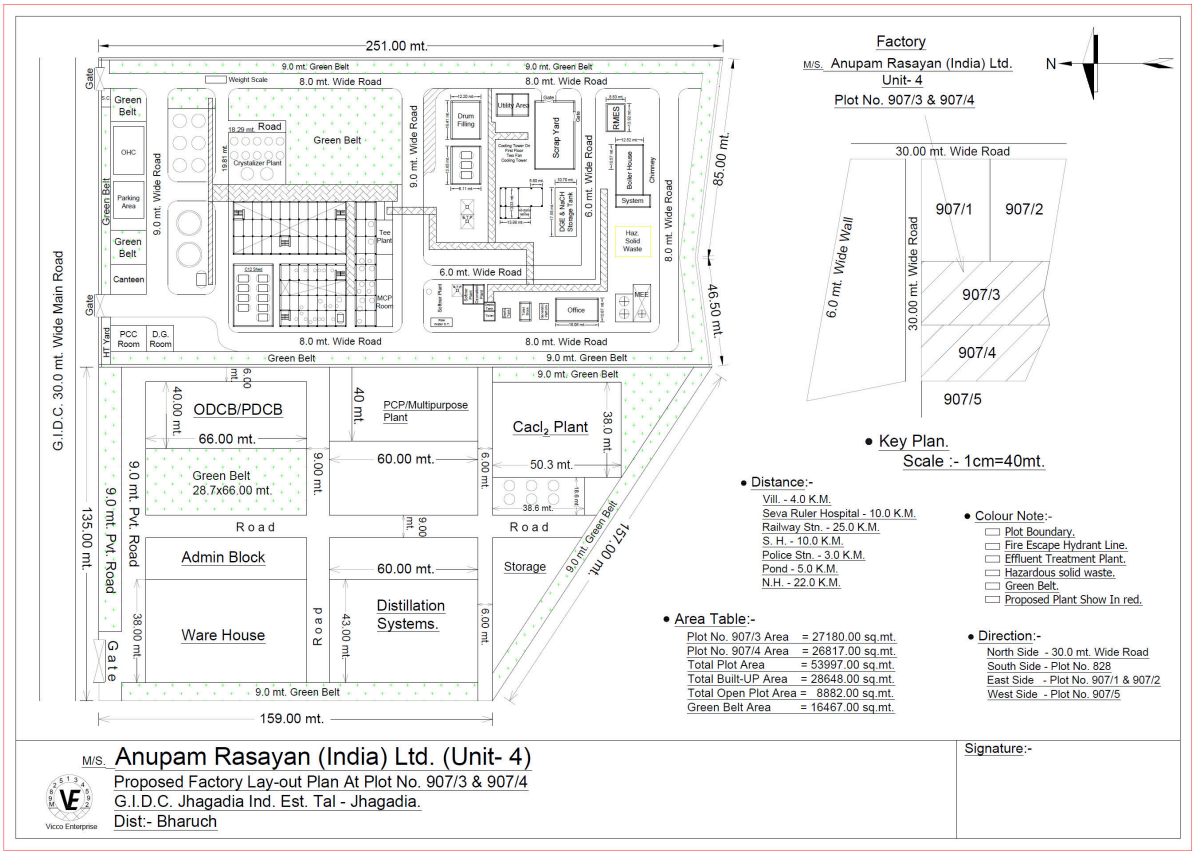
3	HNO3(98%)	0.275
4	NaHCO3	0.020
4-Nitro/3-Nitro-O-Xylene		
1	Ortho Xylene	0.730
2	Nitric Acid (98%)	0.440
3	Sulfuric Acid (98%)	0.270
4	Solvent EDC	0.040
Group – 6 Calcium Chloride		
Calcium Chloride		
1.	Lime Stone/ $CaCO_3$	0.900
2.	HCl (30%)	2.2
Group – 7 Amino Benzoic Esters		
3- Amino -4- Methyl Benzoic Acid Methyl Ester		
1.	3- Nitro -4- Methyl Benzoic Acid	1.13
2.	Methanol	0.202
3.	Sulfuric Acid	0.352
4.	Iron Powder	1.092
5.	Acetic Acid	0.028
6.	Sodium Carbonate	0.022
7.	Solvent - ODCB	1.4
3- Amino -4- Methyl Benzoic Acid Iso Propyl Ester		
1.	3- Nitro -4- Methyl Benzoic Acid	0.970
2.	Iso Propyl Alcohol	0.322
3.	Sulfuric Acid	0.340
4.	Iron Powder	0.940
5.	Acetic Acid	0.028
6.	Sodium Carbonate	0.022
7.	Solvent - ODCB	1.6
3- Amino -4- Methyl Benzoic Acid (2'- Chloro Ethyl) Ester		
1.	3- Nitro -4- Methyl Benzoic Acid	0.930
2.	2- Chloro Ethanol	0.6415

3.	Sulfuric Acid	0.400
4.	Iron Powder	0.900
5.	Acetic Acid	0.028
6.	Sodium Carbonate	0.022
7.	Solvent - ODCB	1.8
5 - Amino -2- Methyl Benzene Sulphonic Acid Phenyl Ester		
1.	2- Methyl -5- Nitro Benzene Sulphonyl Chloride	0.975
2.	Phenol	0.390
3.	Sodium Hydroxide	0.165
4.	Iron Powder	0.525
5.	Acetic Acid	0.020
6.	Sodium Carbonate	0.015
7.	Solvent - ODCB	1.4
Benzene Sulphonic Acid -3- Amino Phenyl Ester		
1.	3- Nitro Phenol	0.615
2.	Benzene Sulfonic Acid	0.777
3.	Sodium Hydroxide	0.756
4.	Iron Powder	0.555
5.	Acetic Acid	0.020
6.	Sodium Carbonate	0.014
7.	Solvent - ODCB	1.4
2- Cyano – 3,4,5,6 -Tetra Chloro Benzoic Acid Methyl Ester		
1.	Tetra Chloro Phthalic Anhydride	0.996
2.	Chlorine gas	0.250
3.	Phosphorus Tri Chloride	0.478
4.	Solvent - ODCB	1.4
5.	Ammonia	0.122
6.	Dimethyl Sulphate	0.890
Benzene Sulphonic Acid 2- methyl -5- Nitro Phenyl Ester		
1.	2- Methyl -5- Nitro Phenol	0.6
2.	Benzene Sulphonyl Chloride	0.690

3.	Sodium Hydroxide	0.157
4.	Solvent - ODCB	1.6
5.	Iron Powder	0.494
6.	Acetic Acid	0.02
7.	Sodium Carbonate	0.015
4- Amino Benzoic Acid Methyl Ester		
1.	4 - Nitro Benzoic Acid	1.106
2.	Methanol	0.212
3.	Sulfuric Acid	0.372
4.	Iron Powder	1.114
5.	Acetic Acid	0.03
6.	Sodium Carbonate	0.023
7.	Solvent - ODCB	1.4
3, 5 - Di Amino 4 - Chloro Benzoic Acid Iso Butyl Ester		
1.	3, 5 – Di Nitro 4 – Chloro Benzoic Acid	1.064
2.	Iso Butyl Alcohol	0.310
3.	Sulfuric Acid	0.176
4.	Iron Powder	0.700
5.	Acetic Acid	0.02
6.	Sodium Carbonate	0.014
7.	Solvent - ODCB	1.4
3,4,5-Trimethoxy Benzoic Acid		
1	Para Cresol	0.715
2	Solvent- EDC	0.040
3	Bromine (Liquid)	2.120
4	Sodium Methoxide (CH3ONa)	0.700
5	Solvent - Methanol	0.050
6	Di Methyl Sulphate (DMS)	1.620
7	Caustic Lye (NaOH) (50%)	1.100
8	Catalyst	0.048
9	DMF	0.173

10	Solvent - Toluene	0.050
11	MNO2	0.610
12	H2SO4 (98%)	0.810
13	Nascent Oxygen	0.550
5-Methyl 2,3-Pyridinedicarboxylic Acid		
1	Methylacroline	1.375
2	Methyl Methoxy Acetate (MMA)	0.208
3	Di Ethyl Oxalate (DEO)	3.147
4	Solvent - Toluene	0.120
5	Catalyst	0.048
6	Acetic Acid	2.977
7	H2SO4	1.786
8	Sodium Methoxide (NaOCH3)	1.184
9	NaCl Solution	0.243
3,4,5-Tri Methoxy Benzaldehyde		
1	Para Cresol	0.693
2	Solvent- EDC	0.040
3	Bromine (Liquid)	2.060
4	Sodium Methoxide (CH3ONa)	0.680
5	Solvent - Methanol	0.050
6	Di Methyl Sulphate (DMS)	1.572
7	Caustic Lye (NaOH) (50%)	1.070
8	Catalyst	0.048
9	DMF	0.173
10	Solvent - Toluene	0.050
11	MNO2	0.600
12	H2SO4 (98%)	0.800

ANNEXURE-II
LAYOUT MAP OF THE PLANT



ANNEXURE-III

BRIEF MANUFACTURING PROCESS DESCRIPTION

EXISTING:

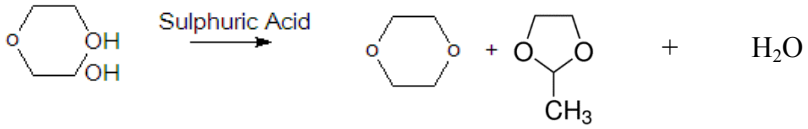
1. 1, 4 Dioxane
Manufacturing Process:

1,4 Dioxane is produced by catalytic Cyclo dehydration of Diethylene Glycol/Poly Ethylene Glycol is in presence of catalyst to get mixture water and product.

This mixture is treated with caustic for demoisturization resulting to moisture free 1,4 Dioxane. Caustic layer of 30 to 40 % is separated out during this treatment. Finally, crude 1, 4 Dioxane is distilled out to get pure product.

During the reaction the second product 2-Methyl-1,3-Dioxolane is also generated which is separated during the distillation and get in pure form and sold as product.

Chemical Reaction:



DEG	1,4 Dioxane	2-Methyl-1,3 -Dioxalane	Water
M.W. 106	M.W. 88	M.W. 88	M.W. 18

Mass Balance:

Sr. No.	Input	Quantity in Kg	Output	Quantity in Kg
1	DEG/PEG	1340	1,4 Dioxane	1000
2	Catalyst 1	10	2-Methyl-1,3-Dioxolane	25
3	Caustic	125	Distillation Residue	10
4	Catalyst 2	5	Caustic (30% - 40 %)	445
Total		**1480**	**Total**	**1480**

2.0 Chloro Benzene Compound:

2.1 Mono Chloro Benzene

Manufacturing Process:

Benzene undergoes chlorination reaction by Chlorine gas in presence of Catalyst Anhydrous Ferric Chloride gives the Product Chloro Benzene.

Excess Benzene used for the dilution in Reaction Mass acts as Solvent, which is recovered after completion of reaction.

Hydrochloric Acid gas which generated during the chlorination reaction is scrubbed to Water to get 30 % HCl solution as Bi Product.

Chemical Reactions

$C_6H_6 + Cl_2 \rightarrow C_6H_5Cl + HCl$

78 71 112.5 36.5

Mass Balance:

Chloro Benzene					
Input				Output	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Benzene	2080		Chloro Benzene	1000
2	Anhydrous Ferric Chloride	10		Recovered Benzene	1350
3	Chlorine Gas	640		Benzene Loss	36
4	Water for 30 % HCl Formation	756		30% Hydrochloric Acid	1080
5	Water for Washings	250		ETP Water	258
6				Distillation Residue	12
	Total	**3736**		**Total**	**3736**

2.2 Ortho Di Chloro Benzene (ODCB)/Para Di Chloro Benzene (PDCB)

Process Description:

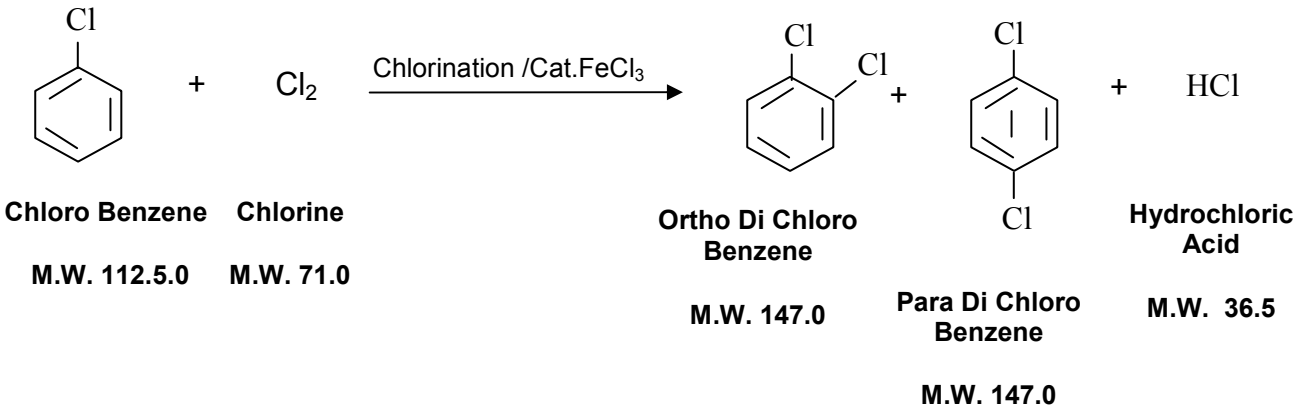
Chloro Benzene undergoes chlorination reaction by Chlorine gas in presence of Catalyst Anhydrous Ferric Chloride gives the mixture of Ortho Di Chloro Benzene as well as Para Dichloro Benzene.

Mixture of these Di Chloro Benzene is taken for fractional Distillation to get as Pure Products.

Excess Chloro Benzene used for dilution in Reaction Mass acts as solvent, which is recovered by distillation.

Hydrochloric Acid gas which generates during the chlorination reaction is scrubbed to Water to get 30 % HCl solution as Bi Product.

Chemical Reactions



Chloro Benzene **M.W. 112.5.0**

Chlorine **M.W. 71.0**

Ortho Di Chloro Benzene **M.W. 147.0**

Para Di Chloro Benzene **M.W. 147.0**

Hydrochloric Acid **M.W. 36.5**

Material Balance / Mass Balance (All Quantities are in Kg)

Ortho Di Chloro Benzene & Para Di Chloro Benzene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Chloro Benzene	2300		Ortho Di Chloro Benzene	450
2	Anhydrous Ferric Chloride	10		Para Di Chloro Benzene	550
3	Chlorine Gas	510		Recovered Chloro Benzene	1500
4	Water for 30 % HCl Formation	580		Chloro Benzene Loss	35
5	Water for Washings	100		30% Hydrochloric Acid	830
6	10% Soda Ash Solution	100		ETP Water	225
				Distillation Residue	10
	Total	**3600**		**Total**	**3600**

2.3 1- Amino 2,4,6 Tri Chloro Benzene / 2, 4, 6-Tri Chloro Aniline (Proposed)

Brief Manufacturing Process:

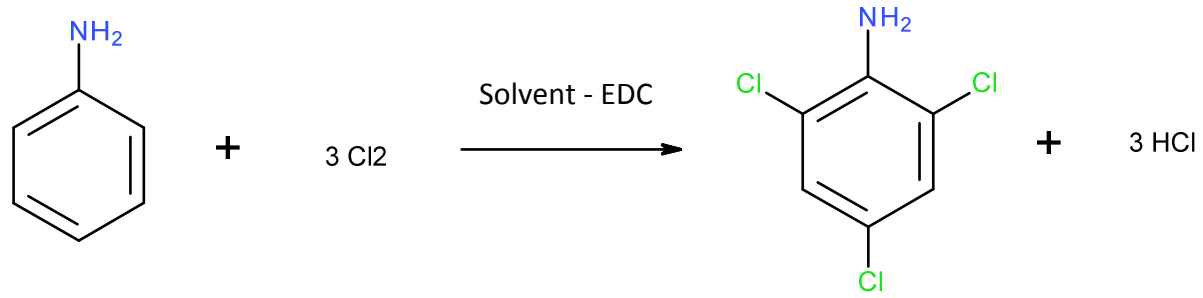
Step-I

Aniline Oil is undergoes chlorination reaction in presence of solvent EDC to form crude product as 1-Amino 2,4,6 Trichloro Benzene. During reaction HCl gas generated which is scrubbed to water for formation of 30% HCl solution.

Step-II

Crude mass is further taken for solvent recovery and finally crude product is distilled out under vaccum to get the final product as 1-Amino 2,4,6 Tri Chloro Benzene.

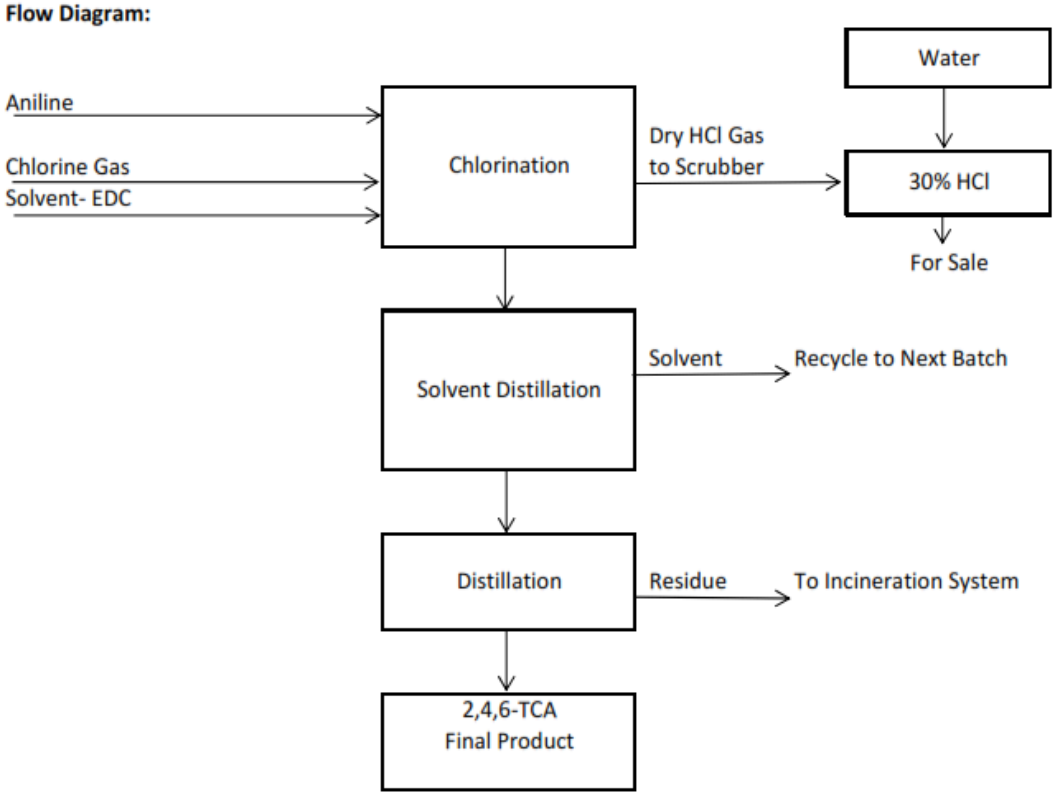
Chemical Reaction:



Aniline	Chlorine	1-Amino 2,4,6 Tri Chloro Benzene	
M.W 93.0	M. W 3 × 71	M. W 180.5	M. W 3× 36.5

Product : 2,4,6-Trcihloroaniline (2,4,6-TCA)

Flow Diagram:



Mass Balance / Material Balance:

2,4,6-Tri Chloro Aniline / 1- Amino 2,4,6 Tri Chloro Benzene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Aniline	575		1-Amino 2,4,6 Tri Chloro Benzene	1010
2	Solvent- EDC	4000		Recovered Solvent-EDC	3900
3	Chlorine Gas	1450		Solvent Loss -EDC	50
4	Water for HCl formation	1743		30 % HCl Solution	2510
5	15% Dil Caustic Solution	1050		8-10 % NaOCl solution	1250
6				Residue	98
	Total	**8818**		**Total**	**8818**

2.4 2,6-Di Chloro Benzoxazole (Proposed)

Brief Manufacturing Process:

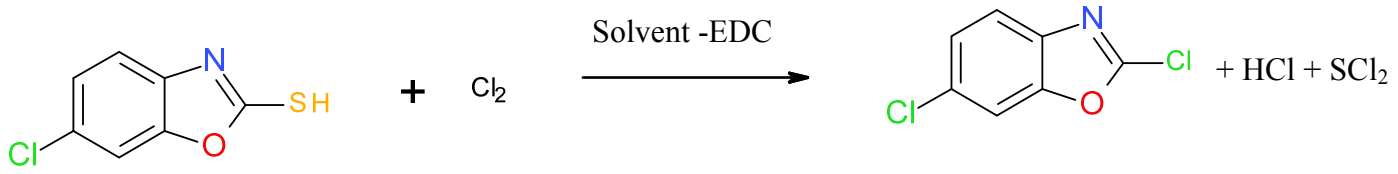
Step-I

2- Mercapto 6- Chloro Benzoxazole is undergoes to chlorination reaction by chlorine gas in presence of solvent- EDC to give crude product. During reaction HCl is generated which is scrubbed to water to form 30% HCl solution.

Step-II

Solvent is recovered by distillation and crude mass is subjected to distillation under vaccum to get the final product 2,6 Di Chloro Benzoxazole.

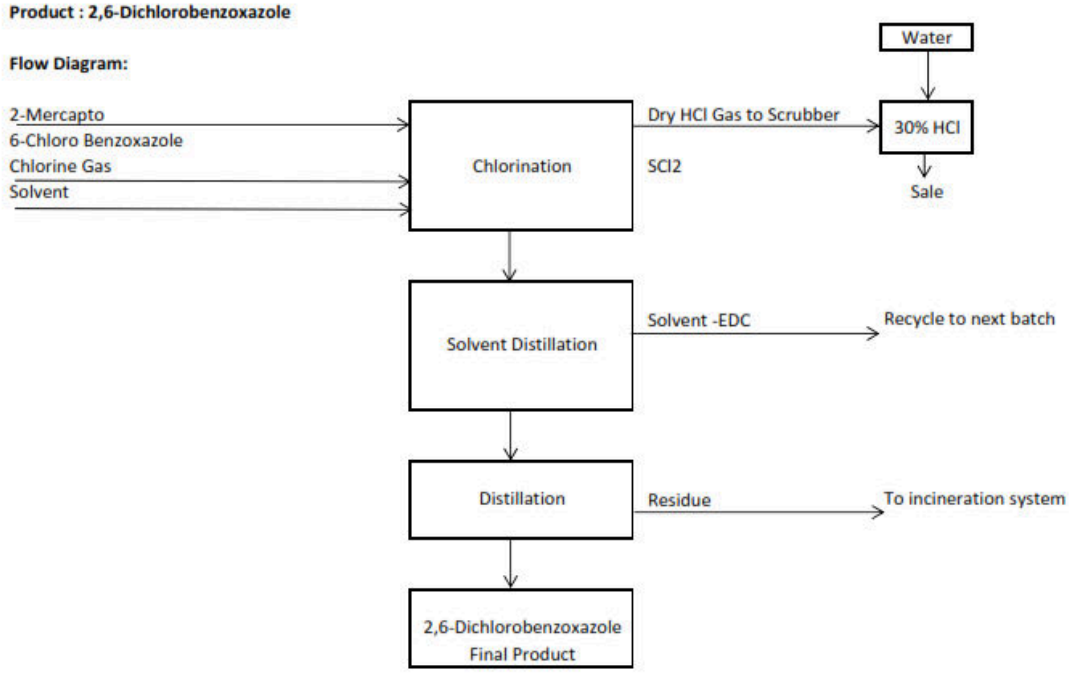
Chemical Reaction:



2- Mercapto 6- Chloro Benzoxazole	Chlorine	2,6 Di Chloro Benzoxazole	36.5	103
M.W 185.5	M.W 71	M.W 188		

Product : 2,6-Dichlorobenzoxazole

Flow Diagram:



Mass Balance:

2,6-Dichloro Benzoxazole					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	2-Mercapto-6-Chlorobenzoxazole	1250		2,6-Dichloro Benzoxazole	1010
2	Solvent -EDC	1500		Recovered Solvent- EDC	1450
3	Chlorine Gas	460		Solvent loss	50
4	Water for 30% HCl formation	610		30% HCl Gas solution	850
5				Sulpher Dichloride (SCl_2)	436
6				Residue	24
	Total	**3820**		**Total**	**3820**

2.5 1-Methyl 3,4,5 Tri Methoxy Benzene / 3,4,5-Tri Methoxy Toluene

Brief Manufacturing Process:

Step-I

Para Cresol is first undergoes bromination reaction by liquid bromine to give 2,6 Di Bromo Para Cresol. During reaction HBr gas is generated which is scrubbed to water to get dilute HBr solution as saleable Bye-product.

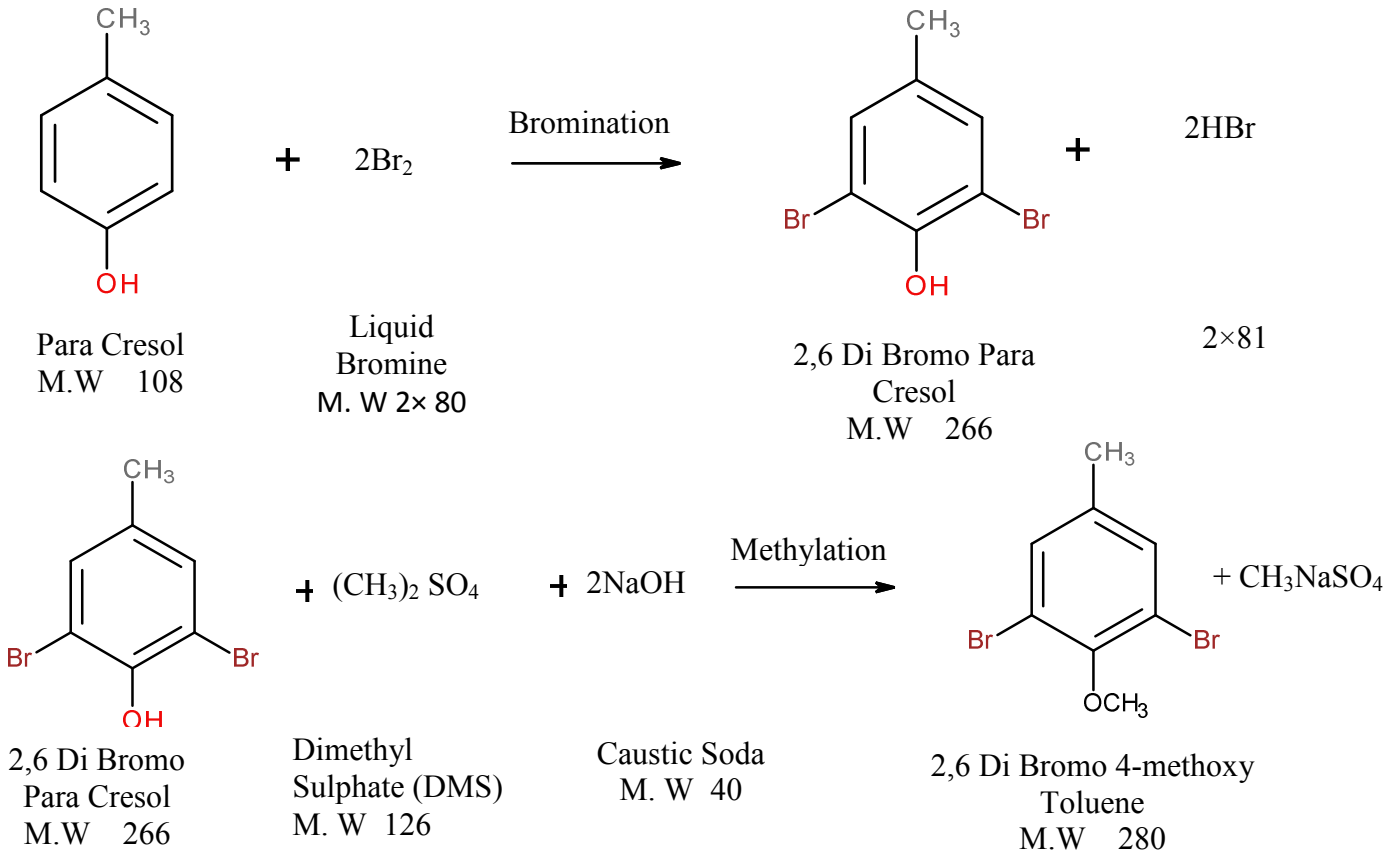
Step-II

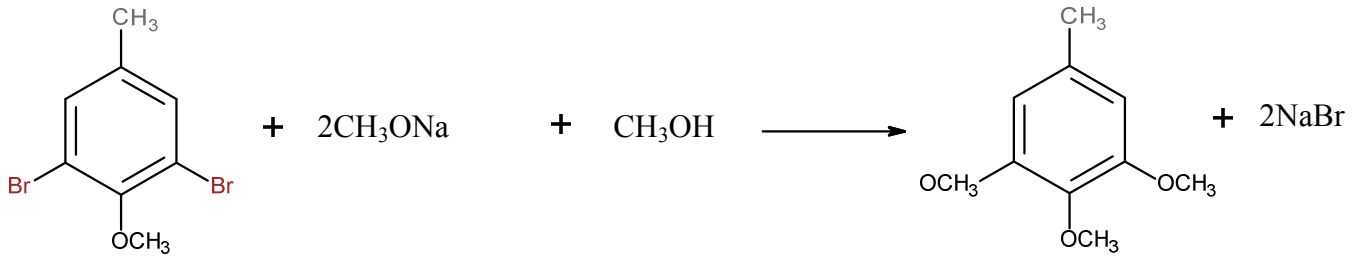
2,6 Di Bromo Para Cresol is then undergoes methylation by Dimethyl Sulphate (DMS) in presence of Caustic Soda lye to get an intermediate product as 2,6 Dibromo 4-methoxy Toluene.

Step-III

2, 6 Di Bromo 4-methoxy Toluene further reacted with Sodium Methoxide in presence of Methanol- Solvent to give the final product as 3,4,5-Tri Methoxy Toluene.

Chemical Reaction:





2,6 Di Bromo 4-methoxy Toluene M.W 280

Sodium Methoxide M.W 108

Methanol M.W 32

3,4,5-Tri Methoxy Toluene M.W 182

Sodium Bromide M.W 2×103

Mass Balance / Material Balance:

1-Methyl 3,4,5 Tri Methoxy Benzene / 3,4,5-Tri Methoxy Toluene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Para Cresol	630		3,4,5-Tri Methoxy Toluene	1000
2	Solvent- EDC	1100		Recovered Solvent	1060
3	Bromine (Br_2)	1870		Solvent Loss (EDC)	40
4	Sodium Methoxide (CH_3ONa)	625		20- 28% Hydro bromic Acid	3375
5	Solvent - Methanol	1200		Recovered Solvent - Methanol	1150
6	Di Methyl Sulphate (DMS)	1430		Solvent Loss (Methanol)	50
7	Caustic Lye (NaOH) (50%)	465		Sodium Bromine Salt	1170
8	Water	3550		Sodium Sulphate Salt	1540
9				Aqueous Layer to ETP	1470
10				Distillation Residue	15
	Total	**10870**		**Total**	**10870**

2.6 2,3,4,5,6- Penta Chloro Pyridine (Proposed)

Brief Manufacturing Process:

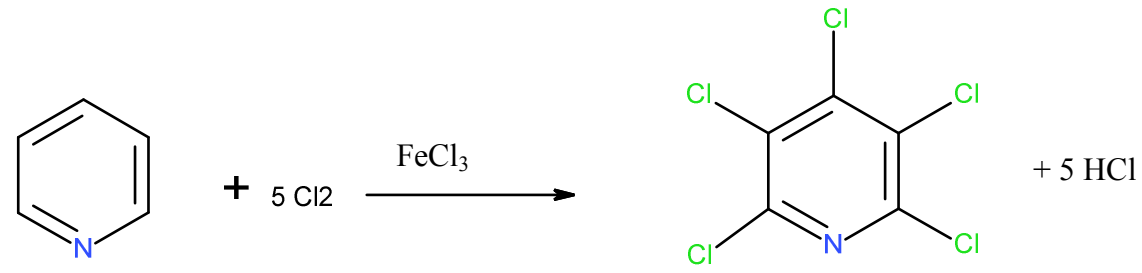
Step-I:

Pyridine is undergoes Chlorination reaction be Chlorine gas in presence of catalyst Anhydrous Ferric to get crude product 2,3,4,5,6- Penta Chloro Pyridine. During the reaction HCl gas is enhanced which is scrubbed to water to get 30% HCl solution as saleable product. Excess Chlorine gas is scrubbed to dilute Caustic Soda solution to get 8-10% Sodium Hypochlorite solution.

Step-II:

Crude reaction mass is washed with plane water to remove dykes of Acidic matter & finally distilled out under vaccum to get the final product as 2,3,4,5,6- Penta Chloro Pyridine.

Chemical Reaction:



Pyridine
M.W 79

Chlorine
M.W 5× 71

2,3,4,5,6- Penta Chloro Pyridine
M.W 251

Hydrochloric Acid
M.W 5× 36.5

Mass Balance / Material Balance:

2,3,4,5,6 – Penta Chloro Pyridine					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Pyridine	350		2,3,4,5,6 – Penta Chloro Pyridine	1010
2	Chlorine Gas	1720		30% HCl solution	2757
3	Catalyst - FeCl3	25		Residue	25
4	Water for HCl solution formation	1891		Aqueous Layer to ETP	394
5	Water for washing	350		8-10% Sodium Hypochlorite	1930
6	Dilute NaOH solution	1780			
	Total	**6116**		**Total**	**6116**

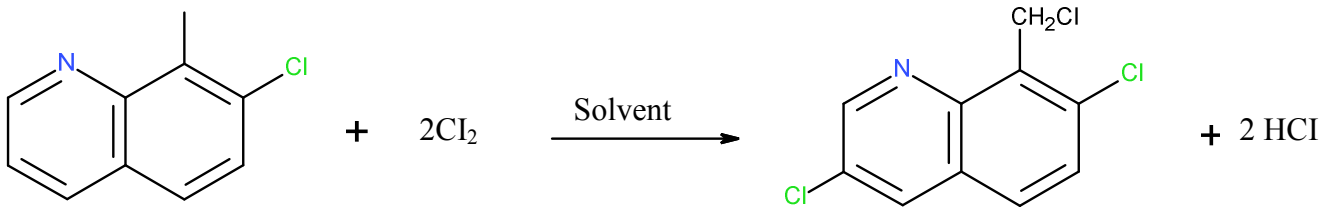
2.8 3,7- Dichloro 8-Methyl Quinoline (Proposed)

Brief Manufacturing Process:

Step-I

7-Chloro 8-Methyl Quinoline undergoes chlorination by Chlorine gas to give the final product as 3,7- Dichloro 8-Methyl Quinoline.

Chemical Reaction:



7-Chloro 8-Methyl Quinoline
M. W. -177

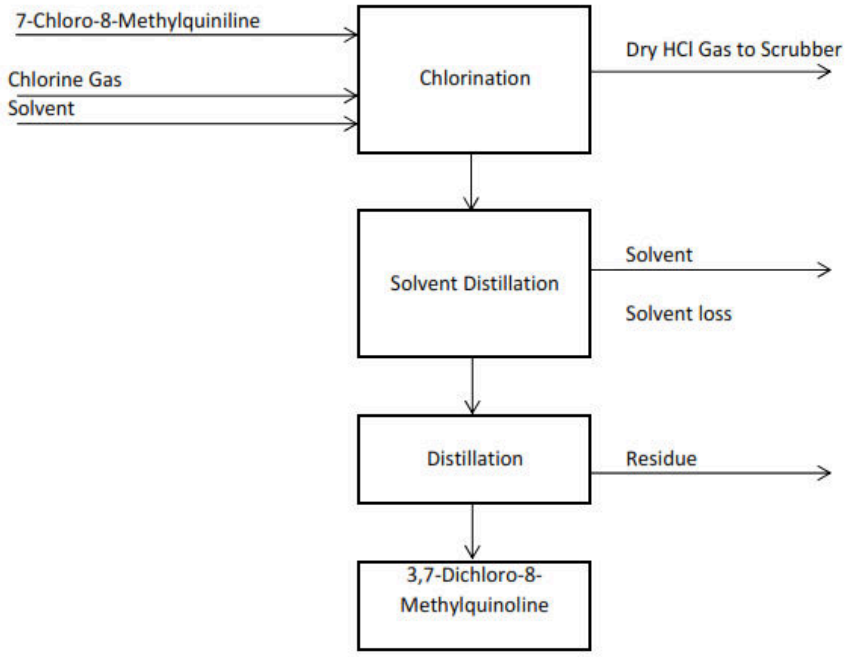
Chlorine
M. W.- 2× 71

3,7- Dichloro 8-Methyl Quinoline
M. W-246

M. W- 2×36.5

Product : 3,7-Dichloro-8-Methylquinoline

Flow Diagram:



Mass Balance / Material Balance:

3,7- Dichloro 8-Methyl Quinoline					
Input				Output	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	7-Chloro 8-Methyl Quinoline	800		3,7- Dichloro 8-Methyl Quinoline	1020
2	Solvent-EDC	4000		Recovered Solvent	3950
3	Chlorine Gas	710		Solvent loss	50
4	Water for 30% HCl Solution	870		30% HCl solution	1250
5	Dilute Caustic for NaoCl	822		8-10% NaOCl Solution	900
6				Residue	32
	Total	**7202**		**Total**	**7202**

3.0 Chloro Phenol Compound:

3.1 Ortho Chloro Phenol & Para Chloro Phenol

Process Description

Phenol (Hydroxy Benzene) undergoes chlorination reaction by Chlorine gas in presence of Catalyst as Anhydrous Ferric Chloride gives the mixture of Ortho Di Chloro Phenol as well as Para Dichloro Phenol.

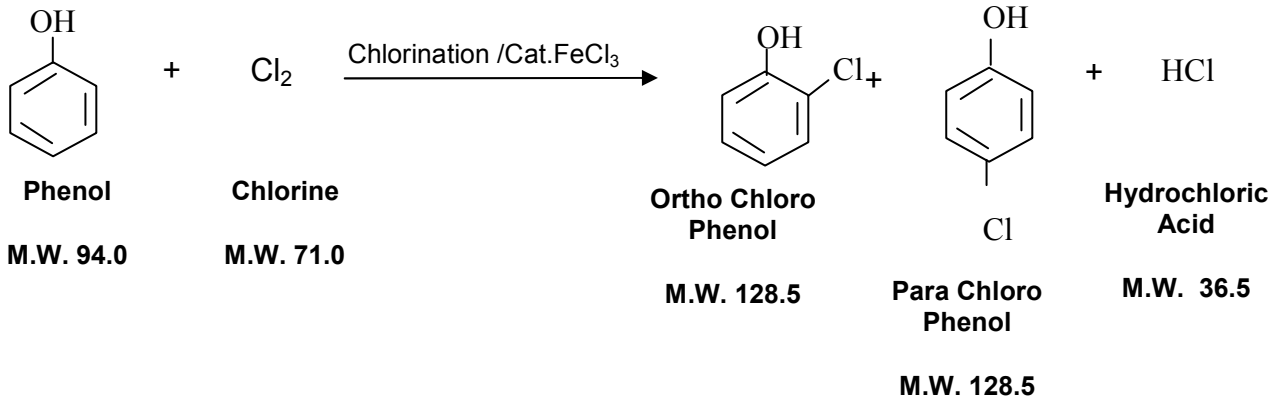
Mixture of these Chloro Phenol is taken for fractional Distillation to get as Pure Products.

Excess

Phenol used for dilution in Reaction Mass acts as solvent, which is recovered by distillation.

Hydrochloric Acid gas which generates during the chlorination reaction is scrubbed to Water to get 30 % HCl solution as Bi Product.

Chemical Reactions



Phenol

M.W. 94.0

Chlorine

M.W. 71.0

Ortho Chloro Phenol

M.W. 128.5

Para Chloro Phenol

M.W. 128.5

Hydrochloric Acid

M.W. 36.5

Material Balance / Mass Balance (All Quantities are in Kg)

Ortho Chloro Phenol & Para Chloro Phenol					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Phenol	2200		Ortho Chloro Phenol	540
2	Anhydrous Ferric Chloride	10		Para Chloro Phenol	460
3	Chlorine Gas	560		Recovered Phenol	1444
4	Water for 30 % HCl Formation	660		Phenol Loss	24
5	10% Soda Ash Solution	200		30% Hydrochloric Acid	940
				ETP Water	210
				Distillation Residue	12
	Total	**3630**		**Total**	**3630**

3.2 2, 4 Di Chloro Phenol

Process Description

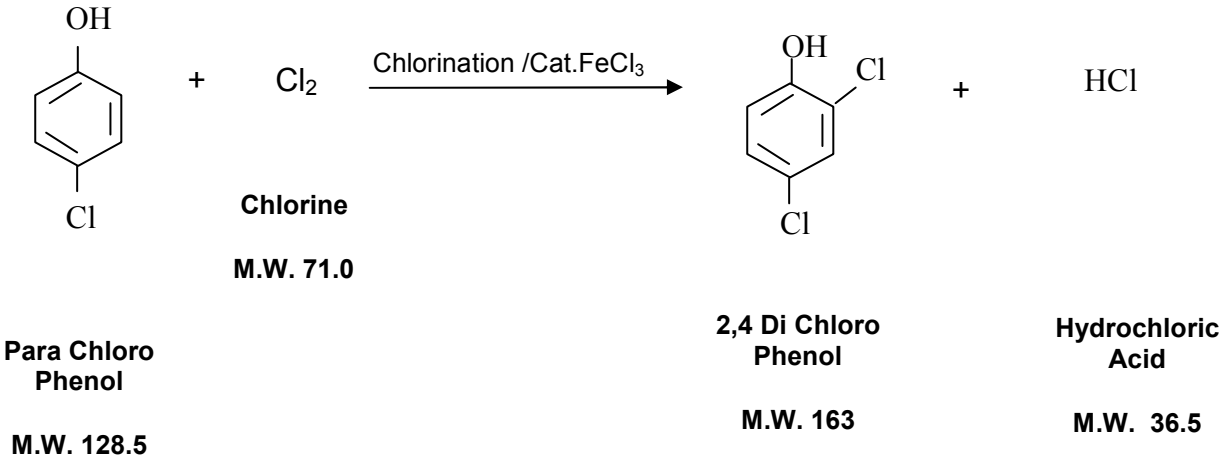
Para Chloro Phenol (4- Chloro Hydroxy Benzene) undergoes chlorination reaction by Chlorine gas in presence of Catalyst as Anhydrous Ferric Chloride gives 2,4 Di Chloro Phenol.

Crude 2,4 Di Chloro Phenol is taken for Distillation to get as Pure Products.

Excess quantity of Para Chloro Phenol is used in Reaction Mass which serves as Solvent, which is recovered by distillation after completion of reaction.

During the chlorination, Hydrochloric Acid gas is generated which is scrubbed to water to get 30 % HCl solution as Bi Product.

Chemical Reactions



Chlorine

M.W. 71.0

Para Chloro Phenol

M.W. 128.5

2,4 Di Chloro Phenol

M.W. 163

Hydrochloric Acid

M.W. 36.5

Material Balance / Mass Balance (All Quantities are in Kg)

2,4 Di Chloro Phenol					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Para Chloro Phenol	2250		2,4 Di Chloro Phenol	1000
2	Anhydrous Ferric Chloride	12		Recovered Para Chloro Phenol	1440
3	Chlorine Gas	440		Para Chloro Phenol Loss	26
4	Water for 30% HCl Formation	520		30% Hydrochloric Acid	735
5	10% Soda Ash Solution	200		ETP Water	208
				Distillation Residue	13
	Total	**3422**		**Total**	**3422**

3.3 2,6 Di Chloro Phenol

Process Description

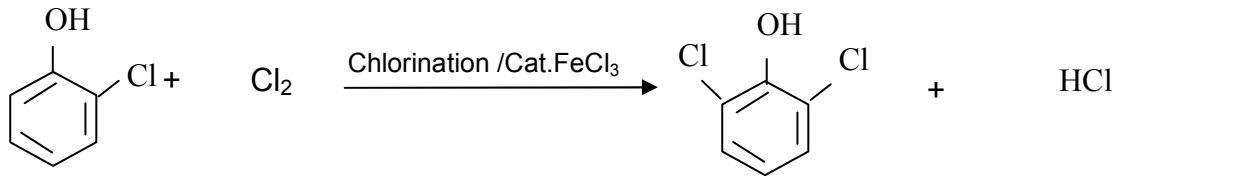
Ortho Chloro Phenol (2- Chloro Hydroxy Benzene) undergoes chlorination reaction by Chlorine gas in presence of Catalyst as Anhydrous Ferric Chloride gives 2,6 Di Chloro Phenol.

2,6 DI Chloro Phenol is taken Distillation to get as Pure Products.

Excess quantity of Ortho Chloro Phenol used for Reaction which serves as Solvent, which is recovered by distillation once the reaction is completed.

During chlorination reaction, Hydrochloric Acid gas is generated which is scrubbed to water to get 30 % HCl solution as Bi Product.

Chemical Reactions



Ortho Chloro Phenol

M.W. 128.5

Chlorine

M.W. 71.0

2, 6 Di Chloro Phenol

M.W. 163

Hydrochloric Acid

M.W. 36.5

Material Balance / Mass Balance (All Quantities are in Kg)

2,6 Di Chloro Phenol					
Input				Output	
Sr.No	Raw Materials / Items	Kg/Batch		Product/By Products	Qty/Batch
1	Ortho Chloro Phenol	2250		2,6 Di Chloro Phenol	1000
2	Anhydrous Ferric Chloride	12		Recovered Ortho Chloro Phenol	1440
3	Chlorine Gas	440		Chloro Phenol Loss	26
4	Water for 30 % HCl Formation	520		30% Hydrochloric Acid	735
5	10% Soda Ash Solution	200		ETP Water	210
				Distillation Residue	10
	Total	**3422**		**Total**	**3422**

3.4 4- Bromo 2,5 Di Chloro Phenol / 1-Hydroxy 4-Bromo 2,5 Di Chloro Benzene (Proposed)

Brief Manufacturing Process:

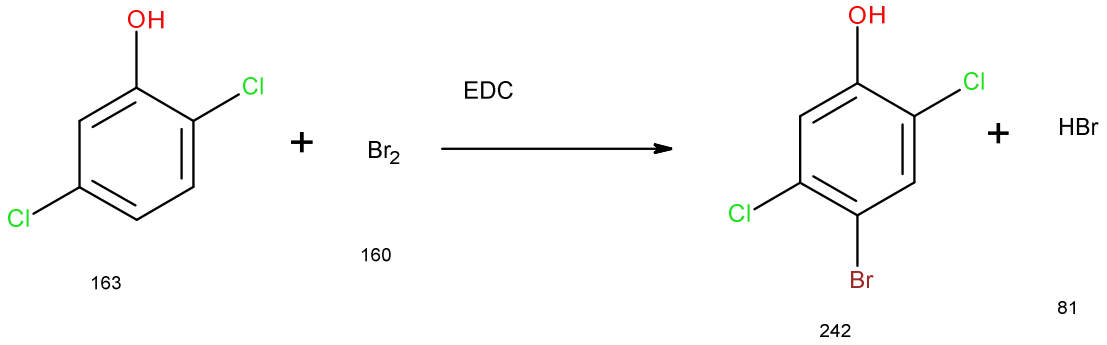
Step-I

2,5- Di Chloro Phenol is subjected to bromination reaction by Liquid Bromine in presence of Solvent-EDC to give the crude product 4-Bromo 2,5 Di Chloro Phenol.

Step-II

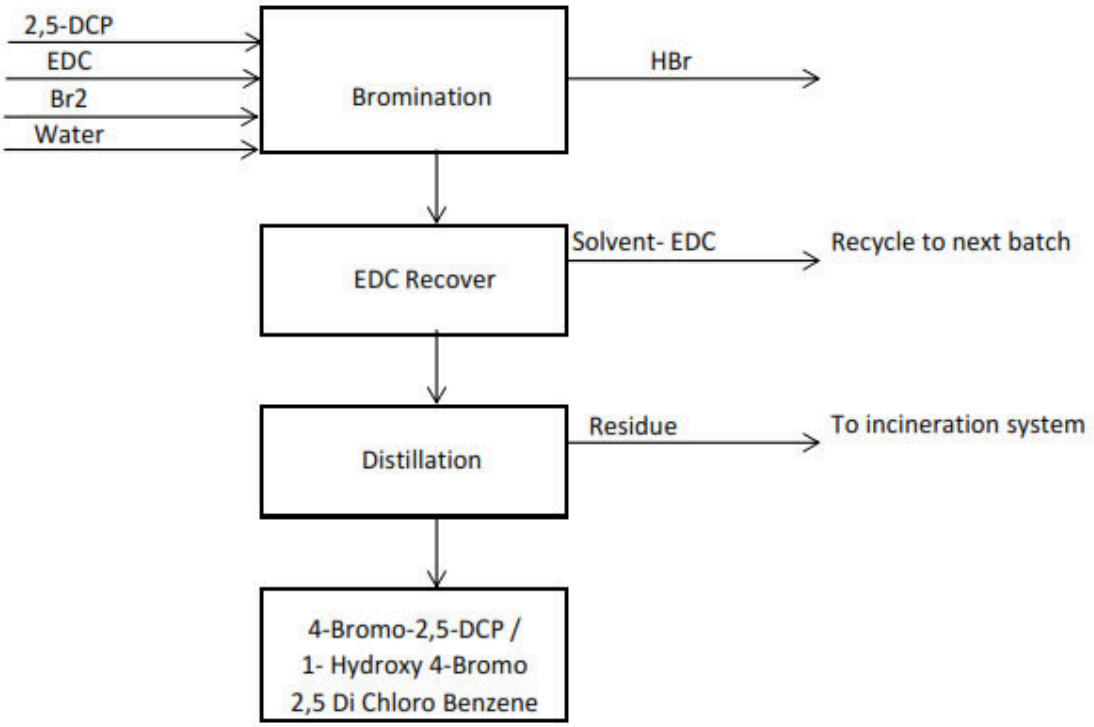
Crude mass of 4-Bromo 2,5 Di Chloro Phenol is further washed with water and Solvent EDC is recovered by distillation. Finally, crude product is distilled out under vaccum to get final product as 4-Bromo 2, 5-Dichloro Phenol.

Chemical Reaction:



Product : 4-Bromo-2,5-DCP /1- Hydroxy 4-Bromo 2,5 Di Chloro Benzene

Flow Diagram:



Mass Balance / Material Balance:

4-Bromo 2, 5-Dichloro Phenol / 1- Hydroxy 4- Bromo 2,5 Di Chloro Benzene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	2,5-DCP	702		1- Hydroxy 4- Bromo 2,5 Di Chloro Benzene	1000
2	Bromine Liquid	690		Recovered - EDC	1170
3	Solvent - EDC	1200		Loss EDC	30
4	Water	863		20- 28% HBr solution	1245
5				Residue	10
	Total	**3455**		**Total**	**3455**

4.0 Meta Di Chloro Benzene (MDCB)

Process Description:

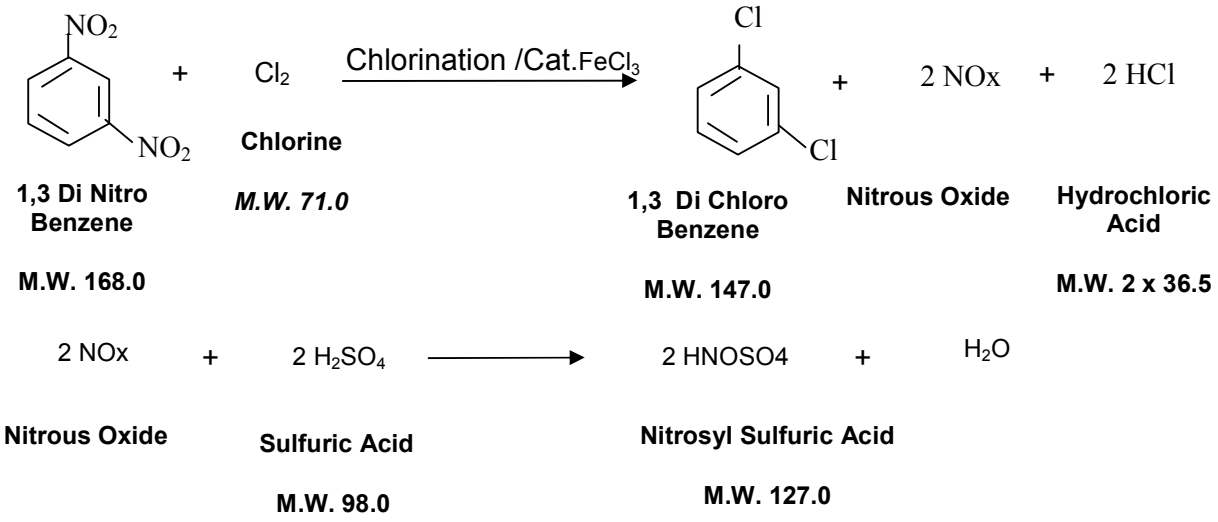
Meta Di Nitro Benzene undergoes De Nitro Chlorination reaction by the action of Chlorine gas in presence of Catalyst to give 1,3 Di Chloro Benzene.

During the reaction NOx is formed which is scrubbed to Sulfuric Acid to get the Bi Product Nitrosyl Sulfuric Acid. This bi product is recycled as raw material at Diazotization stage for manufacturing of Specialty Phenols.

Excess Di Nitro Benzene in Reaction Mass acts as Solvent, which is recovered by distillation after the reaction gets completed.

Hydrochloric Acid gas generates during chlorination reaction & which is scrubbed to water to get 30 % HCl solution as Bi Product.

Chemical Reactions



Material Balance / Mass Balance (All Quantities are in Kg)

1,3 Di Chloro Benzene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	1,3 Di Nitro Benzene	2330		1,3 Di Chloro Benzene	1000
2	Catalyst	10		Recovered Di Nitro Benzene	1160
3	Chlorine Gas	1000		Di Nitro Benzene Loss	25
4	Sulphuric Acid 98 %	1350		Nitrosyl Sulfuric Acid/Sodium nitrile	2465
5	10% Soda Ash Solution	200		ETP Water	225
6				Distillation Residue	15
	Total	**4890**		**Total**	**4890**

5.0 Nitro Compound
5.1 Nitro Benzene:

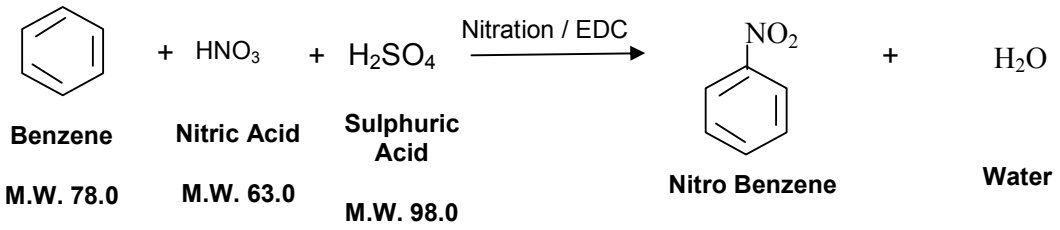
Brief Manufacturing Process

Benzene undergoes Nitration reaction by Nitric Acid in presence of Sulphuric Acid as well as Solvent EDC to give product Nitro Benzene.

After reaction is completed, mass taken for Phase Separation where spent Sulphuric Acid of 65 -70 % isolated as Bi Product.

Organic mass is further taken for solvent recovery by distillation & finally crude product is distilled out to get the pure product.

Chemical Reactions:



Benzene
M.W. 78.0

Nitric Acid
M.W. 63.0

Sulphuric Acid
M.W. 98.0

Nitro Benzene

Water

Material Balance / Mass Balance (All Quantities are in Kg)

Nitro Benzene					
IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	Benzene	665		Nitro Benzene	1000
2	Nitric Acid	540		Recovered Solvent - EDC	1470
3	Sulphuric Acid	300		Solvent - EDC lost	30
4	Solvent - EDC	1500		Dilute Sulphuric Acid	453
5	Water for Washing	500		Distillation Residue	18
6				Aqueous Effluent to ETP	534
	Total	**3505**		**Total**	**3505**

5.2 Meta Di Nitro Benzene/1, 3 - Di Nitro Benzene

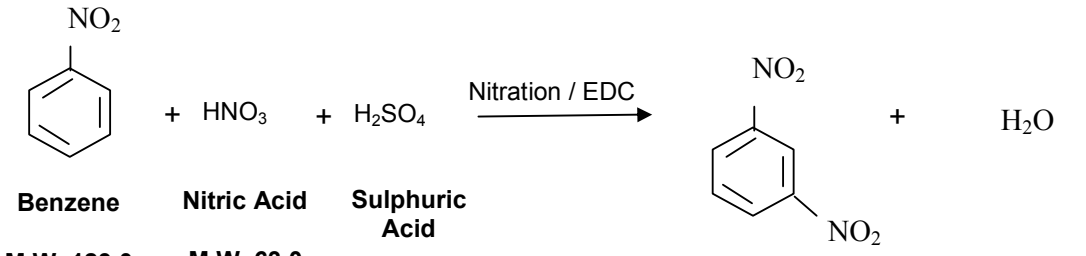
Brief Manufacturing Process:

Nitro Benzene undergoes Nitration reaction by Nitric Acid in presence of Sulphuric Acid as well as Solvent EDC to give product Meta Di Nitro Benzene/1,3 Di Nitro Benzene.

After reaction is completed, mass is taken for Phase Separation where Diluted Sulphuric Acid as spent 65 -70 % isolated as Bi Product.

Organic mass is further taken for solvent recovery by distillation & Finally crude product is distilled out to get the pure product.

Chemical Reactions:



Benzene
M.W. 123.0

Nitric Acid
M.W. 63.0

Sulphuric Acid
M.W. 98.0

Meta Di Nitro Benzene / 1,3 Di Nitro Benzene
M.W. 168.0

Water
M.W. 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

1,3 Di Nitro Benzene					
IN- PUT				OUT- PUT	
Sr No	Raw Materials / Items	Kg/Batch		Product / Bi Product	Qty/Batch
1	Nitro Benzene	755		1,3 Di Nitro Benzene	1000
2	Nitric Acid	385		Recovered Solvent - EDC	1470
3	Sulphuric Acid	260		Solvent - EDC lost	30
4	Solvent - EDC	1500		Dilute Sulphuric Acid	370
5	Water for Washing	500		Distillation Residue	14
6				Aqueous Effluent to ETP	516
7					
8					
	Total	**3400**		**Total**	**3400**

5.3 2, 4-Dicholo -3, 5-Dinitro Benzo Tri Fluoride (Proposed)

Brief Manufacturing Process:

Step-I

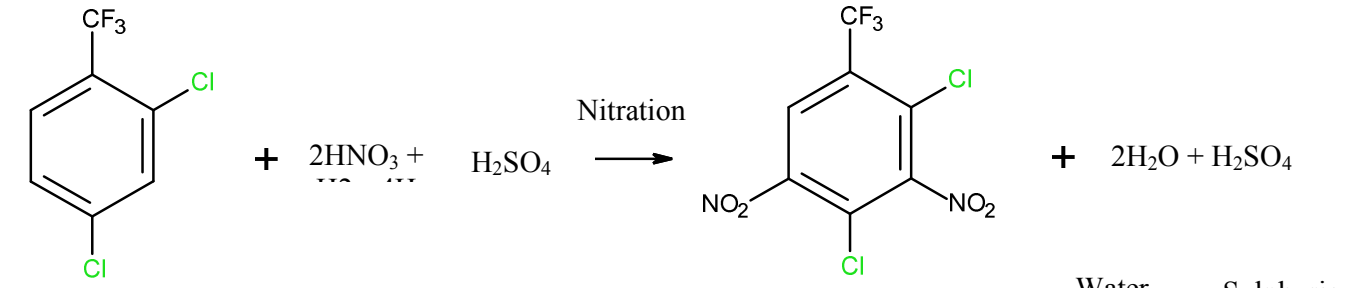
2, 4-Dichloro Benzotrifluoride undergoes nitration by Conc. Nitric Acid in presence of Conc. Sulphuric Acid to form crude 2, 4-Dichloro 3,5 Di Nitro Benzotrifluoride.

Step-II

Crude mass 2, 4-Dichloro 3,5 Di Nitro Benzotrifluoride is extracted by Solvent- EDC where by Dilute Sulphiric Acid layer is separated out from organic mass. Organic mass is then taken for water wash followed by Sodium Bicarbonate wash to remove acidity.

Finally, organic mass is taken for solvent recovery to get the product as 2, 4-Dicholo -3, 5-Dinitro Benzotrifluoride.

Chemical Reaction:



2.4-Dichloro Benzotrifluoride M.W 215

Nitric Acid M. W 2×63

Sulphuric Acid M. W 98

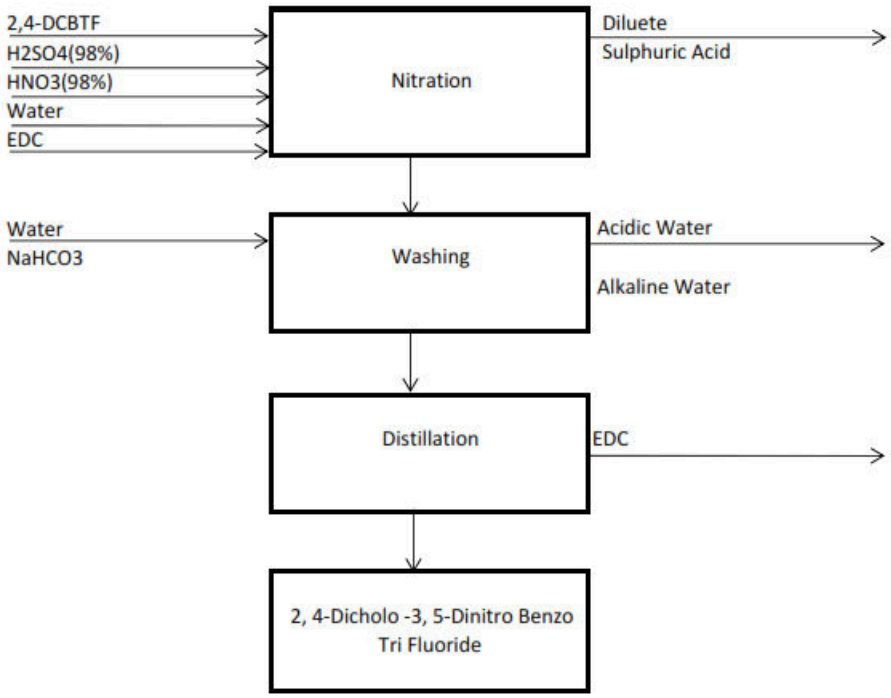
2, 4-Dichloro -3, 5-Di Nitro Benzotrifluoride M. W 305

Water M. W 2×18

Sulphuric Acid M. W 98

Product : 2, 4-Dicholo -3, 5-Dinitro Benzo Tri Fluoride

Flow Diagram:



Mass Balance / Material Balance:

2, 4-Dicholo -3, 5-Dinitro Benzo Tri Fluoride					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	2,4-DCBTF	740		2, 4-Dicholo -3, 5-Dinitro Benzo Tri Fluoride	1005
2	H_2SO_4(98%)	372		Recovered Solvent - EDC	970
3	HNO_3(98%)	450		EDC- Solvent loss	30
4	Solvent - EDC	1000		Dilute H_2SO_4 (70-75%)	500
5	Sodium Bi Carbonate soln. ($NaHCO_3$)	10		Aqueous Water Layer to ETP	507
6	Water for Washing	440			
	Total	**3012**		**Total**	**3012**

5.4 2, 3, 4-Tri Chloro Nitro Benzene (Proposed)

Brief Manufacturing Process:

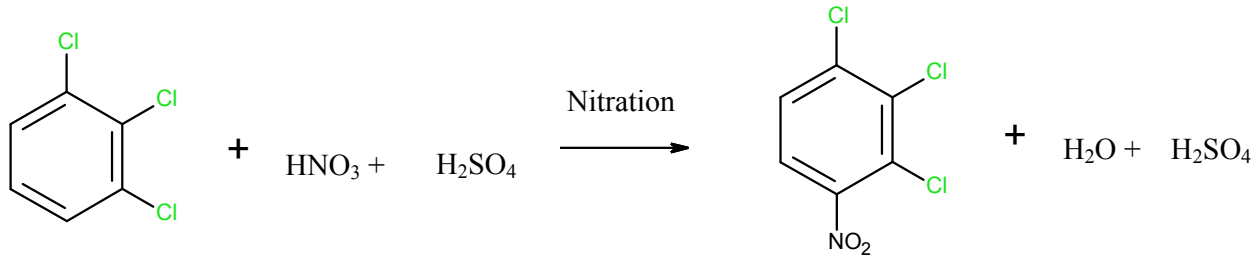
Step-I

1, 2, 3-Trichloro Benzene undergoes nitration reaction by 98% Nitric Acid in presence of Conc. Suphuric Acid to get the Crude product 2,3,4 Trichloro Nitro Benzene.

Step-II

Crude mass of 2,3,4 Trichloro Nitro Benzene then diluted with water and Dilute Sulphuric Acid layer is separated out from organic mass. Organic mass is then given washes of water as well as Sodium Bicarbonate solution and finally dehydrated to get the final product 2, 3, 4-Tri Chloro Nitro Benzene.

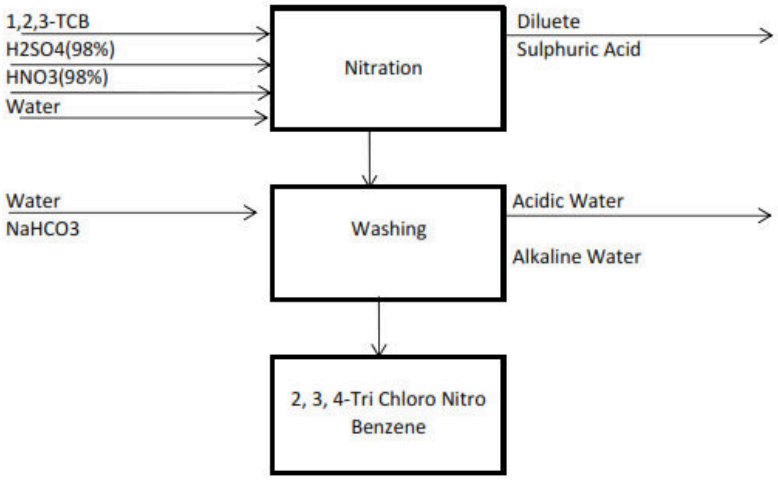
Chemical Reaction:



1, 2, 3-Trichloro Benzene M. W 181.5	Nitric Acid M. W 63	Sulphuric Acid M. W 98	2, 3, 4-Tri Chloro Nitro Benzene M. W 226.5	Water M. W 18	Sulphuric Acid M.W 98

Product : 2, 3, 4-Tri Chloro Nitro Benzene

Flow Diagram:



Mass Balance / Material Balance:

2, 3, 4-Tri Chloro Nitro Benzene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	1,2,3-TCB	778		2,3,4- Tri Chloro Nitro Benzene	1000
2	H_2SO_4(98%)	482		Dilute H_2SO_4	656
3	HNO_3(98%)	275		Aqueous Layer to ETP	199
4	Water	300			
5	$NaHCO_3$	20			
	Total	**1855**		**Total**	**1855**

5.5 4-Nitro/3-Nitro-O-Xylene (Proposed)

Brief Manufacturing Process:

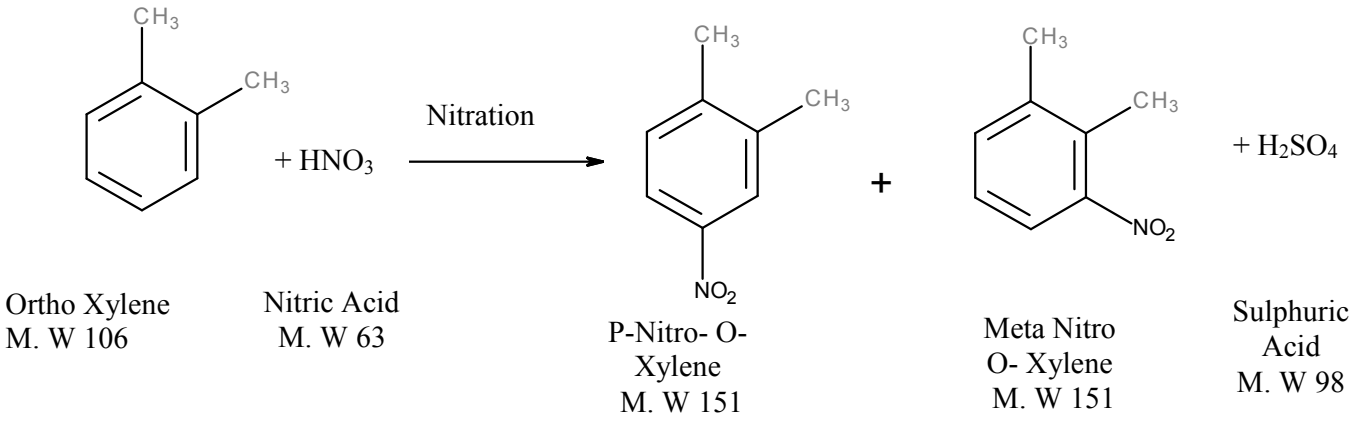
Step-I

Ortho Xylene when undergoes Nitration reaction by 98% Nitric Acid in presence of Conc. Sulphuric Acid and Solvent-EDC it gives the mixture of crude products as 3-Nitro Ortho–Xylene & 4-Nitro Ortho Xylene.

Step-II

Crude mass is then taken for layer separation where by dilute Sulphuric Acid layer is separated out from bottom. Organic mass is washed with water & water layer is separated out. EDC is recovered by distillation and crude product is distilled out to get pure product as 4-Nitro/3-Nito-O-Xylene.

Chemical Reaction:



Ortho Xylene
M. W 106

Nitric Acid
M. W 63

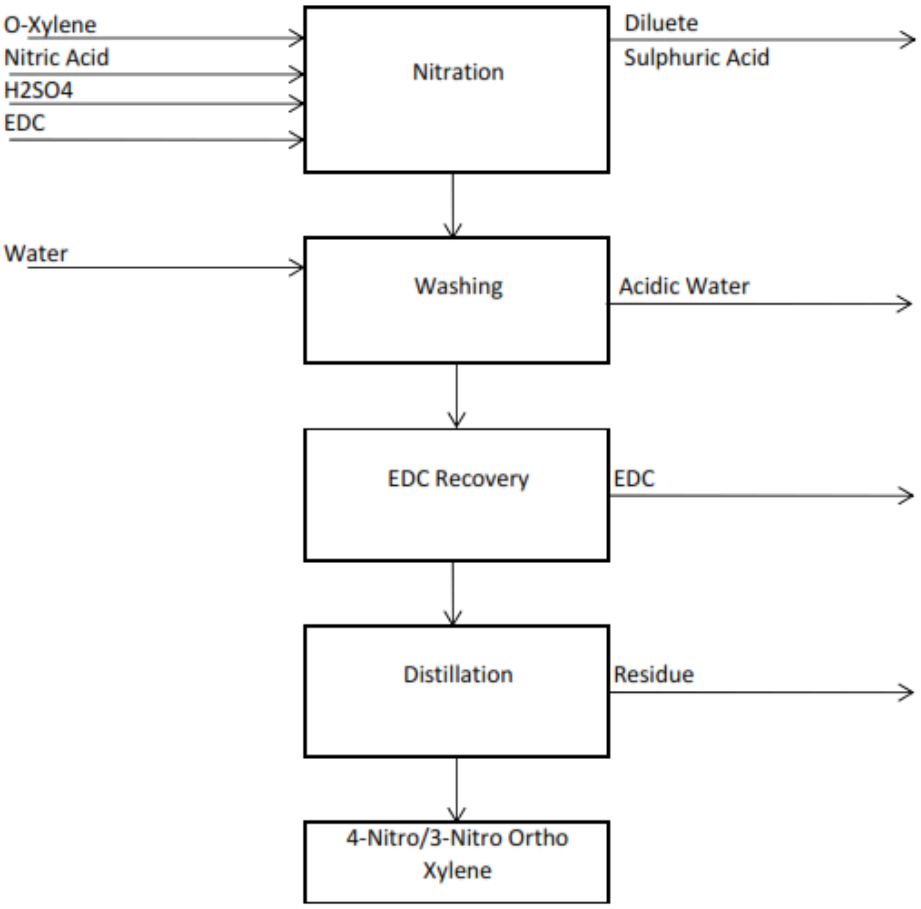
P-Nitro- O-Xylene
M. W 151

Meta Nitro O- Xylene
M. W 151

Sulphuric Acid
M. W 98

Product : 4-Nitro/3-Nitro Ortho Xylene

Flow Diagram:



Mass Balance / Material Balance:

4-Nitro/3-Nitro-O-Xylene					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Ortho Xylene	730		4-Nitro / 3-Nitro O-Xylene	1010
2	Nitric Acid (98%)	440		Recover Solvent	1360
3	Sulfuric Acid (98%)	270		Solvent loss	40
4	Solvent EDC	1400		Dil. H_2SO_4 65-70 %	410
5	Water for washing	400		Distillation Residue	20
				Aq. Efflu. to ETP	400
	Total	**3240**		**Total**	**3240**

6.0 Calcium Chloride:
Manufacturing Process:
Calcium Carbonate is reacted with Hydrochloric Acid to get Calcium Chloride.

Chemical Reaction:

$CaCO_3$ +2 HCl ⟶ $CaCl_2$ + H2O + CO2

Mass Balance:

Calcium Chloride					
IN- PUT				OUT- PUT	
Sr No	Raw Materials / Items	Kg/Batch		Product / Bi Product	Qty/Batch
1	Lime Stone/ $CaCO_3$	900		Calcium Chloride	1000
2	HCl (30%)	2200		Process Sludge	40
3				Drying Loss	1664
4				CO2	396
	Total	**3100**		**Total**	**3100**

7.0 Amino Benzoic Esters:

7.1 --- 3-Amin 4- Chloro Benzoic Acid Methyl Ester

Process Description

Step -1:

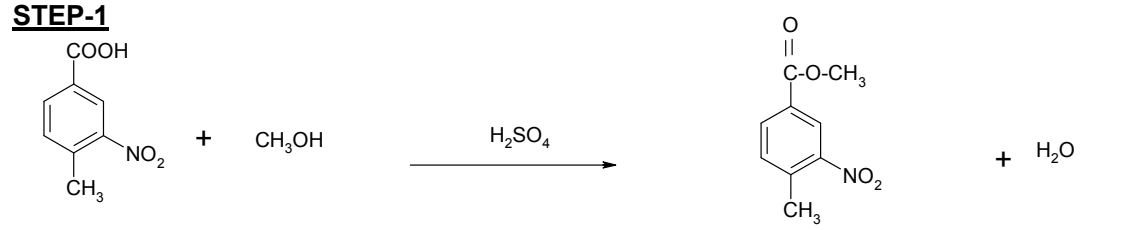
3 – Nitro -4- methyl Benzoic Acid is reacted with Methanol in presence of Sulfuric Acid to form 3-Nitro -4- Methyl Benzoic Acid Methyl Ester.

Step -2:

3- Nitro -4- Methyl Benzoic Acid Methyl Ester undergoes reduction by Acetic Acid and Iron power to form 3- Amino -4- Methyl Benzoic Acid Methyl Ester. Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

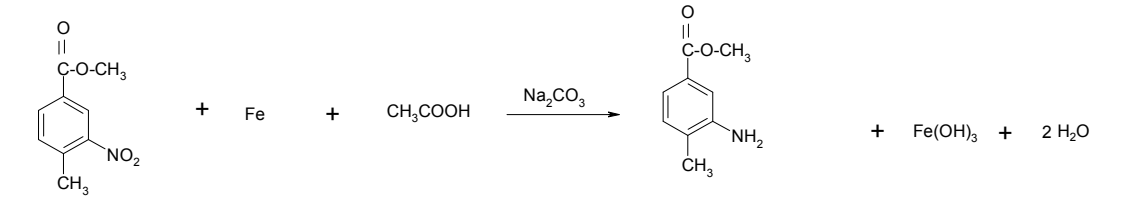
Chemical Reaction

STEP-1



3-Nitro-4-Methyl Benzoic Acid	Methanol		3-Nitro-4-Methyl Benzoic Acid Methyl Ester	Water
M.Wt. = 181.0	M.Wt=32.00		M.Wt. = 195.0	M.Wt. = 18.0

STEP-2



3-Nitro-4-Methyl Benzoic Acid Methyl Ester	Iron Powder	Acetic Acid	3-Amino-4-Methyl Benzoic Acid Methyl Ester	Iron Hydroxide	Water
M.Wt. = 195.0	M.Wt. = 56.0	M.Wt. =60.0	M.Wt. = 165.0	M.Wt. = 106	M.Wt. = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	3- Nitro -4- Methyl Benzoic Acid	1130		3- Amino -4- Methyl Benzoic Acid Methyl Ester	1000
2	Methanol	202		Spent Sulfuric Acid (60-70 %)	500
3	Sulfuric Acid	352		Iron Hydroxide Salt	1896
4	Iron Powder	1092		Recovered Solvent - ODCB	1360
5	Acetic Acid	28		Solvent Loss - ODCB	40
6	Sodium Carbonate	22		Aqueous Layer to ETP	530
7	Solvent - ODCB	1400		Distillation Residue	11
8	Water	1111			
	Total	**5337**			**5337**

7.2 3-Amino 4-Methyl Benzoic Acid Isopropyl Ester

Process Description:

Step -1:

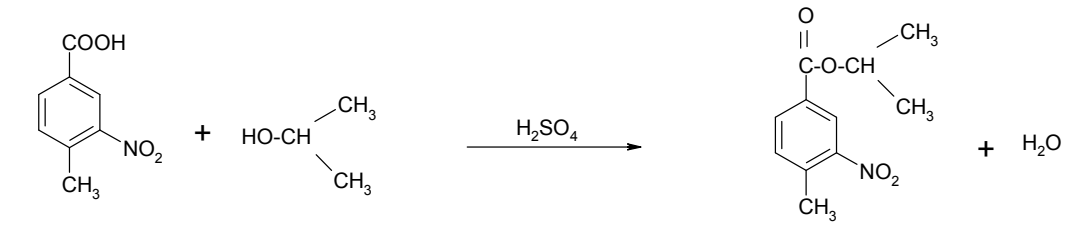
3 – Nitro -4- methyl Benzoic Acid is reacted with Iso Propyl Alcohol in presence of Sulphuric Acid to form 3-Nitro -4- Methyl Benzoic Acid Iso Propyl Ester.

Step -2:

3- Nitro -4- Methyl Benzoic Acid Iso Propyl Ester undergoes reduction by Acetic Acid and Iron power to form 3- Amino -4- Methyl Benzoic Acid Iso Propyl Ester. Finally, Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

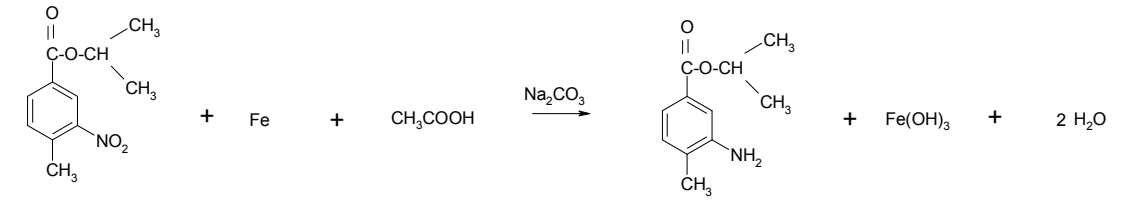
Chemical Reaction:

STEP-1



3-Nitro-4-Methyl Benzoic Acid	Iso Propyl Alcohol		3-Nitro-4-Methyl Benzoic Acid Iso Propyl Ester	Water
M.Wt. = 181.0	M.Wt=60.00		M.Wt. = 223.0	M.Wt. = 18.0

STEP-2



3-Nitro-4-Methyl Benzoic Acid Iso Propyl Ester	Iron Powder	Acetic Acid	3-Amino-4-Methyl Benzoic Acid Iso Propyl ester	Iron Hydroxide	Water
M.Wt. = 223.0	M.Wt. = 56.0	M.Wt. =60.0	M.Wt. = 193.0	M.Wt. = 106	M.Wt. = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	3- Nitro -4- Methyl Benzoic Acid	970		3- Amino -4- Methyl Benzoic Acid Iso Propyl Ester	1000
2	Iso Propyl Alcohol	322		Spent Sulfuric Acid (60 - 70 %)	485
3	Sulfuric Acid	340		Iron Hydroxide Salt	1620
4	Iron Powder	940		Recovered Solvent - ODCB	1575
5	Acetic Acid	28		Solvent Loss - ODCB	25
6	Sodium Carbonate	22		Aqueous Layer to ETP	657
7	Solvent - ODCB	1600		Distillation Residue	10
8	Water	1150			
	Total	**5372**			**5372**

7.3 3-Amino 4-Methyl Benzoic Acid (2' - Chloro Ethyl Ester).

Process Description:

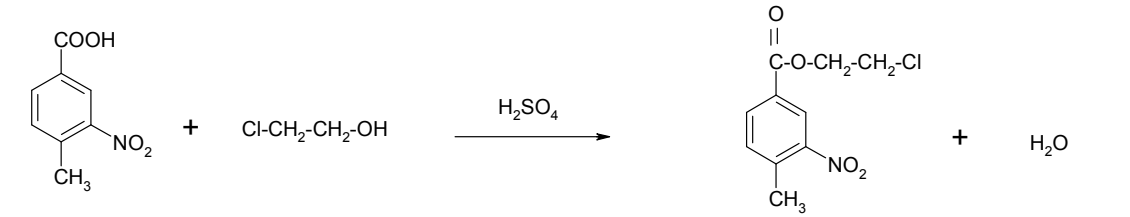
Step -1:

3 – Nitro -4- methyl Benzoic Acid is reacted with 2- Chloro Ethanol in presence of Sulfuric Acid to form 3-Nitro -4- Methyl Benzoic Acid (2'- Chloro Ethyl) Ester.

Step -2:

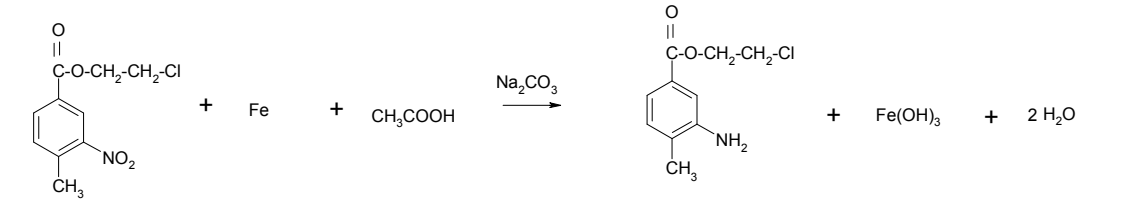
3- Nitro -4- Methyl Benzoic Acid (2- Chloro Ethyl Ester) undergoes reduction by Acetic Acid and Iron power to form 3- Amino -4- Methyl Benzoic Acid (2-Chloro Ethyl) Ester. Finally, Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

Chemical Reaction
STEP-1



3-Nitro-4-Methyl Benzoic Acid	2-Chloro Ethanol	3-Nitro-4-Methyl Benzoic Acid - (2'-Chloro Ethyl Ester)	Water
M.Wt. = 181.0	M.Wt=80.50	M.Wt. = 243.50	M.Wt. = 18.0

STEP-2



3-Nitro-4-Methyl Benzoic Acid (2'-Chloro Ethyl Ester)	Iron Powder	Acetic Acid	3-Amino-4-Methyl Benzoic Acid- (2'-Chloro Ethyl Ester)	Iron Hydroxide	Water
M.Wt. = 243.50	M.Wt. = 56.0	M.Wt. =60.0	M.Wt. = 213.50	M.Wt. = 106	M.Wt. = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	3- Nitro -4- Methyl Benzoic Acid	930		3- Amino -4- Methyl Benzoic Acid (2'- Chloro Ethyl) Ester	1000
2	2- Chloro Ethanol	415		Spent Sulfuric Acid (60 -70 %)	594
3	Sulfuric Acid	400		Iron Hydroxide Salt	1558
4	Iron Powder	900		Recovered Solvent - ODCB	1750
5	Acetic Acid	28		Solvent Loss - ODCB	50
6	Sodium Carbonate	22		Aqueous Layer to ETP	763
7	Solvent - ODCB	1800		Distillation Residue	10
8	Water	1230			
	Total	**5725**			**5725**

7.4 5-Amino-2-Methyl Benzene Sulphonic Acid Phenyl Ester

Process Description

Step -1:

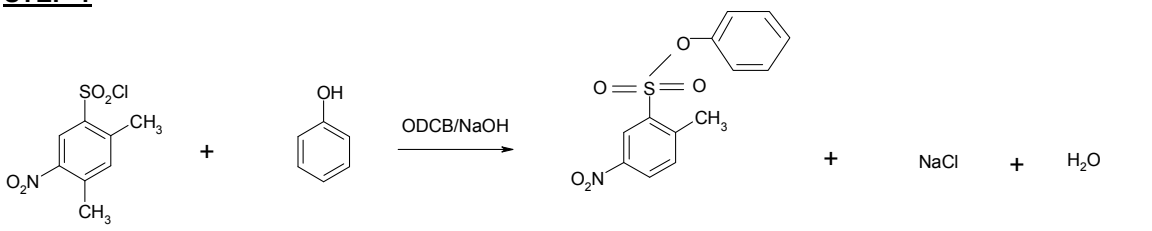
2- Methyl 5- Nitro Benzene Sulphonyl Chloride is reacted with Phenol in presence of Sodium Hydroxide to form 2- Methyl -5 Nitro Benzene Sulphonic Acid Phenyl Ester.

Step -2:

2- Methyl -5 Nitro Benzene Sulphonic Acid Phenyl Ester undergoes reduction by Acetic Acid and Iron power to form 5- Amino -2- Methyl Benzene Sulphonic Acid Phenyl Ester. Finally, Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

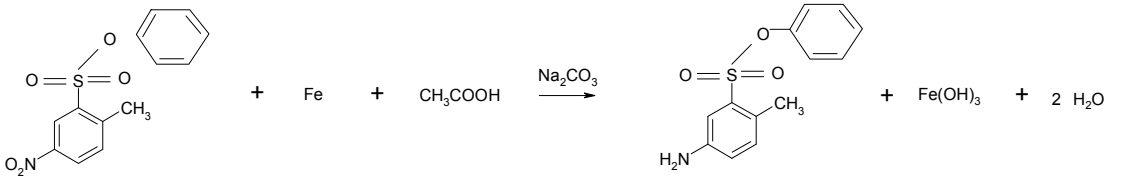
Chemical Reaction

STEP-1



2-Methyl-5-Nitro Benzene Sulphonyl Chloride	Phenol	2-Methyl-5-Nitro Benzene Sulphonic Acid Phenyl Ester	Sodium Chloride	Water
M.Wt. = 235.50	M.Wt. = 94.00	M.Wt. = 293.00	M.Wt. = 58.5	M.Wt. = 18.0

STEP-2



2-Methyl-5-Nitro Benzene Sulphonic Acid Phenyl Ester	Iron Powder	Acetic Acid	5-Amino-2-Mehtyl Benzene Sulphonic Acid Phenyl Ester	Iron Hydroxide	Water
M.Wt. = 293.00	M.Wt. = 56	M.Wt. = 60	M.Wt. = 263.00	M.Wt. = 107	M.Wt. = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	2- Methyl -5- Nitro Benzene Sulphonyl Chloride	975		5 - Amino -2- Methyl Benzene Sulphonic Acid Phenyl Ester	1000
2	Phenol	390		Sodium Chloride	247
3	Sodium Hydroxide	165		Iron Hydroxide Salt	868
4	Iron Powder	525		Recovered Solvent - ODCB	1360
5	Acetic Acid	20		Solvent Loss - ODCB	40
6	Sodium Carbonate	15		Aqueous Layer to ETP	789
7	Solvent - ODCB	1400		Distillation Residue	16
8	Water	830			
	Total	**4320**			**4320**

7.5 Benzene Sulphonic Acid 3-Amino Phenyl Ester.

Process Description

Step -1:

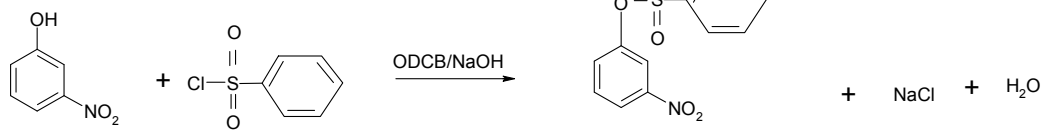
3- Nitro Phenol is reacted with Benzene Sulphonyl Chloride in presence of Sodium Hydroxide as well as Solvent - ODCB to form Benzene Sulphonic Acid -3- Nitro Phenyl Ester.

Step -2:

Benzene Sulphonic Acid -3- Nitro Phenyl Ester undergoes reduction by Acetic Acid and Iron Power to form Benzene Sulphonic Acid -3- Amino Phenyl Ester. Finally, Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

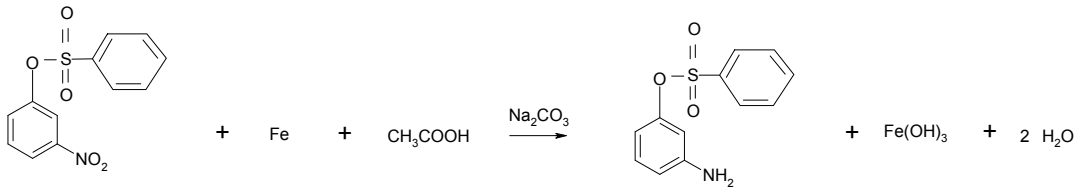
Chemical Reaction

STEP-1



3-Nitro Phenol	Benzene Sulphonyl Chloride	Benzene Sulphonic Acid-3-Nitro Phenyl Ester	Sodium Chloride	Water
M.Wt. = 139.00	M.Wt. = 176.50	M.Wt. = 279.00	M.Wt. = 58.5	M.Wt. = 18.0

STEP-2



Benzene Sulphonic Acid-3-Nitro Phenyl Ester	Iron Powder	Acetic Acid	Benzene Sulphonic Acid-3-Amino phenyl ester	Iron Hydroxide	Water
M.Wt. = 279.00	M.Wt. = 56	M.Wt. = 60	M.Wt. = 249.00	M.Wt. = 107	M.Wt. = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	3- Nitro Phenol	615		Benzene Sulphonic Acid -3- Amino Phenyl Ester	1000
2	Benzene Sulfonic Acid	777		Sodium Chloride	263
3	Sodium Hydroxide	756		Iron Hydroxide Salt	944
4	Iron Powder	555		Recovered Solvent - ODCB	1360
5	Acetic Acid	20		Solvent Loss - ODCB	40
6	Sodium Carbonate	14		Aqueous Layer to ETP	1264
7	Solvent - ODCB	1400		Distillation Residue	16
8	Water	750			
	Total	**4887**			**4887**

7.6 2-Cyano-3, 4, 5, 6 -Tetrachloro Benzoic Acid Methyl Ester

Process Description:

Step -1:

Tetra Chloro Phthalic Anhydride is reacted with Chlorine Gas in presence of Phosphorus Tri chloride as well as Solvent - ODCB to form Tetra Chloro Phthaloyl Chloride

Step -2:

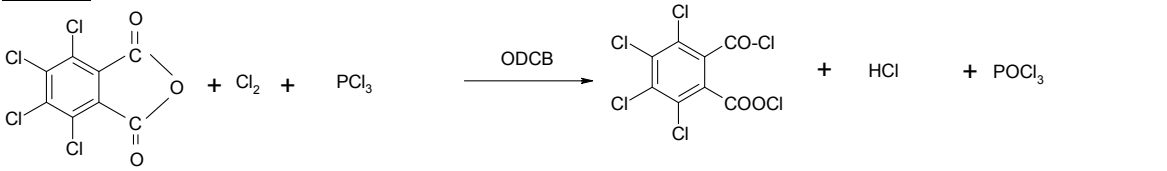
Tetra Chloro Phthaloyl Chloride further reacted with ammonia as well as it undergoes de hydration in presence of Solvent – 1, 2 Dichloro Benzene (ODCB) to form 2- Cyano 3,4,5,6 Tetra chloro Benzoic Acid Ammonium Salt.

Step -3:

2- Cyano 3,4,5,6 Tetra chloro Benzoic Acid Ammonium Salt further reacted with Di methyl Sulphate to form 2- Cyano 3,4,5,6 Tetra chloro Benzoic Acid Methyl Ester.

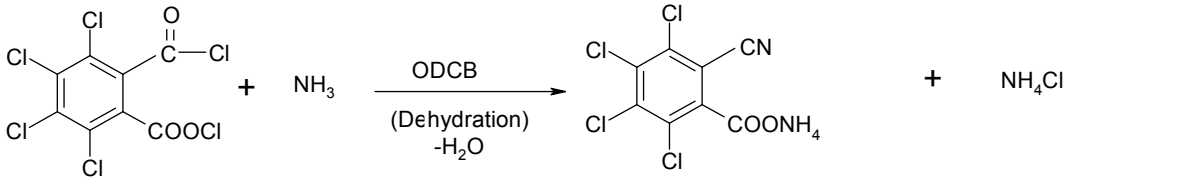
Chemical Reaction

STEP-1



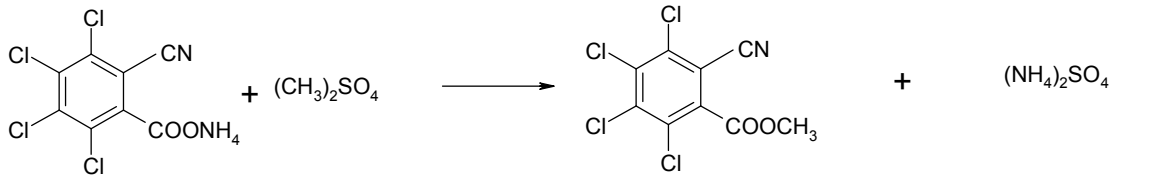
Tetrachloro Phthalic Anhdride	Chlorine Gas	Phosphorous Trichloride	Tetrachloro Phthaloyl Chloride	Hydrochloric Acid	Phosphorous Oxy Chloride
M.Wt = 286.00	M.Wt=71	M.Wt=137.5	M.Wt = 357.00	M.Wt = 36.50	M.Wt=153.5

STEP-2



Tetrachloro Phthaloyl Chloride M.Wt = 357.00	Ammonia M.Wt=17	2-Cyano-3,4,5,6, Tetrachloro Benzoic acid Ammonium Salt M.Wt = 302.00	Ammonium Chloride M.Wt = 53.50

STEP-3



2-Cyano-3,4,5,6, Tetrachloro Benzoic acid Ammonium Salt M.Wt = 302.00	Dimethyl Sulfate M.Wt=126	2-Cyano-3,4,5,6, Tetrachloro Benzoic Acid Methyl Ester M.Wt = 299.00	Ammonium Sulfate M.Wt = 132.00

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	Tetra Chloro Phthalic Anhydride	996		2- Cyano – 3,4,5,6 -Tetra Chloro Benzoic Acid Methyl Ester	1000
2	Chlorine gas	250		Recovered Solvent - ODCB	1360
3	Phosphorus Tri Chloride	478		Solvent Loss - ODCB	40
4	Solvent - ODCB	1400		30 % Hydrochloride Acid	410
5	Ammonia	122		Ammonium Chloride	110
6	Dimethyl Sulphate	218		Ammonium Sulphate	300
7	Water	890		$POCl_3$	530
8				Aqueous Layer to ETP	590
				Distillation Residue	14
	Total	**4354**			**4354**

7.7 Benzene Sulphonic Acid 2-Methyl-5-Nitrophenyl Ester

Process Description

Step -1:

2- Methyl -5- Nitro Phenol is reacted with Benzene Sulphonyl Chloride in presence of Sodium Hydroxide and Solvent – 1, 2 Dichloro Benzene (ODCB) to give Benzene Sulfonic Acid 2- methyl -5- Nitro Phenyl Ester.

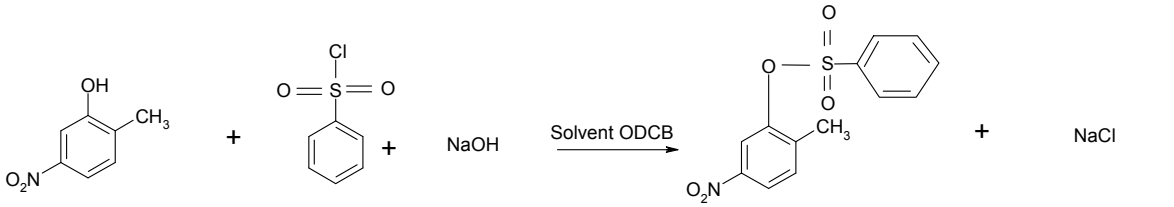
Step -2:

Benzene Sulfonic Acid 2- methyl -5- Nitro Phenyl Ester undergoes reduction by Acetic Acid and Iron power to form Benzene Sulphonic Acid -2- Methyl -5- Nitro Phenyl Ester.

Finally, Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

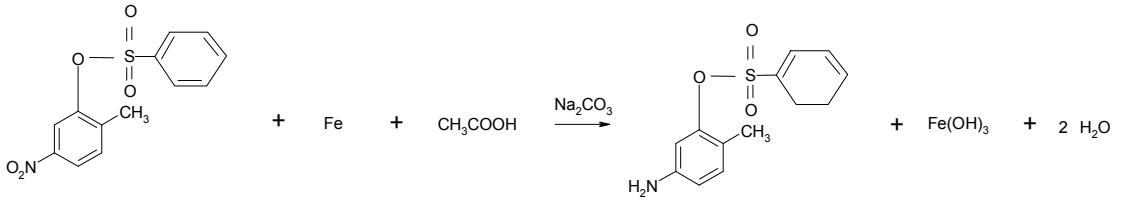
Chemical Reaction

STEP-1



2-Methyl-5-Nitro Phenol	Benzene Sulfonyl Chloride	Sodium Hydroxide	Benzene Sulphonic Acid -2-Methyl-5-Nitro Phenyl Ester	Sodium Chloride
M.Wt. = 153.00	M.Wt. = 176.50	M.Wt=40	M.Wt. = 293.00	M.Wt. = 58.5

STEP-2



Benzene Sulphonic Acid -2-Methyl-5-Nitro Phenyl Ester	Iron Powder	Acetic Acid	Benzene Sulphonic Acid -2-Methyl-5-Amino Phenyl Ester	Iron Hydroxide	Water
M.Wt. = 293.00	M.Wt. = 56	M.Wt. = 60	M.Wt. = 263.00	M.Wt. = 107	M.Wt. = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	2- Methyl -5- Nitro Phenol	600		Benzene Sulphonic Acid 2-methyl -5- Nitro Phenyl Ester	1000
2	Benzene Sulphonyl Chloride	690		Recovered Solvent - ODCB	1550
3	Sodium Hydroxide	157		Solvent Loss - ODCB	50
4	Solvent - ODCB	1600		Sodium Chloride	230
5	Iron Powder	494		Iron hydroxide Salt	750
6	Acetic Acid	20		Aqueous Layer to ETP	806
7	Sodium Carbonate	15		Distillation Residue	10
8	Water	820			
	Total	**4396**			**4396**

7.8 4 -Amino Benzoic Acid Methyl Ester

Process Description

Step -1:

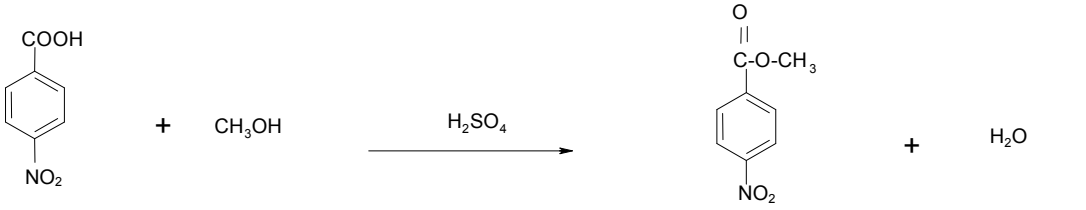
4 – Nitro Benzoic Acid is reacted with Methanol in presence of Sulfuric Acid to form 4- Nitro -Benzoic Acid Methyl Ester.

Step -2:

4 - Nitro Benzoic Acid Methyl Ester undergoes reduction by Acetic Acid and Iron power to form 4 - Amino Benzoic Acid Methyl Ester. Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

Chemical Reaction:

STEP-1



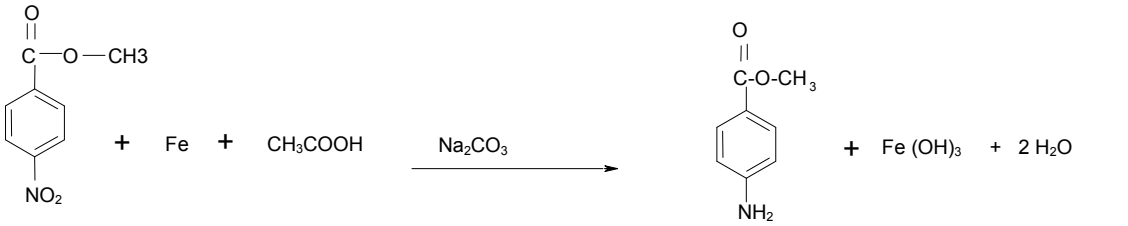
4-Nitro Benzoic Acid M.Wt. = 167.0

Methanol M.Wt = 32.00

4 -Nitro Benzoic Acid Methyl Ester M.Wt. = 181.0

Water M.Wt. = 18.0

STEP-2



4-Nitro Benzoic Acid Methyl Ester M.Wt. 181.0

Iron Powder M.Wt. = 56.0

Acetic Acid M.Wt = 60.0

4 Amino Benzoic Acid Methyl Ester M.Wt = 151.0

Iron Hydroxide M.Wt = 106.0

Water M.Wt = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	4 - Nitro Benzoic Acid	1106		4- Amino Benzoic Acid Methyl Ester	1000
2	Methanol	212		Spent Sulfuric Acid (60-70 %)	500
3	Sulfuric Acid	372		Iron Hydroxide Salt	1930
4	Iron Powder	1114		Recovered Solvent - ODCB	1360
5	Acetic Acid	30		Solvent Loss - ODCB	40
6	Sodium Carbonate	23		Aqueous Layer to ETP	530
7	Solvent - ODCB	1400		Distillation Residue	11
8	Water	1111			
	Total	**5368**			**5368**

7.8 3, 5 Di Amino 4- Chloro Benzoic Acid Iso Butyl Ester

Process Description

Step -1:

3, 5 – Di Nitro- 4 – Chloro Benzoic Acid is reacted with Iso Butyl Alcohol in presence of Sulfuric Acid to form 3, 5 - Di Nitro – 4 – Chloro Benzoic Acid Iso Butyl Ester.

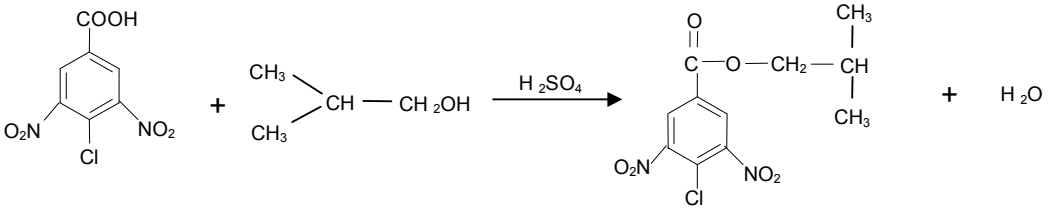
Step -2:

3, 5 Di Nitro – 4 – Chloro Iso Butyl Ester undergoes reduction by Acetic Acid and Iron power to 3, 5 Di Nitro 4 – Chloro Benzoic Acid Iso Butyl Ester.

Product is extracted using Solvent – 1, 2 Dichloro Benzene (ODCB) and Iron Hydroxide salt which is formed during reaction is isolated from mass by filtration.

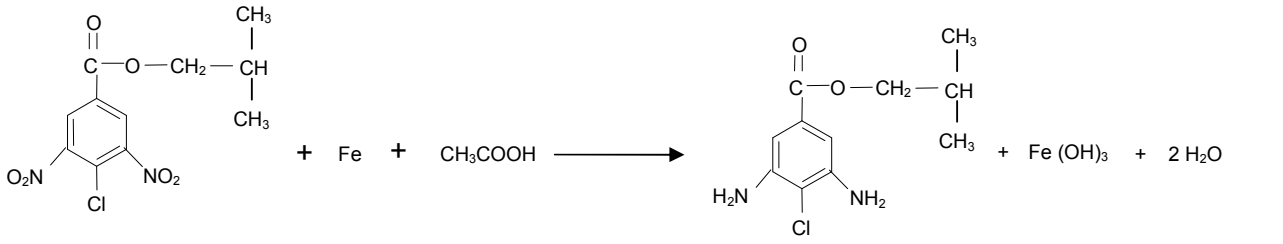
Chemical Reaction

STEP-1



3, 5 – Di Nitro 4 – Chloro Benzoic Acid	Iso Butyl Alcohol	3, 5 Di Nitro – 4 – Chloro Benzoic Acid Iso Butyl Ester	Water
M. Wt = 246.5	M. Wt = 74.0	M. Wt = 302.5	M. Wt = 18.0

STEP-2



3, 5 Di Nitro – 4 – Chloro Benzoic Acid Iso Butyl Ester	Iron Powder	Acetic Acid	3, 5 Di Amino – 4 – Chloro Benzoic Acid Iso Butyl Ester	Iron Hydroxide	Water
M. Wt = 302.5	M.Wt. = 56.0	M.Wt = 60.0	M.Wt = 242.5	M. Wt = 106.0	M. Wt = 18.0

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	3, 5 – Di Nitro 4 – Chloro Benzoic Acid	1064		3, 5 - Di Amino 4 - Chloro Benzoic Acid Iso Butyl Ester	1000
2	Iso Butyl Alcohol	310		Spent Sulfuric Acid (60-70 %)	250
3	Sulfuric Acid	176		Iron Hydroxide Salt	1392
4	Iron Powder	700		Recovered Solvent - ODCB	1360
5	Acetic Acid	20		Solvent Loss - ODCB	40
6	Sodium Carbonate	14		Aqueous Layer to ETP	330
7	Solvent - ODCB	1400		Distillation Residue	12
8	Water	700			
	Total	**4384**			**4384**

7.9 3,4,5-Trimethoxy Benzoic Acid (Proposed)

Brief Manufacturing Process:

Step-I

Para Cresol is first undergoes bromination reaction by liquid bromine to give 2,6 Di Bromo Para Cresol. During reaction HBr gas is generated which is scrubbed to water to get dilute HBr solution as saleable Bye-product.

Step-II

2,6 Dibromo Para Cresol is then undergoes methylation by Dimethyl Sulphate (DMS) in presence of Caustic Soda lye to get an intermediate product as 3,5 Dibromo 4-methoxy Toluene.

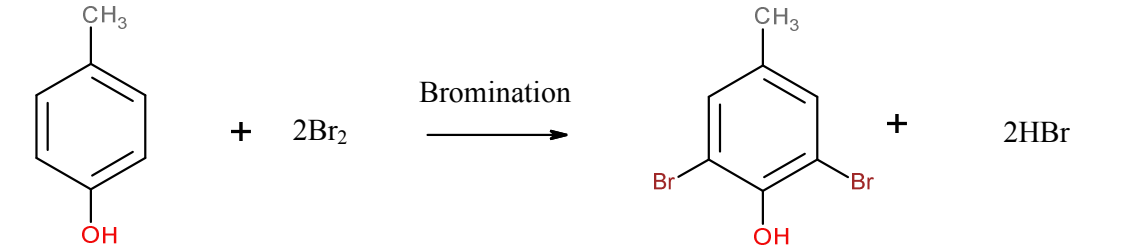
Step-III

2,6 Dibromo 4-methoxy Toluene further reacted with Sodium Methoxide in presence of Methanol-Solvent to give the final product as 3,4,5-Tri Methoxy Toluene.

Step-IV

3,4,5-Tri Methoxy Toluene finally undergoes air oxidation in Autoclave and to give the final product as 3,4,5-Tri Methoxy Benzoic Acid.

Chemical Reaction:

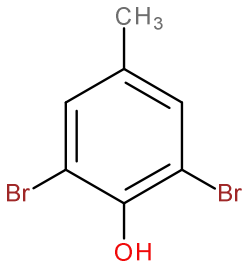


Para Cresol
M. W 108

Liquid Bromine
M. W 2×80

2,6 Di Bromo
Para Cresol
M. W 266

M. W 162



2,6 Di Bromo
Para Cresol
M. W 266

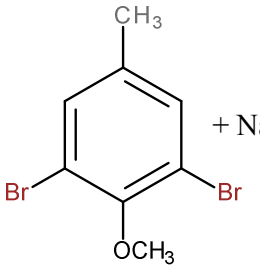
$(CH_3)_2 SO_4$ +

Dimethyl
Sulphate
M. W 126

NaOH

Caustic
Soda
M.W 40

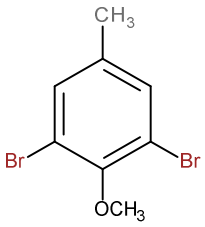
Methylation



+ Na_2SO_4

2,6 Dibromo
4-methoxy Toluene
M. W 280

M.W 142

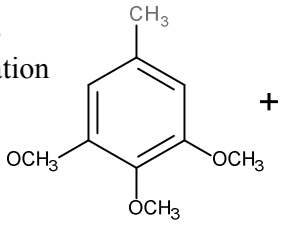


+

$2CH_3ONa$ +

CH_3OH

De-Bromo
Methoxylation



+

2NaBr

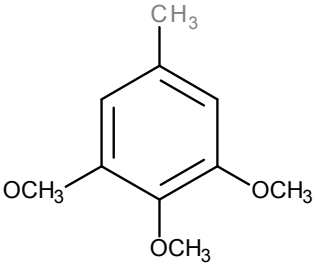
2,6 Dibromo
4-Methoxy
Toluene
M. W 280

Sodium
Methoxide
M. W 108

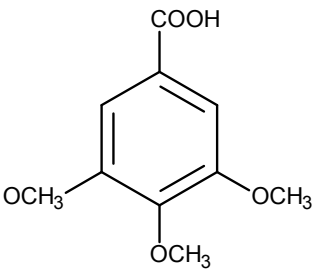
Methanol
M. W 32

3,4,5-Tri Methoxy
Toluene
M. W182

M. W 2×103



Air oxidation

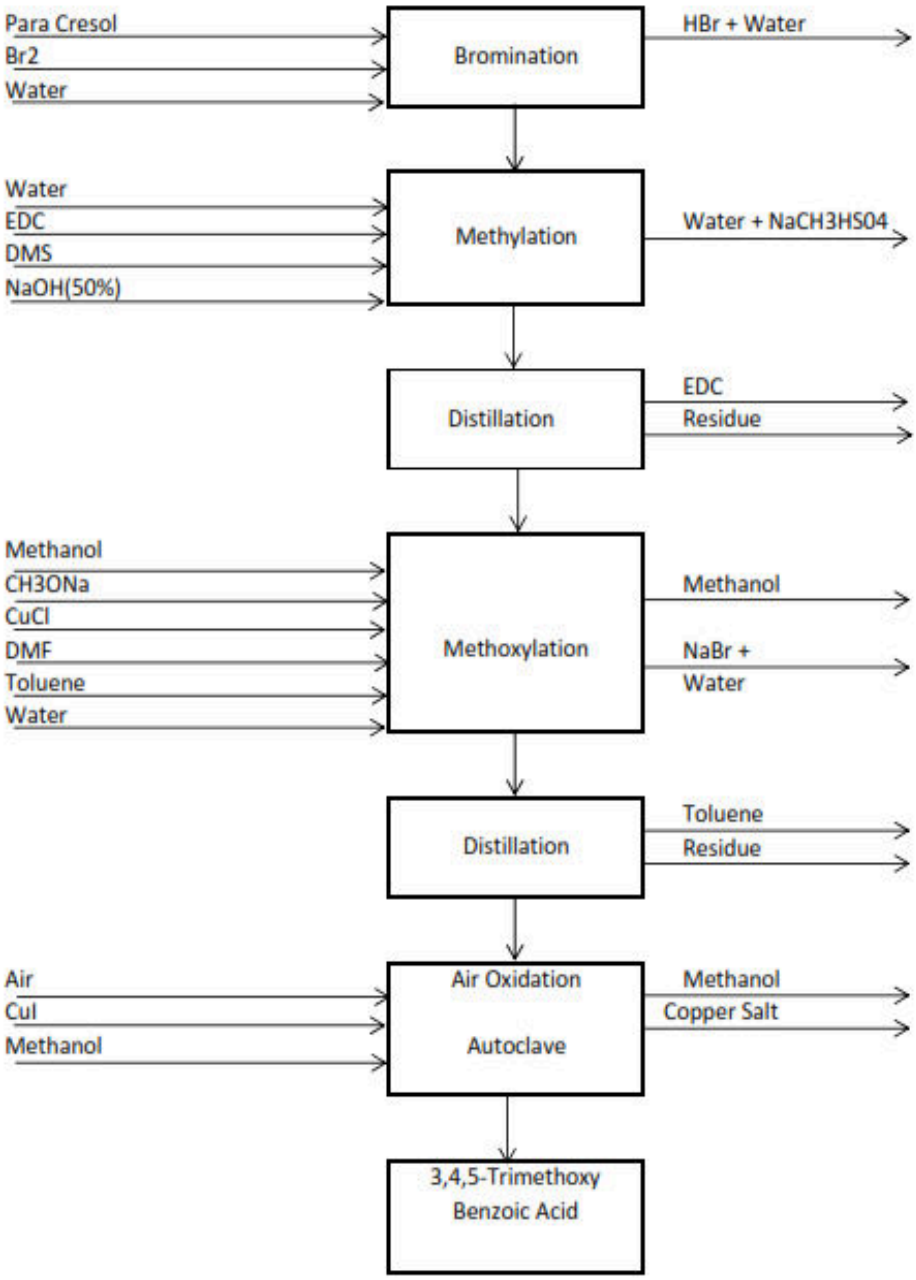


3,4,5-Tri Methoxy
Toluene
M. W 182

3,4,5-Tri Methoxy
Benzoic Acid
M.W. 212

Product : 3,4,5-TMT

Flow Diagram:



Mass Balance / Material Balance:

3,4,5-Tri Methoxy Benzoic Acid					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Para Cresol	715		3,4,5-Tri Methoxy Benzoic Acid	1010
2	Solvent- EDC	1100		Recovered Solvent- EDC	1060
3	Bromine (Liquid)	2120		Solvent Loss (EDC)	40
4	Sodium Methoxide (CH_3ONa)	700		28% Hydrobromic Acid	3832
5	Solvent - Methanol	1200		Recovered Solvent - Methanol	1150
6	Di Methyl Sulphate (DMS)	1620		Solvent Loss (Methanol)	50
7	Caustic Lye (NaOH) (50%)	1100		Sodium Bromine Salt	1330
8	Water	2900		Sodium Sulphate Wet Cake	1750
9	Catalyst	48		Aqueous Layer to ETP	1714
10	DMF	173		Distillation Residue	25
11	Solvent - Toluene	3000		Recovered Toluene	2950
12	MNO_2	610		Toluene Loss	50
13	H_2SO_4 (98%)	810		$MnSO_4$ Wet Cake	1300
14	Nascent Oxygen	550		Oxygen Loss	385
	Total	**16646**		**Total**	**16646**

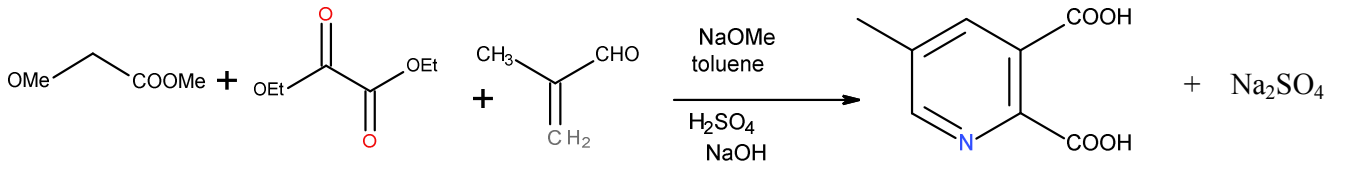
7.11 5-Methyl 2,3-Pyridinedicarboxylic Acid

Brief Manufacturing Process:

Step-I

Diethyl Oxalate is reacted with Methyl Methoxy Acetate as well as Methylacroline in presence of Sodium Methoxide & Solvent – Toluene and finally treated with Sodium Hydroxide followed by Sulphuric Acid to give the product as 5-Methyl 2,3-Pyridinedicarboxylic Acid.

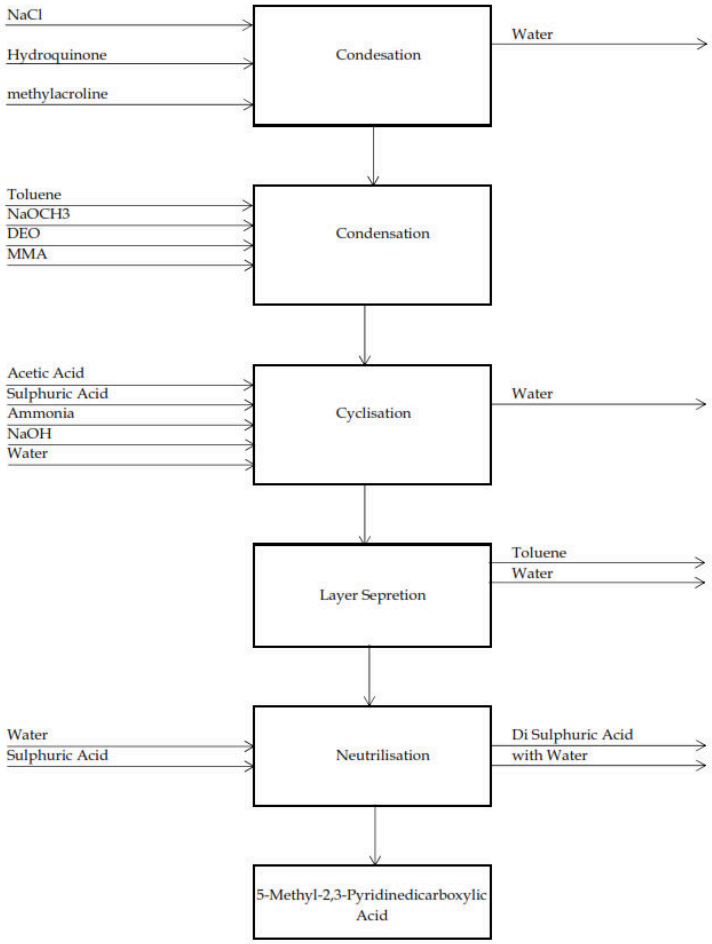
Chemical Reaction:



Methyl Methoxyacetate	Diethyl Oxalate	Methacrolein	Methyl pyridine dicarboxylic acid	Sodium Sulphate
MW 104.11	MW 54.02	MW 70	MW 181	MW 142

Product : **5-Methyl-2,3-Pyridinedicarboxylic Acid**

Flow Diagram:



Mass Balance / Material Balance:

5-Methyl 2,3-Pyridinedicarboxylic Acid					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Methylacroline	1375		5-Methyl 2,3-Pyridinedicarboxylic Acid	1000
2	Methyl Methoxy Acetate (MMA)	208		Waste Water to ETP	1180
3	Di Ethyl Oxalate (DEO)	3147		Dilute H_2SO_4	5754
4	Solvent - Toluene	6000		Recovered - Toluene	5880
5	Catalyst	48		Solvent Loss	120
6	Acetic Acid	2977		15% Na_2SO_4 Solution	2789
7	H_2SO_4	1786		Di Ethyl Oxalate Recovered & reuse to fresh batch	1395
8	Sodium Methoxide ($NaOCH_3$)	1184			
9	NaCl Solution	243			
10	Water	1150			
	Total	**18118**		**Total**	**18118**

7.12 3,4,5-Tri Methoxy Benzaldehyde

Brief Manufacturing Process:

Step-I

Para Cresol is first undergoes bromination reaction by liquid bromine to give 2,6 Di Bromo Para Cresol. During reaction HBr gas is generated which is scrubbed to water to get dilute HBr solution as saleable Bye-product.

Step-II

2,6 Dibromo Para Cresol is then undergoes methylation by Dimethyl Sulphate (DMS) in presence of Caustic Soda lye to get an intermediate product as 2,6 Dibromo 4-methoxy Toluene.

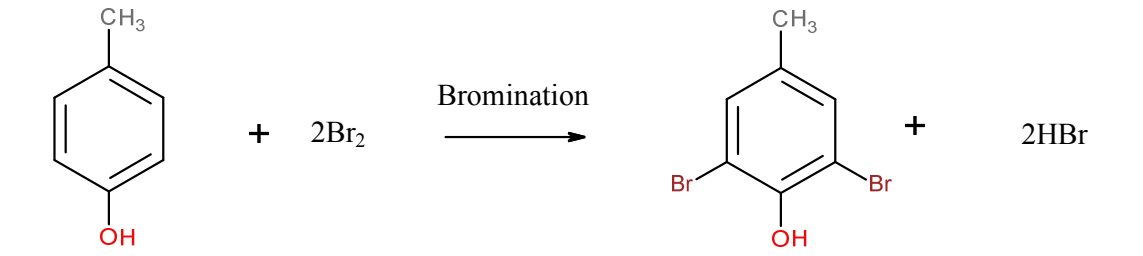
Step-III

2,6 Dibromo 4-methoxy Toluene further reacted with Sodium Methoxide in presence of Methanol-Solvent to give the final product as 3,4,5-Tri Methoxy Toluene.

Step-IV

3,4,5-Tri Methoxy Toluene finally undergoes oxidation by oxidizing agent as Manganese Oxide in presence of Sulphuric Acid to give the final product as 3,4,5-Tri Methoxy Benzaldehyde.

Chemical Reaction:

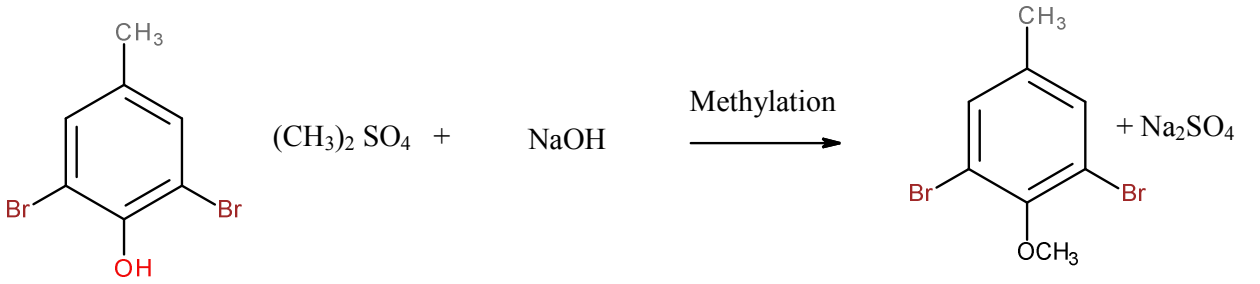


Para Cresol
M. W 108

Liquid Bromine
M. W 2×80

2,6 Di Bromo
Para Cresol
M. W 266

M. W 162



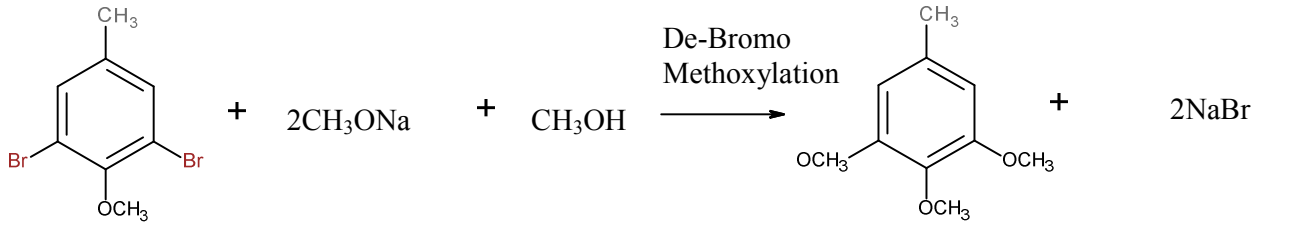
2,6 Di Bromo
Para Cresol
M. W 266

Dimethyl
Sulphate
M. W 126

Caustic
Soda
M.W 40

2,6 Dibromo
4-methoxy Toluene
M. W 280

M.W 142



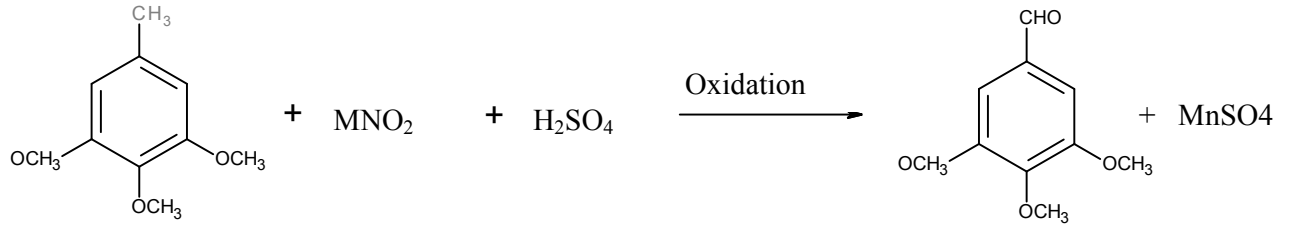
2,6 Dibromo 4-Methoxy Toluene M. W 280

Sodium Methoxide M. W 108

Methanol M. W 32

3,4,5-Tri Methoxy Toluene M. W182

M. W 2×103



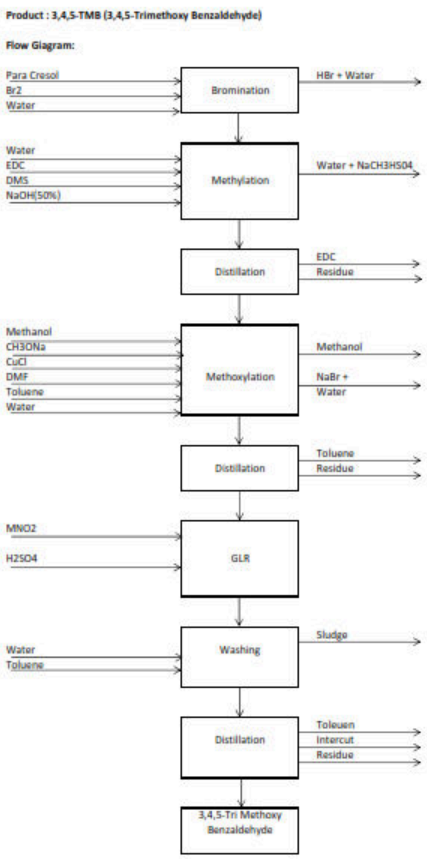
3,4,5-Tri Methoxy Toluene M. W182

Manganese Oxide M. W 87

Sulphuric Acid M.W 98

3,4,5-Tri Methox Benzaldehyde M. W 196

M. W 151



Mass Balance / Material Balance:

3,4,5-Tri Methoxy Benzaldehyde					
Input				**Output**	
Sr.No	**Raw Materials / Items**	**Kg/Batch**		**Product/By Products**	**Qty/Batch**
1	Para Cresol	693		3,4,5-Tri Methoxy Benzaldehyde	1000
2	Solvent- EDC	1100		Recovered Solvent- EDC	1060
3	Bromine (Liquid)	2060		Solvent Loss (EDC)	40
4	Sodium Methoxide (CH_3ONa)	680		28% Hydrobromic Acid	3720
5	Solvent - Methanol	1200		Recovered Solvent - Methanol	1150
6	Di Methyl Sulphate (DMS)	1572		Solvent Loss (Methanol)	50
7	Caustic Lye (NaOH) (50%)	1070		Sodium Bromine Salt	1290
8	Water	2900		Sodium Sulphate Wet Cake	1696
9	Catalyst	48		Aqueous Layer to ETP	1615
10	DMF	173		Distillation Residue	15
11	Solvent - Toluene	3000		Recovered Toluene	2950
12	MNO_2	600		Toluene Loss	50
13	H_2SO_4 (98%)	800		$MnSO_4$ Wet Cake	1260
	Total	**15896**		**Total**	**15896**

ANNEXURE-IV
WATER CONSUMPTION AND WASTE WATER GENERATION, FUEL & ENERGY REQUIREMENTS

Sr. No.	Category	Water Consumption (KL / Day)	Waste Water Generation (KL / Day)
1.	Domestic	5.0	4.0
2.	**Industrial**		
	Process	131.0	56.0
	Washing	3.0	3.0
	Boiler	63.0	5.0
	Cooling	98.0	5.0
	Scrubbing	5.0	5.0
3.	Gardening	5.0	0.0
Total Industrial		**300.0**	**74.0**
Grand Total		**310.0**	**78.0**

NOTE: NO CHANGE IN WATER POLLUTION LOAD DUE TO INCREASE IN PRODUCTS IN PRODUCT LIST.

ELECTRICITY REQUIREMENT

Total Power Requirement

Power required from DGVCL is 1000 KVA (Existing) + 1500 KVA (Proposed) = 2500 KVA

Standby power supply from D.G. set: 1050 KVA + (800 KVA + 600 KVA) = 2450 KVA

FUEL REQUIREMENT

Existing:

Coal – 3.5 MT/Day or Lignite-6.5 MT/Day

D.G.Set-5 MT/Month

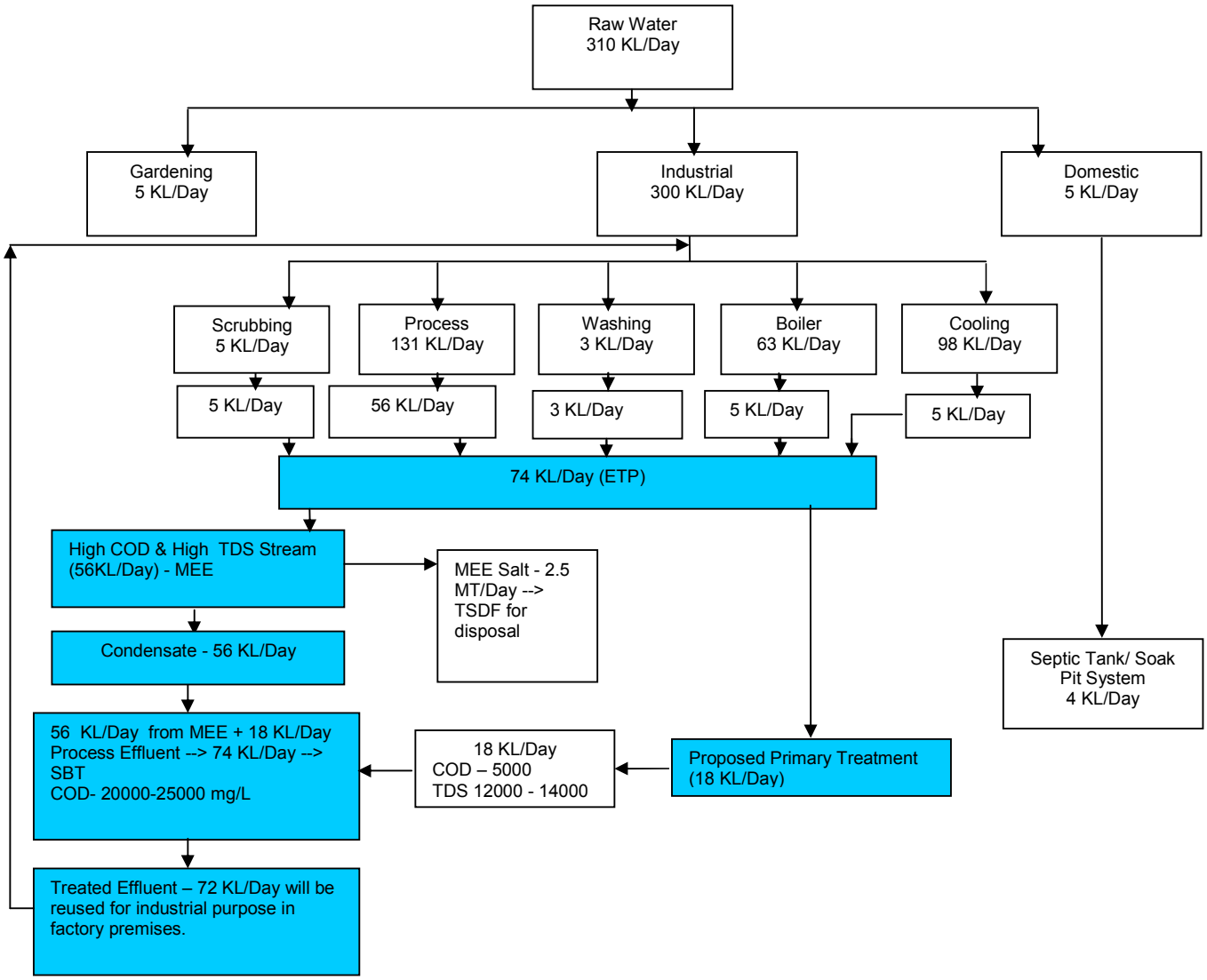
After proposed expansion:

Proposed Boiler: Coal- 130 MT/day or Lignite-150 MT/Day or Briquette-170 MT/Day

Thermopack: Coal- 20 MT/day or Lignite-25 MT/Day or Briquette-26 MT/Day

D.G. Set (HSD)- 210 Liter/Hr

Water Balance



ANNEXURE-V
DESCRIPTION OF EFFLUENT TREATMENT PLANT WITH FLOW DIAGRAM

The effluent (18 KL/Day) is collected in equalization tank with adequate capacity. Auto pH adjustment system is provided to correct the pH of effluent thereafter, in the desire range if required. Observing the characteristics, effluent is biodegradable. Hence biological treatment having Anaerobic and Aerobic phase is suggested. In order to limit the energy requirement to satisfy this organic load, it is thought fit to introduce an Aerobic stage has the advantages of Low energy requirement, low sludge volume, and most important, flexibility for variations in load. The effluent after Anaerobic Digestion is subjected to Aeration having diffused Air Aeration system equipped with blower and micro bubble diffusers. The sludge is separated in Lamella clarifies. Cooling tower blow down & Boiler blow down is added into lifting sump after lamella clarification. The treated effluent is subjected to Tertiary treatment, which shall comprise if chlorination for disinfection and coagulation for effective removal of suspended matter in Dual Media Filter. Then the treated effluent is sent to SBT.

Industry has installed Multi Effect Evaporator for the treatment of industrial effluent (in case of non operation of CETP) having capacity of 110 KL/Day. The condensate water generated from the MEE is used in to process.

List of Major Equipment in Effluent Treatment Plant:

Sr. No.	Particulates	Qty.	Capacity
1.	Oil & Grease Trap	02	1.00 KL each
2.	Collection / equalization tank	01	25 KL
3.	Neutralization tank	01	1 KL
4.	Primary settling Tank	01	7 KL
5.	Aeration Tank	01	75 KL
6.	Secondary settling Tank	01	6.5 KL
7.	Holding Tank and Chlorination	01	10 KL
8.	Mixed Bed Filter	01	2 KL/Hr.
9.	Sludge Drying Beds	03	2.0 m^2 each
10.	Sludge Storage Area	01	5.00 m^2
11.	Air Blower For Collection tank & Equalization tank and Aeration tank	02	5 HP
12.	Course diffuser	01 Lot	--
13.	Fine diffuser for Aeration tank	01 Lot	--
14.	Effluent Transfer pump	01	1 HP
15.	Sludge Recycle Pump	01	1 HP
16.	Filter feed pump	01	1 HP
17.	Piping, Valves and Fabrications	--	--
18.	Electrical Panel, Cabling, with energy meter.	--	--
19.	R.O. Plan	01	2.0 KL/Hr.
20.	Multi Effective Evaporate	01	01 KL/Hr.

DESCRIPTION OF MEE

Industry has installed Multi Effect Evaporator for the treatment of industrial effluent (in case of non operation of CETP) having capacity of 110 KL/Day. The condensate water generated from the MEE is used into process

Neutral effluent from Primary Treatment Plant is passed through 3 stages Evaporator System and the evaporated water is collected in an Evaporated Water Collection Tank and then recycled to plant after filtering through sand filter and carbon filter. The sludge from the evaporators is filtered through Nutsch Filter whereby solid filtered sludge is obtained and the filtrate is recycled back to process.

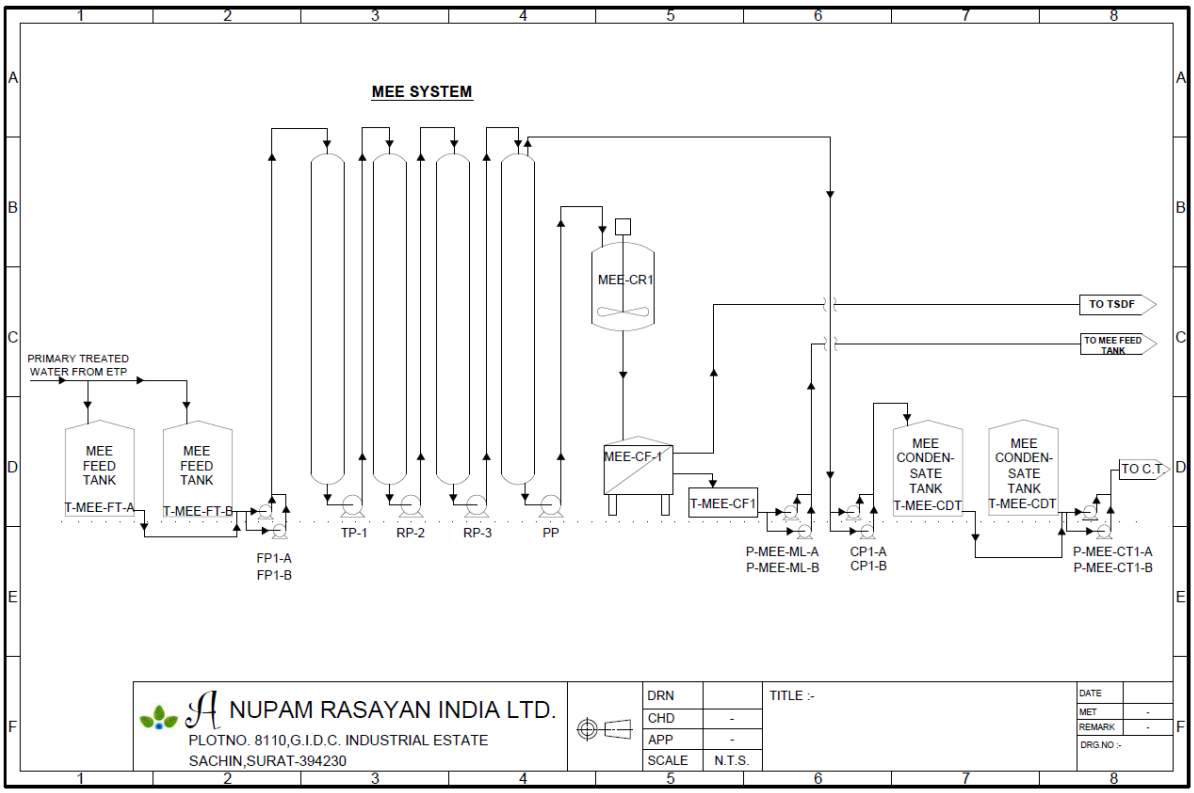
Multi stage evaporator (3-Stages) is a long tube forced circulation type evaporators wherein the first effect hot thermic oil is used to evaporate waste water. The evaporated water in the form of steam at 2 kg/cm^{2}g pressure is used for evaporating the effluent in the second stage at atmospheric pressure. Evaporated water from the second stage is used for evaporating waste water in the third stage under vacuum of 550 mmHg. Finally evaporated water from the third stage is condensed in the steam condenser using cooling water on other side. Condensate from all the three stages is collected in condensate receiving tanks, which is pure water and hence, reused in the process. Concentrated mass from each effect is collected in the crystallizer where, on cooling inorganic salts are precipitated along with organic contaminants. This mass is filtered in nutsch filter and filtrate is recycled back to process.

Design of MEE:

Basis of Design

Nos of Effects	:	3 Effects – (1 FF + 2 FC)
Waste Capacity	:	110 KLD
Feed Rate	:	5500 Kg/Hr (20 working hours per day)
Feed Concentration	:	12 % TDS
Feed Temperature	:	35 ^{0}C
Product Rate	:	1650 Kg/Hr
Product concentration	:	40%
Product Temperature	:	56 ^{0}C
Water evaporation	:	3850 Kg/Hr

MEE Flow Diagram:



Details of SBT:

Process Description

In coming pH is in the range of 6.0-7.0 and has to be adjusted with lime treatment before taking to the filter. Catalytic Advance Oxygen System is given as pretreatment. The process is a batch processes in which wastewater is pumped and applied onto the top surface of the Bioreactor as shown in Figure. The design has suitable provision for manual removal of suspended solids from the bio-filter surface. Distribution of wastewater over the media is achieved via pumping, piping and distribution arrangements. Separate distribution lines are provided for raw wastewater as well as recycle water. There are two modes of suspended solids handing. In one types, suspended solids can be applied on the surface directly and can be scrapped out manually may be once in a month. The top 2 inch layer can be replaced with the additive material which is easily available in the local open market. The suspended solids are filtered out which includes additives that combine with organic of waste to produce manure. In the second mode, solids can be retained in the settling tank and then can be removed mechanically. Water first percolates through the bioreactor media which in houses cultured media in 40-60 min and gets collected into the collection tank. It can then be pumped on to the media again (recycling) in order to achieve maximum solid liquid contact. The recirculation mode is provided for further polishing of the effluent. Dissolved organic and inorganic are oxidized and the water is purified further.

ProjectSummary

Capacity	:	75 cum/d
Recovery	:	More than 97% (>72cum/d)
Organic load	:	375 kg/d
COD load	:	1.5 T/d
Suspended Solid load:		22.5 kg/d
Typical Flow	:	6-7 cum/h
Area	:	approx.450 m^2
Output water Quality:		This water can be used cooling make up

SN	Parameter	Unit	Influent	SBT quality	GPCB limit
1	pH		6-9	7.0-7.5	6.5-7.5
2	TSS	mg/L	200-300	<30	<100
3	TDS	mg/L	12000-14000	-	-
4	BOD	mg/L	3000-5000	<100	<100
5	COD	mg/L	18000-20000	<200	<250
6	Ammonical N	mg/L	500-850	<20	<50
7	Oil & Grease	mg/L	20	<5	

Note: After appropriate dilution, the above mentioned composition can be achieved.

Estimate for 75 m^3/d Effluent recycling facility

SN	Item
I	**CIVIL**
	Note: ***Effluent after pH correction & Suspended Solids/Primary sludge removal will be made available to Raw Water Tank***
1.1	**Equalization Tank:** **(3x7x3) m** **MOC: RCC**
1.2	**Treated water Tank 1** : 20 cum effective volume (3.5x3.5x2) m MOC: RCC **Treated water Tank 2** : 20 cum effective volume (3.5x3.5x2) m MOC: RCC **Treated water Tank 3** : 20 cum effective volume (3.5x3.5x2) m MOC: RCC
1.3	**Bioreactor I**: (24Mx10 M)x 2.7M h **Bioreactor II**: (9Mx10 M)x 2.7M h **Bioreactor III**: (9Mx10M)x 2.7M h MOC: Existing RCC structure
1.4	Pump room: 10 sqm
1.5	Foundation work wherever applicable

II	MECHANICAL & ELECTRICAL
2.1	**P1, P2**: Flow 6.0-7.0 cum/h; 12 M head submersible; to lift water from Equalization Tank to AOS system: 2 Nos (1w + 1s)
2.2	**P3, P4**: Flow 6.0-7.0 cum/h; 12 M head submersible; to lift water from Equalization Tank to BR1: 2 Nos (1w + 1s)
2.3	**P5, P6**: Flow 6.0-7.0 cum/h; 12 M head submersible; to lift water from

	Equalization CT1 to BR2: 2 Nos (1w + 1s)
2.4	**P7, P8**: Flow 6.0-7.0 cum/h; 12 M head submersible; to lift water from CT2 to BR3: 2 Nos (1w + 1s)
2.5	**P9, P10**: Flow 6.0-7.0 cum/h; 15 M head submersible; ***Recycle pump cum*** ***Discharge***: to lift water from CT3 to BR3: 2 Nos (1w + 1s)
2.6	Distribution system grid: PVC header & laterals. Oil & Grease trap, level sensor, other accessories
2.7	Bar Screen
2.8	Control Panel for 11 pumps
2.9	4 core cable (200m)
2.10	Level sensor & control, indicators & alarms

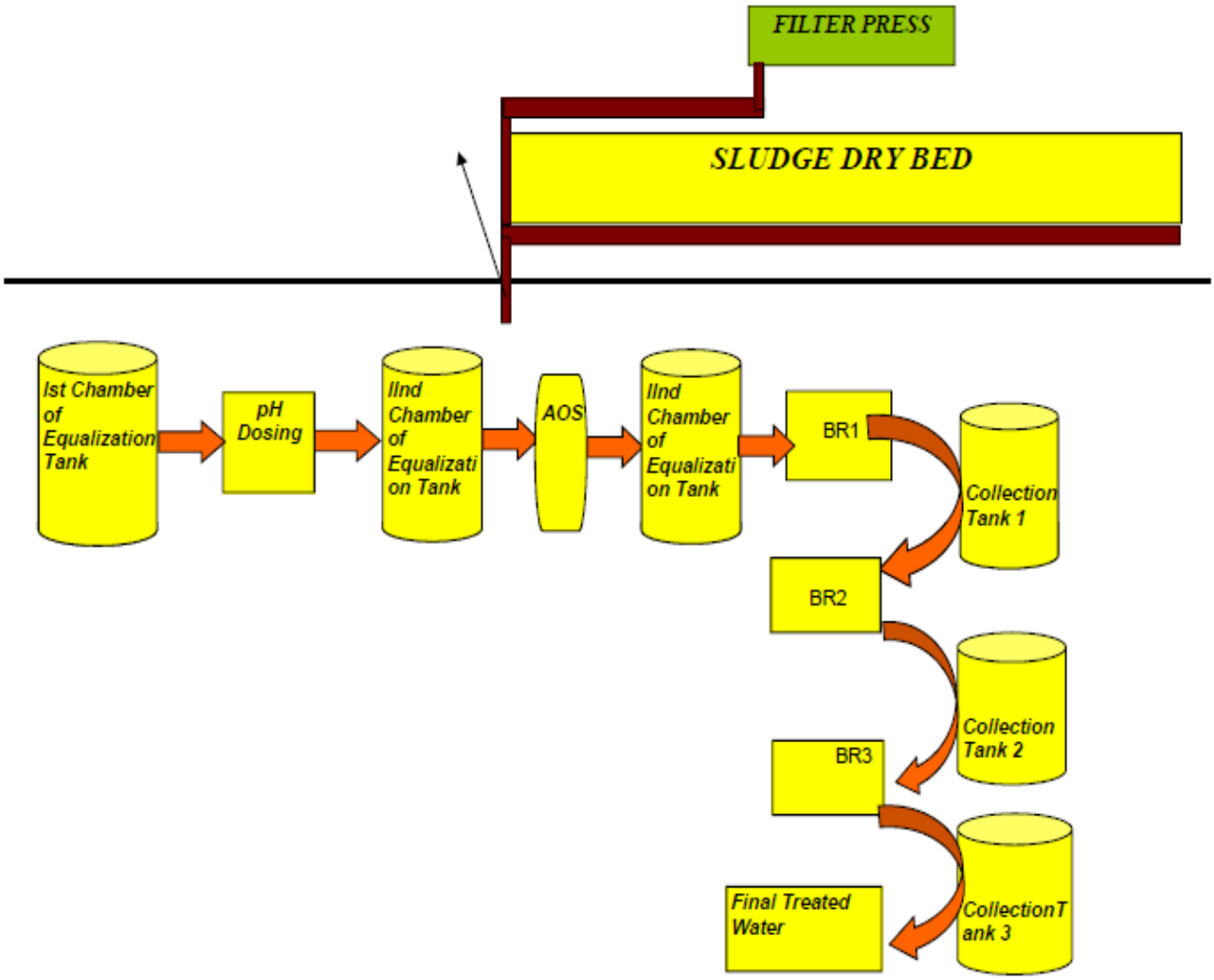
III	**CATALYTIC AOS SYSTEM**
3.1	AOS system for effluent treatment: with oxygen generator, closed loop
3.2	AOS contactor system
3.3	Catalytic system

IV	**BIOREACTOR MEDIA: SUPPLY & LAYING**
4.1	**Under drain: 10 to 40 mm** **Approx 250 cum**
4.2	Additive: Approx. 45 cum
4.3	Jute layer: in 3 layers (800 sqm)
4.4	Plantation work
5.5	**Special Media**

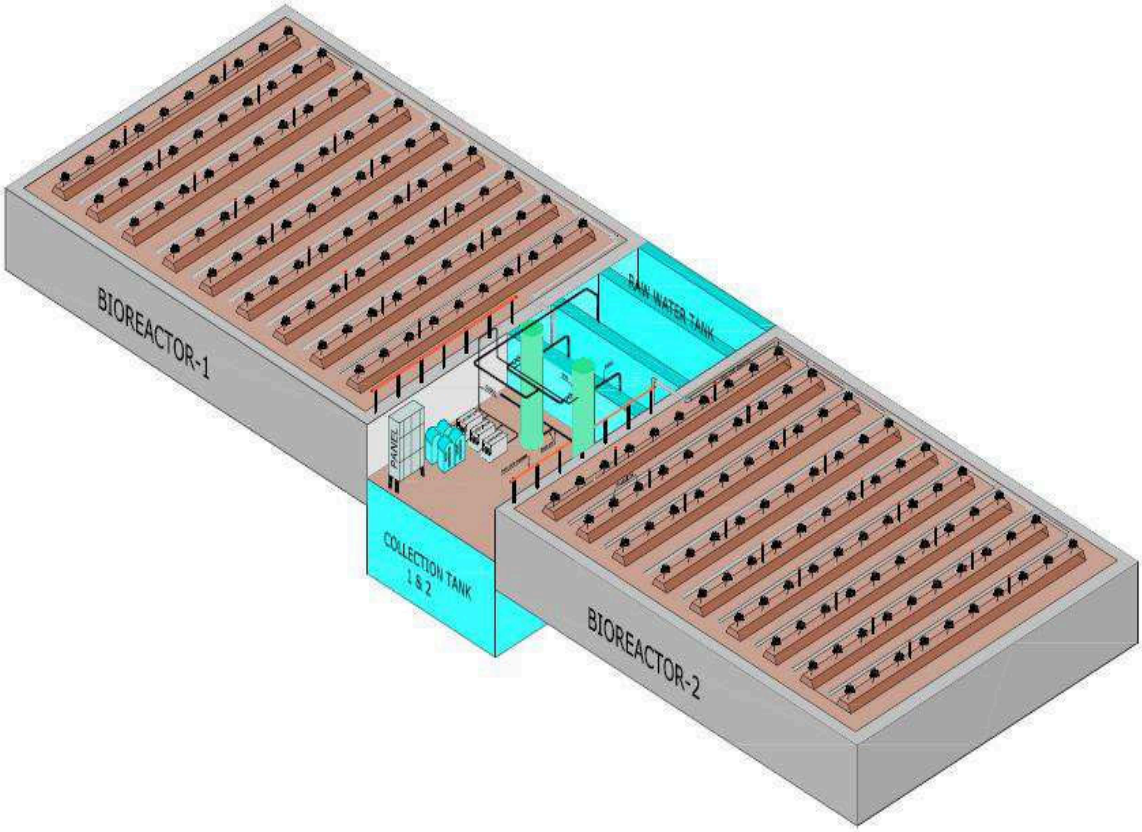
VI	TECHNOLOGY
6.1	Technology IP
6.2	Submission of Drawings
6.4	Overall supervision of the project

VII	ANNUAL Operation & Maintenance (for 1 yr: : Assumption 365 days/yr)
7.1	Power
7.2	Staff
7.3	Additives
7.4	Repair& replacement
7.5	O&M supervision
7.6	Analysis

Flow Diagram:



Schematic of Bioreactor:3D Model



ANNEXURE-VI

DETAILS OF HAZARDOUS WASTE GENERATION & DISPOSAL

Sr. No.	Waste Details	Waste Category	Quantity MT/Month			Mode of Disposal
			Existing	Additional	Total	
1.	ETP Sludge	34.3	15.83	0	15.83	Collection, Storage, Transportation and Disposal at Nearest TSDF
2.	Process waste Sludge Iron Sludge & Process Salts	26.1	1000	0	1000	Collection, Storage, Transportation and Disposal at Nearest TSDF or sell to Cement Industry
3.	Used Oil	5.1	50 Liter/Month	0	50 Liter/Month	Collection, Storage, Transportation And Selling to authorized recyclers.
4.	Discarded liners/Bags Carboy Drums Unit in No./Month	33.3	1003 Nos/Month	0	1003 Nos/Month	Collection, Storage, Transportation And Selling to authorized recyclers after decontamination.
5.	Salt from MEE	34.3	60	0	60	Collection, Storage, Transportation and Disposal at Nearest TSDF
6.	Distillation Residue	36.4	85.66	0	85.66	Collection, Storage, Transportation and sell to Cement Industry for Co-processing or Disposal at Common Incineration Site
7.	Fly Ash	--	80	0	80	Collection, Storage, Transportation and sell to brick manufacturers or disposal in TSDF.
8.	Dilute Sulphuric Acid	--	753.3	0	753.3	Sell to end user
9.	30 % HCl Solution	--	3375.0	0	3375.0	Sell to end user
10.	35 -40 % Nitrosyl Sulphuric Acid /	C1	986.0	0	986.0	Sell to end user

	Sodium Nitrite Solution					
11.	$POCl_3$	D2	265.0	0	255.0	Sell to end user
12.	Caustic Soda Solution (30% to 40%)	C7	470.0	0	470.0	Sell to end user
13.	Ammonium Chloride	--	55.0	0	55.0	Sell to end user
14.	Ammonium Sulphate Salt	D2	150.0	0	150.0	Sell to end user
15.	20-28 % HBr Solution	C12	0	10920	10920	Sell to end user
16.	Sodium Bromide Salt	--	0	3570	3570	Sell to end user
18.	Sodium Sulphate	C1	0	6093	6093	Collection, Storage, Transportation and Disposal at Nearest TSDF
19.	8-10 % Sodium Hypochlorite Soln	--	0	600	600	Sell to end user
20.	30 -40 % Dilute Nitric Acid		0	20	20	Sell to end user
21.	Sulphur Dichloride		0	1090	1090	Sell to end user

ANNEXURE-VII

DETAILS OF AIR POLLUTION CONTROL SYSTEM

(A) Details of Flue Gas Stack; Stack Attached To Steam Boiler & Thermic Fluid Heater (Existing)

SOURCES OF GASESOUS EMISSIONS	**STACK**		
Fuel Used	Natural Gas/LDO -150 KL/Day or Coal 9 MT/Month		
Capacity	2.5 MT/hour		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 mg/Nm^3	94 mg/Nm^3	150 mg/Nm^3
Stack Height	18 meters		
Stack Diameter at the Top	200 MM		
Air Pollution Control System	--		

(B) Details of Flue Gas Stack; Stack Attached To D.G.Set (Existing)

SOURCES OF GASESOUS EMISSIONS	**STACK**		
Fuel Used	HSD		
Capacity	600 KVA		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 mg/Nm^3	94 mg/Nm^3	150 mg/Nm^3
Stack Height	11 meters		
Stack Diameter at the Top	150 MM		
Air Pollution Control System	--		

(C) Details of Flue Gas Stack; Stack Attached To Steam Boiler, Hot Air Generator – I, II (Existing)

SOURCES OF GASESOUS EMISSIONS	**STACK**		
Fuel Used	Coal/Lignite/Briquette		
Capacity	12 MT/Hr		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 mg/Nm^3	94 mg/Nm^3	150 mg/Nm^3

Stack Height	38 meters
Stack Diameter at the Top	1000 MM
Air Pollution Control System	ESP with Water scrubber as well as online monitoring system

(D) Details of Flue Gas Stack; Stack Attached to Thermic Fluid Heater (Existing)

SOURCES OF GASESOUS EMISSIONS	**STACK**		
Fuel Used	Natural Gas/LDO -150 KL/Day or Coal 9 MT/Month		
Capacity	2000 U		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 mg/Nm^3	94 mg/Nm^3	150 mg/Nm^3
Stack Height	25 meters		
Stack Diameter at the Top	400 MM		
Air Pollution Control System	--		

(E) Details of Flue Gas Stack: Stack Attached To D.G. Set (Existing)

Sources of Gaseous Emissions	D.G. Set (800 KVA + 600 KVA)		
Fuel Used	HSD		
Stack Height	11 Meters		
Stack Diameter at The Top	200 MM		
Type of Emissions	SO_2	NOx	SPM
Permissible Limits	262 mg/Nm^3	94 mg/Nm^3	150 mg/Nm^3

(F) Stack Attached To Process Vent (Existing)

SOURCES OF PROCESS EMISSIONS	**VENT**
Source of emission	Process Vent
Type of Emissions	HCl
Permissible Limits	20 mg/Nm^3
Stack Height	11 meters
Stack Diameter at the Top	200 MM

Air Pollution Control System	Two Stage scrubber

(G) **Stack Attached To Process Vent (Existing)**

SOURCES OF PROCESS EMISSIONS	**VENT**
Source of emission	Process Vent
Type of Emissions	SO2
Permissible Limits	40 mg/Nm^3
Stack Height	11 meters
Stack Diameter at the Top	200 MM
Air Pollution Control System	Two Stage scrubber

(H) Stack Attached To Process Vent (Existing)

SOURCES OF PROCESS EMISSIONS	**VENT**
Source of emission	Process Vent
Type of Emissions	Cl2
Permissible Limits	9 mg/Nm^3
Stack Height	11 meters
Stack Diameter at the Top	200 MM
Air Pollution Control System	Two Stage scrubber

Note: No additional stack/vent required.

ANNEXURE-VIII
DETAILS OF HAZARDOUS CHEMICALS STORAGE & HANDLING

Sr. No.	Name of Hazardous Chemical	Type	MOC	Size KL	No	Dimension
1	DEG/PEG	liquid	MS	20	1	5.3 m x 2.5 m
2	Sulphuric Acid	liquid	MS	10	1	4.0 m x 2.0 m
3	Hydrochloric Acid	liquid	MS	20	2	5.3 m x 2.5 m
4	Nitric Acid	liquid	Aluminium coated tank	10	1	4.0 m x 2.0 m
5	Bromine	liquid	MS	5	1	2.5 m x 1.5 m
6	Toluene	liquid	MS	20	1	5.3 m x 2.5 m
7	MIBK	liquid	MS	20	2	5.3 m x 2.5 m
8	Thionyl Chloride	liquid	MS	10	1	5.0 m x 1.8 m
9	EDC	liquid	SS 304	20	2	5.3 m x 2.5 m
10	o-Xylene	liquid	MS	20	1	5.3 m x 2.5 m
11	Toluene	liquid	MS	20	1	5.3 m x 2.5 m
12	Methanol	liquid	MS	20	1	5.3 m x 2.5 m
13	Ethyl Acetate	liquid	MS	20	1	5.3 m x 2.5 m
14	Acetic Acid	liquid	MS	20	1	5.3 m x 2.5 m
15	DMF (Dimethyl Formamide)	liquid	MS	20	1	5.3 m x 2.5 m
16	Sodium Hydroxide	Solid	Bags	--	--	--
17	Chlorine	Gas	Tonner/through Pipeline from the neighboring manufacturer	900 Kg	10	--
18	3- Nitro -4- Methyl Benzoic Acid	Liquid	Drum	200 Liter	10	--
19	2- Methyl -5- Nitro Phenol	Liquid	Drum	200 Liter	10	--
20	4-Chloro Benzoic Acid	Liquid	Drum	200 Liter	10	--
21	m-Dichlorobenzene	Liquid	Drum	200 Liter	10	--
22	2,5 – Dimethyl Aniline	Liquid	Drum	200 Liter	10	--
23	2,4 – Dichloro Phenol	Liquid	Drum	200 Liter	10	--
24	Dichloro Nitro Benzene	Liquid	Drum	200 Liter	10	--
25	2- (4 – Hydroxy Phenoxy) Propionic Acid	Liquid	Drum	200 Liter	10	--
26	Dimethyl sulfate	Solid	Bags	--	--	--
27	Phenol	Liquid	Drum	200 Liter	10	--

ANNEXURE-IX
NOISE LEVEL AT DIFFERENT PLACES WITHIN THE PREMISES

ANNEXURE-X
SOCIO-ECONOMIC IMPACTS

1) Employment Opportunities

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

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

2) Industries

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

3) Public Health

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

4) Transportation and Communication

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

ANNEXURE-XI

PROPOSED TERMS OF REFERENCE FOR EIA STUDIES

1. Project Description

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

2. Description of the Environment and Baseline Data Collection

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

3. Socio Economic Data

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

4. Impacts Identification And Mitigatory Measures

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

5. Environmental Management Plan

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

6. Risk Assessment

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

- Disaster Management Plan.

7. **Information for Control of Fugitive Emissions**
8. **Post Project Monitoring Plan for Air, Water, Soil and Noise.**
9. **Information on Rain Water Harvesting**
10. **Green Belt Development plan**