3 ANNEXURES

Annexure 1: Production Details

Table 1: List of Products with Capacity

Sr. No.	Name of Products	Production capacity (MTPA)
1	Styrene Acrylate Co-Polymers Solids (Resins) & Styrene maleic anhydride solid/derivatives & Styrene AA Terpolymer	50,000
2	Styrene Acrylate Co-Polymers liquid /Emulsions / solutions / PU Emulsions (Resins)	45,000
3	Ethylene acrylic / acrylate co-polymer	15,000
4	PHOTO INITIATORS (Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide)	1000
5	UV Monomer (Ester of diol and acrylates)	10,000
6	CAB (CELLULOSE ACETATE BUTYRATE)	3000
7	Isothiazolinones	10,000
8	Polyester Resin (ester of poly ethylene and aromatic acid)	10,000
9	Alkyl Ketene Diamer (AKD)	20,000
	Total	**1,64,000**

Annexure 2: Copy of Plot Holding Letter

भारतीय गैर न्यायिक

भारत

पचास रुपये

रु.50

FIFTY RUPEES

Rs.50

सत्यमेव जयते

INDIA

INDIA NON JUDICIAL

ગુજરાત गुजरात GUJARAT

AF 819649

NOTARIAL NOTARIAL NOTARIAL NOTARIAL

S. R. NO: 4421 DATE: 21/2/19

NAME: Shiva Pharmachem Ltd

ADDRESS: Plot No. 450 to 466 & 502 Near Solaris Chemtech Kurar Khadi, Vadodara

BY: Mitesh

NAME & ADDRESS:
HARSHIDA Y. RANA
PANIGATE RANA
OPP. POLICE STATION
VADODARA-390 001.

Nyaymandir Court

(STAMP VENDER'S
LICENCE NO. 16
VADODARA.

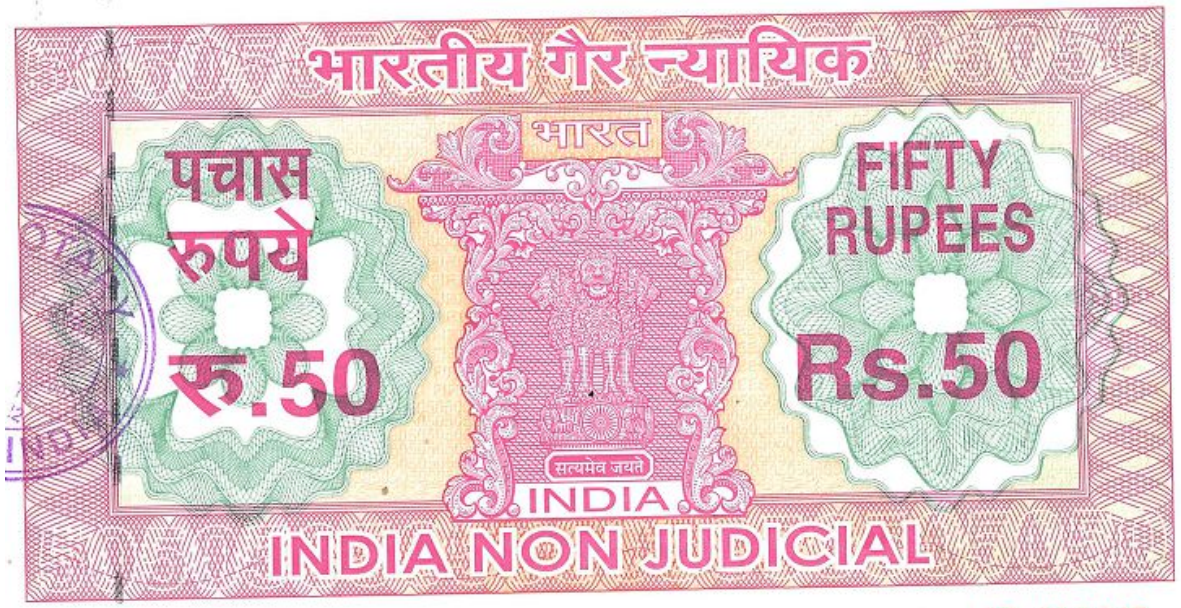
Regd. No.: 2326
Date: 25/07/2019

LEASE AGREEMENT

THIS AGREEMENT OF LEASE ("Agreement ") is made and entered into at Vadodara on this 1st Day of April 2019. ("Execution date ")

For Shiva Pharmachem Limited
Authorised Signatory

For SHIVA PERFORMANCE MATERIALS PVT. LTD.
Director / Authorised Signatory



ગુજરાત गुजरात GUJARAT AF 819642

ENG. E. R. NO: 4414 DATE: 21/2/19
NAME: Shiva pharmachem Ltd.
ADDRESS: plot no. 458 to 460 & 502 near Solanz Chemtech Karakhadi Vadodara
BY: Mitesh

NAME & ADDRESS:
HARSHIDA Y. RANA
PANIGATE RANAWAS,
OPP. POLICE STATION
VADODARA-390 001.

Nyayamandir Court
(STAMP VENDOR)
LICENCE NO.
VADODARA

NOTARY GOVT. OF INDIA

BETWEEN

Shiva Pharmachem Limited (CIN No.- U24231GJ1999PLC035615), having their address at 9th Floor, ABS Tower, Old Padra Road, Vadodara herein after referred to as the **"Lessors"** (Which expression shall unless it be repugnant to context or the meaning thereof be deemed to mean and include their heirs' legal representatives, assigns and successors etc.) of ONE PART.

For Shiva Pharmachem Limited
Authorised Signatory

For SHIVA PERFORMANCE MATERIALS PVT. LTD.
Director / Authorised Signatory

AND

Shiva Performance Materials Private Limited (CIN No.- **U24100GJ2013PTC078001**), company incorporated and registered under the provisions of the companies act, 1956 and having its registered office at 9th Floor, ABS Tower, Old Padra Road, Vadodara hereinafter referred to as the **"Lessee"** (which expression shall, unless it be repugnant to the context or the meaning there be deemed to mean and include its permitted assigns and successors etc.) of the **"OTHER PART;**

The **"Lessor"** and **"Lessee"** are hereinafter for the sake of brevity and convenience individually referred to as the **"Party"** and collectively as **"Parties"**

WHEREAS:

A. The Lessors are absolutely seized and possessed of otherwise well and sufficiently entitled to right and interest in the land bearing survey no 447 to 460 & 502, EPC Canal Road, Backside of Shiva Pharmachem Limited, Village: Karakhadi, Taluka: Padra, District: Vadodara admeasuring 102945 square meter land.

B. The Lessee is desirous of taking on lease part of the property admeasuring ~~23762~~ 26133 Square meters (Twenty-~~three~~ six thousand ~~seven~~ one hundred ~~sixty two~~ Thirty three square meter only). (Hereinafter referred to as the "said property ") and more particularly described herein First Schedule and has approached the Lessors to grant on Lease the said property. The said property is more particularly is annexed hereto as Annexure A. Survey No. 452, 453 Part A of 455, 456 & 457 are leased to Shiva Performance materials private Limited

C. The Lessee has requested the Lessor to allow it to use and occupy the said property on a strictly on leasehold basis as stipulated under this agreement without in any way creating any other right, title or interest in favor of the Lessee for consideration of factory which the lessee shall use the premises for setting up Specialities chemicals manufacturing unit Called "Shiva Performance Materials Private Limited Unit II ("Purpose").

For Shiva Pharmachem Limited
Authorised Signatory

For SHIVA PERFORMANCE MATERIALS PVT. LTD.
Director / Authorised Signatory

D. The Lessee acknowledges that the Lessors are absolutely seized and possessed of the said property and that the Lessors have permitted/granted the Lessee the use of the said property on lease subject to compliance of this agreement.

E. Relying on the various representation of the lessee in this agreement, the Lessors have agreed to demise leasehold right to lessee to occupy and construct factory building on the said property on the terms and condition and in the manner hereinafter appearing.

NOW THIS AGREEMENT WITNEESSTH AND IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES HERE TO AS FOLLOWS: -

1. GRANT OF LEASE AND PERMITTED TO USE.

a. Based on the declaration and assurances , given by the parties hereto the lessee hereby agrees , assures, confirms, declares and undertakes to use the said property as Lessee only(and not in any other capacity or as acquiring any interest either as a tenant or irrevocable Lessee or any other right of any nature whatsoever or otherwise howsoever) and subject to the due performance and observance/compliance of all terms , condition and covenants herein contained and subject to the payment of the lease rent ant all other payments to be made by the Lessee as mentioned herein, the Lessors hereby permit the Lessee to use and occupy, exclusively , the said property for the Lease Term on the terms and condition contained in this Agreement .

b. The lessee shall use the said property for setting up for constructing building thereon for setting up setting up Specialities chemical manufacturing unit called "Shiva Performance Materials Private Limited Unit II.

c. The Lessee shall have access to the said property at all times during 24*7 during the subsistence of this agreement.

d. The Lese contemplated in this agreement is confined to the use of the said property hereto by the Lessee as set out in this Agreement and neither amounts to nor is it intended to create any, tenancy, sub tenancy rights, irrevocable license, or as transferring any right, title and interest of any nature whatsoever in favor of the Lessee in, over or upon the said property

For Shiva Pharmachem Limited
Authorised Signatory

For SHIVA PERFORMANCE MATERIALS PVT. LTD.
Director / Authorised Signatory

THE FIRST SCHEDULE HEREINABOVE REFERRED TO:

(Description of said property)

Southern side : Land of Shiva Pharmachem Limited

Easter side : Land of Shiva Pharmachem Limited

Western side : Road and Neogen Chemical Plant

Norther side : Plant of Shiva Pharmachem Limited

WITNESS WHEREOF the parties hereto have hereunto set and subscribed their respective hand and seal the day and year first hereinabove written.

SIGNED, SEALED AND DELIVERED BY THE WITHIN NAMED "LESSORS'

For Shiva Pharmachem Limited

Authorised Signatory

In the presence of

1. HEMANSHU R. BAKSHI

SIGNED, SEALED AND DELIVERED BY THE WITHIN NAMED "LESSEE'

In the presence of

2. Kushan Modi

For SHIVA PERFORMANCE MATERIALS PVT. LTD.

Director / Authorised Signatory

NOTARY S.Y. GAJIAWALA VADODARA CITY (GUJ. STATE) REG. NO. 4586/2007 EXP. DATE: 11-9-2022 GOVT. OF INDIA

Annexure A

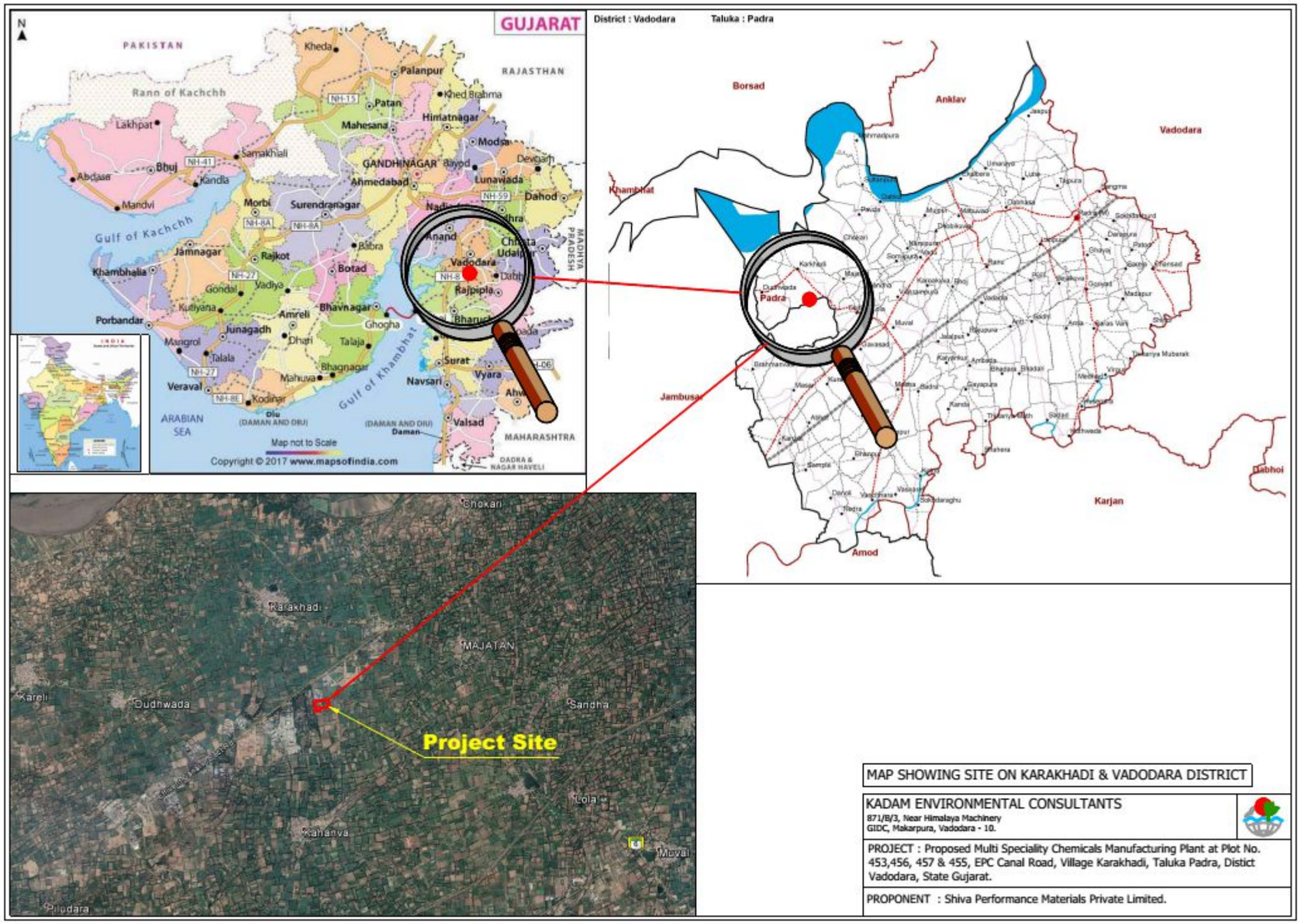
Plan of Said Properly

BEFORE ME

25/7/2.19

S.Y. GAJIAWALA NOTARY

Annexure 3: Site Location Map



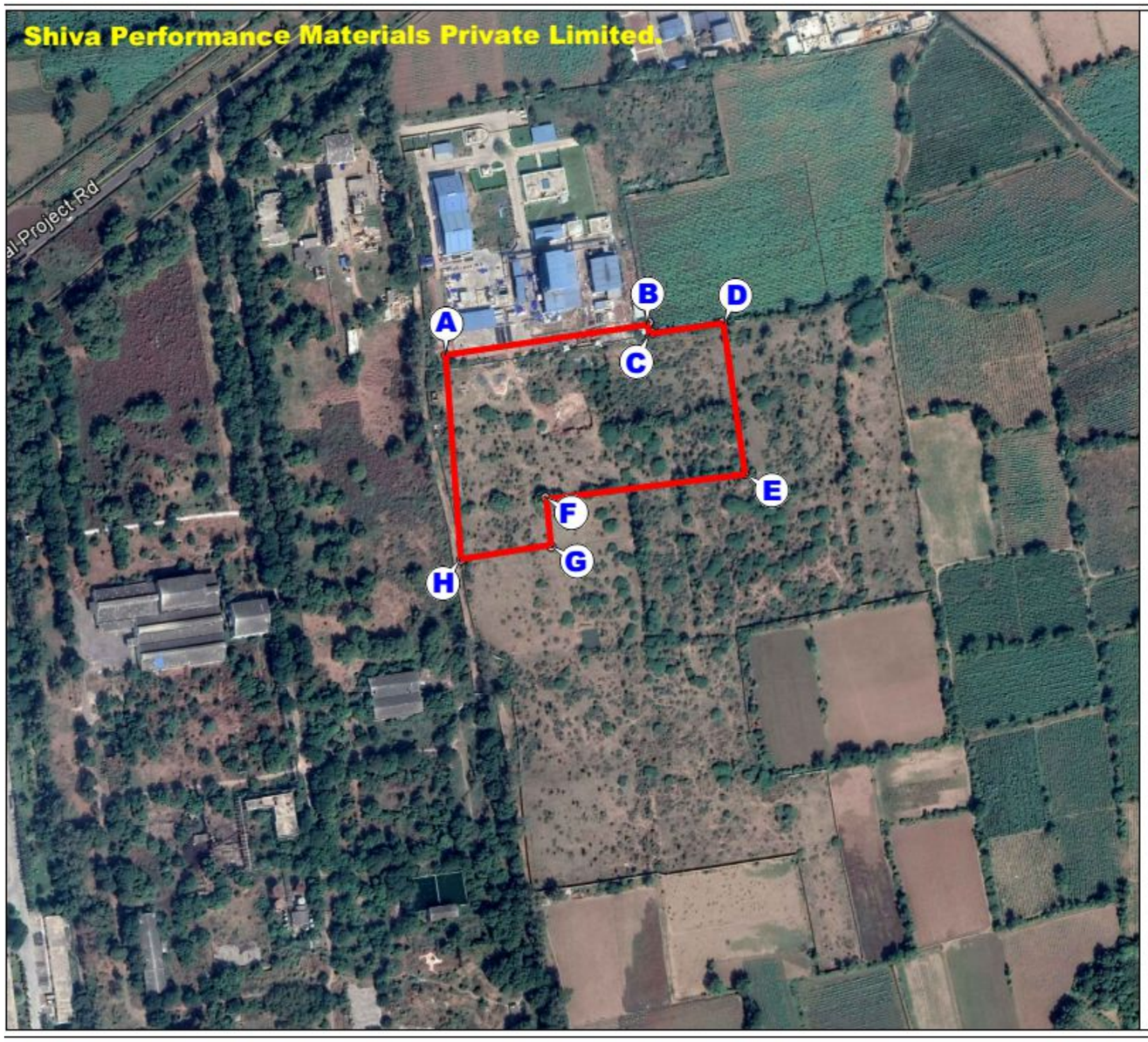
MAP SHOWING SITE ON KARAKHADI & VADODARA DISTRICT

KADAM ENVIRONMENTAL CONSULTANTS
871/B/3, Near Himalaya Machinery
GIDC, Makarpura, Vadodara - 10.

PROJECT : Proposed Multi Speciality Chemicals Manufacturing Plant at Plot No. 453,456, 457 & 455, EPC Canal Road, Village Karakhadi, Taluka Padra, Distict Vadodara, State Gujarat.

PROPONENT : Shiva Performance Materials Private Limited.

Annexure 4: Site Boundary Map



Project Site Boundary

	LATITUDE	LONGITUDE
A	22°11'46.13"N	72°54'36.08"E
B	22°11'46.93"N	72°54'41.45"E
C	22°11'46.67"N	72°54'41.54"E
D	22°11'46.94"N	72°54'43.40"E
E	22°11'43.23"N	72°54'43.98"E
F	22°11'42.66"N	72°54'38.71"E
G	22°11'41.45"N	72°54'38.87"E
H	22°11'41.13"N	72°54'36.48"E

N

SCALE = N.T.S.

Annexure 5: Site Layout Map

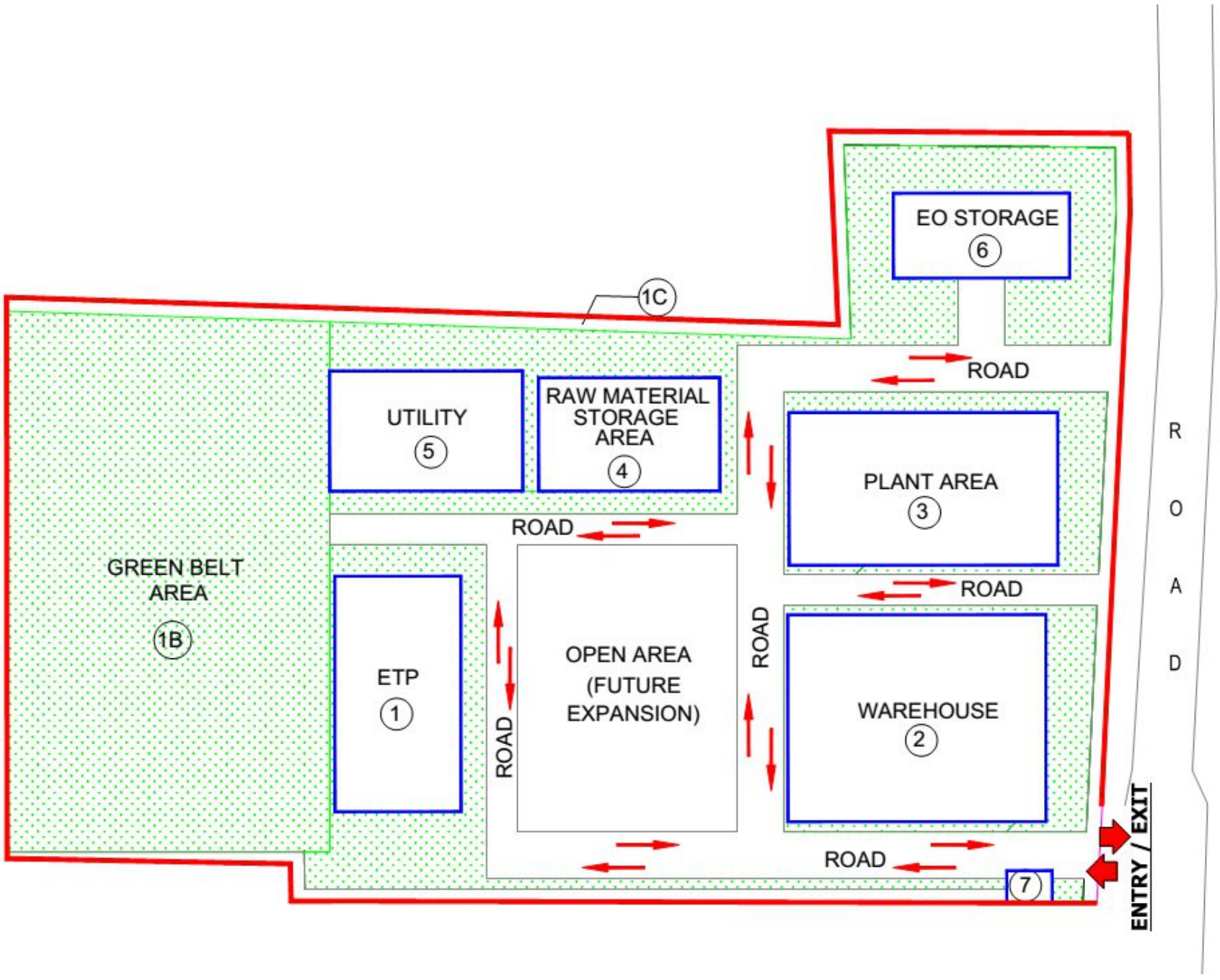


Table 2: Area Break up at Site

S. No.	Title	Area, m^2	% of total Area
1	ETP	1117	4.27
2	Warehouse	2010	7.69
3	Plant Area	1544	5.91
4	Raw Material Storage Area	773	2.96
5	Utility Area	872	3.34
6	EO Storage	564	2.16
7	Security Cabin	55	0.21
8 (1B)	Greenbelt Area	11522	44.1
9 (1C)	Roads	5296	20.3
10	OPEN AREA (Future Expansion)	2380	9.11
	Total	**26133**	**100**

Annexure 6: Manufacturing Processes with material balance

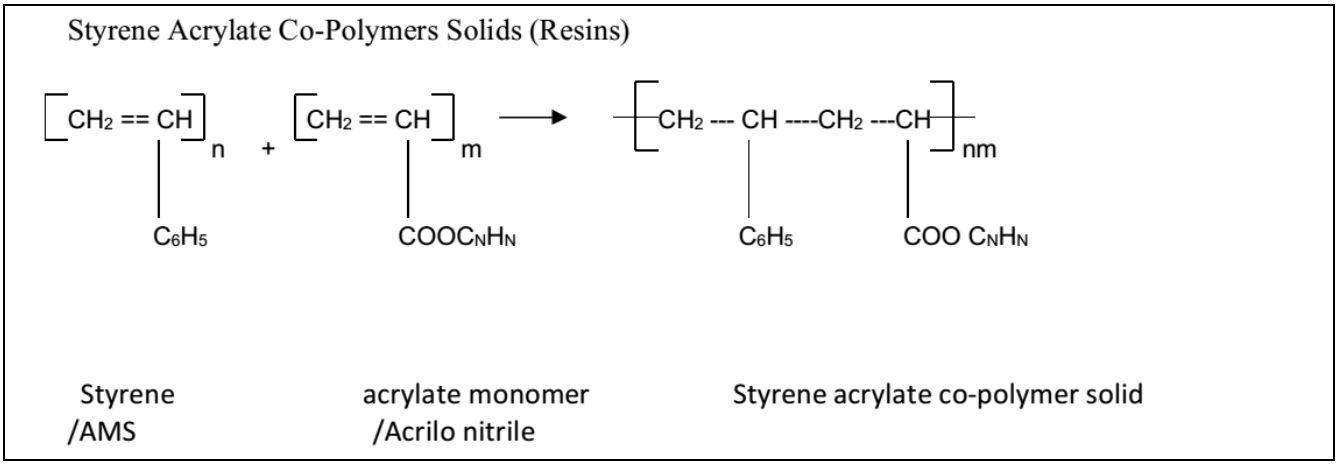
1. Styrene Acrylate Co-Polymers Solids (Resins) & Styrene maleic anhydride solid/derivatives & Styrene AA Terpolymer

Process Description:

Styrene and Acrylate Monomer are fed into Reactor 1 and mixed. Then, Solvent, recovered solvent, mixture of recovered solvent, initiator and cross-linking agent are charged in Reactor 2. Mixing and heating is done for some time. Now Reactor 1 mixture is transferred to reactor 2. Now this whole mass is boiling for few times. Vapor gets evaporated while monomer and solvent will condensate continuously. Recovered solvent and monomer will be collected and will be uses in next cycle. Solid mass will collected and crushed to convert into solid powder. Solid Powder will be packed.

In this process based on requirements, AMS will replace to Styrene and acrylate may replace with another acrylate/ Propene nitrile/Maleic anhydride based on requirements.

Chemical Reaction:



Process Flow diagram:

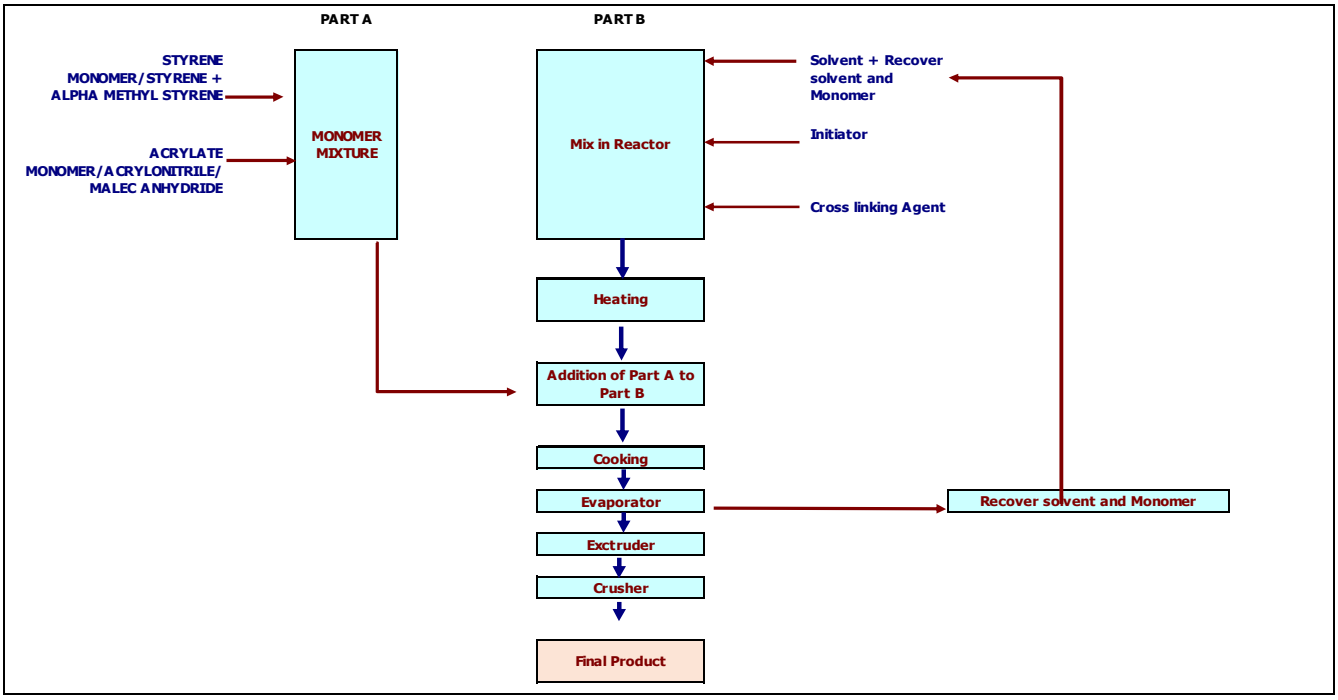


Table 3: Material Balance of Styrene Acrylate Co-Polymers Solids

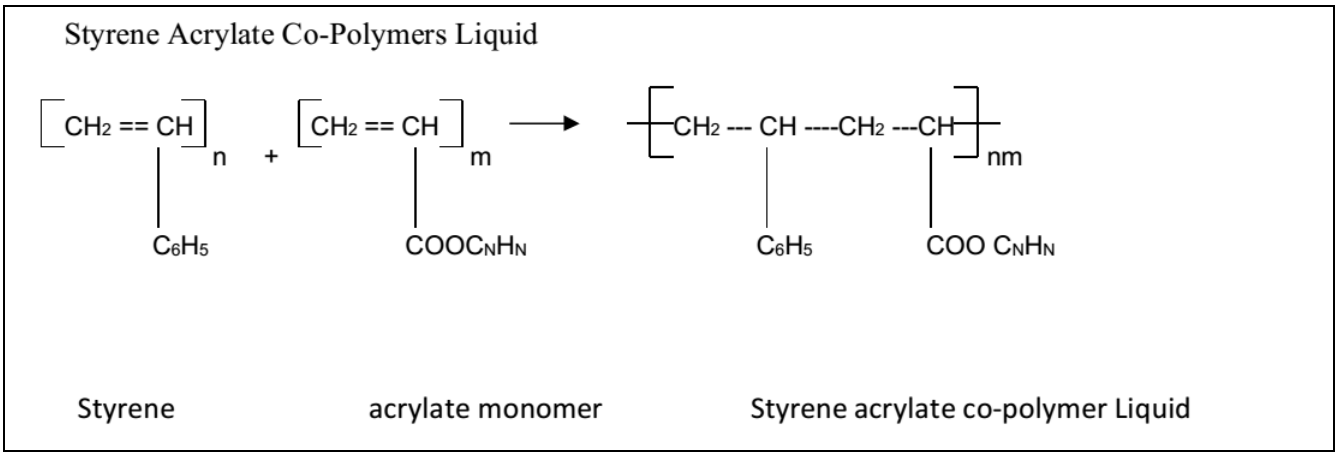
S. No.	Input/MT of Product					
	Raw Materials				**Quantity (MT/MT)**	
1	Styrene Monomer				0.722	
2	Acrylate Monomer/Maleic anhydride/Propene nitrile				0.310	
3	Solvent + Recover solvent				0.516	
4	Initiator i.e. BPO				0.003	
5	Cross Linking Agent i.e. DVB or may other				0.002	
	Total				**1.55**	
S. No.	**Output/MT of Product**					**Remark**
	Product	**Liquid Effluent**	**Air Emission**	**Recovery/ Product**	**Solid waste**	
1	Styrene Acrylate Co-Polymers Solid (Resins)			1		Product
2	Recover solvent + Monomer			0.55		To be used in next cycle
3	Solvent loss during recovery		0.0031			To Atmosphere
Total		**0.0**	**0.0031**	**1.5**	**0.0**	
		1.55				

2. Styrene Acrylate Co-Polymers liquid /Emulsions / solutions / PU Emulsions (Resins)

Process Description:

Styrene and acrylate monomer are charged in Reactor 1 and mixed. Then, Charge Initiator, Surfactants/Emulsifier and water in Reactor 2. Reaction mass is mixed and heated. Mass of Reactor 1 will be added slowly in reactor 2. Now Cool mass and filter it. Filtrate material is final product and will be packed in drum/IBC Container.

Chemical Reaction:



Process Flow diagram:

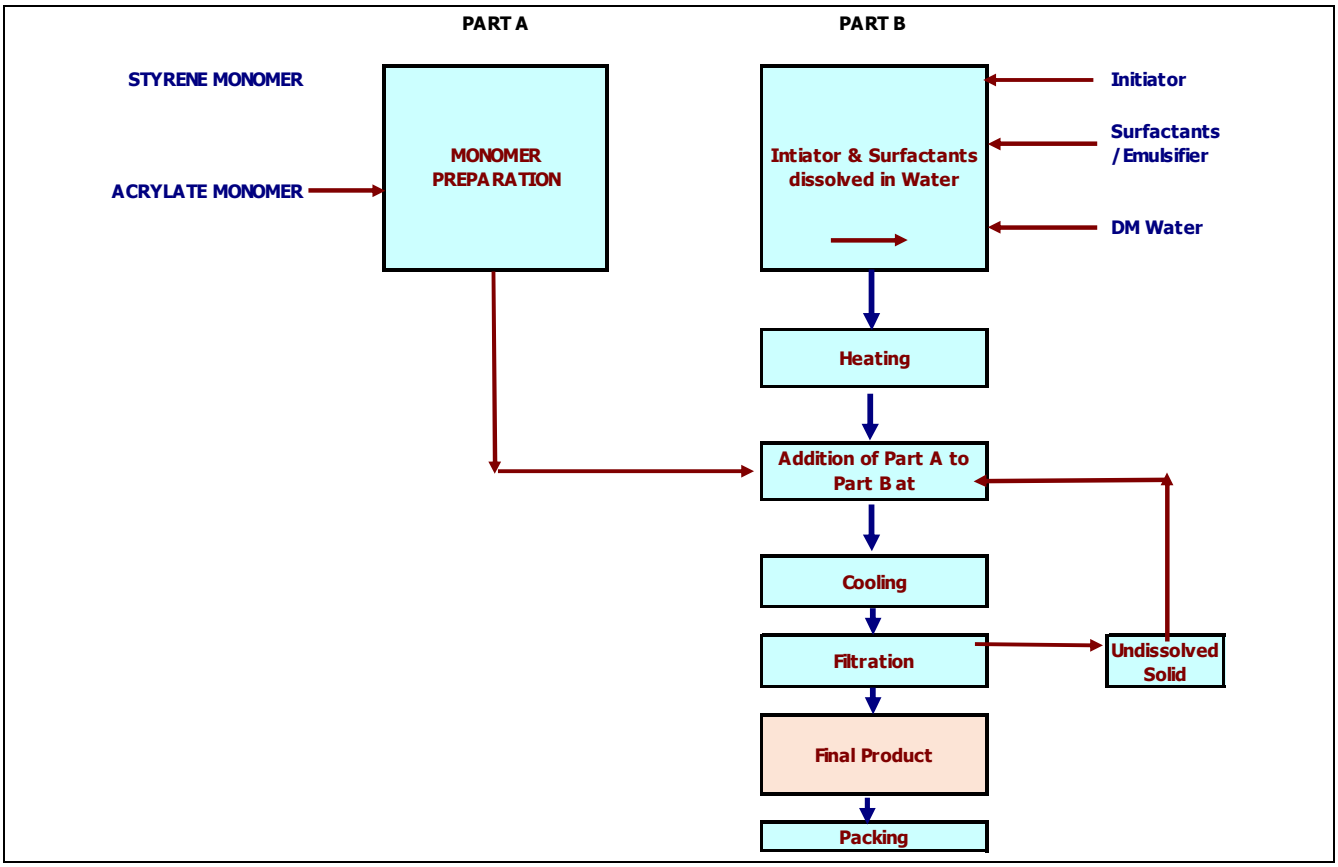


Table 4: Material Balance of Styrene Acrylate Co-Polymers

S. No.	Input/MT of Product	
	Raw Materials	**Quantity (MT/MT)**
1	Styrene Monomer	0.21
2	Acrylate Monomer	0.21
3	Surfactant	0.03
4	Initiator	0.025
5	DM Water	0.525
	Total	**1.000**

S. No.	Output/MT of Product					Remark
	Product	**Liquid Effluent**	**Air Emission**	**Recovery/ Product**	**Solid waste**	
1	Styrene Acrylate Co-Polymers liquid (Resins)	-		1		Product
Total		**0.0**	**0.0**	**1.0**	**0.0**	
		1.0				

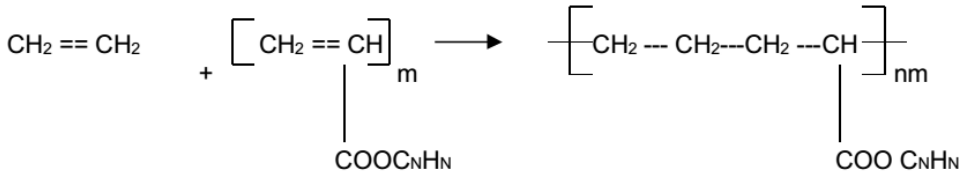
3. Ethylene acrylic / acrylate co-polymer

Process Description:

Ethylene and acrylate Monomer/Acrylic acid are fed in Reactor 1 and mixed. Then Initiator, Surfactants/Emulsifier and water are fed in Reactor 2. Reaction mass is mixed and heated. Mixture of Reactor 1 will be added to reactor 2 mixtures. Cool this mass and filter it. Filtrate material is final product and will pack in drum/IBC Container.

Chemical Reaction:

Styrene Acrylate Co-Polymers Liquid



Process Flow diagram:

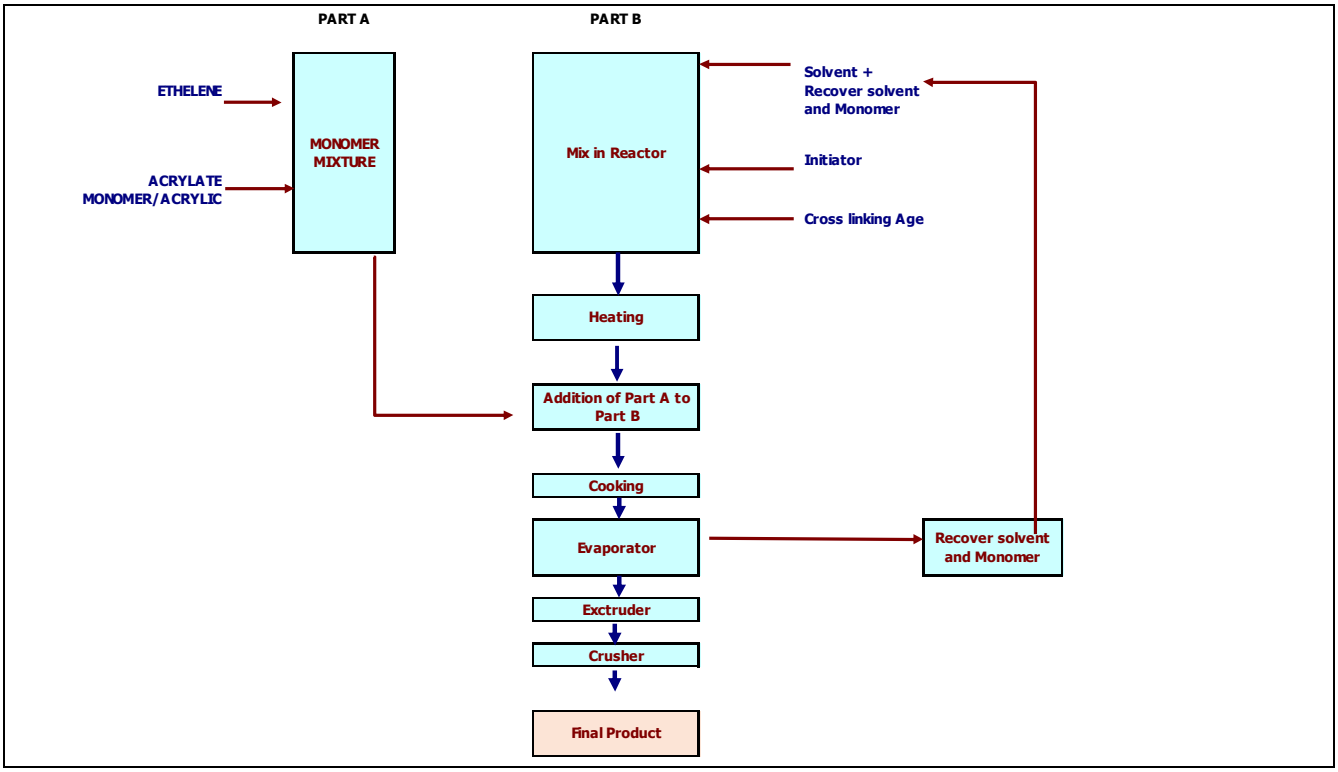


Table 5: Material Balance of Ethylene acrylic / acrylate co-polymer

S. No.	Input/MT of Product					
	Raw Materials				**Quantity (MT/MT)**	
1	Ethylene				0.829	
2	Acrylate Monomer (Butyl Acrylate)/Acrylic				0.206	
3	Solvent + Recover solvent				0.519	
4	Initiator i.e. BPO				0.003	
5	Cross Linking Agent i.e. DVB or may other				0.002	
	Total				**1.558**	
S. No.	**Output/MT of Product**					**Remark**
	Product	**Liquid Effluent**	**Air Emission**	**Recovery/ Product**	**Solid waste**	
1	Ethylene Acrylate Co-Polymers	-		1		Product
2	Recover solvent + Monomer			0.55		To be used in next cycle
3	Solvent loss during recovery	-	0.0031			To Atmosphere

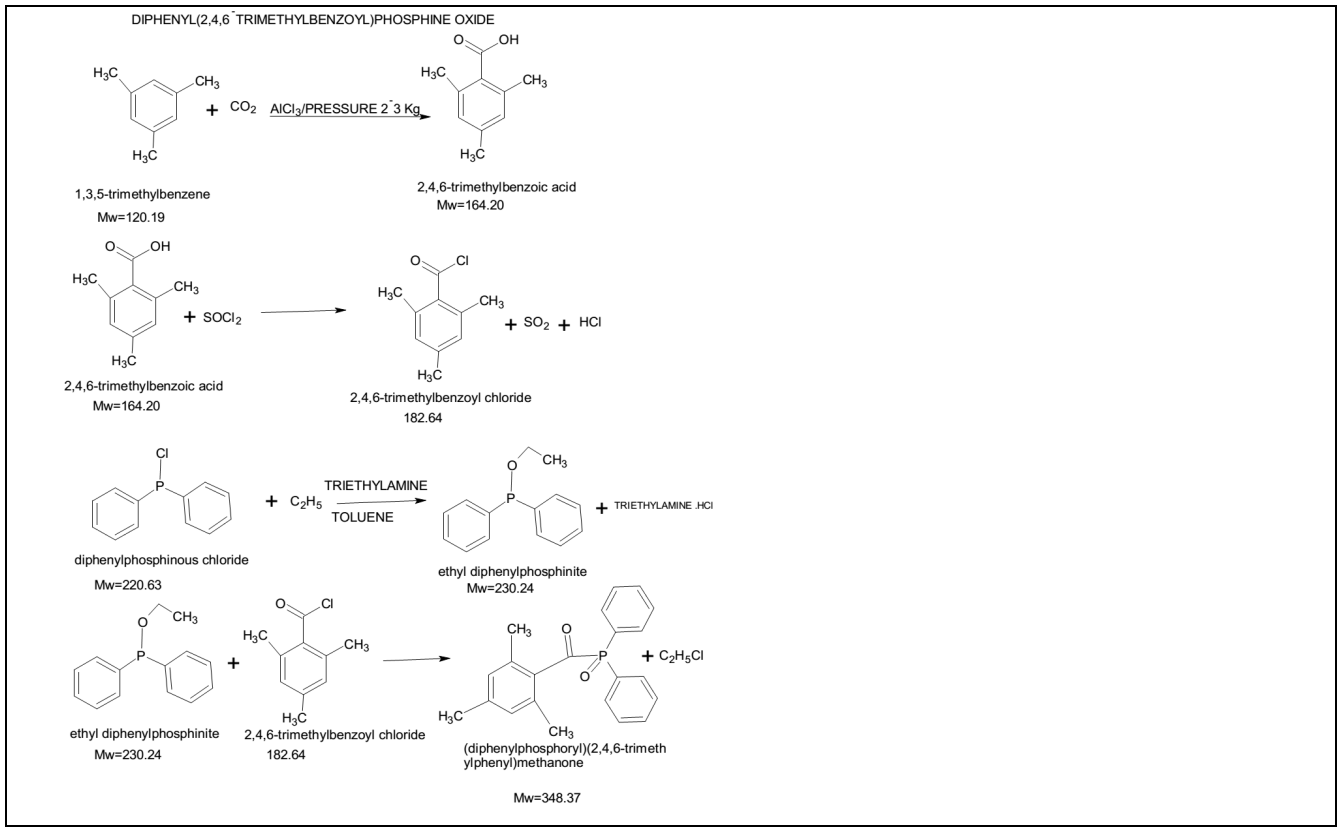
Total	**0.000**	**0.003**	**1.555**	**0.00**	
	1.558				

4. Photo Initiators (Diphenyl(2,4,6-trimethylbenzoyl) phosphine oxide)

Process Description:

1. Mesitylene reacts with Carbon dioxide and Aluminum chloride at 2-3 Kg Pressure and 20 —25 ^{0}C temperature. Carboxylation of mesitylene takes place and converts to 2, 4, 6 Tri methyl benzoic acid.
2. 2,4,6, Tri methyl benzoic acid reacts with thionyl chloride at 60-65 ^{0}C temperature to produce 2,4,6-Trimethylbenzoylchloride crude, which is distillated further to get pure 2,4,6 –Tri methyl benzoyl chloride.
3. In another step to produce ethyl di-phenyl phosphinite, Toluene, Tri ethylamine and anhydrous ethanol are charged in reactor, cool with brine to -2^0 C under nitrogen atmosphere, add Chlorodiphenylphosphine drop wise for 3 to 4 hours. Maintain temperature for 0.5 to 1 hour after addition complete. Filter this mass to recover byproduct of Tri ethylamine HCl and carry out distillation of mother liquor. Initially low vacuum is carry out to recover toluene and then high vacuum under reduce pressure is carry out to collect the Ethyl diphenylphosphinite.
4. Now toluene and Eheyl disphenylphosphinite are charged into Reactor, stirring and heating up to 50 —60 ^{0}C, then 2, 4, 6 Tri methyl benzoic acid is added drop wise for 2 to 3 hrs. and temperature is maintained 48 to 52 °C during addition. Temperature is increased up to 80° C, condensation reaction is done for 2 to 3 hours and gradually yellow solid is formed. Ethyl chloride is recovered by using two stage chilled brine condenser in this stage.
5. After completion of above reaction, temperature is raised and melted the solid mass, then cool and filter it. Filter cake is dried and condensed to recover the solvent. Yellow solid is generated which is product

Chemical Reaction:



Process Flow diagram:

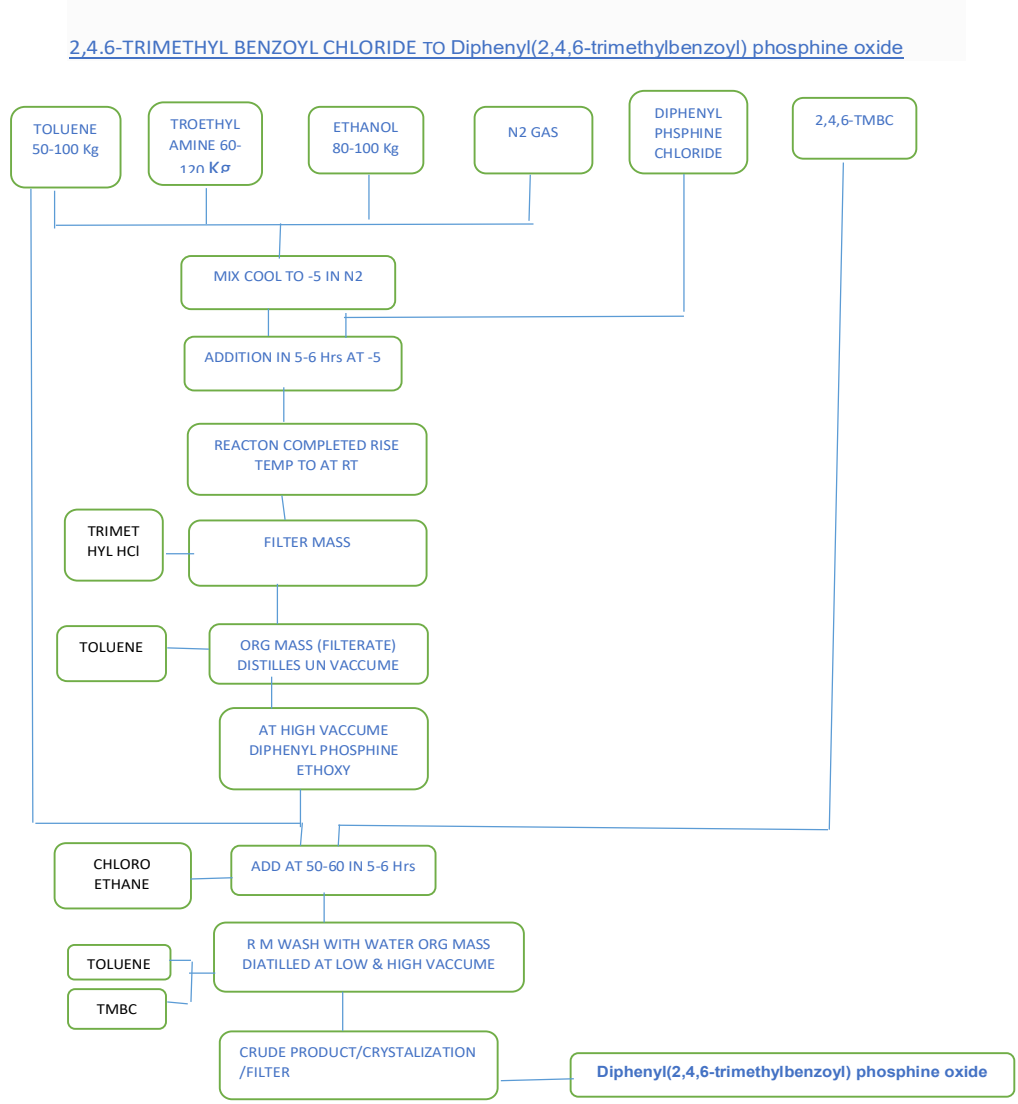


Table 6: Material Balance of Photo Initiators

S. No.	Input/Mt Of Product	
	Raw Materials	**Quantity (Mt/Mt)**
1	Mesitylene	4.000
2	Aluminium Chloride	1.179
3	10%Hcl	5.000
4	Carbon Dioxide	0.230
5	Thionyl Chloride	0.612
6	Toluene	1.327
7	Triethyl Amine	0.431
8	Ethanol	0.195
9	Diphenyl Chloride	0.938
	Total	**13.912**

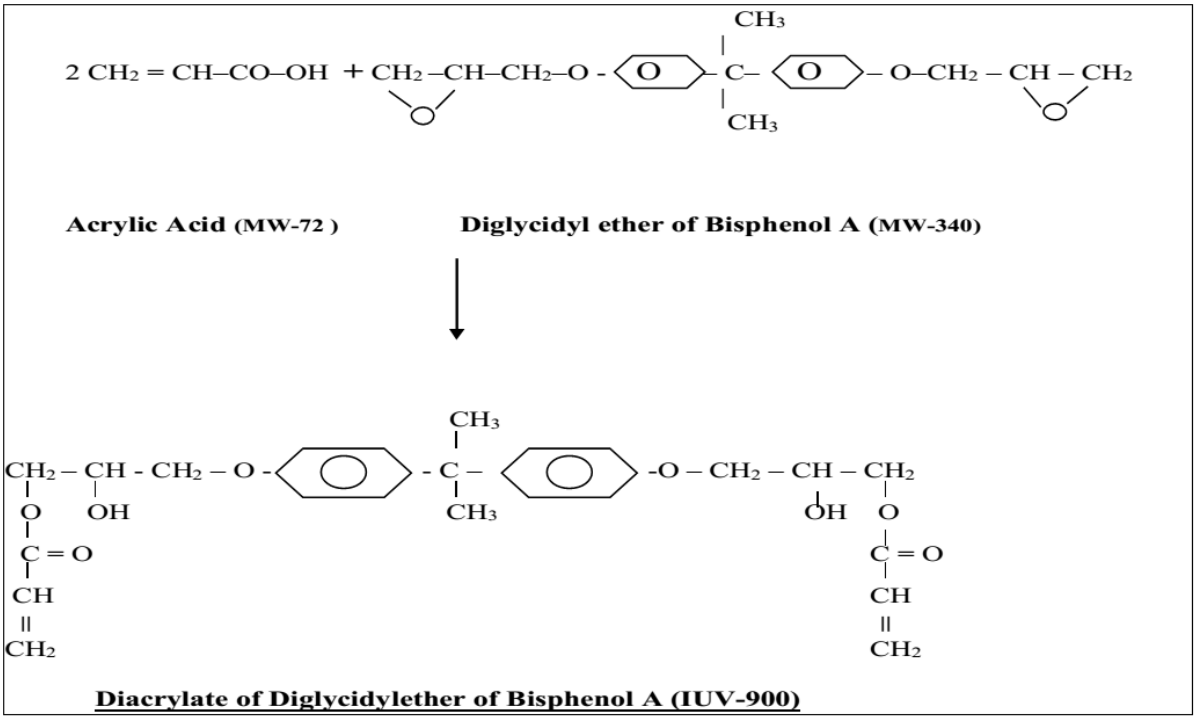
S. No.	Output/Mt Of Product					Remark
	Product	Liquid Effluent	Air Emission	Recovery/ Product	Solid Waste	
1	Photo initiator			1		Product
2	Recover Mesitylene		0.03	3.44		To Be Used In Next Cycle
3	AQ Mass Of $AlCl_3$ Solution	6.33				To ETP
4	SO_2		0.33			Scrubber
5	HCl		0.18			Scrubber
6	Recover Toluene		0.07	1.26		To Be Used In Next Cycle
7	Recover Triethyl Amine			0.55		To Be Used In Next Cycle
8	Ethyl Chloride	0.27				To ETP
9	Residue	-			0.45	
Total		**6.60**	**0.61**	**6.25**	**0.45**	
		13.912				

5. UV Monomer(ester of diol and acrylates)

Process Description:

Diglycidyl Ether of Bisphenol A (Epoxy Resin) will react with acrylic acid at 115^0C convert to Di acrylate of Diglycidyl Ether of Bisphenol A. Cool it and add MEHQ as Stabilizer.

Chemical Reaction:



Process Flow diagram:

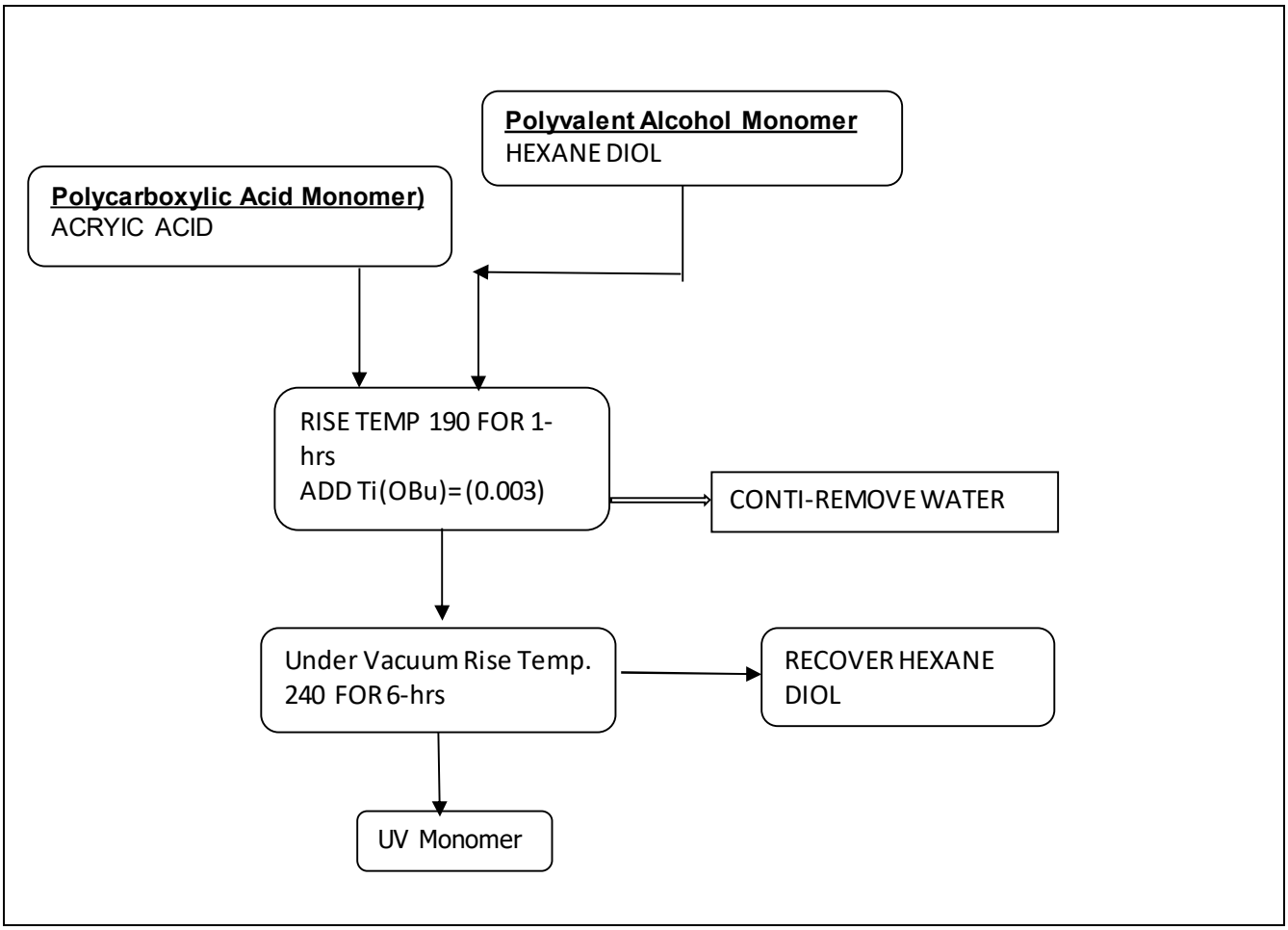


Table 7: Material Balance of UV Monomer(ester of diol and acrylates)

S. No.	Input/MT of Product					
	Raw Materials				**Quantity (MT/MT)**	
1	Acrylic Acid				0.637	
2	Diols				1.044	
	Total				**1.681**	
S. No.	**Output/MT of Product**					**Remark**
	Product	**Liquid Effluent**	**Air Emission**	**Recovery/ Product**	**Solid waste**	
1	UV Monomer			1		Product
2	Hexandiol		0.0034	0.52		To be used in next cycle
3	Effluent	0.160				To ETP
Total		**0.16**	**0.0034**	**1.52**	**0.00**	
		1.681				

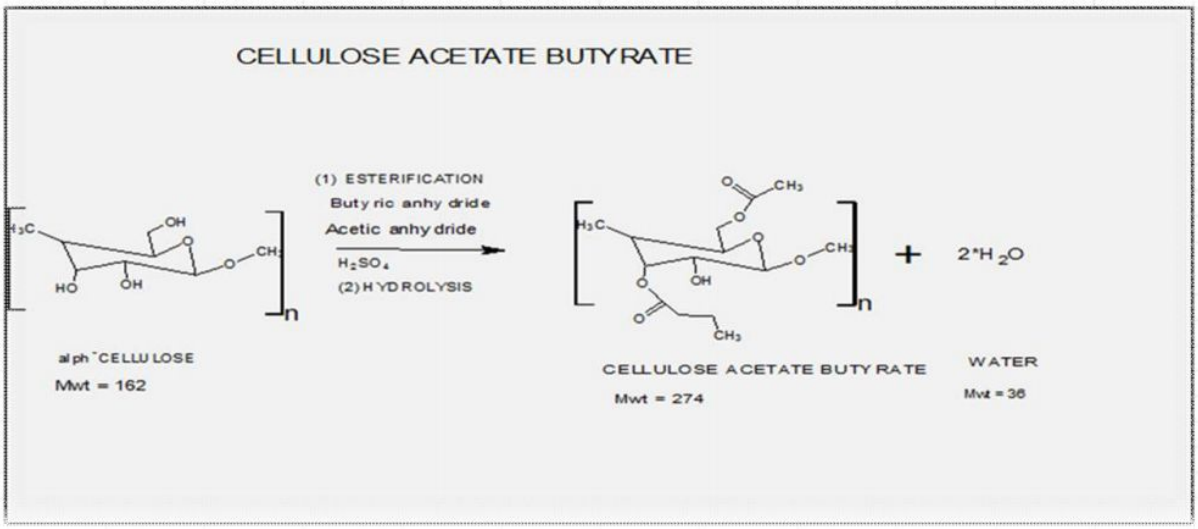
6. Cellulose Acetate Butyrate (CAB)

Process Description:

Cellulose and DMAC (Dimethylacetamide) are mixed in Reactor and heating up to 100 ^{0}C in presence of Nitrogen Atmosphere. Then add Butyl Anhydride and Acetic Anhydride to above mixure for 2 hours. Now whole mixure is

cooking at 115^{0}C for 7-8 hrs and cool it. Recover DMAC under vacuum at 50-69 at 5 mmHg. Residual part pours in water with vigorous starring & filter it and wash with plenty of water. Dry the cake under vacuum.

Chemical Reaction:



Process Flow diagram:

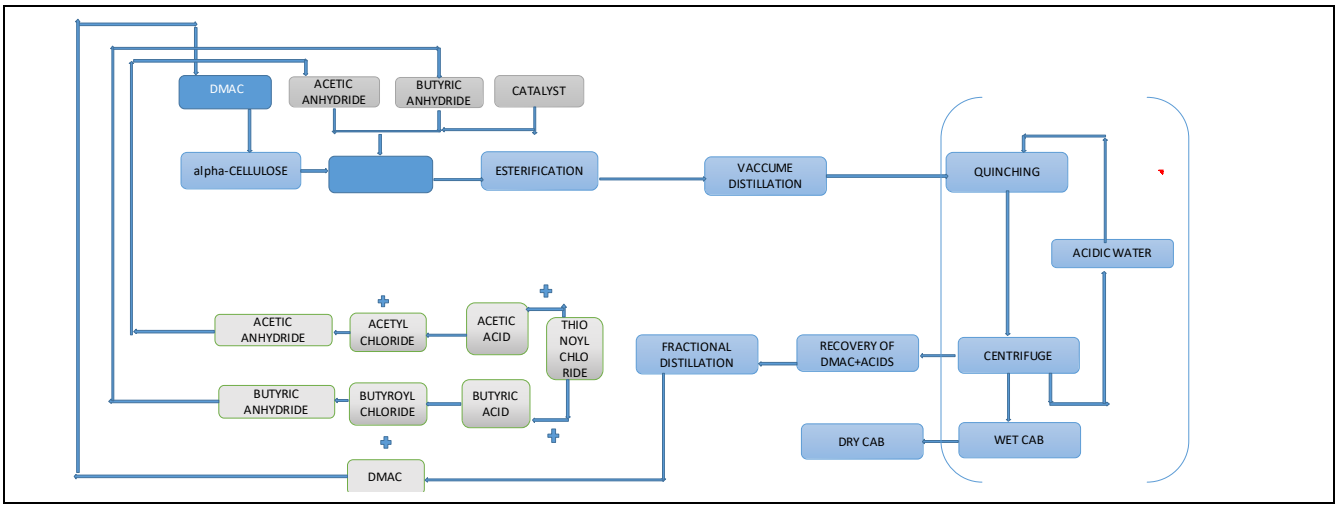


Table 8: Material Balance of Cellulose Acetate Butyrate (CAB)

S. No.	Input/MT of Product	
	Raw Materials	**Quantity (MT/MT)**
1	Alpha Cellulose	0.65
2	Acetic Anhydride	0.01
3	Butyric Anhydride	2.27
4	Catalyst	0.00
5	DMAC	6.48
6	Water	15.00
	Total	**24.41**

S. No.	Output/MT of Product					Remark
	Product	**Liquid Effluent**	**Air Emission**	**Recovery/ Product**	**Solid waste**	
1	CAB			1.00000		Product

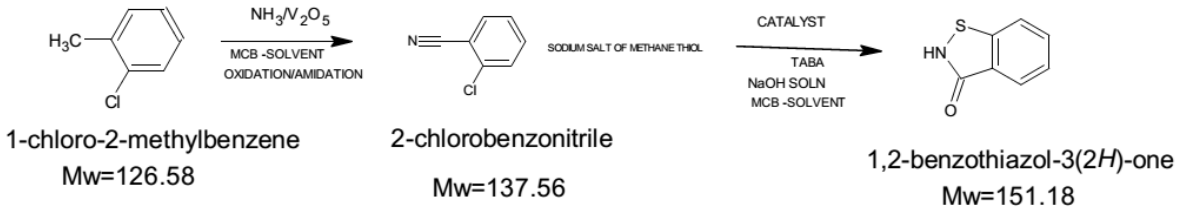
2	Acetic Anhydride			0.200		To be used in next cycle
3	Butyric Anhydride			1.840		To be used in next cycle
4	Recover DMAC			6.200		To be used in next cycle
5	AQ Water	15.17				To ETP
Total		**15.17**	**0.00**	**9.24**	**0.00**	
		24.41				

7. Isothiazolinones

Process Description:

Carry out Oxidation and aminidation of 1- Chloro 2-Methyl benzene in Mono Chloro benzene in presence of Vanadium Pentoxide and ammonia, will give 2- Chlorobenzonitrile. Mix 2 Chlorobenzonitrile, Monochlorobenzene and 50% by weight aqueous solution of tetra-n-butylammonium bromide under Nitrogen atmosphere. Sodium Hydroxide and water are mixed in separate vessel under nitrogen atmosphere. Then Methanethiol was added to at Room Temperature for 1 hour. 30% of by weight aqueous solution of Sodium Methylmercaptide was added to mixture of Mix 2 Chlorobenzonitrile, Monochlorobenzene and 50% by weight aqueous solution of tetra-n-butylammonium bromide. The reaction mixture is separated to Water (lower) layer and Oil (Upper) layer at 40 to 50 ^{0}C after completion of reaction. Mono Chlorobenzene and water are added to Oil layer. Then Sulfuryl chloride is added to this mixture with stirring at temperature of 5 to 15^{0}C. Heating this mixture up to 70 to 80 ^{0}C and allow to react for 1 hours. Reaction mixture is cool to room temperature after completion of reaction to precipitate white crystals. This white crystal wash with Mono Chlorobenzen and dried it to gen final product.

Chemical Reaction:



1-chloro-2-methylbenzene
Mw=126.58

2-chlorobenzonitrile
Mw=137.56

1,2-benzothiazol-3(2*H*)-one
Mw=151.18

Process Flow diagram:

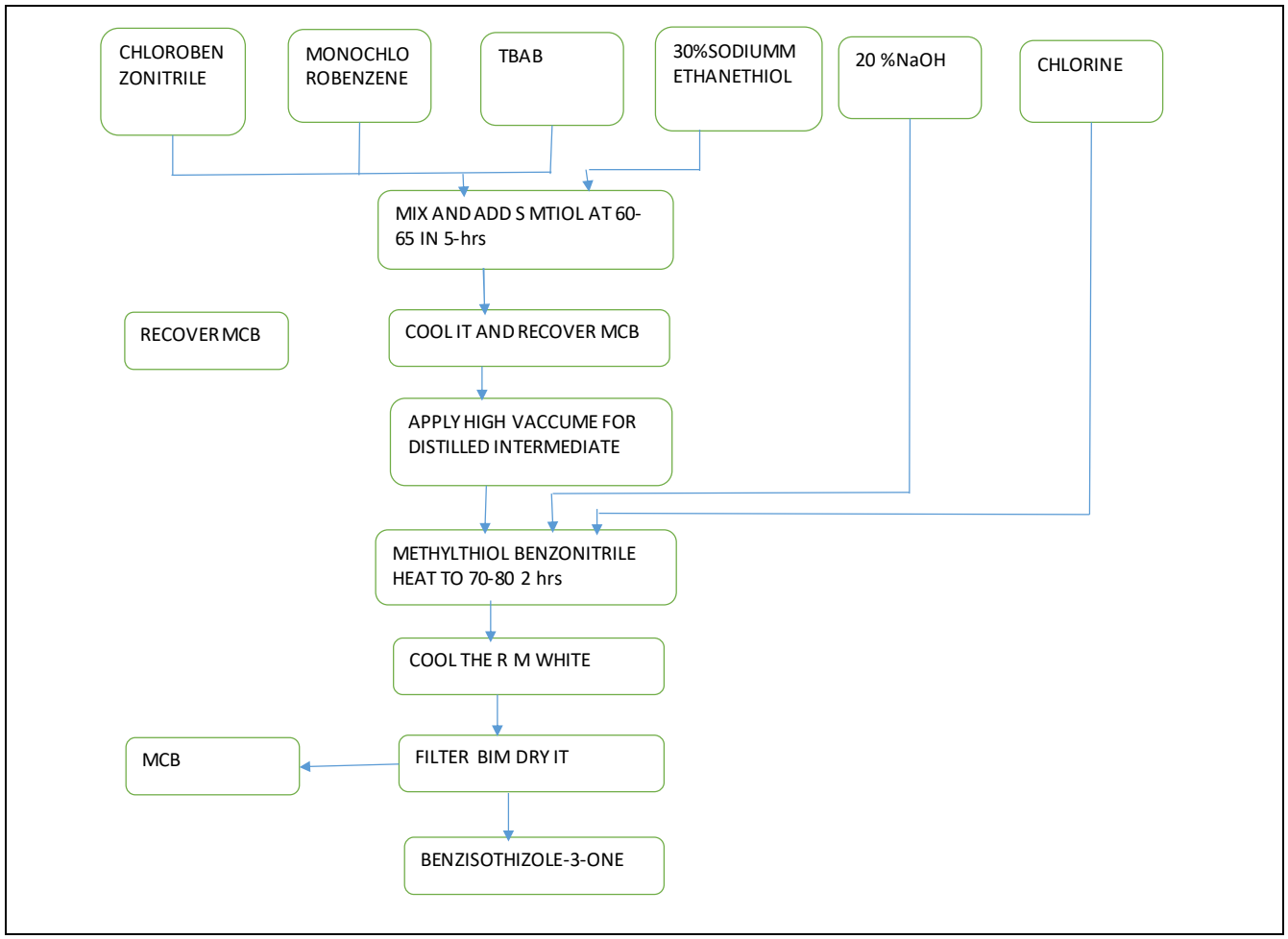


Table 9: Material Balance of Isothiazolinones

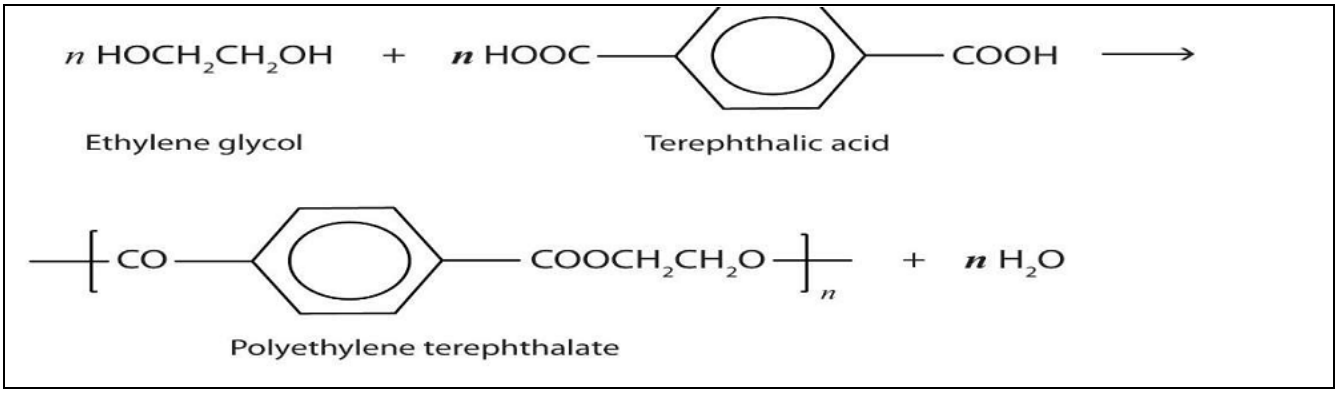
S. No.	Input/Mt Of Product					
	Raw Materials				**Quantity (Mt/Mt)**	
1	2-Chlorobenzonitrile				0.978	
2	Mono Chloro benzene				2.950	
4	30% Sodium Salt Of Methane Thiol				1.895	
5	Chlorine				0.587	
6	20%Naoh Solution				1.457	
	Total				**7.87**	
S. No.	**Output/Mt Of Product**					**Remark**
	Product	**Liquid Effluent**	**Air Emission**	**Recovery/ Product**	**Solid Waste**	
1	Isothiazone			1		Product
2	Recover MCB			2.86		To Be Used In Next Cycle
3	Loss		0.089			To Atmosphere
4	Effluent	3.92				To ETP
Total		**3.92**	**0.089**	**3.86**	**0.00**	
		7.87				

8. Polyester Resin(ester of poly ethelene and aromatic acid)

Process Description:

Dicarboxylic Acid is reacted with Glycol at high temperature, water will generate during this esterification and poly condensation reaction to get polyester resin.

Chemical Reaction:



Process Flow diagram:

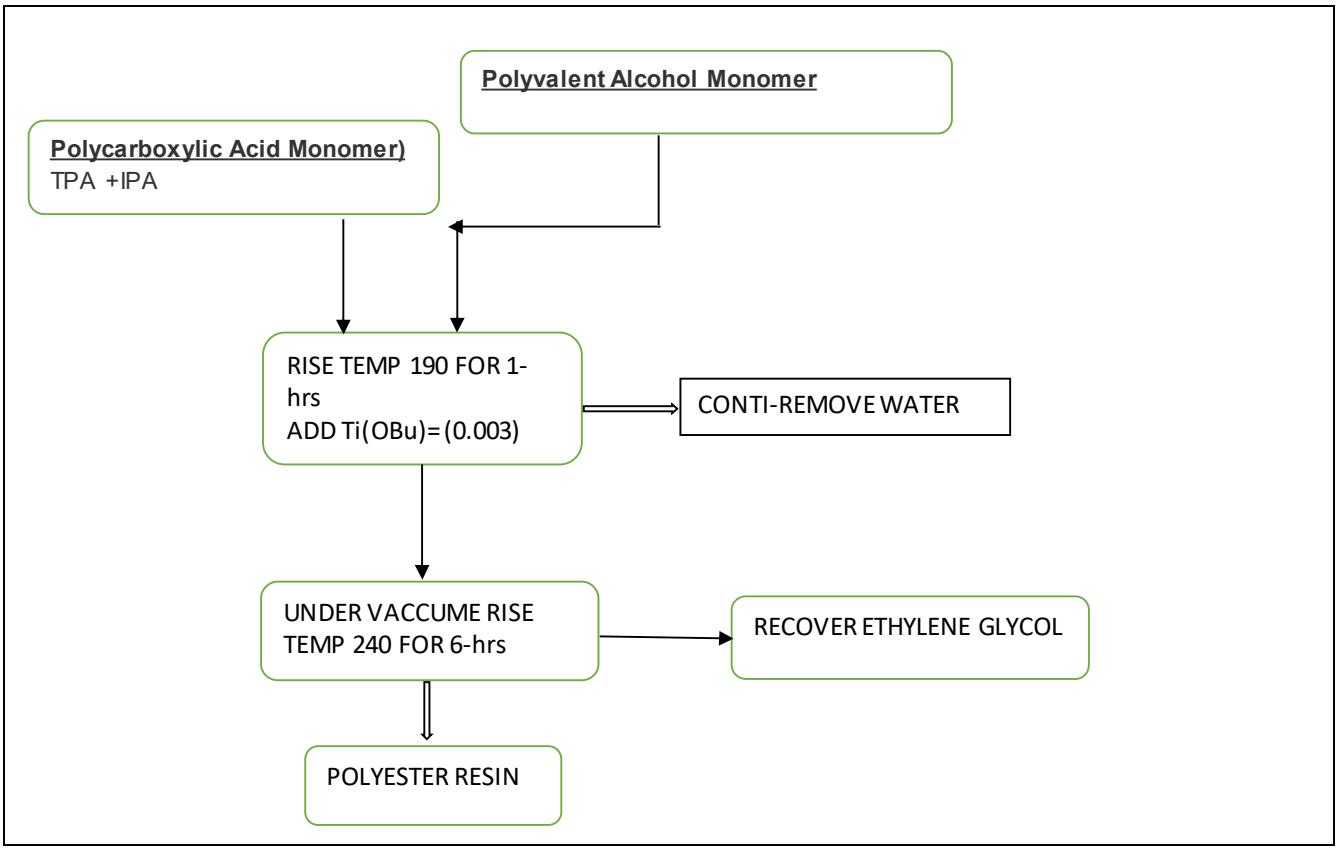


Table 10: Material Balance of Polyester Resin(ester of poly ethelene and aromatic acid)

S. No.	Input/MT of Product	
	Raw Materials	**Quantity (MT/MT)**
1	Terephthalic acid	0.51
2	Isophthalic acid	0.34
3	Diols	0.64
	Total	**1.50**

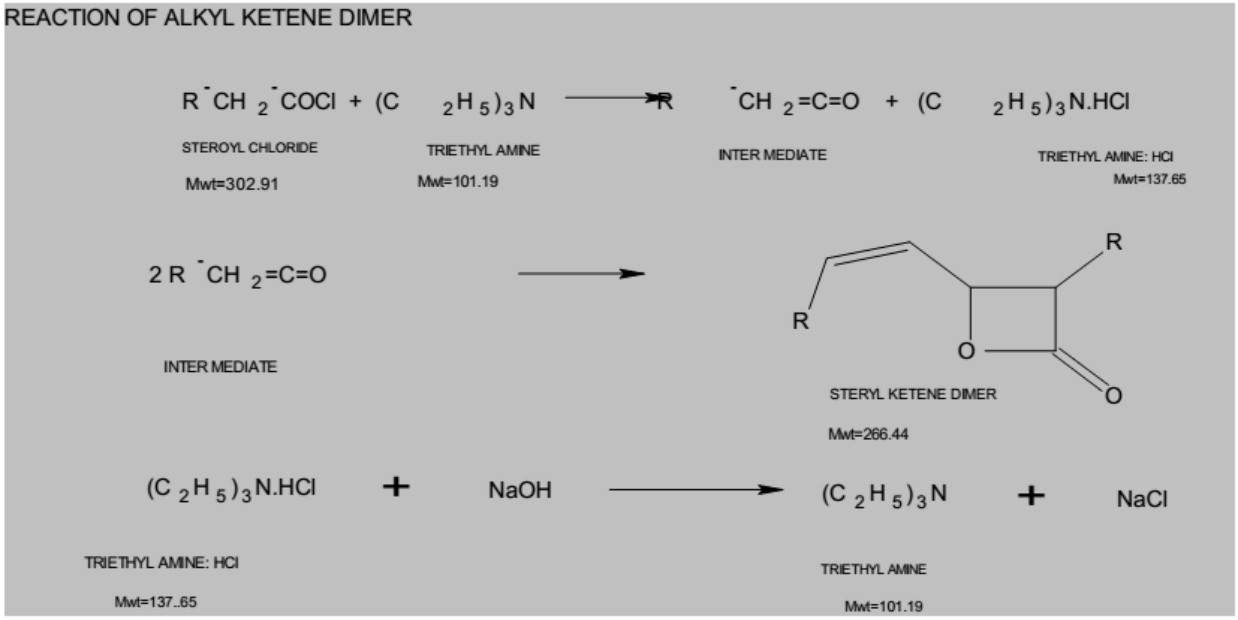
S. No.	Output/MT of Product					Remark
	Product	Liquid Effluent	Air Emission	Recovery/ Product	Solid waste	
1	Polyester resin	-		1		Product
2	Recover Glycol			0.31		To be used in next cycle
3	Water Effluent	0.19				TO ETP
	Loss during recovery		0.000			
Total		**0.19**	**0.000**	**1.31**	**0.00**	
		1.50				

9. Alkyl Ketene Diamer (AKD)

Process Description:

Takes toluene, add dry triethylamine with stirring. The Fatty acid chloride is added drop wise with stirring for 30 minutes. Increase temperature to 55 ^{0}C. The Triethylamine hydrochlorides is formed. This reaction mixture further stirring for 30 minutes and then heating up to 70^{0}C. Filtered this reaction mixture to separate the amine-hydrochloride which is wash by small amount of toluene. The filtrate contains the alkyl ketene dimer. Excess triethylamine, solvent and water are separated to get Alkyl ketene diamer.

Chemical Reaction:



Process Flow diagram:

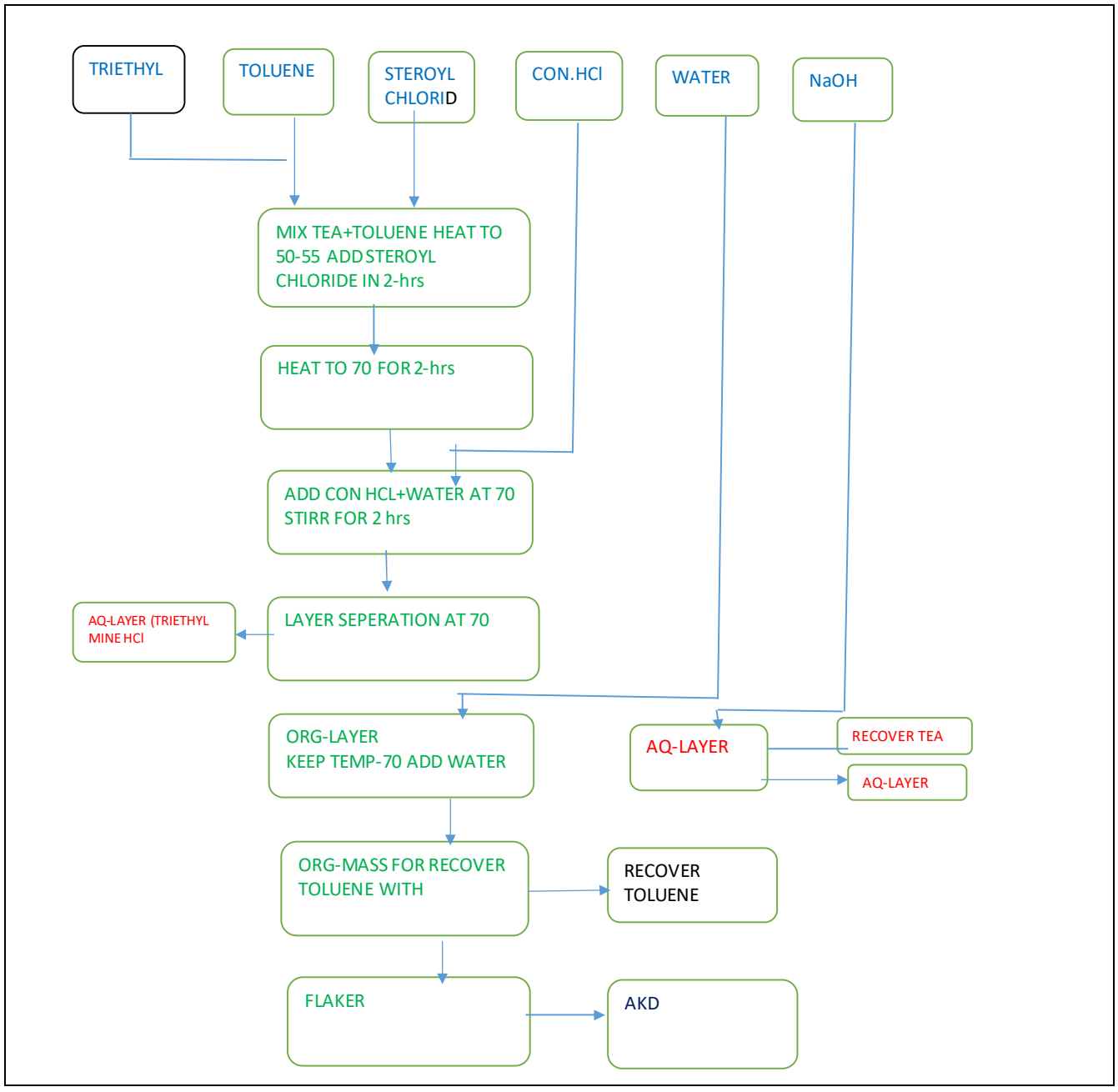


Table 11: Material Balance of Alkyl Ketene Diamer (AKD)

S. No.	Input/MT of Product	
	Raw Materials	**Quantity (MT/MT)**
1	Triethyl Amine	0.457
2	Steroyl Chloride	1.237
3	Toluene	0.926
4	Con. HCl (30%)	0.094
5	WATER	0.758
6	NaOH- PELETS	0.164
	Total	**3.64**

S. No.	Output/MT of Product					Remark
	Product	Liquid Effluent	Air Emission	Recovery/ Product	Solid waste	
1	AKD			1		Product
2	Recovery of Toluene		0.048	0.879		To be used in next cycle
3	AQ-Layer	1.254				TO ETP
4	Recover TEA		0.056	0.400		To be used in next cycle
Total		**1.254**	**0.104**	**2.279**	**0.000**	
		3.64				

Annexure 7: Raw Material & Product Storage Details

Table 12: Storage Details of Raw Materials

S. No.	Chemical	CAS No.	State	Means of Storage	Capacity of Storage Means	No. of Storage means	Total Capacity	Safety Measures	Pressure	Temperature
Raw Materials										
1	Styrene	100-42-5	liquid	storage tank	30 KL	1	30	PESO Approved, LT, PT, Earth relay system, earthling & bonding, flame arrester, flame proof fitting	Atmosphere	Atmosphere
2	Alpha Methyl Styrene	98-83-9	liquid	storage tank	30 kl	1	30	PESO Approved, LT, PT, Earth relay system, earthling & bonding, flame arrester, flame proof fitting	Atmosphere	Atmosphere
3	Butyl Acrylate	141-32-2	liquid	storage tank	25 T	1	25	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
4	Acrylic acid	79-10-7	liquid	storage tank	25 T	2	50	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
5	Toluene/Xylene	108-88-3	liquid	Barrel	200 Liter	10	2 KL	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
6	2-Ethylhexyl Acrylic	103-11-7	liquid	Storage Tank	25 T	1	25	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
7	Methyl acrylic acid	79-41-4	liquid	storage Tank	25 T	1	25	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
8	Methyl methacrylate	80-62-6	liquid	Storage Tank	25 T	1	25	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
9	Liquor Ammonia	1336-21-6	liquid	Barrel	200 Liter	25	4.5 T	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
10	Ethyl Acrylate	140-88-5	liquid	Storage Tank	25 T	1	25 T	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
11	Propene nitrile	107-13-1	liquid	Storage Tank	25 T	1	25 T	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere
12	Methyl iso butyl Ketone	108-10-1	liquid	Barrel	200 Liter	1	50	Earth relay system, earthling & bonding, flame arrester, flame proof fitting, Insulated Tank	Atmosphere	Atmosphere

S. No.	Chemical	CAS No.	State	Means of Storage	Capacity of Storage Means	No. of Storage means	Total Capacity	Safety Measures	Pressure	Temperature
Raw Materials										
13	Ethylene	74-85-1	Cryogenic	Storage Tank	20 T	2	40	SMPA Approved, LT, PT, Earth relay system, earthling & bonding, flame arrester, flame proof fitting	Under pressure	Cryogenic
14	Methylene	75-09-2	liquid	storage tank/Drum	10 T	1	10	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
15	Aluminum Chloride	7446-70-0	Solid	Bags	50 Kg	100	5	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
16	10% & 30 % Hydrochloric Acid	7647-01-0	liquid	storage tank/Drum	200 liter	50	10 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
17	Carbon Dioxide	124-38-9	Gas	Tank/Cylinder	25 kg	20	500 Kg	Store at Cool, dry and well-ventilated area, separate storage	Under pressure	Atmosphere
18	Thionyl Chloride	7719-09-7	liquid	storage tank/Drum	20 T	1	20	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
19	Triethyl Amine	121-44-8	liquid	storage tank/Drum	200 Liter	50	10	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
20	Ethanol	64-17-5	liquid	storage tank/Drum	200 Liter	50	10	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
21	Diphenyl Chloride	2524-64-3	liquid	storage tank/Drum	200 Liter	50	10	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
22	Hexandiol	629-11-8	Solid	PP Bag	25 Kg	20	0.5 T	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
23	alpha Cellulose	9004-34-6	Solid	PP Bag	25 Kg	20	0.5 T	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
24	Acetic Anhydride	108-24-7	liquid	drum	200 Liter	10	2	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
25	Butyric Anhydride	106-31-0	liquid	drum	200 Liter	10	2	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere

S. No.	Chemical	CAS No.	State	Means of Storage	Capacity of Storage Means	No. of Storage means	Total Capacity	Safety Measures	Pressure	Temperature
Raw Materials										
26	Dimethylacetamide (DMAC)	127-19-5	liquid	Drum	200 Liter	5	1	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
27	2-Chloribenzonitrile	873-32-5	Solid	PP Bag	25 Kg	20	0.5 T	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
28	Mono Chloro benzene	108-90-7	liquid	Drum	200 Liter	10	1	Store at Cool, dry and well-ventilated area, separate storage, Flame proof fitting	Atmosphere	Atmosphere
29	TBAB(Tetra-n-butyl ammonium bromide)	1643-19-2	Solid	PP Bag	25 Kg	20	0.5 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
30	30% Sodium Salt of Methanethiol	5188-07-8	Solid	PP Bag	25 Kg	20	0.5 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
31	Chlorine	7782-50-5	liquid	Tonner	1 T	10	10 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
32	20% NaOH Solution	1310-73-2	liquid	Drum/Tank	200 Liter	5	1	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
33	Terephthalic acid	100-21-0	Solid	PP Bag	50 kg	10	0.5 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
34	Isophthalic acid	121-91-5	Solid	PP Bag	50 kg	10	0.5 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
35	Glycol	107-21-1	liquid	Drum	200 Liter	10	2 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
36	Steroyl Chloride	112-76-5	liquid	Drum	200 Liter	10	2 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere
37	toluene	108-88-3	liquid	Drum	200 Liter	10	2 T	PESO Approved, LT, PT, Earth relay system, earthling & bonding, flame arrester, flame proof fitting	Atmosphere	Atmosphere
38	NaOH- PELETS	1310-73-2	Solid	PP Bag	50 Kg	10	0.5 T	Store at Cool, dry and well-ventilated area, separate storage	Atmosphere	Atmosphere

Table 13: Storage Details of Products

S. No.	Chemical	State	Means of Storage	Capacity of Storage Means	No. of Storage means	Total Capacity	Safety Measures	Pressure	Temperature
Products									
1	Styrene Acrylate Co-Polymers Solids (Resins) & Styrene maleic anhydride solid/derivatives & Styrene AA Terpolymer	Solid	bag/ Jumbo bag	50 Kg/ 1 T	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
2	Styrene Acrylate Co-Polymers liquid /Emulsions / solutions / PU Emulsions (Resins)	Liquid	drum/IBC Container	200 litre /1 T	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area, Flame proof fitting	Atmosphere	Atmosphere
3	Ethylene acrylic / acrylate co-polymer	Solid	drum/IBC Container	200 litre /1 T	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area, Flame proof fitting	Atmosphere	Atmosphere
4	PHOTO INITIATORS	Solid	Corrugated box	50 Kg	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
5	UV Monomer	Liquid	drum/IBC Container	200 litre /1 T	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
6	CAB(CELLULOSE ACETATE BUTYRATE)	Solid	Corrugated box	50 Kg	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
7	Isothiazolinones	Solid	Corrugated box	50 Kg	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
8	Polyester Resin	Liquid	drum/IBC Container	200 liter/1 T	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere
9	Alkyl Ketene Diamer (AKD)	Solid	Corrugated box	50 Kg	As per requirements	as per requirements	store in Dry and Well-ventilated area, separate storage, No smoking area , Flame proof fitting	Atmosphere	Atmosphere

Table 14: Transportation Details

S. No.	Chemical	State	Means of Transportation	Source
RAW MATERIAL				
1	Styrene	liquid	Tanker	Road
2	Alpha Methyl Styrene	liquid	Tanker	Road
3	Butyl Acrylate	liquid	Tanker/ISO Container	Sea, Road
4	Acrylic acid	liquid	Tanker/ISO Container	Sea, Road
5	Toluene/Xylene	liquid	Truck	Road
6	2-Ethylhexyl Acrylic	liquid	Tanker/ISO Container/Truck	Sea, Road
7	Methyl acrylic acid	liquid	Tanker/ISO Container/Truck	Sea, Road
8	Methyl methacrylate	liquid	Tanker/ISO Container/truck	Sea, Road
9	Liquor Ammonia	liquid	Truck	Road
10	Ethyl Acrylate	liquid	Tanker/ISO Container/Truck	Road
11	Propene nitrile	liquid	Tanker/ISO Container	Road
12	Methyl Iso butyl Ketone	liquid	Truck	Road
13	Ethylene	Cryogenic	Tanker	Road
14	Methylene	liquid	Truck	Road
15	Aluminium Chloride	Solid	Truck	Road
16	10% & 30 % Hydrochloric Acid	liquid	Truck	Road
17	Carbon Dioxide	Gas	Truck	Road
18	Thionyl Chloride	liquid	Truck	Road
19	Triethyl Amine	liquid	Truck	Road
20	Ethanol	liquid	Truck	Road
21	Diphenyl Chloride	liquid	Truck	Road
22	Hexandiol	Solid	Truck	Road
23	alpha Cellulose	Solid	Truck	Road
24	Acetic Anhydride	liquid	Truck	Road
25	Butyric Anhydride	liquid	Truck	Road
26	Di-methyl acetamide (DMAC)	liquid	Truck	Road
27	2-Chloribenzonitrile	Solid	Truck	Road
28	Mono chloro benzene	liquid	Truck	Road
29	TBAB(Tetra-n-butyl ammonium bromide)	Solid	Truck	Road
30	30% Sodium Salt of Methanethiol	Solid	Truck	Road
31	Chlorine	liquid	Truck	Road
32	20% NaOH Solution	liquid	Truck	Road
33	Terephthalic acid	Solid	Truck	Road
34	Isophthalic acid	Solid	Truck	Road
35	Glycol	liquid	Truck	Road
36	Steroyl Chloride	liquid	Truck	Road
37	toluene	liquid	Truck	Road
38	NaOH- PELETS	Solid	Truck	Road
FINISHED GOODS				
1	Styrene Acrylate Co-Polymers Solids (Resins) & Styrene maleic anhydride solid/derivatives & Styrene AA Terpolymer	Solid	Truck	Road
2	Styrene Acrylate Co-Polymers liquid /Emulsions / solutions / PU Emulsions (Resins)	Liquid	Truck	Road

S. No.	Chemical	State	Means of Transportation	Source
3	Ethylene acrylic / acrylate co-polymer	Solid	Truck	Road
4	PHOTO INITIATORS	Solid	Truck	Road
5	UV Monomer	Liquid	Truck	Road
6	CAB(CELLULOSE ACETATE BUTYRATE)	Solid	Truck	Road
7	Isothiazolinones	Solid	Truck	Road
8	Polyester Resin	Liquid	Truck	Road
9	Alkyl Ketene Diamer (AKD)	Solid	Truck	Road

Annexure 8: Water Consumption and Wastewater Generation Details

Total water requirement for the proposed project is 400.2 KLD which will be sourced from Borewell.

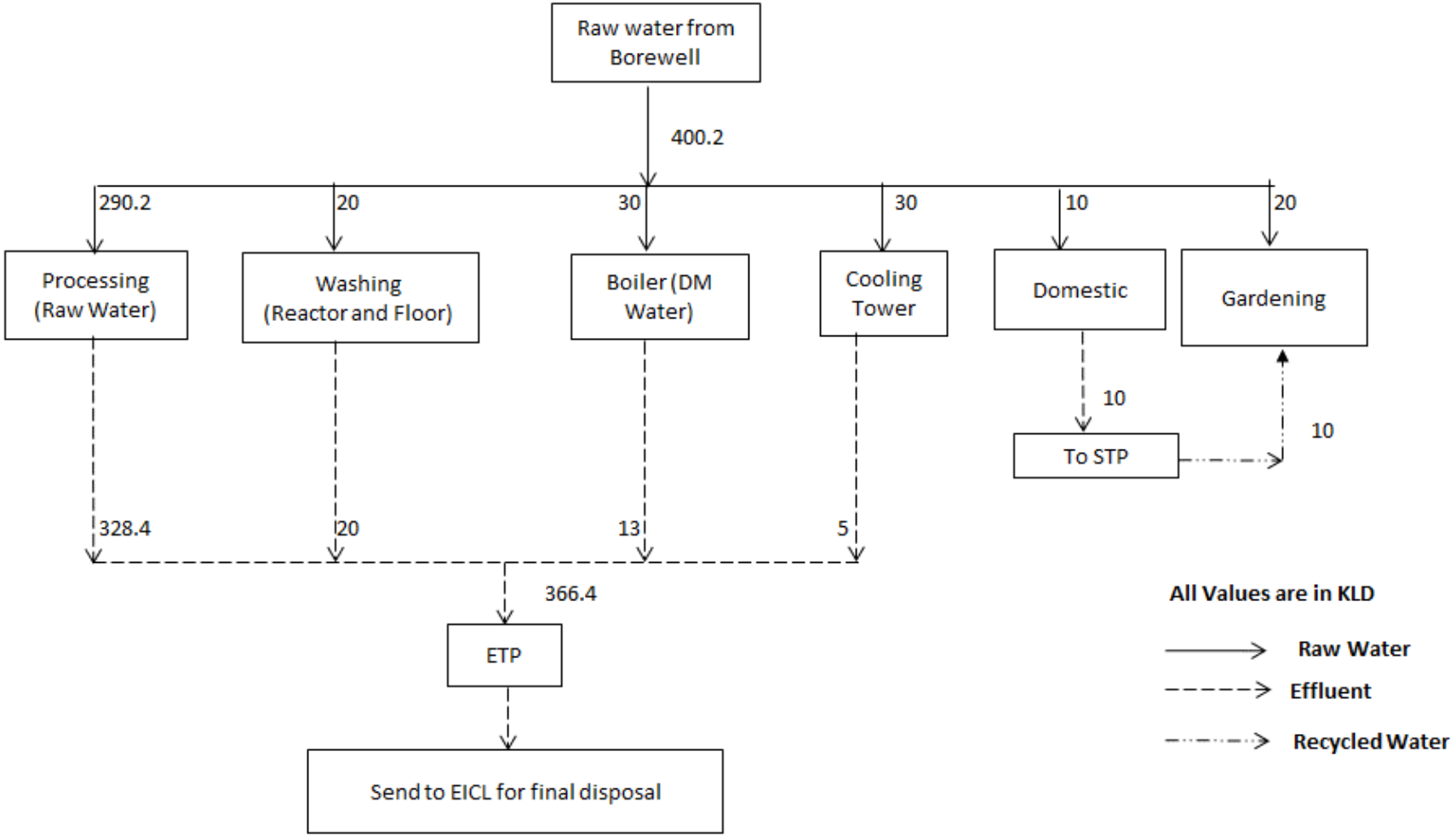
Table 15: Water Consumption

S. No.	Area of Consumption	Fresh Water Quantity, KLD	Source of Water
1	Domestic	10	Borewell water
2	Gardening	20	
3	Processing (Raw water)	290.2	
4	Washing (Reactor and Floor)	20	
5	D M Water	30	
6	Boiler	25	DM water
7	Cooling Tower	30	Borewell water
Total		**400.2**	

Table 16: Waste Water Generation

S. No.	Area of Generation	Wastewater generation in KLD	Remark
1	Domestic	10	To STP for treatment and treated water will be used for gardening
2	Processing	328.4	To ETP for treatment and treated effluent will be sent to EICL for further treatment and final disposal
3	Washing (Reactor and Floor)	20	
4	D M Water	5	
5	Boiler	8	
6	Cooling Tower	5	
	Total Industrial	**366.4**	
	Total	**376.4**	

Water Balance Diagram



Annexure 9: Details of Waste Water Treatment Plan

Details of Effluent Treatment Plant

Combined effluent from process, washing and utilities from plant by gravity to be taken in inlet storage tank. Then it will pass through Oil and grease trap to remove oil and grease. Then it will collect into equalization cum neutralization tank where hydrated lime will add to increase PH to 10.5, then add alum to reduce PH to 8.5 and polyelectrolyte will add to it.

Then treated water to be transferred to Primary settling tank to maximum removal of activated sludge from bottom. Overflow from primary settling tank goes to 1st stage aeration tank. Settled sludge with water to be collected in Intermediate holding tank.

Overflow from 1st stage aeration tank is transferred to secondary setting tank to remove remaining activated sludge from this stage. clearer water to be overflowed and goes to Secondary aeration to for effluent polishing and ascertaining optimized Biodegradation. Settled sludge with water further to be collected in intermediated holding tank.

Clear water further transfers to final settle tank to get complete removal of activated sludge from water. Whatever settled sludge with water further to be collected in intermediated holding tank.

Clear water from final settling tank to be collected in intermediate storage tank. Now these waters are further taken for PSF & ACF Filtration. Filtered Effluent will be stored in final tank till it is analyzed for COD, TDS & PH. Final Treated effluent to be send to EICL for further treatment and final disposal.

Details of Sewage Treatment Plant

Sewage water to be collected in inlet tank. Then it will pass through bar screen chamber and strainer. Will inject to Modular Sewage Treatment Plant based on trans Bio-Filter Technology for treatment.

Treated water is collected in final storage tank after disinfected and will use further to agriculture purpose.

Figure 3-1: ETP Process Block Diagram

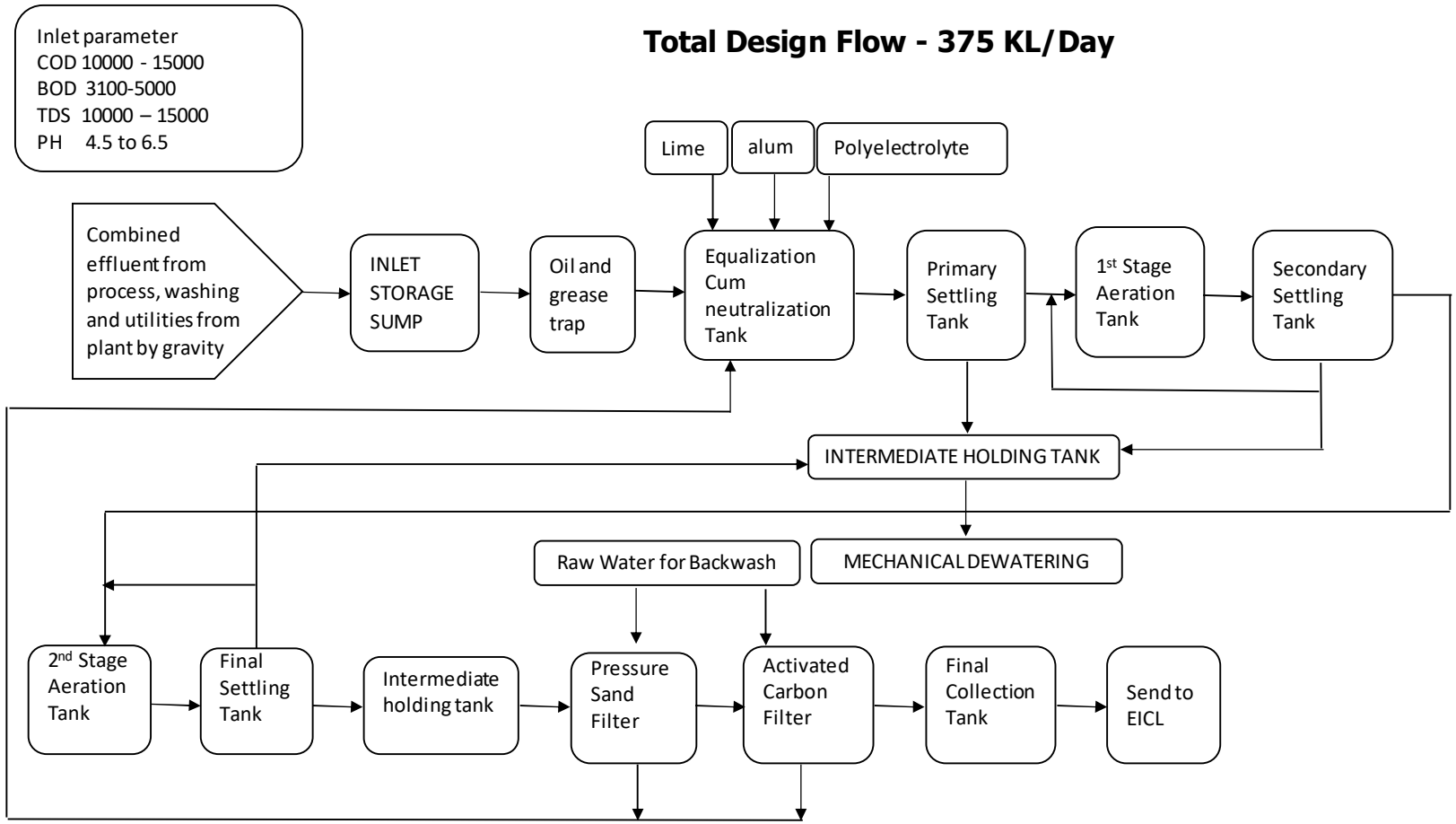
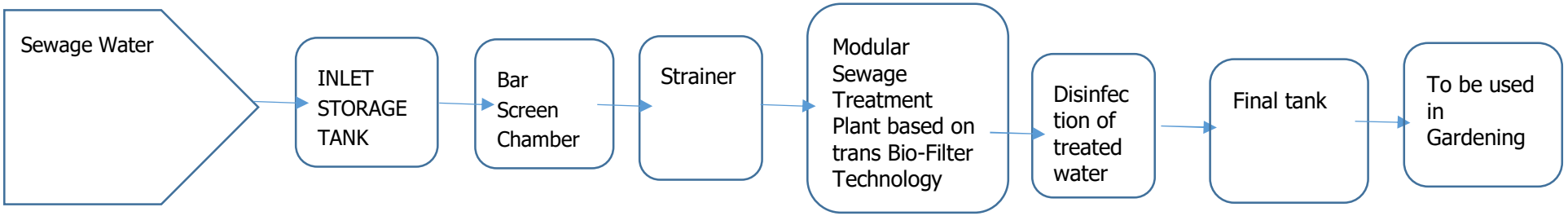


Figure 3-2: Flow Diagram of STP



Annexure 10: Fuel Consumption

Table 17: Details of Fuel Consumption

S. No.	Stack Attached to	Capacity	No. of working hrs	Type of Fuel used	Fuel consumption
1	Boiler	3 TPH	24	Briquette	20.0 MT/DAY
3	Thermic Fluid Heater	5 lakh Kcal/Hr	24	Briquette	20.0 MT/DAY
2	DG set	800 kVA	-	Diesel	180 LTR/DAY

*Note: DG Sets will be used only during Power failure.

Annexure 11: Hazardous Waste Generation

Table 18: Details of Hazardous Waste Generation

S. No.	Type of Waste	Hazardous Waste Category	Quantity per Year MT	Source	Method of Collection	Treatment / Disposal
1	Used Oil	5.1	5 KL	Equipment & hot oil system	Drum	sent to recycler
2	Contaminated discarded container/bags	33.3	12000 Nos	Plant internal usage	Stored	sent to recycler
3	Chemical sludge from Waste water treatment	34.3	240 MT	From process plant	HDPE Bag	sent to TSDF for landfilling
4	Wastes or residues	23.1	3600 MT	From process plant	HPDE Bag	sent for TSDF Incinerator

Annexure 12: Stack Details

Table 19: Flue Gas Stacks

S. No.	Stack Attached to	Capacity	No. of working hrs	Type of Fuel used	Fuel consumption	Stack Height, m	Stack Diameter, m
1	Boiler	3 TPH	24	Briquette	20.0 MT/DAY	31	0.5
2	Thermic Fluid Heater	5 lakh Kcal/Hr	24	Briquette	20.0 MT/DAY	21	0.15
3	DG set	800 kVA	-	Diesel	180 LTR/DAY	15.5	0.5

***Note:** DG Sets will be used only during Power failure.

Table 20: Process Vents

S. No.	Stack Attached to	Nos. of Stacks	Stack Height in m	Pollutants Emitted	Air Pollution Control Measures Attached
1	Vent to blow down reactor	10	22	PM	Condenser scrubber
2	Stack attached to the outlets of the dryers and mills	2	10	PM	Dust collector
3	SO2 Scrubber	1	22	SO2	Caustic Scrubber
4	HCL Scrubber	2	22	HCL	Caustic Scrubber
5	Propene nitrile storage tank vent to Scrubber	1	10	Propene nitrile Vapor	Scrubber

Details of Air Pollution Control Measures

1) Dust Collector

The filtration dust collector is an equipment that effectively captures and removes industrial dust (BPA dust, solid product dust, etc.) through nonwoven fabrics and bag filters, and then releases only clean air to the outside. It is a facility to remove the dust generated during the input of the project's raw materials and product packaging.

By adopting the above measures, it is possible to effectively reduce the discharge of unorganized gases during the storage and production of raw materials and products, and also reduce the unorganized emissions of pollutants, ensuring that the concentration of factory area and factory boundaries is lower than the standard requirements.

2) Caustic Scrubber

SO2 And HCl gases generated from process would scrubbed by caustic media.

Figure 3-3: Flow diagram of Caustic Scrubber