APPENDIX I

(See paragraph - 6)

FORM 1

(I) Basic Information

Sr. No.	Item	Details
1.	Name of the project/s	Punagri Organics and Lifesciences Pvt. Ltd.
2.	S. No. in the schedule	5(f)
3.	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	Amendment in TOR for Proposed Project of Pharmaceutical API's and Intermediates with modification in few products (removal of some existing products as mentioned in ToR and addition of few new products) Overall production capacity will be reduced from 483 MT/Month to 385 MT/month For details of manufacturing capacity, Please refer **Annexure – I**
4.	New/Expansion/Modernization	New Requesting Amendment in TOR with modification in few products (removal of some existing products as mentioned in ToR and addition of few new products). Changes in Product list are mentioned in **Annexure I.**
5.	Existing Capacity/Area etc.	--
6.	Category of Project i.e. 'A' or 'B'	'B'
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 No. 180, Near Sardar Chowk,
	Plot/Survey/Khasra No.	Phase II, GIDC -Vapi
	Village	GIDC, Vapi – 396 185
	Tehsil	Vapi
	District	Valsad
	State	Gujarat
10.	Nearest railway station/airport along with distance in kms.	Vapi- 2.8 Km
11.	Nearest Town, city, District Headquarters along with distance in kms.	Vapi -2 Km
12.	Village Panchayats, ZillaParishad, Municipal Corporation, local body (complete postal address with telephone nos. to be given)	GIDC- Vapi
13.	Name of the applicant	Punagri Organics and Lifesciences Pvt. Ltd.
14.	Registered Address	M/s. Punagri Organics and Lifesciences Pvt. Ltd. C-303, Neelkanth Business Park, Nathani Road, Vidhyavihar - W, Mumbai 400 086.
15.	Address for correspondence:	M/s. Punagri Organics and Lifesciences Pvt. Ltd. C-303, Neelkanth Business Park, Nathani Road, Vidhyavihar - W, Mumbai 400 086.
	Name	Mr. Chhaganlal Chandra
	Designation (Owner/Partner/CEO)	Director
	Address	M/s. Punagri Organics and Lifesciences Pvt. Ltd. Plot No. 180, Near Sardar Chowk, Phase II, GIDC, Vapi – 396 185
	Pin Code	396 185
	E-mail	shruti.dama@jaychemicals.co.in cmc@jaychemicals.co.in
	Telephone No.	9819110837

	Fax No.	-
16.	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	NA
17.	Interlinked Projects	No
18.	Whether separate application of interlinked project has been submitted?	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)	No
24.	Whether there is any litigation pending against the project and/or land in which the project is propose	No

	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.	
25.	Project Cost	Rs. 60 crore

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	The premise where proposed project shall be established is having land area of 10556 sq m. As the site is located within GIDC area of Vapi, there shall not be any change in land use.
1.2	Clearance of existing land, vegetation and Buildings?	Yes	Minor site clearance activities shall be carried out to clear shrubs and weed.
1.3	Creation of new land uses?	No	The project site is located on level ground, which does not require any major land filling for area grading work.
1.4	Pre-construction investigations e.g. bore Houses, soil testing?	No	Project will be set up in well established GIDC area, hence, not necessary.
1.5	Construction works?	Yes	For detail Please refer **Annexure – VI**
1.6	Demolition works?	No	There will not be any demolition work at the site.
1.7	Temporary sites used for construction works or housing of construction workers?	No	Workers for the proposed construction work will be available from nearby villages.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	Yes	Details are shown in Plant Layout and is attached in **Annexure-II.**
1.9	Underground works mining or tunneling?	No	**Not Applicable**
1.10	Reclamation works?	No	**Not Applicable**
1.11	Dredging?	No	**Not Applicable**
1.12	Off shore structures?	No	**Not Applicable**
1.13	Production and manufacturing processes?	Yes	The Details of Product Profile are vide **Annexure - I**.

			The Details of Manufacturing Process is vide **Annexure - III**.
1.14	Facilities for storage of goods or materials?	Yes	Areas for storage of raw materials and finished products will be developed for the proposed project.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	Process Waste water generated will be treated in ETP plant and reused within premises. Domestic waste water will be disposed off through septic tank/soak pit system Details of treatment and disposal of the Liquid Effluent are given as **Annexure – V** and details of storage & disposal of the solid waste are given as **Annexure –VI.**
1.16	Facilities for long term housing of operational workers?	No	The operational workers will be available from the local area**.**
1.17	New road, rail or sea traffic during Construction or Operation?	No	The existing infrastructure and transportation system in GIDC is adequate and connects the unit with highway & railway station.
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	The existing transportation system of GIDC is adequate and connects the unit with highway & railway station.
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	Not Applicable
1.20	New or diverted transmission lines or Pipelines?	No	Not Applicable
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	Not Applicable
1.22	Stream crossings?	No	Not Applicable
1.23	Abstraction or transfers of water form ground or surface waters?	Yes	Water requirement shall be met through GIDC Water Supply.
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	Not Applicable
1.25	Transport of personnel or materials for	Yes	The unit will be within GIDC having

	construction, operation or decommissioning?		adequate transportation facilities.
1.26	Long-term dismantling or decommissioning or restoration works?	No	Not Applicable
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	Not Applicable
1.28	Influx of people to an area either temporarily or permanently?	Yes	Proposed project will generate direct 120 employment to skilled/semi-skilled/unskilled workers from the local area
1.29	Introduction of alien species?	No	Not Applicable
1.30	Loss of native species or genetic diversity?	No	Not Applicable
1.31	Any other actions?	No	Not Applicable

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	Not Applicable
2.2	Water (expected source & competing users) unit: KLD	Yes	Water requirement shall be 325 KL/Day (140 KLD Fresh + 185 KLD Recycled) and Fresh water supply shall be met through GIDC Water Supply. Water balance is given as **Annexure –IV.**
2.3	Minerals (MT)	No	Not Applicable
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.	Not Applicable

2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	**Fuel** Natural Gas –16,000 Nm^3/day for process and MEE operation **Energy :** 800 KVA from DGVCL.
2.7	Any other natural resources (use appropriate standard units)	No	LDO will be used as fuel in DG sets

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	Not Applicable
3.3	Affect the welfare of people e.g. by changing living conditions?	No	Not Applicable
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.	No	Not Applicable
3.5	Any other causes	No	Not Applicable

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	Not Applicable
4.2	Municipal waste (domestic and or commercial wastes)	No	Not Applicable
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Please refer **Annexure –VI**
4.4	Other industrial process wastes	Yes	Please refer **Annexure - VI**
4.5	Surplus product	No	Not Applicable
4.6	Sewage sludge or other sludge from effluent treatment	Yes	Sludge generated from ETP shall be disposed at common TSDF site for secured land filling.
4.7	Construction or demolition wastes	Yes	Construction activies will be carried out and waste generated from construction wastes are shown in **Annexure- VI**
4.8	Redundant machinery or equipment	No	Not Applicable
4.9	Contaminated soils or other materials	No	Not Applicable
4.10	Agricultural wastes	No	Not Applicable
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 on flue gas emission please refer as **Annexure – VII**
5.2	Emissions from production processes	Yes	For details on process emission please

			refer as **Annexure – VII**
5.3	Emissions from materials handling storage or transport	No	The material handling including storage and transportation may contribute to fugitive emission. Spillage will be avoided through proposed handling and providing training.
5.4	Emissions from construction activities including plant and equipment	No	Not Applicable
5.5	Dust or odors from handling of materials including construction materials, sewage and waste	No	Dust will be generated during construction and handling of materials but due care would be taken.
5.6	Emissions from incineration of waste	No	Not Applicable
5.7	Emissions from burning of waste in open air (e.g.slash materials, construction debris)	No	Not Applicable
5.8	Emissions from any other sources	No	Not Applicable

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

Sr. No.	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	The noise levels near the sources such as D. G. Set, Thermopack etc. will be higher during the operational phase but general noise levels within plant are expected to remain within the prescribed limit. At noisy area, adequate preventive & control measures will be taken. No significant noise, vibration or emission of light & heat from the unit.
6.2	From industrial or similar processes	Yes	There may be noise from process but generally noise level within plant expected to remain low.

6.3	From construction or demolition	Yes	Noise may be occur due to construction work.
6.4	From blasting or piling	No	Not Applicable
6.5	From construction or operational traffic	No	Not Applicable
6.6	From lighting or cooling systems	No	Not Applicable
6.7	From any other sources	No	Not Applicable

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	The raw material storage area shall be made of impervious layer so as to avoid any contamination from spillage of hazardous chemicals/ materials.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	Domestic sewage shall be disposed to septic tank / soak pit system. Waste water shall be treated in ETP plant and shall be reused within premises.
7.3	By deposition of pollutants emitted to air into the and or into water	No	Not Applicable
7.4	From any other sources	No	Not Applicable
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	Not Applicable

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	Risk of fire and toxic effect due to storage of chemicals and process but to avoid that due care will be taken.For detail please refer **Annexure – VIII**
8.2	From any other causes	No	Not Applicable
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	No	The proposed site falls under seismic zone III. Proposed structure will be built as per the code for earthquake resistant building structure.

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

Sr. No.	Information/Checklist confirmation	Yes/ No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting. lities, ancillary development or development stimulated by the project which could have impact on the environment e.g. • Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) • housing development • extractive industry • supply industry • other	Yes	For detail please refer **Annexure – IX**

9.2	Lead to after-use of the site, which could havean impact on the environment	No	Not Applicable
9.3	Set a precedent for later developments	No	Not Applicable
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	Not Applicable

(II) Environmental Sensitivity

Sr. No.	Areas	Name/ Identity	Aerial distance (within 15km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	No protected area within 10 km from the proposed project site.
2	Areas which important for are or sensitive Ecol logical reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	No	Not Applicable
3	Area used by protected, important or sensitive Species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	No protected area or sensitive species within 10 km from the proposed project site.
4	Inland, coastal, marine or underground waters	No	Not Applicable
5	State, National boundaries	Maharashtra state boundary	Maharashtra state boundary is about 7 km from project site.
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	Not Applicable
7	Defense installations	No	Not Applicable
8	Densely populated or built-up area	Vapi	Vapi is around 2.5 km from the proposed project site.
9	Area occupied by sensitive man-made land uses Hospitals, schools, places of worship, community facilities)	Vapi	Vapi town has hospitals, schools and general community facilities.
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	No	Not Applicable
11	Areas already subjected to pollution environmental damage. (those where existing legal environmental standards are exceeded)or	No	Not Applicable

12	Are as susceptible to natural hazard which could cause the project to present environmental problems (earthquake s, subsidence ,landslides, flooding erosion, or extreme or adverse climatic conditions)	Earth quake	Project site falls in seismic zone III. So, all the structures shall be constructed as per the IS code for earthquake resistance structures.

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

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

Date: 13/03/2019

Place: Vapi

For, Punagri Organics and Lifesciences Pvt. Ltd.

Authorized Signatory

NOTE:

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.

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 showing by chief wildlife warden showing these features vis-a-vis the project location and the Recommendation or comments of the Chief Wildlife Warden 'thereon (at the stage of EC)."

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

LIST OF ANNEXURES

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

ANNEXURE – I

LIST OF PRODUCTS WITH THEIR REVISED PRODUCTION CAPACITY

Sr.no.		Products			As per Existing TOR Granted		As per Revised Proposed Amendment		Remarks
					Max. Production Capacity of Each Product MT/ Month	Production Capacity MT/Month (Product Mix)	Max. Production Capacity of Each Product MT/ Month	Production Capacity MT/Month (Product Mix)	
Group I	**A**		**Anti-ulcer API's**						
		(I)	**Prazole chlorides**						
			1	Omeprazole chloride **OR**	11	11	8	8	Change in Production Capacity
			2	Pantoprazole chloride **OR**	7		7		No Change
			3	Rabeprazole chloride	8		8		No Change
		(II)	**Prazole Benzimidazoles**						
			1	2-Mercapto-5-methoxybenzimidazole **OR**	30	30	30	30	No Change
			2	5-Difluoromethoxy-2-mercaptobenzimidazole **OR**	7		7		No Change
			3	2-Mercaptobenzimidazole	9		9		No Change

		(III)	**API's**						
			1	Omeprazole sulphide/Omeprazole salts **OR**	7	10	5	10	Change in Production Capacity
			2	Esomeprazole salts **OR**	3		3		No Change
			3	Pantoprazole sulphide/Pantoprazole salts **OR**	10		10		No Change
			4	Rabeprazolesulphide/Rabeprazole salts **OR**	10		10		No Change
	B	**Anti depressant**							
		(II)	**API's**						
			1	Citalopram salts **OR**	10	10	8		Change in Production Capacity
			2	Escitalopram salts **OR**	4		4		No Change
		(I)	**Intermediates**						
			1	Cyanodiol salts **OR**	35	35	28	30	Change in Production Capacity
			2	5-Cyanophthalide **AND**	28		23		Change in Production Capacity
			3	5-Carboxyphthalide	0	-	30		New Product Added
	C	**Beta Blocker**							
		(I)	**Intermediates**						
			1	4-Hydroxycarbazole **OR**	14	20	14	30	No Change

			2	4-(2,3-epoxypropoxy)-carbazole **OR**	14		14		No Change
			3	2-(2-Methoxy-phenoxy)-ethylamine **OR**	11		11		No Change
		(II)	**API**						
			1	Carvedilol **OR**	20		20		No Change
	D	**Antiarrhythmic**							
			1	Lidocaine Hydrochloride **OR**	3		30		Change in Production Capacity
	E	**Antianginal**							
		(I)	**Intermediates**						
			1	N-(2,6-dimethyl-phenyl)-2-piparazinoacetamide **OR**	3		3		No Change
			2	3-(2-Methoxyphenoxy)-1,2-epoxypropane	2		2		No Change
		(II)	**API**						
			1	Ranolazinedihydrochloride **OR**	2		2		No Change
	F	**Anti-convulsant**							
		(I)	**Intermediates**						
			1	Isobutylglutaric acid **OR**	10		10		No Change
			2	R-(-)-3-(Carbamoylmethyl)-5-methylhexanoic acid **OR**	4		4		No Change
		(II)	**API**						

			1	Pregabalin **OR**	3		3		No Change
	G	**Muscle relaxant**							
			1	Metaxalone **OR**	3		3		No Change
	H	**Anti HIV/AIDS**							
		(I)	**Intermediates**						
			1	3-Amino-2-chloro-4-methylpyridine **OR**	4		4		No Change
		(II)	**API**						
			1	Nevirapine **OR**	4		4		No Change
	I	**Lipid-lowering**							
		(I)	**Intermediates**						
			1	(4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl -1,3-dioxane-4-acetate **OR**	2		2		No Change
			2	tert-butyl [(4R,6R)-6-aminoethyl-2,2-dimethyl-1,3-dioxan-4-yl]acetate **OR**					No Change
		(II)	**API**						
			1	Atorvastatin **OR**					No Change
	J	**NSAID**							
		(I)	**Intermediates**						
			1	1-(4-Methylphenyl)-4,4,4-Trifluoro-Butane-1,3-Dione **OR**	7		0		Product Removed
			2	4-Hydrazinobenzene-sulfonamide hydrochloride **OR**	7		0		Product Removed

			3	2-Amino-5-methylthiazole	0		15		New Product Added
			4	Isopropyl 4-hydroxy-2-methyl-2H-1,2-benzothiazine-3-carboxylate 1,1-dioxide	0		21		New Product Added
		(II)	**API**						
			1	Celecoxib **OR**	10		0		Product Removed
			2	Meloxicam	0		7		New Product Added
			3	Piroxicam	0		7		New Product Added
	K	**Anti-diabetic**							
		(I)	**Intermediates**						
			1	(S)-1-(2-chloroacetyl)pyrrolidine-2-carbonitrile **OR**	8		8		No Change
		(II)	**API**						
			1	Vildagliptine **OR**	9		9		No Change
	L	**Anti-histamine**							
		(I)	**Intermediates**						
			1	2-Chlorobenzimidazole **OR**	10		10		No Change
	M	**Cholinesterase inhibitors**							
		(I)	**Intermediates**						
			1	(S)-3-[1-(Dimethylamino)ethyl]phenol **OR**	6		6		No Change
		(II)	**API**						

			1	Rivastigmine Salt **OR**	5		5		No Change
	N	**Anti cancer (Kinase inhibitors)**							
		(I)	**Intermediates**		6		6		No Change
			1	(2-Methyl-5-Nitrophenyl) Guanidine Nitrate **OR**					
			2	3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-One **OR**	4		4		No Change
			3	N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine **OR**	4		4		No Change
		(II)	**API**						
			1	ImatinibMesylate **OR**	3		3		No Change
			2	Axitinib	3		3		No Change
Group II	**Catalytic hydrogenation/dehydrogenation**								
			1	a. Nitro to amino	200	200	100	100	Change in Production Capacity
				b. Dearomatisation					
				c. Aromatisation					
				d. Debenzoylation					
				e. Keto to alcohol etc.					
Group III	**Castor Oil & derivatives**								
			1	Undecylenic acid	30	30	0	0	Product Removed

			2	Sebacic acid	5	5	0	0	Product Removed
Group III	**Fine Speciality Chemicals**								New Group Added
			1	MNPT **OR**	0	-	150	150	New Product Added
			2	Fast Red B Base **AND**	0		90		New Product Added
			3	Fast Scarlet R Base	0		12		New Product Added
				OR					
			4	Fast Bordeaux GP Base	0		150		New Product Added
Group IV	**Intermediate for Pigments**								
			1	Fast Red KD Base **OR**	25	30	12	25	Change in Production Capacity
			2	Napthol ASLC **OR**	25		23		Change in Production Capacity
			3	5-amino-6-methyl benzimidazolone (5-AMBI) **OR**	10		10		No Change
			4	5-Acetoacetylamino-benzimidazolone OR	30		19		Change in Production Capacity
			5	CLT Acid **OR**	0	-	25		New Product Added

			6	OPDA/ PPDA **OR**	100	100	25		Change in Production Capacity
Group V	**R&D Centre**								
			1	Research activities of synthetic organic chemicals comprising of various unit processes & unit operations in a pilot reactor (like acetylation, nitration, hydrolysis, bromination, reduction, oxidation, hydrogenation, condensation etc.)	2	2	2	2	No Change
				Total/Month	787	483	1042	385	There is a change in total production capacity.
				Total/Day	26.2	16.1	34.7	12.8	

REVISED LIST OF RAW MATERIAL WITH THEIR PRODUCTION CAPACITY

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
Group-I- API's, Intermediates for API's & derivatives				
1	**Omeprazole chloride**			
	3,5-Lutidine	8	1	8
	Acetic acid		3.35	26.8
	H2O2 (50%)		1.151	9.208
	Sulphuric acid (98%)		2.29	18.32
	Nitric acid (65%)		1.475	11.8
	NaOH lye (48%)		7.54	60.32
	NaOH flakes		0.312	2.496
	Methanol (recovered)		8.775	70.2
	Methanol (make-up)		0.325	2.6
	MDC (recovered)		3.95	31.6
	MDC (make-up)		0.05	0.4
	Dimethylsulphate		0.95	7.6
	Ammonium sulphate		0.391	3.128
	Ammonium persulphate		0.704	5.632
	Toluene (recovered)		6.93	55.44
	Toluene (make-up)		0.07	0.56
	Thionyl chloride		0.962	7.696
		Total	**40.225**	**321.8**
2	**Pantoprazole chloride**			
	Maltol	7	2.291	16.037
	NaOH Lye (48%)		9.936	69.552
	Dimethylsulphate		2.518	17.626
	MDC (recovered)		27.72	194.04

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	MDC (make-up)		0.28	1.96
	Ammonia solution (recovered)		8.94	62.58
	Ammonia solution (make-up)		1.79	12.53
	Acetone		0.5	3.5
	Toluene (recovered)		16.83	117.81
	Toluene (make-up)		0.17	1.19
	POCl3 (recovered)		8.94	62.58
	POCL3 (make-up)		1.79	12.53
	Acetic acid		8.3	58.1
	H2O2 (50%)		1.193	8.351
	Methanol (recovered)		6.1	42.7
	Methanol (make-up)		0.4	2.8
	NaOH Flakes		0.621	4.347
	Acetic acid (recovered)		3.5	24.5
	Acetic anhydride		1.278	8.946
	Thionyl chloride		0.97	6.79
		Total	**104.067**	**728.469**
3	**Rabeprazole chloride**			
	2,3-Lutidine		1	8
	Acetic acid		3.35	26.8
	H2O2 (50%)		1.084	8.672
	Sulphuric acid (98%)		2.29	18.32
	Nitric acid (65%)	8	1.475	11.8
	NaOH lye (48%)		6.814	54.512
	NaOH flakes		0.355	2.84
	3-Methoxy-1-propanol		0.754	6.032
	HCl (35%)		1.456	11.648

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	MDC (recovered)		13.85	110.8
	MDC (make-up)		0.15	1.2
	Acetic anhydride		0.72	5.76
	Acetic acid (recovered)		0.975	7.8
	Toluene (recovered)		9.9	79.2
	Toluene (make-up)		0.1	0.8
	Thionyl chloride		0.645	5.16
		Total	**44.918**	**359.344**
4	**2-Mercapto-5-methoxybenzimidazole**			
	4-Methoxy-2-nitroaniline		1.111	33.33
	NaHS (30%) fresh		1.372	41.16
	NaHS (20%) recycle		2.592	77.76
	NaOH (48%)	30	3.077	92.31
	Carbondisulphide		0.953	28.59
	Sulphuric acid (98%)		1.195	35.85
	Activated carbon		0.11	3.3
		Total	**10.41**	**312.3**
5	**5-Difluromethoxy-2-mercaptobenzimidazole**			
	Paracetamol		0.925	6.475
	Freon 22		1.06	7.42
	NaOH (48%)		4.338	30.366
	MDC (recovered)		9.9	69.3
	MDC (make-up)	7	0.1	0.7
	HNO3 (98%)		0.591	4.137
	NaHS (30%) fresh		1.144	8.008
	NaHS (20%) recycle		2.162	15.134
	Carbondisulphide		0.795	5.565

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Sulphuric acid (98%)		0.996	6.972
	Activated carbon		0.092	0.644
		Total	**22.103**	**154.721**
6	**2-Mercaptobenzimidazole**			
	o-Nitroaniline	9	1.096	9.864
	NaHS (30%) fresh		1.647	14.823
	NaHS (20%) recycle		3.112	28.008
	NaOH (48%)		3.693	33.237
	Carbondisulphide		1.144	10.296
	Sulphuric acid (98%)		1.435	12.915
	Activated carbon		0.132	1.188
		Total	**12.259**	**110.331**
7	**Omeprazole sodium**			
	Omeprazole chloride	5	0.823	4.115
	2-Mercapto-5-methoxybenzimidazole		0.799	3.995
	Triethybenzyl ammonium chloride		0.025	0.125
	NaOH (48%)		1.023	5.115
	MDC (recovered)		17.82	89.1
	MDC (make-up)		0.18	0.9
	Phthalic anhydride		0.71	3.55
	Sodium cabonate		0.639	3.195
	H2O2(30%)		0.639	3.195
		Total	**22.658**	**113.29**
8	**Esomeprazole salts**			
	Omeprazole chloride	3	1.809	5.427
	2-Mercapto-5-methoxybenzimidazole		1.756	5.268

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Triethybenzyl ammonium chloride		0.055	0.165
	NaOH (48%)		1.787	5.361
	MDC (recovered)		15.84	47.52
	MDC (make-up)		0.16	0.48
	D-(-)diethyl tartrate		0.488	1.464
	Titanium isopropoxide		0.334	1.002
	Toluene (recovered)		9.9	29.7
	Toluene (make-up)		0.1	0.3
	Cumenehydroperoxide		2.95	8.85
	KOH (85%)		0.512	1.536
	Methanol (recovered)		4.5	13.5
	Methanol (make-up)		0.5	1.5
	Methanol		3	9
	MgCl2.2H2O		0.38	1.14
	Acetone		7.5	22.5
		Total	**51.571**	**154.713**
9	**Pantoprazole sodium**			
	Pantoprazole chloride		0.689	6.89
	2-Mercapto-5-difluromethoxybenzimidazole		0.665	6.65
	Triethybenzyl ammonium chloride		0.01	0.1
	NaOH (48%)	10	0.591	5.91
	MDC (recovered)		6.93	69.3
	MDC (make-up)		0.07	0.7
	Sodium hypochlorite (8%)		2.707	27.07
	Acetone		0.5	5
		Total	**12.162**	**121.62**

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
10	**Rabeprazole sodium**			
	Rabeprazole chloride	10	0.769	7.69
	2-Mercaptobenzimidazole		0.49	4.9
	Triethybenzyl ammonium chloride		0.01	0.1
	NaOH (48%)		0.629	6.29
	MDC (recovered)		6.93	69.3
	MDC (make-up)		0.07	0.7
	Sodium hypochlorite (8%)		2.88	28.8
	Acetone		0.5	5
	Total		**12.278**	**122.78**
11	**Citalopram HBr**			
	CyanodiolHBr	8	1.54	12.32
	Sulphuric acid (98%)		0.732	5.856
	NaOH (48%)		1.5	12
	Toluene (recovered)		10.8	86.4
	Toluene (make-up)		0.2	1.6
	IPA		9	72
	IPA (recovered)		5.85	46.8
	IPA (make-up)		0.15	1.2
	HBr (48%)		0.681	5.448
	Activated carbon		0.1	0.8
	Total		**30.553**	**224.424**
12	**Escitalopram oxalate**			
	CyanodiolHBr	4	4.783	19.132
	MDC (recovered)		29.7	118.8
	MDC (make-up)		0.3	1.2
	NaOH (48%)		1.275	5.1

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	TEA		0.92	3.68
	Methane sulphonic acid		0.391	1.564
	IPA (recovered)		19.8	79.2
	IPA (make-up)		0.2	0.8
	(+)-Di-p-toluoyl-D-tartaric acid		2.283	9.132
	Oxalic aicddihydrate		0.335	1.34
	Acetone		2.5	10
		Total	**62.487**	**249.948**
13	**Cyanodiol HBr**			
	5-Cyanophthalide		0.82	22.96
	THF (recovered)		8.3	232.4
	GR-1 (1N)		8.5	238
	GR-2 (1N)		7.91	221.48
	Ammonium chloride		1.292	36.176
	Acetic acid		1.372	38.416
	Toluene (recovered)	28	2.97	83.16
	Toluene (Make-up)		0.03	0.84
	Ammonia solution		0.72	20.16
	IPA (20%, recovered)		4.25	119
	IPA (pure, recovered)		3	84
	IPA (pure, make-up)		0.17	4.76
	HBr (48%)		0.809	22.652
		Total	**40.143**	**1124.004**
14	**5-Cyanophthalide**			
	5-Carboxyphthalide		1.36	31.28
	MCB (recovered)	23	6.90	158.7
	MCB (make-up)		0.10	2.3

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Thionyl chloride		2.50	57.5
	Ammonia		0.31	7.13
	NaOH Lye (48%)		4.60	105.8
	MDC (recovered)		10.90	250.7
	MDC (make-up))		0.10	2.3
	Activated carbon		0.16	3.68
		Total	**26.93**	**619.39**
15	**5-Carboxyphthalide**			
	Purified Terephthalic acid		1.25	37.5
	Oleum		5.5	165
	Paraformaldehyde	30	0.3	9.3
	NaOH (48%)		0.475	14.25
	H2SO4 (98%)		0.293	8.79
		Total	**9.818**	**234.84**
16	**4-Hydroxide carbazole, dry**			
	Resorcinol		1.205	16.87
	Sodium hydroxide lye (48%)		1.676	23.464
	Raney nickel		0.02	0.28
	Phenylhydrazine	14	1.089	15.246
	Sulphuric acid (98%)		5.553	77.742
	Catalyst (recovered)		0.123	1.722
	Catalyst (fresh)		0.003	0.042
		Total	**9.669**	**135.366**
17	**4-(2,3-epoxypropoxy)-carbazole**			
	4-Hydroxycarbazole		1.016	14.224
	Sodium hydroxide lye (48%)	14	0.494	6.916
	Epichlorohydrin		0.772	10.808

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	IPA (recovered)		7.92	110.88
	IPA (make-up)		0.08	1.12
	Activated carbon		0.09	1.26
	Total		**10.372**	**145.208**
18	**2-(2-Methoxy-phenoxy)-ethylamine**			
	2-Methoxyphenol	11	1.194	13.134
	Sodium hydroxide lye (48%)		4.214	46.354
	TBAB		0.112	1.232
	EDC (recovered)		8.77	96.47
	EDC (make-up)		1.042	11.462
	N,N-DMF		1.474	16.214
	Potassium phthalimide		1.751	19.261
	MDC (recovered)		9.9	108.9
	MDC (make-up)		0.1	1.1
	Total		**28.557**	**314.127**
19	**Carvedilol**			
	4-(2,3-epoxypropoxy)-carbazole	20	1.214	24.28
	2-(2-methoxyphenoxy) ethanamine		0.932	18.64
	Ethylacetate (recovered)		9.9	198
	Ethylacetate (make-up)		0.1	2
	Activated carbon		0.05	1
	Total		**12.196**	**243.92**
20	**Lidocaine HCl**			
	2,6-Dimethylanilne	30	0.617	18.51
	Soda ash		0.766	22.98
	Chloroacetyl achloride		0.701	21.03

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	MDC (recovered)		9.51	285.3
	MDC (make-up)		0.19	5.7
	Diethylamine		0.498	14.94
	Acetone		2.405	72.15
	Dry HCl		0.167	5.01
		Total	**14.687**	**368.46**
21	**N-(2,6-dimethyl-phenyl)-2-piparazinoacetamid**			
	2,6-Dimethylanilne		0.713	2.139
	Soda ash		0.549	1.647
	Chloroacetylachloride		0.81	2.43
	MDC (recovered)		9.9	29.7
	MDC (make-up)		0.1	0.3
	Piperazine	3	1.515	4.545
	HCl (35%)		1.805	5.415
	NaOH (48%)		1.909	5.727
	Toluene (recovered)		9.9	29.7
	Toluene (make-up)		0.1	0.3
		Total	**27.301**	**81.903**
22	**3-(2-Methoxyphenoxy)-1,2-epoxypropane**			
	2-Methoxyphenol		1.395	2.79
	Epichlorohydrin		1.195	2.39
	MDC (recovered)	2	11.88	23.76
	MDC (make-up)		0.12	0.24
	NaOH (48%)		1.168	2.336
		Total	**15.758**	**31.516**
23	**Ranolazine diHCl**			
	N-(2,6-dimethyl-phenyl)-2-	2	0.585	1.17

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	piparazinoacetamide			
	3-(2-Methoxyphenoxy)-1,2-epoxypropane		0.435	0.87
	IPA (recovered)		2.523	5.046
	IPA (make-up)		0.25	0.5
	Dry HCl		0.168	0.336
	NaOH flakes		0.05	0.1
		Total	**4.011**	**8.022**
24	**Isobutylglutaric acid**			
	Ethyl2-cyanoacetate		0.751	7.51
	Cyclohexane (recovered)		0.98	9.8
	Cyclohexane (make-up)		0.02	0.2
	Isovaleraldehyde		0.636	6.36
	Piperidine	10	0.07	0.7
	Diethyl malonate		1.181	11.81
	HBr (47%)		13.88	138.8
	MDC (recovered)		8.9	89
	MDC (Make-up)		0.1	1
		Total	**26.518**	**265.18**
25	**R-(-)-3-(Carbamoylmethyl)-5-methylhexanoic acid**			
	Acetic anhydride		1.805	7.22
	Ammonia solution (23%)		1.37	5.48
	MTBE (recovered)		2.95	11.8
	MTBE (make-up)	4	0.05	0.2
	HCl (35%)		1.001	4.004
	MDC (recovered)		9.9	39.6
	MDC (make-up)		0.1	0.4

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Ethanol		0.5	2
	R-(+)-α-phenylethylamine		1.29	5.16
		Total	**18.966**	**75.864**
26	**Pregabalin**			
	R-(-)-3-(Carbamoylmethyl)-5-methylhexanoic acid	3	2.04	6.12
	NaOH Lye (48%)		3.425	10.275
	Bromine		2.082	6.246
	Hydrochloric acid (35%)		2.305	6.915
	Aqueous IPA, 55% (recovered)		8.4	25.2
	Aqueous IPA, 55% (make-up)		0.1	0.3
	Activated carbon		0.1	0.3
		Total	**18.452**	**55.356**
27	**Metaxalone**			
	3,5-Dimethylphenol	3	1.54	4.62
	Epichlorohydrin		2.336	7.008
	Caustic flakes		0.527	1.581
	IPA (recovered)		3.55	10.65
	IPA (make-up)		0.05	0.15
	MDC (recovered)		19.6	58.8
	MDC (make-up)		0.4	1.2
	Methanol (recovered)		23.6	70.8
	Methanol (Loss)		0.4	1.2
	Ammonia		31.9	95.7
	HCl (35%)		2.42	7.26
	Toluene (recovered)		11.76	35.28
	Toluene (Loss)		0.24	0.72

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	IPA		0.975	2.925
	Sodium carbonate		1.735	5.205
	Ethylchloroformate		0.625	1.875
		Total	**101.658**	**304.974**
28	**3-amino-2-chloro-4-methylpyridine**			
	Cyanoacetamide	4	1.585	6.34
	Ethyl acetoacetate		2.453	9.812
	KOH		1.297	5.188
	HCl (30%)		3.885	15.54
	POCl3		5.163	20.652
	Sodium acetate		2.481	9.924
	PdCl2 (recovered)		0.07	0.28
	Methanol (recovered)		14.85	59.4
	Methanol (make-up)		0.15	0.6
	Hydrogen		0.064	0.256
	NaOH Lye (48%)		9.481	37.924
	H2SO4 (98%)		1.14	4.56
	Chlorine		1.599	6.396
	MDC (recovered)		9.9	39.6
	MDC (make-up)		0.1	0.4
	Activated carbon		0.1	0.4
	IPA (recovered)		9.9	39.6
	IPA (make-up)		0.1	0.4
		Total	**64.318**	**257.272**
29	**Nevirapine**			
	Cyanoacetamide	4	1.585	6.34
	Ethyl acetoacetate		2.453	9.812

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	KOH		1.297	5.188
	HCl (30%)		3.885	15.54
	POCl3		5.163	20.652
	Sodium acetate		2.481	9.924
	PdCl2 (recovered)		0.07	0.28
	Methanol (recovered)		14.85	59.4
	Methanol (make-up)		0.15	0.6
	Hydrogen		0.064	0.256
	NaOH Lye (48%)		9.481	37.924
	H2SO4 (98%)		1.14	4.56
	Chlorine		1.599	6.396
	MDC (recovered)		9.9	39.6
	MDC (make-up)		0.1	0.4
	Activated carbon		0.1	0.4
	IPA (recovered)		9.9	39.6
	IPA (make-up)		0.1	0.4
		Total	**64.318**	**257.272**
30	**(4r-cis)-1,1-Dimethylethyl-6-cyanomethyl-2,2-dimethyl-1,3-dioxane-4-acetate**			
	Ethyl (R)-4-cyano-3-hydroxybutanoate	2	1.013	2.026
	tert-Butyl acetate		0.748	1.496
	LDA in Heane/THF		4.73	9.46
	MTBE		3.65	7.3
	HCl (35%)		0.903	1.806
	Triethanolamine		0.161	0.322
	EDTA		0.004	0.008
	Glucose		1.045	2.09

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Ethyl acetate		3.65	7.3
	Na2CO3		0.065	0.13
	n-Hexane (recovered)		4.95	9.9
	n-Hexane (make-up)		0.05	0.1
	2,2-DMP		0.497	0.994
	Methanesulfonic acid		0.065	0.13
	NaOH Lye (48%)		0.258	0.516
	Activated carbon		0.109	0.218
		Total	**21.898**	**43.796**
31	**Tert-butyl[(4R,6R)-6-aminoethyl-2,2-dimethyl-1,3-dioxan-4-yl]acetate**			
	(4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl -1,3-dioxane-4-acetate	2	1.131	2.262
	IPA (recovered)		4.95	9.9
	IPA (make-up)		0.05	0.1
	Catalyst (Recycle)		0.002	0.004
	Hydrogen		0.017	0.034
		Total	**6.15**	**12.3**
32	**Atorvastatin**			
	Ethyl (R)-4-cyano-3-hydroxybutanoate	2	1.146	2.292
	tert-Butyl acetate		0.846	1.692
	LDA in Heane/THF		5.35	10.7
	MTBE		3.65	7.3
	HCl (35%)		1.021	2.042
	Triethanolamine		0.182	0.364
	EDTA		0.004	0.008
	Glucose		1.182	2.364

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Ethyl acetate		3.65	7.3
	Na2CO3		0.073	0.146
	n-Hexane (recovered)		4.95	9.9
	n-Hexane (make-up)		0.05	0.1
	2,2-DMP		0.562	1.124
	Methanesulfonic acid		0.073	0.146
	NaOH Lye (48%)		0.292	0.584
	Activated carbon		0.109	0.218
	IPA (recovered)		4.95	9.9
	IPA (make-up)		0.05	0.1
	Catalyst (Recycle)		0.002	0.004
	Hydrogen		0.017	0.034
		Total	**28.159**	**56.318**
33	**2-Amino-5-methylthiazole**			
	Sulfuryl chloride		3.175	47.625
	Propionaldehyde		1.27	19.05
	Methanol		2.216	33.24
	NaOH Lye (48%)		8.946	134.19
	Thiourea	15	1.279	19.185
	HCl (35%)		0.333	4.995
	Toluene recovered		1.75	26.25
	Toluene make up		0.05	0.75
	Ethyl acetae recovered		0.33	4.95
	Ethyl acetate make up		0.02	0.3
		Total	**19.369**	**290.535**
34	**Isopropyl 4-hydroxy-2-methyl-2H-1,2-benzothiazine-3-carboxylate 1,1-dioxide**			

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Sodium saccharin	21	1.266	26.586
	DMF		0.633	13.293
	Isopropyl chloroacetate		0.842	17.682
	Soda ash		0.133	2.793
	Sodium metal		0.335	7.035
	IPA recovered		6.8	142.8
	IPA make up		0.2	4.2
	Dimethylsulphate		1.057	22.197
	HCl (35%)		0.715	15.015
	Methanol recovered		1.75	36.75
	Methanol make up		0.05	1.05
	Total		**13.781**	**289.401**
35	**Meloxicam**			
	2-Amino-5-methylthiazole	7	0.54	3.78
	Methyl benzothizone isopropyl ester		1.09	7.63
	o-Xylene recovered		15.8	110.6
	o-Xylene make-up		0.2	1.4
	Acetic acid		0.304	2.128
	NaOH flakes		0.22	1.54
	Methanol recovered		11.8	82.6
	Methanol make up		0.2	1.4
	Activated carbon		0.15	1.05
	Total		**30.304**	**212.128**
36	**Piroxicam**			
	2-Aminopyridine	7	0.44	3.08
	Methyl benzothizone isopropyl ester		1.11	7.77

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	o-Xylene recovered		15.8	110.6
	o-Xylene make-up		0.2	1.4
	Methane sulfonic acid		0.01	0.07
	IPA recovered		1.45	10.15
	IPA make up		0.05	0.35
	MDC recovered		11.8	82.6
	MDC make up		0.2	1.4
	Activated carbon		0.2	1.4
		Total	**31.26**	**218.82**
37	**(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile**			
	L-Proline		1.408	11.264
	MDC (recovered)		9.9	79.2
	MDC (make-up))		0.1	0.8
	Chloroacetyl chloride		2.098	16.784
	Di-isopropyl ether(recovered)		7.92	63.36
	Di-isopropyl ether(make-up)		0.08	0.64
	MCB (recovered)		11.88	95.04
	MCB (make-up)	8	0.12	0.96
	Thionyl chloride		3.732	29.856
	N,N-DMF		0.1	0.8
	Ammonia		0.5	4
	NaOH (48%)		8.09	64.72
	IPA (recovered)		10.9	87.2
	IPA (make-up)		0.1	0.8
	Activated carbon		0.16	1.28
		Total	**57.088**	**456.704**
38	**Vildagliptine**			

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	1-Amino-3-hydroxyadamantate	9	0.923	8.307
	(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile		0.923	8.307
	MEK (recovered)		9.9	89.1
	MEK (make-up)		0.1	0.9
	Potassium carbonate		0.425	3.825
	Potassium iodide		0.077	0.693
	Activated carbon		0.11	0.99
	Total		**12.458**	**112.122**
39	**2-Chlorobenzimidazole**			
	OPDA	10	1.071	10.71
	Urea		0.614	6.14
	Sulphuric acid		1.236	12.36
	NaOH (48%)		6.643	66.43
	POCl3 (recovered)		16.071	160.71
	POCl3 (make-up)		2.5	25
	Dry HCl		0.357	3.57
	IPA (recovered)		12.87	128.7
	IPA (make-up)		0.13	1.3
	Activated carbon		0.12	1.2
	Total		**41.612**	**416.12**
40	**(S)-3-(1-(dimethylamino)ethyl)phenol**			
	[1-(3-Methoxyphenyl)ethyl]dimethyl amine	6	4.188	25.128
	HBr (47%)		12.097	72.582
	Ethyl acetate (recovered)		16.5	99
	Ethyl acetate (make-up))		0.5	3

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Soda ash		1.009	6.054
	S-(+)-Camphor-10-sulphonic acid		2.685	16.11
	Ethanol		2.7	16.2
	Ethyl acetate		4	24
	MDC (recovered)		14.85	89.1
	MDC (make-up)		0.15	0.9
		Total	**58.679**	**352.074**
41	**Rivastigmine**			
	(S)-3-(1-(dimethylamino)ethyl)phenol		1.02	5.1
	N-Ethyl-N-methylcarbamoyl chloride		0.783	3.915
	Sodium hydride		0.248	1.24
	THF (reocvered)		6.5	32.5
	THF (make-up)	5	0.5	2.5
	NaOH (48%)		0.365	1.825
	MDC (recovered)		9.9	49.5
	MDC (make-up)		0.1	0.5
	IPA (recovered)		9.9	49.5
	IPA(make-up)		0.1	0.5
	Activated carbon		0.1	0.5
		Total	**29.516**	**147.58**
42	**(2-Methyl-5-Nitrophenyl) Guanidine Nitrate**			
	2-Methyl-5-nitroaniline		0.768	4.608
	HCl (30%)		0.868	5.208
	Cyanamide (50%)	6	0.303	1.818
	HNO3 (70%)		0.497	2.982
	NaOH (48%)		0.674	4.044

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Total		**3.11**	**18.66**
43	**3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-One**			
	3-Acetyl pyridine	4	0.743	2.972
	1,1-dimethoxy-N,N-dimethylmethanamine		0.95	3.8
	Cyclohexane (recovered)		8.91	35.64
	Cyclohexane (make-up)		0.09	0.36
	Total		**10.693**	**42.772**
44	**N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine**			
	(2-Methyl-5-Nitrophenyl) Guanidine Nitrate	4	1.725	6.9
	3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-One		0.905	3.62
	IPA (recovered)		9.9	39.6
	IPA (make-up)		0.1	0.4
	NaOH Flakes		1.464	5.856
	Catalyst (recovered)		0.0099	0.0396
	Catalyst (make-up)		0.0001	0.0004
	Hydrogen		0.03	0.12
	Toluene (recovered)		14.85	59.4
	Toluene (make-up)		0.15	0.6
	Total		**29.134**	**116.536**
45	**ImatinibMesylate**			
	N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine	3	0.732	2.196
	4-(4-methyl piperazinomethyl) benzoic acid dihydrochloride		0.899	2.697
	Toluene (recovered)		9.9	29.7
	Toluene (make-up)		0.1	0.3

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Thionyl chloride		0.366	1.098
	NaOH (48%)		1.54	4.62
	IPA (recovered)		9.9	29.7
	IPA (make-up)		0.1	0.3
	Activated carbon		0.15	0.45
	Methane sulfonic acid		0.198	0.594
		Total	**23.885**	**71.655**
46	**Axitinib**			
	6-Iodoindazole		1.429	4.287
	NMP		14	42
	Xantphos		0.125	0.375
	Catalyst		0.035	0.105
	NaHCO3		0.541	1.623
	2-Mercapto-N-methylbenzamide		1.028	3.084
	Iodine		3.125	9.375
	KOH		1.536	4.608
	Ascorbic acid	3	0.906	2.718
	Methanol		4	12
	N,N-DIPEA		1.536	4.608
	Acetic anhydride		0.821	2.463
	2-Vinylpyridine		2.5	7.5
	THF		4	12
	1,2-Diaminopropane		1.18	3.54
	Activated carbon		0.1	0.3
	Ethanol		7.5	22.5
		Total	**44.362**	**133.086**
Group-II- Catalytic hydrogenation/ Dehydrogenation				

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
47	**p-Anisidine**			
	PNCB	100	1.41	141
	Caustic flakes		0.394	39.4
	Methanol (recovered)		3.28	328
	Methanol (make-up)		0.32	32
	Catalyst (recovered)		0.014	1.4
	Hydrogen gas		0.0347	3.47
		Total	**5.4527**	**545.27**
48	**1-Butyl piperazine**			
	1-Benzyl-4-tert-butylpiperazine	100	1.812	181.2
	Toluene (recovered)		6.93	693
	Toluene(make-up)		0.07	7
	Catalyst (recovered)		0.018	1.8
	Catalyst (make-up)		0.0006	0.06
	Hydrogen gas		0.0164	1.64
		Total	**8.847**	**884.7**
Group-III- Fine Speciality Chemicals				
49	**MNPT**			
	p-Toluidine	150	0.939	140.85
	Acetic anhydride		0.05	7.5
	MDC (recovered)		9.9	1485
	MDC (make-up)		0.1	15
	HNO3(98%)		0.563	84.45
	Wash filtrate		2.05	307.5
	C/F Filtrate		0.5	75
	Condensate		0.15	22.5
	NaOH Lye (48%)		0.654	98.1

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Acitic Acid (70%)		0.916	137.4
		Total	**15.822**	**2373.3**
50	**Fast Red B Base and Fast Scarlet R Base**			
	o-Anisidine	90 and 12 respectively	0.823	74.07
	Acetic acid (70%)		0.762	68.58
	Acetic anhydride		0.05	4.5
	MDC (recovered)		8.91	801.9
	MDC (make-up)		0.09	8.1
	HNO3(98%)		0.774	69.66
	Wash filtrate		3.2	288
	C/F Filtrate		0.321	28.89
	Condensate		0.188	16.92
	NaOH Lye (48%)		1.197	107.73
	Sulphuric acid		0.201	18.09
	Filtrate		0.301	27.09
		Total	**16.817**	**1513.53**
51	**Fast Bordeaux GP Base**			
	p-Anisidine	150	0.951	142.65
	Acetic anhydride		0.762	114.3
	MDC (recovered)		8.91	1336.5
	MDC (make-up)		0.09	13.5
	HNO3(98%)		0.496	74.4
	Wash filtrate		1.55	232.5
	C/F Filtrate		0.491	73.65
	Condensate		0.16	24
	NaOH Lye (48%)		0.54	81
	Acetic Anhydride		0.05	7.5

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
		Total	**14**	**2100**
Group-IV- Intermediates for pigments				
52	**Fast Red KD Base**			
	HBA	12	1.015	12.18
	NaOH (Lye (48%)		3.386	40.632
	DMS		1.971	23.652
	HNO3 (98%)		0.957	11.484
	MDC (recovered)		8.91	106.92
	MDC (make-up)		0.09	1.08
	MCB recoevered		3.96	47.52
	MCB (make-up)		0.04	0.48
	Thionyl chloride		0.846	10.152
	DMF		0.04	0.48
	Aniline		0.633	7.596
	NaHS (30%) recovered		0.396	4.752
	NaHS (30%) fresh		2.254	27.048
	H2SO4 (98%)		0.214	2.568
	IPA (recovered)		14.85	178.2
	IPA (make-up))		0.15	1.8
	Activated carbon		0.13	1.56
		Total	**39.842**	**478.104**
53	**Napthol ASLC**			
	Hydroquinone	23	0.451	10.373
	NaOH Lye (48%)		2.815	64.745
	Dimethyl sulphate		0.648	14.904
	DIPA		0.005	0.115
	Sulfuryl chloride		0.521	11.983

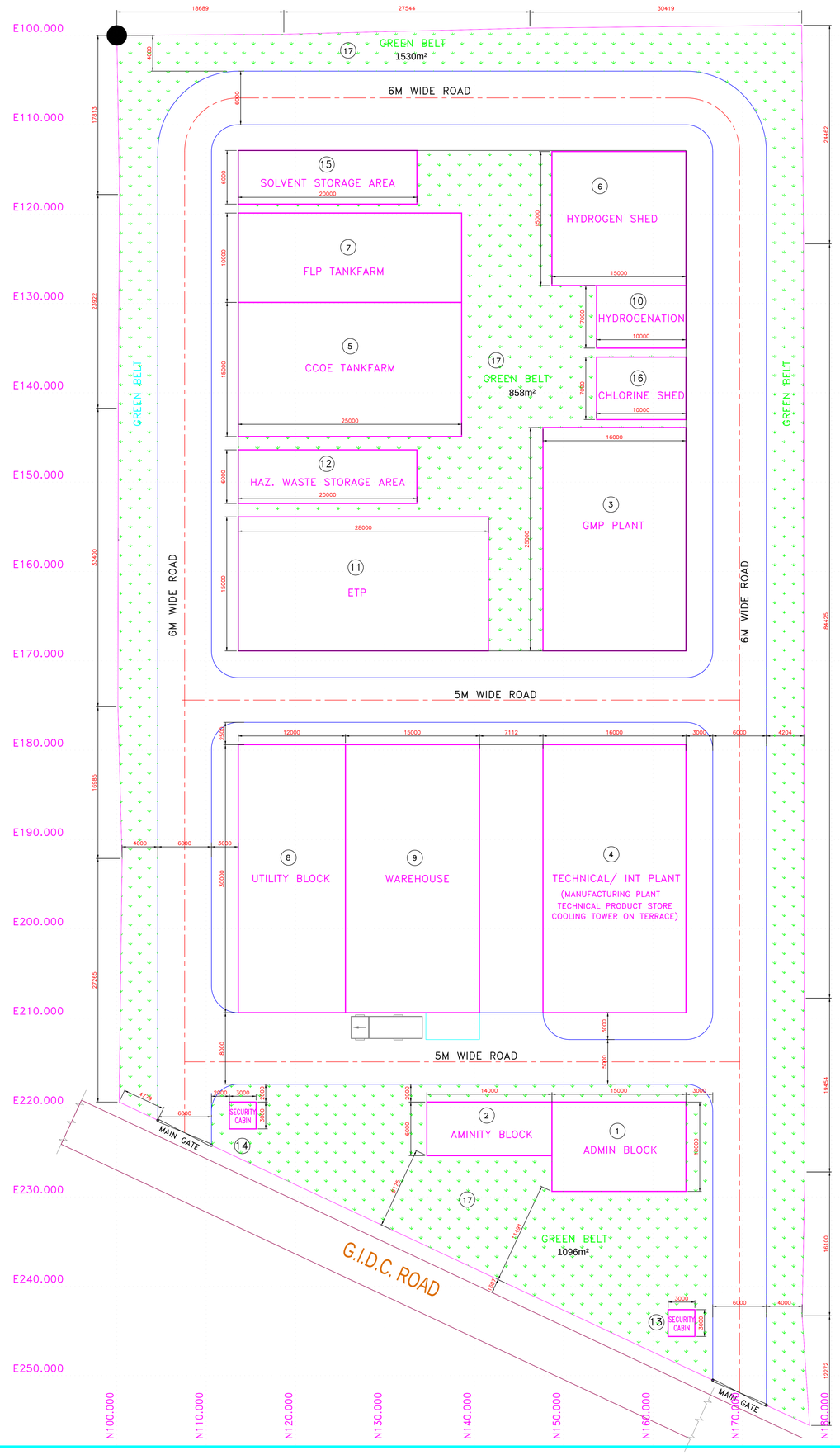
Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Nitric acid (70%)		0.828	19.044
	Hydrogen gas		0.0193	0.4439
	Catalyst (recovered)		0.008	0.184
	Catalyst (make-up)		0.0007	0.0161
	IPA (recovered)		7.92	182.16
	IPA (make-up)		0.08	1.84
	BON acid		0.553	12.719
	Thionyl chloride		0.35	8.05
		Total	**14.199**	**326.58**
54	**AMBI dry**			
	MNPT		1.708	17.08
	Catalyst (recovered)		0.016	0.16
	Catalyst (Make-up)		0.0016	0.016
	Xylene (recovered))		5.94	59.4
	Xylene (make-up)		0.06	0.6
	Hydrogen gas	10	0.1348	1.348
	Urea		1.34	13.4
	Nitric acid (70%)		2.175	21.75
	NaOH Lye (48%)		1.404	14.04
	HCl (35%)		1.8	18
	Activated carbon		0.12	1.2
		Total	**14.6994**	**146.994**
55	**AABI dry**			
	ONA		1.1	20.9
	Catalyst (recovered)	19	0.016	0.304
	Catalyst (Make-up)		0.0016	0.0304
	Xylene (recovered))		5.94	112.86

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Xylene (make-up)		0.06	1.14
	Hydrogen gas		0.096	1.824
	Urea		0.952	18.088
	Nitric acid (70%)		1.546	29.374
	NaOH Lye (48%)		0.998	18.962
	HCl (35%)		1.28	24.32
	Activated carbon		0.185	3.515
	Toluene (recovered)		7.625	144.875
	Toluene (make-up)		0.375	7.125
	Methyl acetoacetate		0.608	11.552
		Total	**20.7826**	**394.86**
56	**CLT Acid**			
	Toluene		0.789	19.725
	H2SO4(98%)		1.872	46.8
	FeCl3		0.011	0.275
	Chlorine		0.643	16.075
	HNO3 (70%)	25	0.843	21.075
	Ammonia (23%)		1.416	35.4
	Acetic acid		0.055	1.375
	Iron powder		0.75	18.75
	HCl (recovered)		0.9	22.5
		Total	**7.279**	**181.975**
57	**OPDA/PPDA**			
	ONCB/PNCB		1.575	39.375
	Aq. Ammonia (recovered)	25	8.85	221.25
	Aq. Ammonia (make-up)		0.5	12.5
	Toluene (recovered)		14.85	371.25

Sr. No.	Name of Raw Material	Production Capacity MT/Month	Quantity MT/MT	Quantity MT/Month
	Toluene (make-up)		0.15	3.75
	Hydrogen gas		0.06	1.5
	Catalyst (recovered)		0.0135	0.3375
	Catalyst (Top-up)		0.0005	0.0125
	Original filtrate (recycle)		8	200
		Total	**33.999**	**849.975**

ANNEXURE – II

LAYOUT MAP OF THE PLANT



AREA STATEMENT

PLANT NORTH
ACTUAL NORTH
28°

SR.NO	DESCRIPTION	SIZE	GR. FLOOR (IN SQ.M)	REMARK
1	ADMIN BLOCK	15Mx10M	150M²	Gr. + 2 Floor
2	AMINITY BLOCK	14Mx6M	84M²	Gr. + 2 Floor
3	GMP PLANT	25Mx16M	400M²	Gr. + 3 Floor
4	TECHNICAL /INT PLANT	30Mx16M	480M²	Gr. + 3 Floor
5	CCOE TANKFARM	25Mx15M	375M²	
6	HYDROGEN SHED	15Mx15M	225M²	
7	FLP TANKFARM	25Mx10M	250M²	
8	UTILITY BLOCK	30Mx12M	360M²	Gr. + 2 Floor
9	WARE HOUSE	30Mx15M	450M²	
10	HYDROGENATION	10Mx7M	70M²	Gr. + 1 Floor
11	ETP	28Mx15M	420M²	
12	HAZ. WASTE STORAGE AREA	20Mx6M	120M²	
13	SECURITY BLOCK	3Mx3M	9M²	
14	SECURITY BLOCK	3Mx3M	9M²	
15	SOLVENT STORAGE AREA	20Mx6M	120M²	
16	CHLORINE SHED	10Mx7M	70M²	
17	GREEN BELT	–	3484M²	
18	ROAD AREA / OPEN TO SKY	–	3480M²	
	TOTAL		10556M²	

TOTAL PLOT AREA :- 10556m 2
GREEN BELT 33% OF TOTAL PLOT AREA:-3484m 2

Rev	Date	Description	Name	Checked	Approved

Shroff & Associates (Engineers) Pvt. Ltd.
Shroff Consulting Engineers LLP.

Title : PLOT PLAN

Owner: M/s JAY CHEMICALS

Plant: | Location: DAHEJ

Project Name: | Project No:

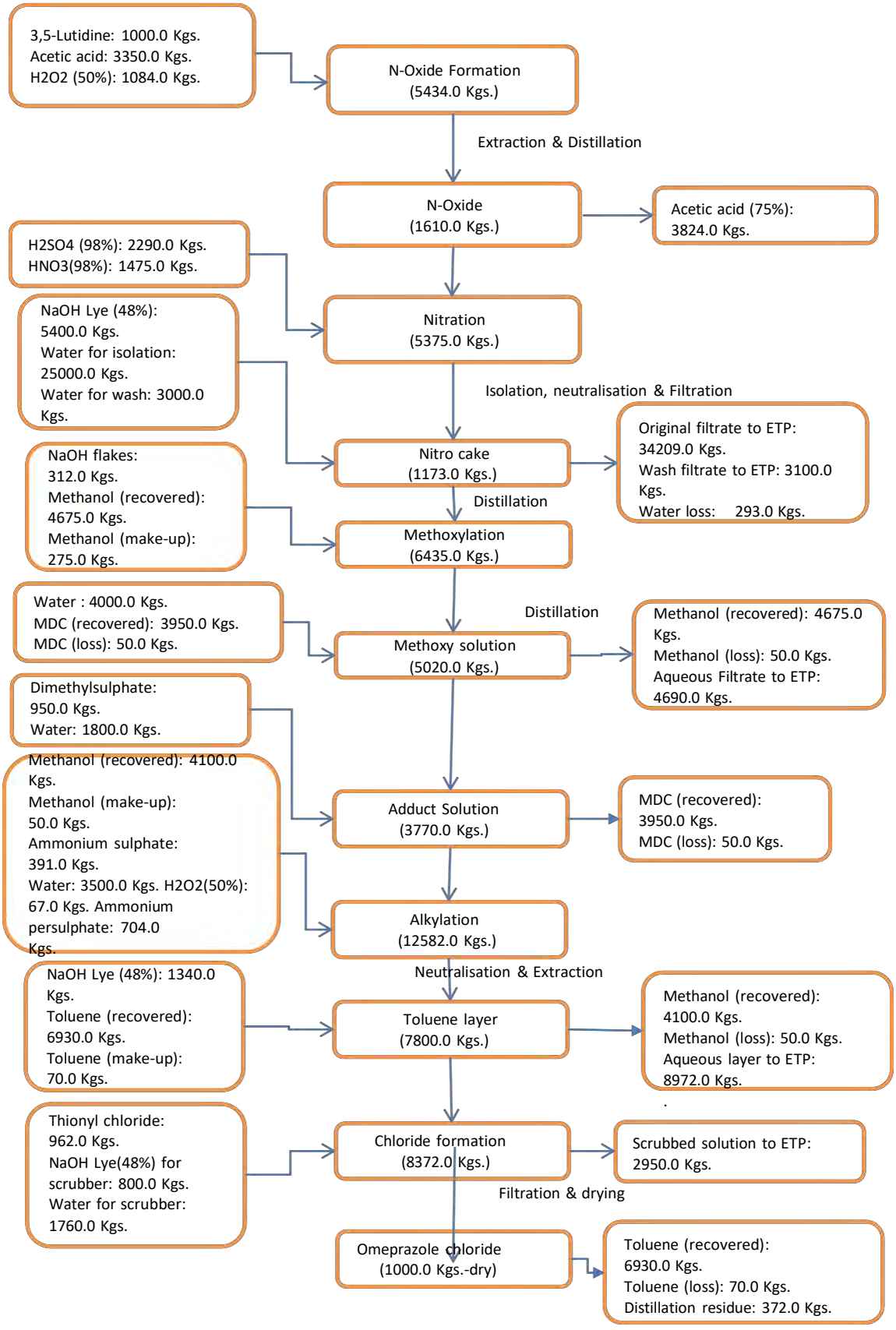
Scale | Drg. No. | Sheet of | Rev

ANNEXURE III
MANUFACTURING PROCESS OF PRODUCTS

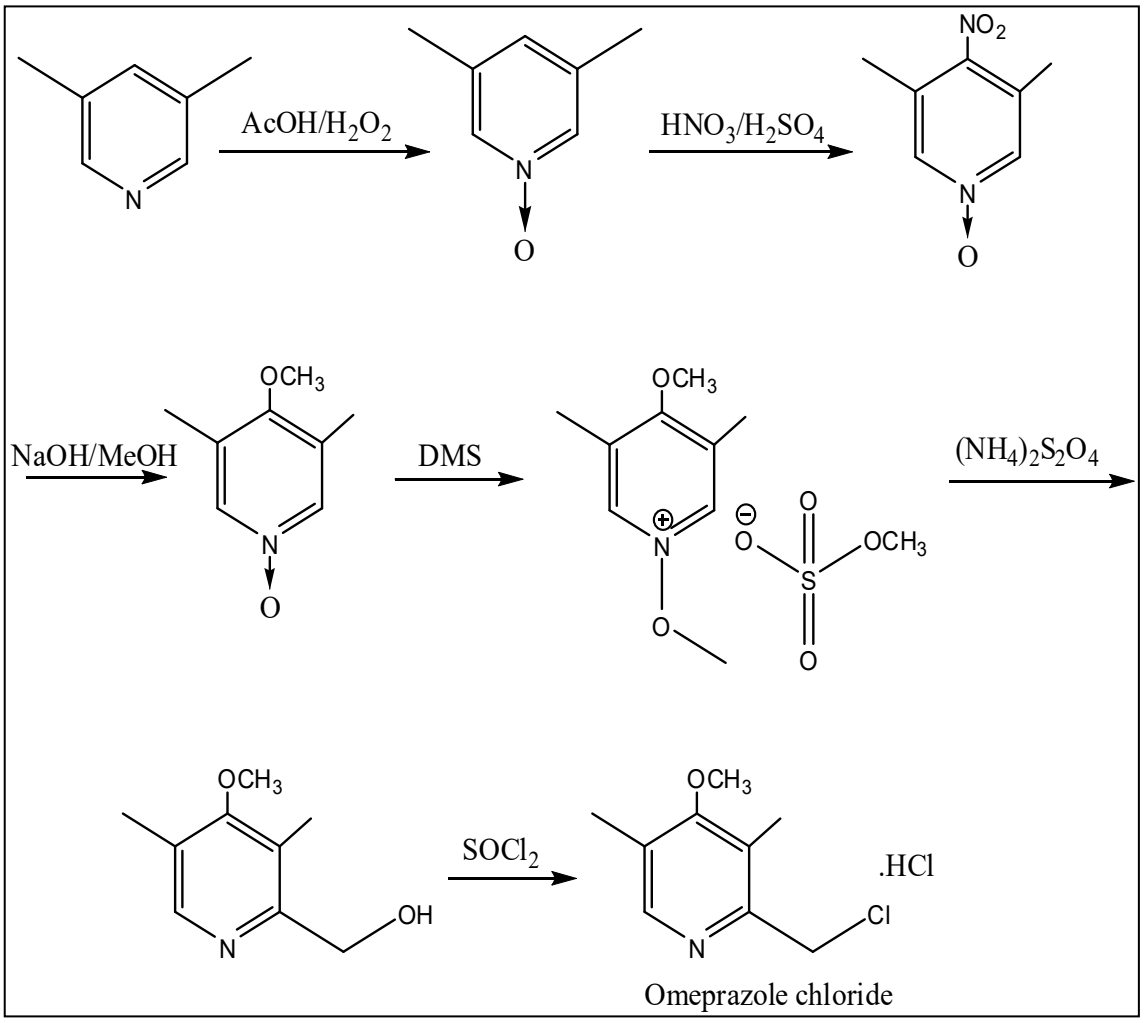
1. **PRODUCT: 2 - Chloromethyl - 4-methoxy - 3, 5- dimethylpyridine hydrochloride (Omeprazole chloride)**

MANUFACTURING PROCESS:
3,5-Lutidine is reacted with hydrogen peroxide in prsence of acetic acid. Excess acetic acid is distilled off. N-oxide is nitrated with mix acid, isolated , filtered & dried. Nitro product is reacted with sodium methoxide to form Methoxy product & extracted in solvent. Dimethylsulphate is added into solvent solution and rearranged with ammonium persulphate, neutralised and extracted in another solvet. Thionyl chloride is added into solvent solution, cooled, filtered & dried to get the product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

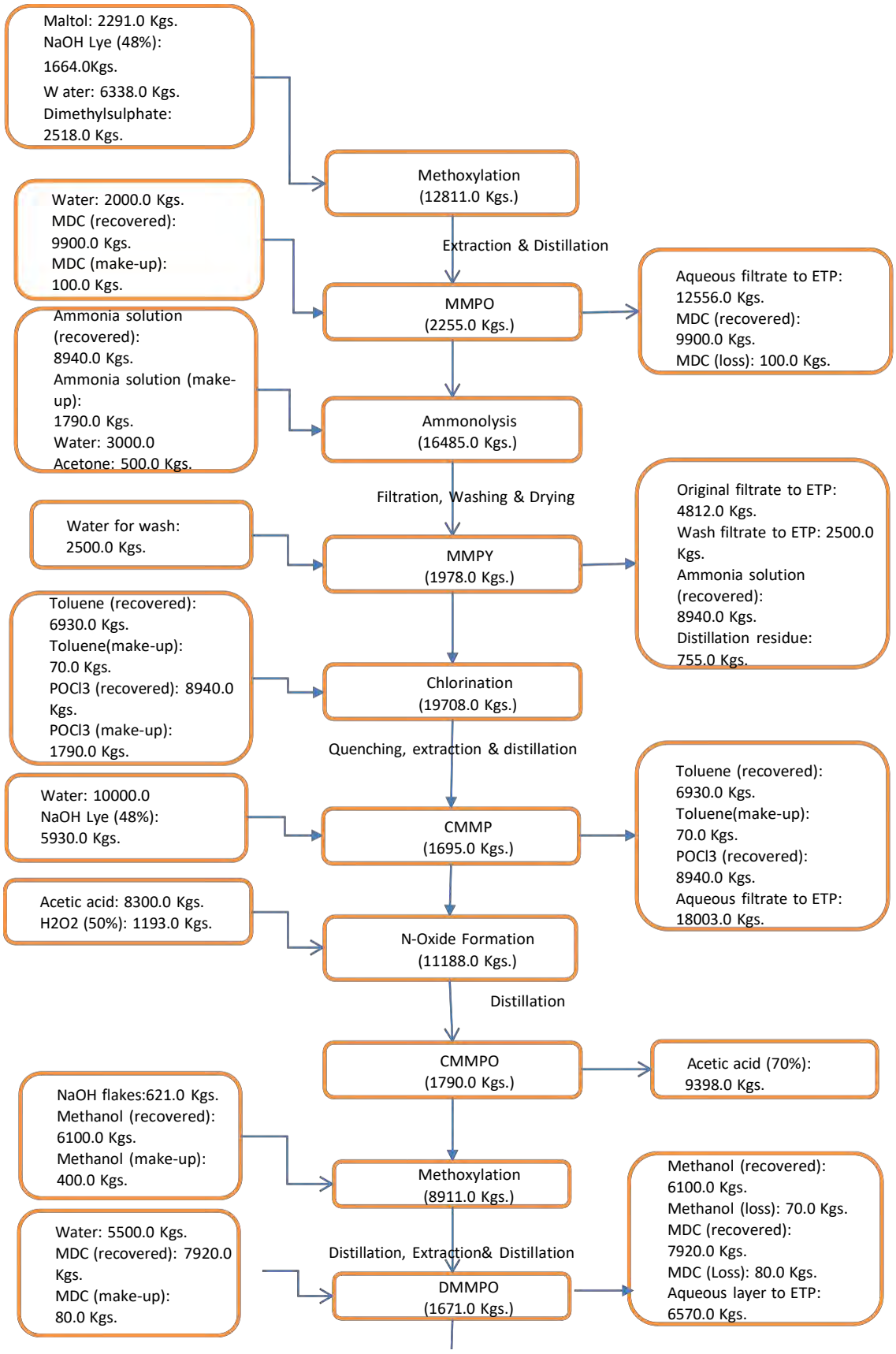
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	3,5-Lutidine	1000.00	Omeprazole chloride	1000.00	Product
2	Acetic acid	3350.00	Acetic acid (75%)	3824.00	Sale
3	H2O2 (50%)	1151.00	Methanol (recovered)	8775.00	Recycle
4	Sulphuric acid (98%)	2290.00	Methanol (loss)	100.00	Loss
5	Nitric acid (65%)	1475.00	MDC (recovered)	3950.00	Recycle
6	NaOH lye (48%)	7540.00	MDC (loss)	50.00	Loss
7	NaOH flakes	312.00	Toluene (recovered)	6930.00	Recycle
8	Methanol (recovered)	8775.00	Toluene (loss)	70.00	Loss
9	Methanol (make-up)	325.00	Distillation residue	372.00	Incineration
10	MDC (recovered)	3950.00	Water loss	293.00	Loss
11	MDC (make-up)	50.00	Effluent to ETP	53921.00	ETP
12	Dimethylsulphate	950.00			
13	Ammonium sulphate	391.00			
14	Ammonium persulphate	704.00			
15	Toluene (recovered)	6930.00			
16	Toluene (make-up)	70.00			
17	Thionyl chloride	962.00			
18	Water	39060.00			
	Total	79285.00		79285.00	

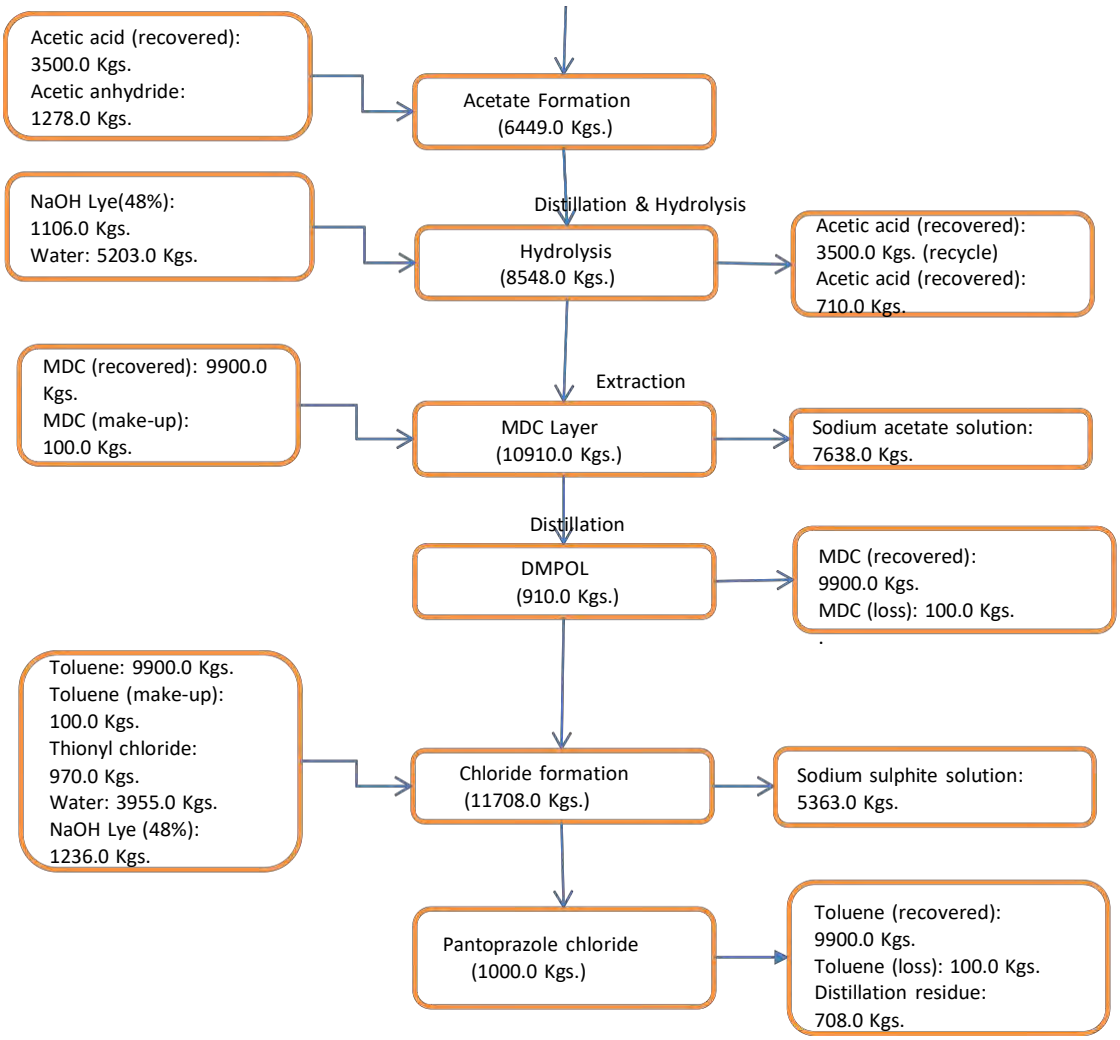
2. PRODUCT: Pantaprazole chloride

MANUFACTURING PROCESS:

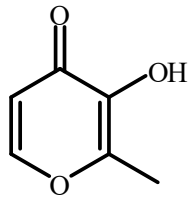
Maltol is methoxylated with DMS and methoxy product is subjected to ammonolysis yielding pyridine derivative. It is chlorinated with POCl3 to afford chloro derivateive which is treated with htdrogen peroxide in acetic acid to afford N-oxide derivative. N-oxide is then reacted with Sodium hydroxide solution in methanol to yield methoxy derivative. It is reacted with acetic anhydride and aceate derivative is hydrolysed in presence of alkali to yield hydroxy methyl derivative. This derivative is then chlorinated with thionyl chloride and subsequent work up afford final product i.e. Pantoprazole chloride, which is then dried & packed.

PROCESS FLOW CHART:




Acetic acid (recovered):
3500.0 Kgs.
Acetic anhydride:
1278.0 Kgs.
Acetate Formation
(6449.0 Kgs.)
NaOH Lye(48%):
1106.0 Kgs.
Water: 5203.0 Kgs.
Distillation & Hydrolysis
Hydrolysis
(8548.0 Kgs.)
Acetic acid (recovered):
3500.0 Kgs. (recycle)
Acetic acid (recovered):
710.0 Kgs.
MDC (recovered): 9900.0
Kgs.
MDC (make-up):
100.0 Kgs.
Extraction
MDC Layer
(10910.0 Kgs.)
Sodium acetate solution:
7638.0 Kgs.
Distillation
DMPOL
(910.0 Kgs.)
MDC (recovered):
9900.0 Kgs.
MDC (loss): 100.0 Kgs.
Toluene: 9900.0 Kgs.
Toluene (make-up):
100.0 Kgs.
Thionyl chloride:
970.0 Kgs.
Water: 3955.0 Kgs.
NaOH Lye (48%):
1236.0 Kgs.
Chloride formation
(11708.0 Kgs.)
Sodium sulphite solution:
5363.0 Kgs.
Pantoprazole chloride
(1000.0 Kgs.)
Toluene (recovered):
9900.0 Kgs.
Toluene (loss): 100.0 Kgs.
Distillation residue:
708.0 Kgs.

CHEMICAL REACTION:

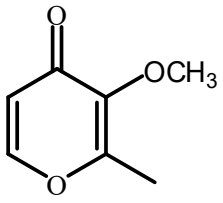


HMPO

3-hydroxy-2-methyl-4*H*-pyran-4-one
Chemical Formula: $C_6H_6O_3$
Molecular Weight: 126.11
CAS Number 118-71-8

Step-I

DMS

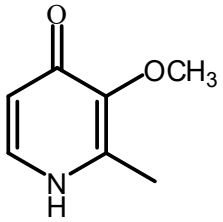


MMPO

3-methoxy-2-methyl-4*H*-pyran-4-one
Chemical Formula: $C_7H_8O_3$
Molecular Weight: 140.14

Step-II

NH_4OH

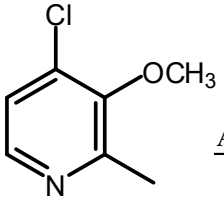


MMPY

3-methoxy-2-methylpyridin-4(1*H*)-one
Chemical Formula: $C_7H_9NO_2$
Molecular Weight: 139.15

Step-III

$POCl_3$, DMF
H_2O, NaOH

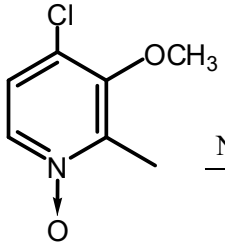


CMMP

4-chloro-3-methoxy-2-methylpyridine
Chemical Formula: C_7H_8ClNO
Molecular Weight: 157.60

Step-IV

$AcOH/H_2O_2$

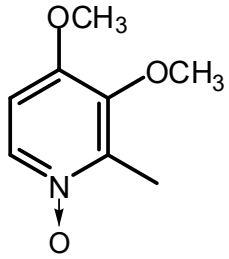


CMMPO

4-chloro-3-methoxy-2-methylpyridine 1-oxide
Chemical Formula: $C_7H_8ClNO_2$
Molecular Weight: 173.60

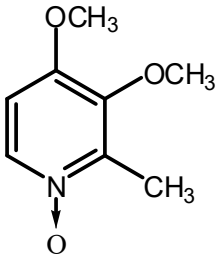
Step-V

NaOMe/MeOH



DMMPO

3,4-dimethoxy-2-methylpyridine 1-oxide
Chemical Formula: $C_8H_{11}NO_3$
Molecular Weight: 169.18

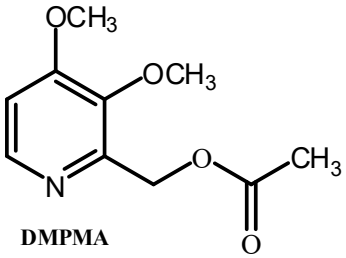


DMMPO

3,4-dimethoxy-2-methylpyridine 1-oxide
Chemical Formula: $C_8H_{11}NO_3$
Molecular Weight: 169.18

Step-VI

$DMAP/Ac_2O$

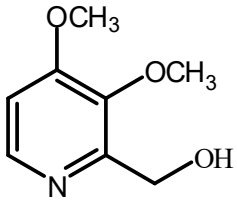


DMPMA

(3,4-dimethoxypyridin-2-yl)methyl acetate
Chemical Formula: $C_{10}H_{13}NO_4$
Molecular Weight: 211.21

Step-VII

NaOH

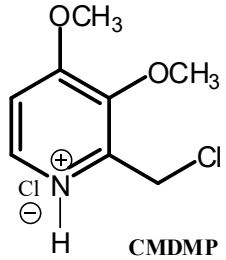


DMPOL

(3,4-dimethoxypyridin-2-yl)methanol
Chemical Formula: $C_8H_{11}NO_3$
Molecular Weight: 169.18

Step-VIII

$SOCl_2$/DMF



CMDMP

2-(chloromethyl)-3,4-dimethoxypyridinium chloride
Chemical Formula: $C_8H_{11}Cl_2NO_2$
Molecular Weight: 224.08

Pantoprazole Chloride

MASS BALANCE:

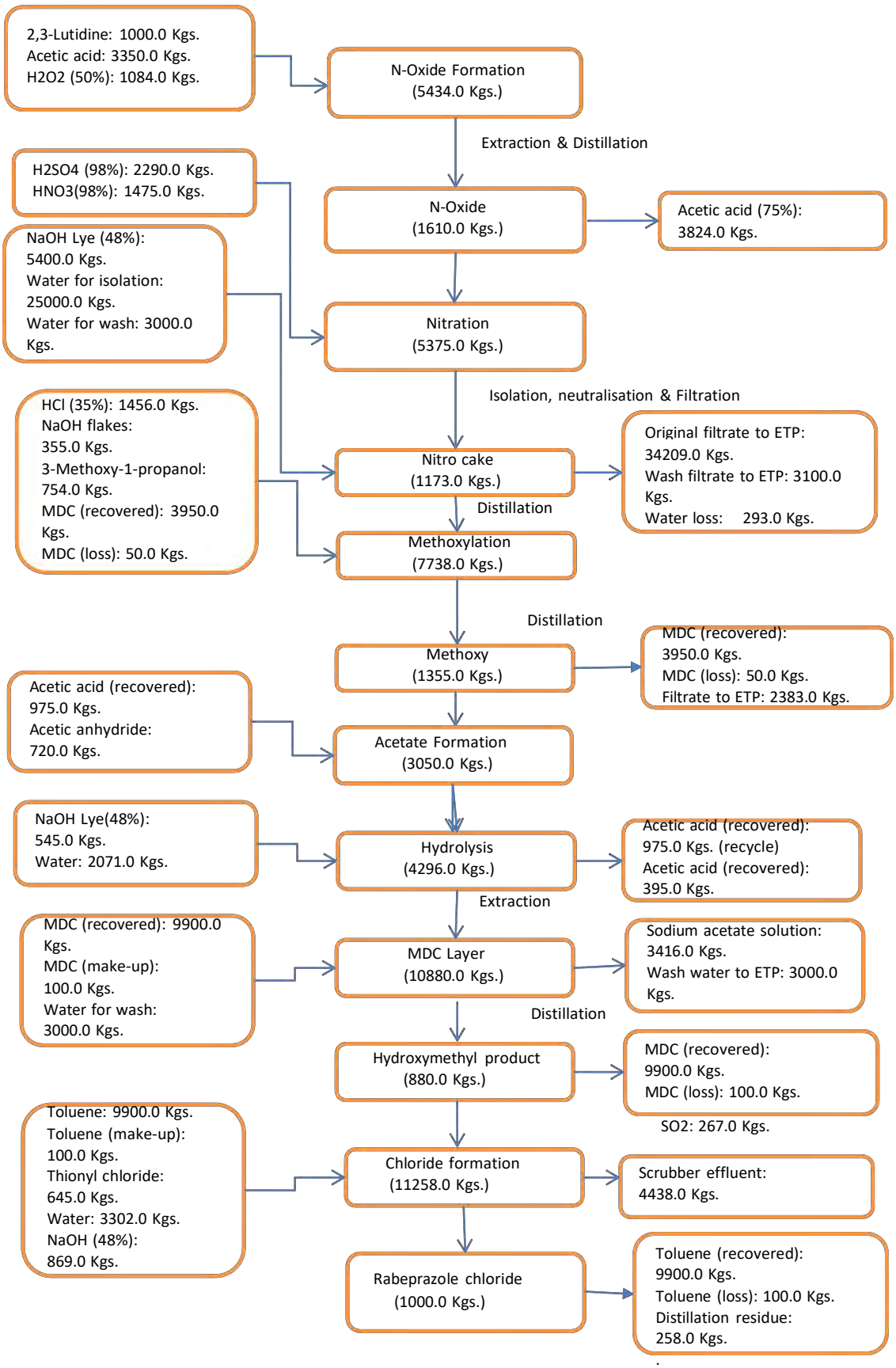
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Maltol	2291.00	Pantoprazole chloride	1000.00	Product
2	NaOH Lye (48%)	9936.00	MDC (recovered)	27720.00	Recycle
3	Dimethylsulphate	2518.00	MDC (loss)	280.00	Loss
4	MDC (recovered)	27720.00	Ammonia solution (recovered)	8940.00	Recycle
5	MDC (make-up)	280.00	Toluene (recovered)	16830.00	Recycle
6	Ammonia solution (recovered)	8940.00	Toluene (Loss)	170.00	Loss
7	Ammonia solution (make-up)	1790.00	POCl3 (recovered)	8940.00	Recycle
8	Acetone	500.00	Methanol (recovered)	6100.00	Recycle
9	Toluene (recovered)	16830.00	Methanol (loss)	70.00	Loss
10	Toluene (make-up)	170.00	Acetic acid (recovered)	3500.00	Recycle
11	POCl3 (recovered)	8940.00	Acetic acid (recovered)	710.00	Sale
12	POCL3 (make-up)	1790.00	Acetic acid (70%)	9398.00	Sale
13	Acetic acid	8300.00	Sodium sulphite solution	5363.00	Recover & Sale
14	H2O2 (50%)	1193.00	Sodium acetate solution	7638.00	Recovere & Sale
15	Methanol (recovered)	6100.00	Distillation residue	1463.00	Incineration
16	Methanol (make-up)	400.00	Effluent	44441.00	ETP
17	NaOH Flakes	621.00			
18	Acetic acid (recovered)	3500.00			
19	Acetic anhydride	1278.00			
20	Thionyl chloride	970.00			
21	Water	38496.00			
	Total	142563.00		142563.00	

3. PRODUCT: Rabeprazole chloride

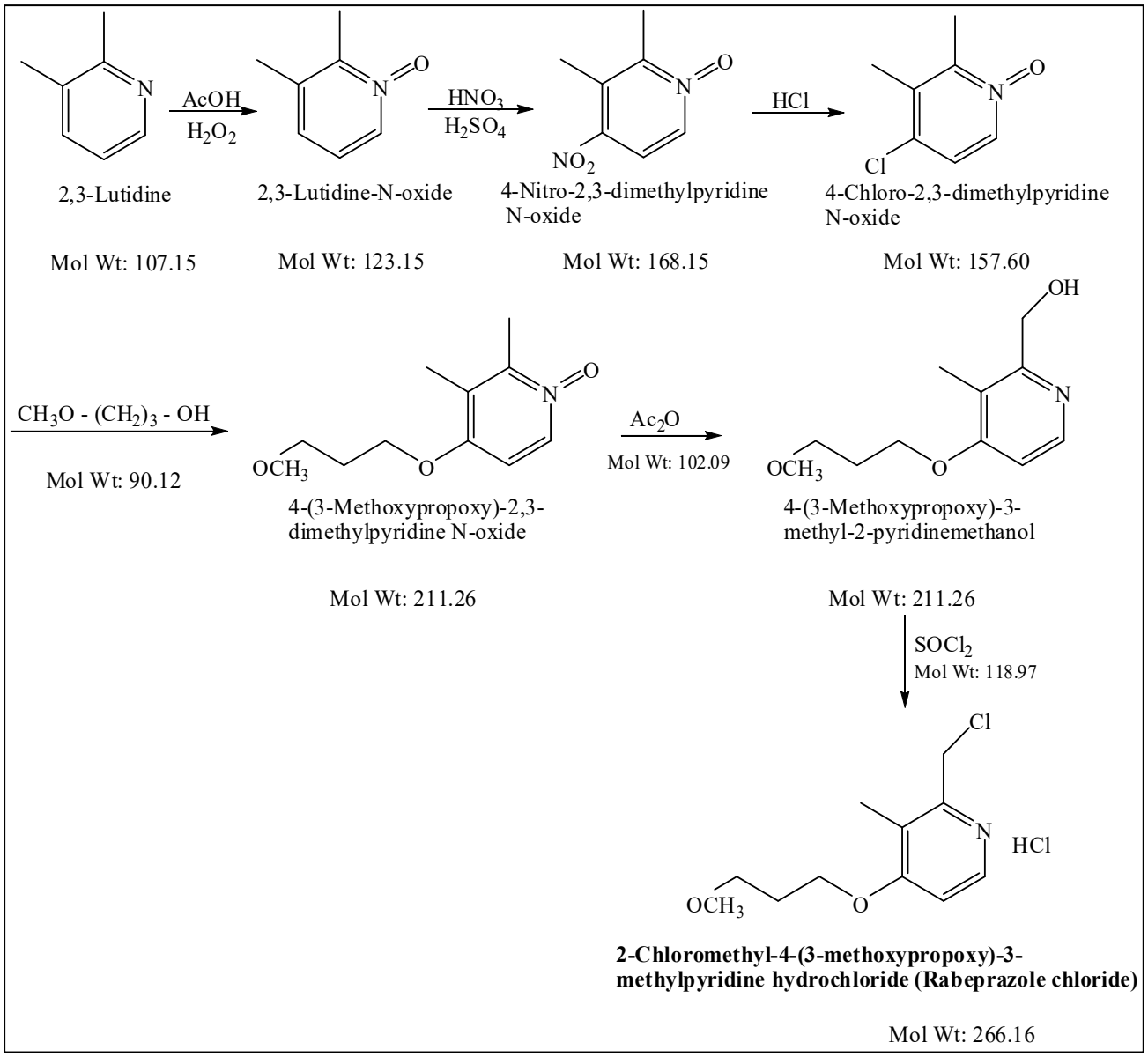
MANUFACTURING PROCESS:

2,3-Lutidine is reacted with hydrogen peroxide in presence of acetic acid. Excess acetic acid is distilled off. N-oxide is nitrated with mix acid, isolated , filtered & dried. Nitro product is reacted with HCl and then with sodium salt of 3-Methoxy-1-propanol to form Methoxy product & extracted in solvent. The methoxy product is acetylated with acetic anhydride and subsequent hydrolysis afforded Hydroxymethylcompound. It is then reacted with thionyl chloride in solvent, filtered, washed & dried to get final product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

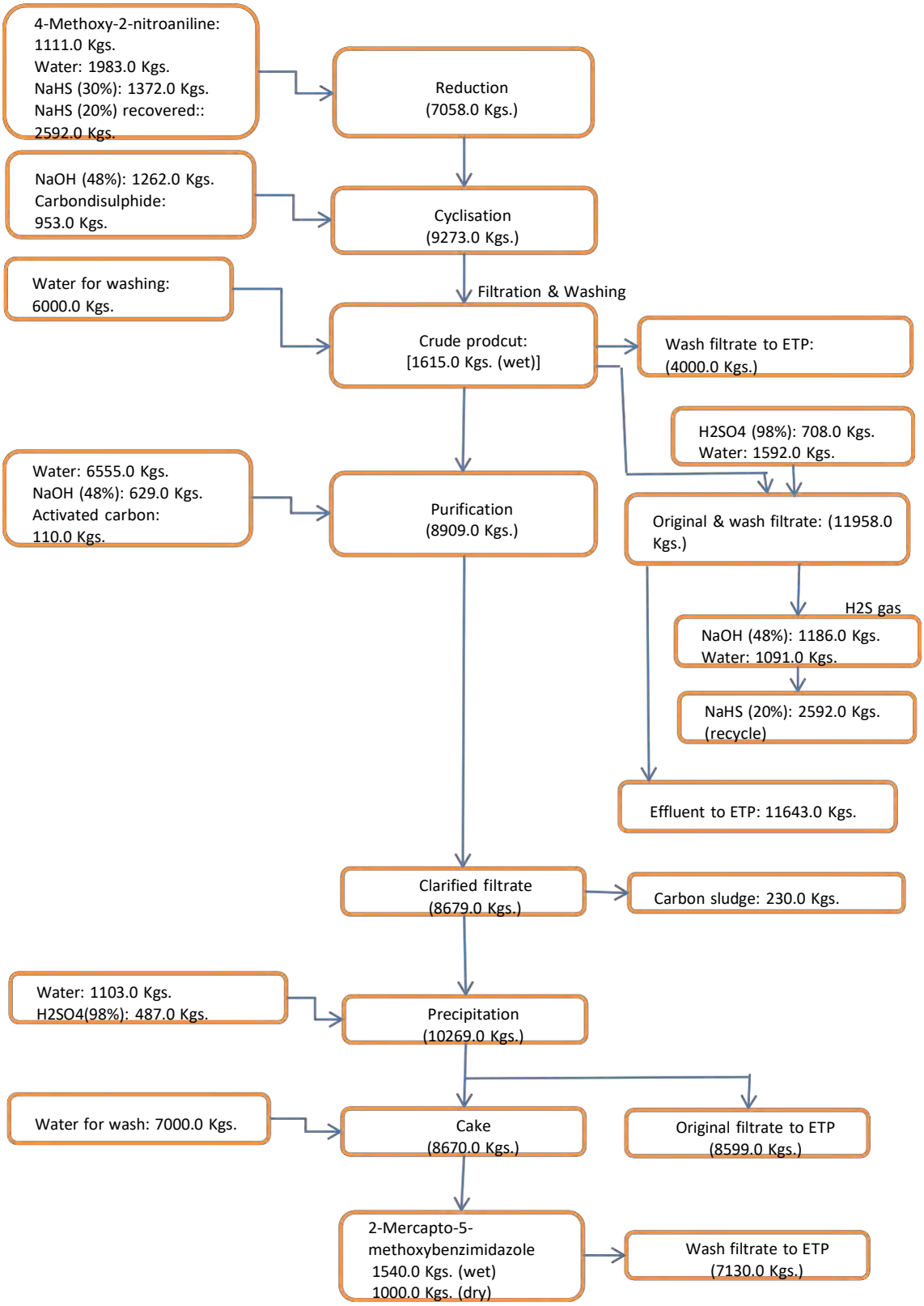
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	2,3-Lutidine	1000.00	Rabeprazole chloride	1000.00	Product
2	Acetic acid	3350.00	Acetic acid (75%)	3824.00	Sale
3	H2O2 (50%)	1084.00	Acetic acid (recovered)	975.00	Recycle
4	Sulphuric acid (98%)	2290.00	Acetic acid (recovered)	395.00	Loss
5	Nitric acid (65%)	1475.00	MDC (recovered)	13850.00	Recycle
6	NaOH lye (48%)	6814.00	MDC (loss)	150.00	Loss
7	NaOH flakes	355.00	Toluene (recovered)	9900.00	Recycle
8	3-Methoxy-1-propanol	754.00	Toluene (loss)	100.00	Loss
9	HCl (35%)	1456.00	Distillation residue	258.00	Incineration
10	MDC (recovered)	13850.00	Water loss	293.00	Loss
11	MDC (make-up)	150.00	Effluent to ETP	50546.00	ETP
12	Acetic anhydride	720.00			
13	Acetic acid (recovered)	975.00			
14	Toluene (recovered)	9900.00			
15	Toluene (make-up)	100.00			
16	Thionyl chloride	645.00			
17	Water	36373.00			
	Total	81291.00		81291.00	

4. PRODUCT:2-Mercapto-5-methoxybenzimidazole

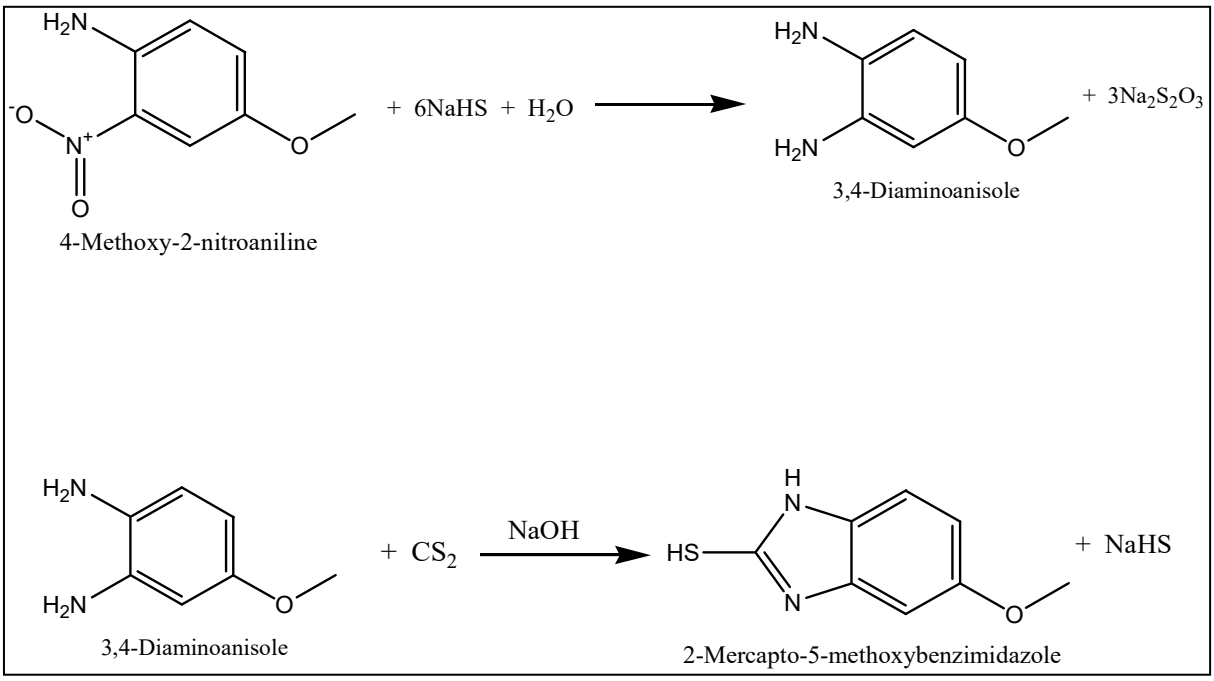
MANUFACTURING PROCESS:

4-Methoxy-2-nitroaniline is reduced with sodium hydrosulphide and then cyclised with carbon disulphide in presence of caustic soda solution, which gives crude product followed by filtartion & washing. The crude product is purified is purified by dissolving in dilute cautic soda solution followed by carbon treatment & filtration. The clarified filtered is precipitated with dilute sulphuric acid, filtered & washed washed with water to yield moist cake of product. Product is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

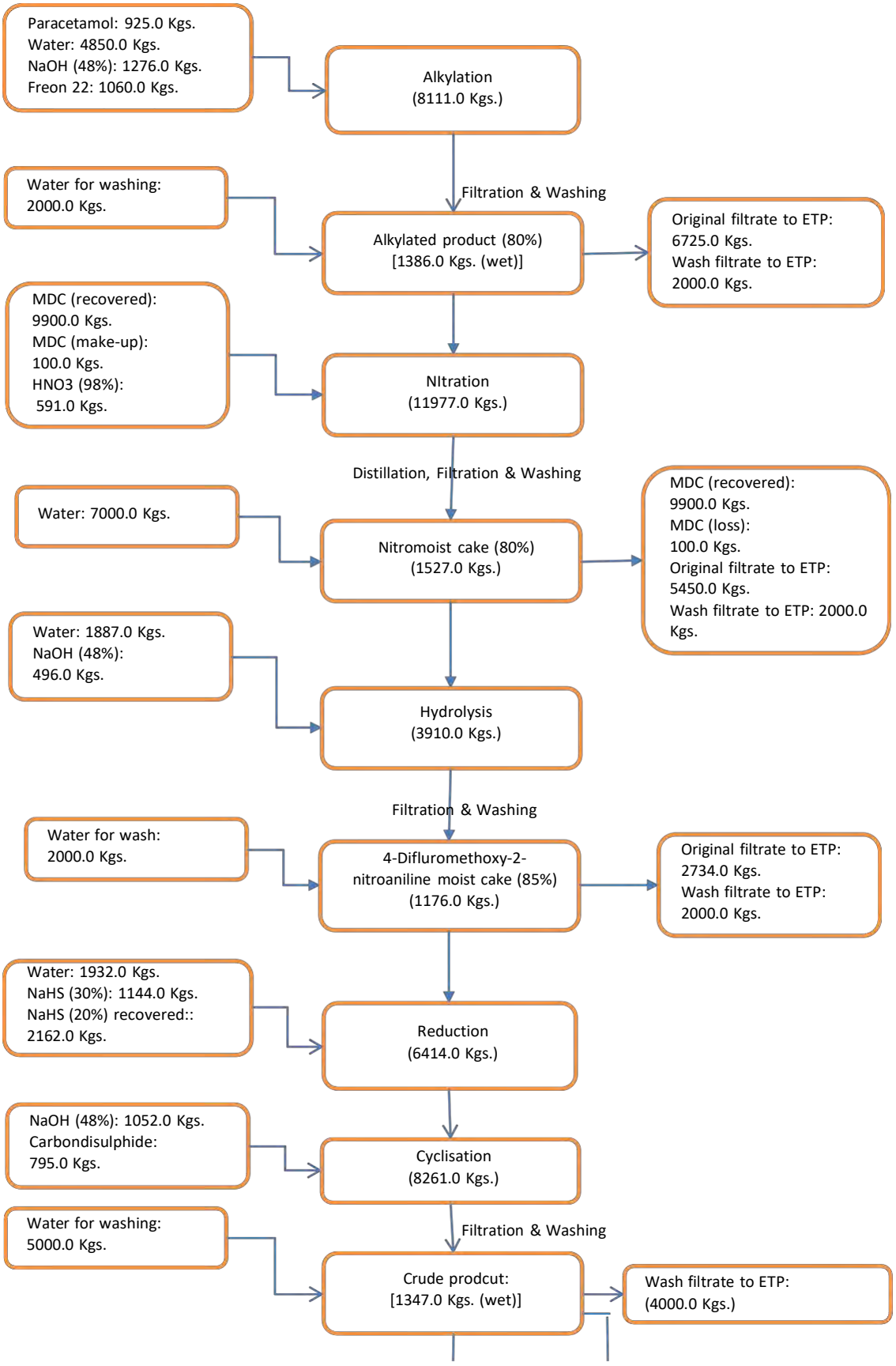
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	4-Methoxy-2-nitroaniline	1111.00	2-Methoxy-5-mercapto benzimidazole (dry)	1000.00	Product
2	NaHS (30%) fresh	1372.00	(wet)	1540.00	
3	NaHS (20%) recycle	2592.00	NaHS (20%)	2592.00	Reuse
4	NaOH (48%)	3077.00	Carbon sludge	230.00	Incineration
5	Carbondisulphide	953.00	Effluent	31372.00	ETP
6	Sulphuric acid (98%)	1195.00			
7	Activated carbon	110.00			
8	Water	25324.00			
9	Total	35734.00		35734.00	

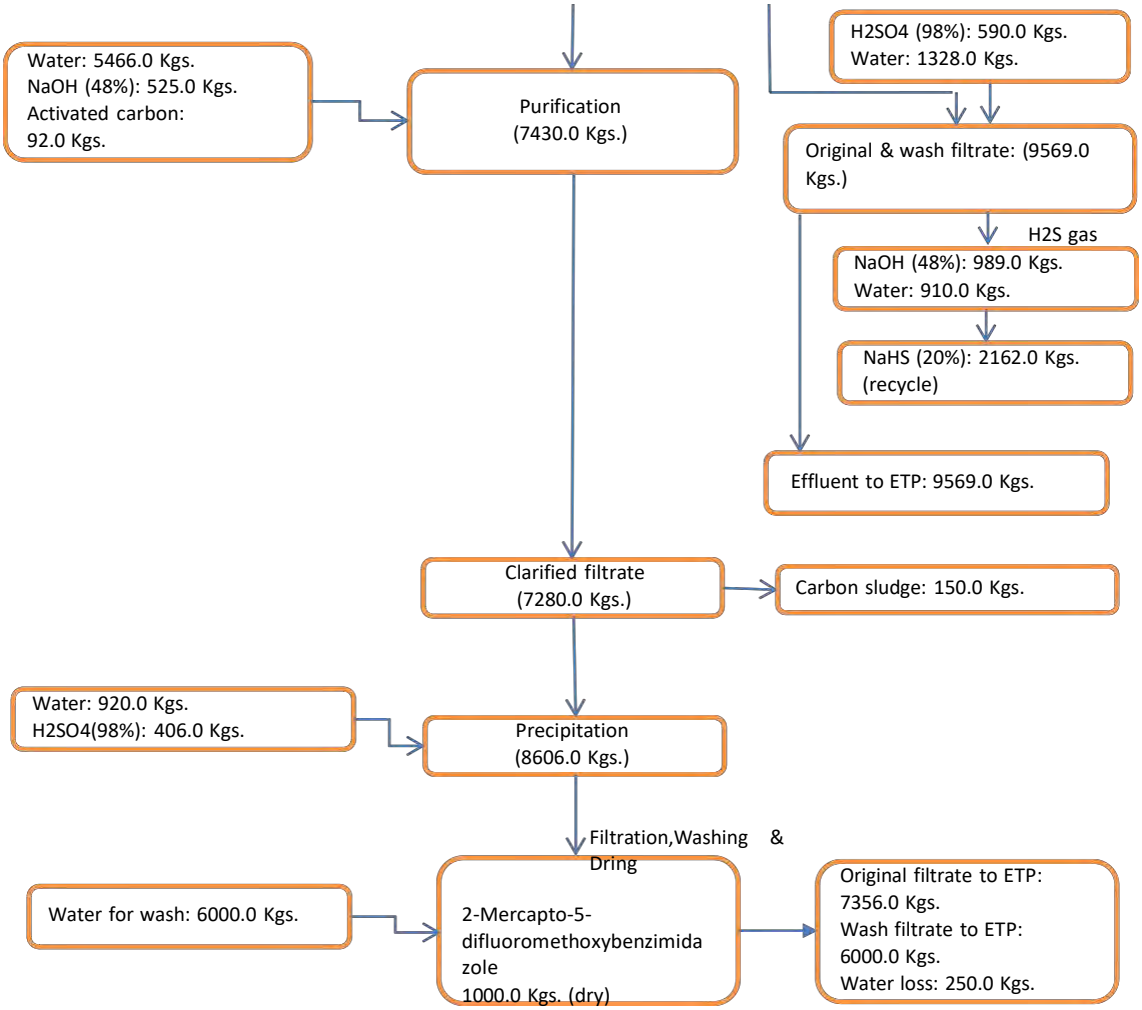
5. PRODUCT:5-difluoromethoxy-2-mercaptobenzimidazole

MANUFACTURING PROCESS:

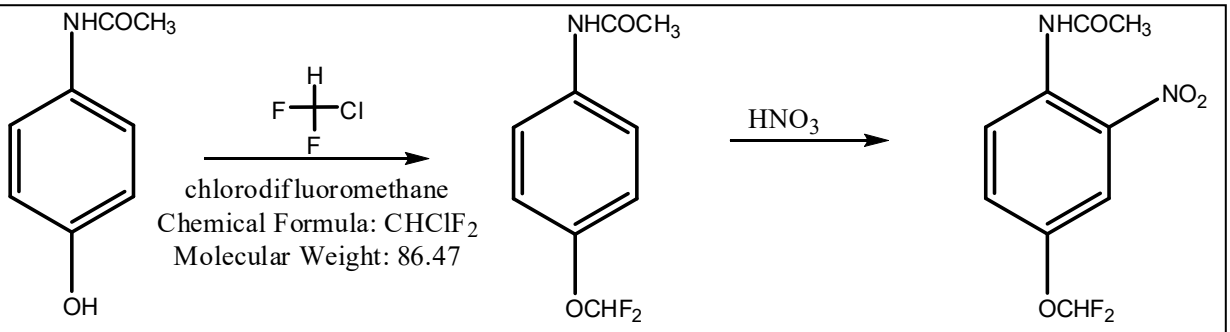
Paracetamol is alkylated with Freon 22 at elevated temperature and after filtration & washing, alkylated product is obtained. It is then nitrated with nitric acid and after work up nitro cake is obtained. Nitrocake is hydrolysed to get 4-Difluromethoxy-2-nitroaniline moist cake. It is reduced with sodium hydrosulphide and then cyclised with carbon disulphide in presence of caustic soda solution, which gives crude product followed by filtartion & washing. The crude product is purified is purified by dissolving in dilute cautic soda solution followed by carbon treatment & filtration. The clarified filtered is precipitated with dilute sulphuric acid, filtered & wahed washed with water to yield moist cake of product. Product is dried & packed.

PROCESS FLOW CHART:




Water: 5466.0 Kgs.
NaOH (48%): 525.0 Kgs.
Activated carbon:
92.0 Kgs.
Purification
(7430.0 Kgs.)
H2SO4 (98%): 590.0 Kgs.
Water: 1328.0 Kgs.
Original & wash filtrate: (9569.0 Kgs.)
H2S gas
NaOH (48%): 989.0 Kgs.
Water: 910.0 Kgs.
NaHS (20%): 2162.0 Kgs.
(recycle)
Effluent to ETP: 9569.0 Kgs.
Clarified filtrate
(7280.0 Kgs.)
Carbon sludge: 150.0 Kgs.
Water: 920.0 Kgs.
H2SO4(98%): 406.0 Kgs.
Precipitation
(8606.0 Kgs.)
Filtration,Washing & Dring
Water for wash: 6000.0 Kgs.
2-Mercapto-5-difluoromethoxybenzimidazole
1000.0 Kgs. (dry)
Original filtrate to ETP:
7356.0 Kgs.
Wash filtrate to ETP:
6000.0 Kgs.
Water loss: 250.0 Kgs.

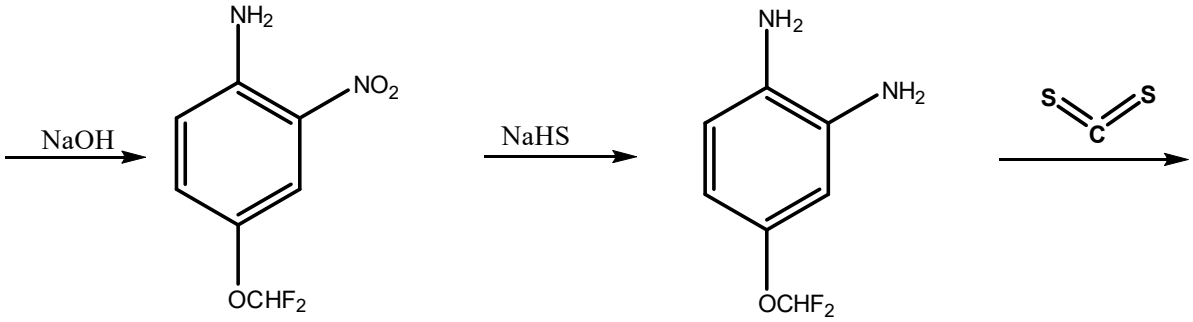
CHEMICAL REACTION:



Paracetamol
Chemical Formula: $C_8H_9NO_2$
Molecular Weight: 151.16

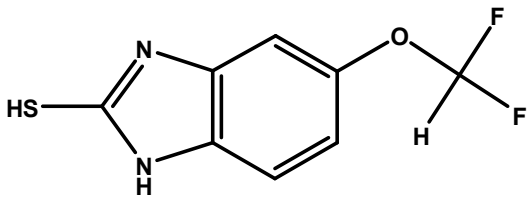
N-(4-(difluoromethoxy)phenyl)acetamide
Chemical Formula: $C_9H_9F_2NO_2$
Molecular Weight: 201.17

N-(4-(difluoromethoxy)-2-nitrophenyl)acetamide
Chemical Formula: $C_9H_8F_2N_2O_4$
Molecular Weight: 246.17



4-(difluoromethoxy)-2-nitroaniline
Chemical Formula: $C_7H_6F_2N_2O_3$
Molecular Weight: 204.13
App
M.P.

4-(difluoromethoxy)benzene-1,2-diamine
Chemical Formula: $C_7H_8F_2N_2O$
Molecular Weight: 174.15



5-Difluromethoxy-2-mercaptobenzimidazole
Chemical Formula: $C_8H_6F_2N_2OS$
Molecular Weight: 216.21

MASS BALANCE:

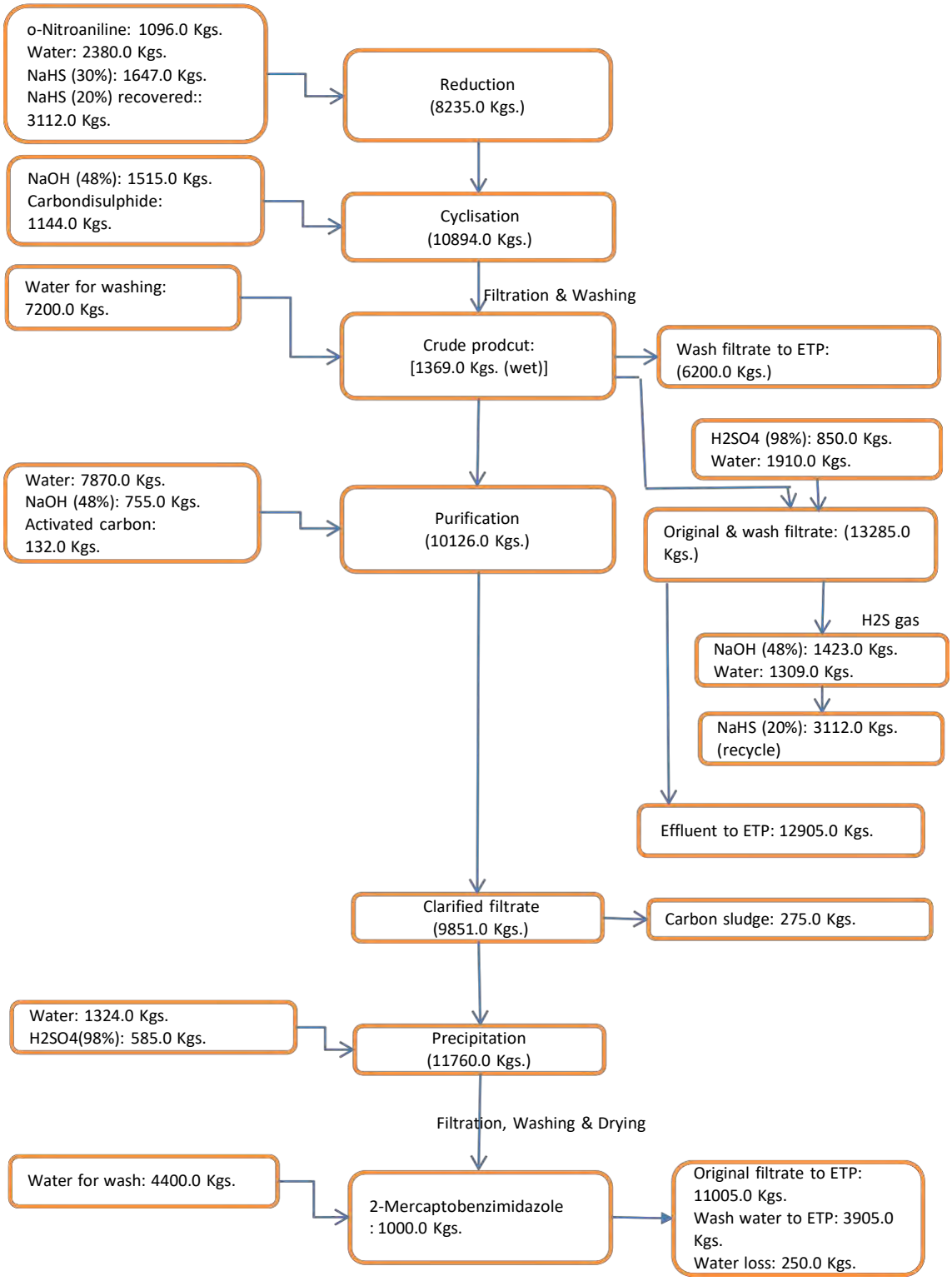
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Paracetamol	925.00	5-Difluromethoxy-2-mercaptobenzimidazole	1000.00	Product
2	Freon 22	1060.00	MDC (recovered)	9900.00	Recycle
2	NaOH (48%)	4338.00	MDC (Loss)	100.00	Incineration
3	MDC (recovered)	9900.00	NaHS (20%)	2162.00	Recycle
4	MDC (make-up)	100.00	Carbon sludge	150.00	Incineration
5	HNO3 (98%)	591.00	Water loss	250.00	Loss
6	NaHS (30%) fresh	1144.00	Effluent	47834.00	ETP
7	NaHS (20%) recycle	2162.00			
8	Carbondisulphide	795.00			
9	Sulphuric acid (98%)	996.00			
10	Activated carbon	92.00			
11	Water	39293.00			
9	Total	61396.00		61396.00	

6. PRODUCT: 2-Mercaptobenzimidazole

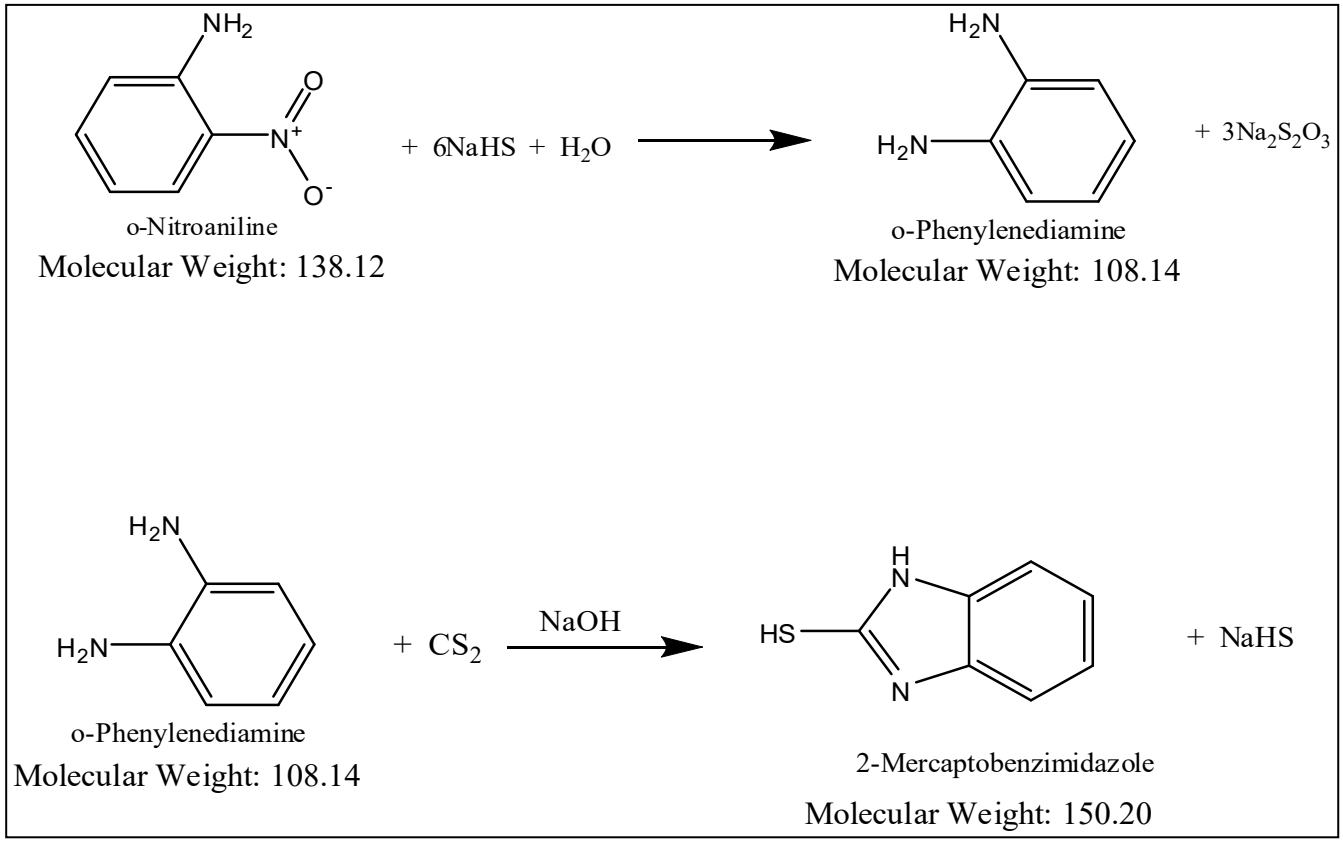
MANUFACTURING PROCESS:

o-Nitroaniline is reduced with sodium hydrosulphide and then cyclised with carbon disulphide in presence of caustic soda solution, which gives crude product followed by filtartion & washing. The crude product is purified is purified by dissolving in dilute cautic soda solution followed by carbon treatment & filtration. The clarified filtered is precipitated with dilute sulphuric acid, filtered & wahed washed with water to yield moist cake of product. Product is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

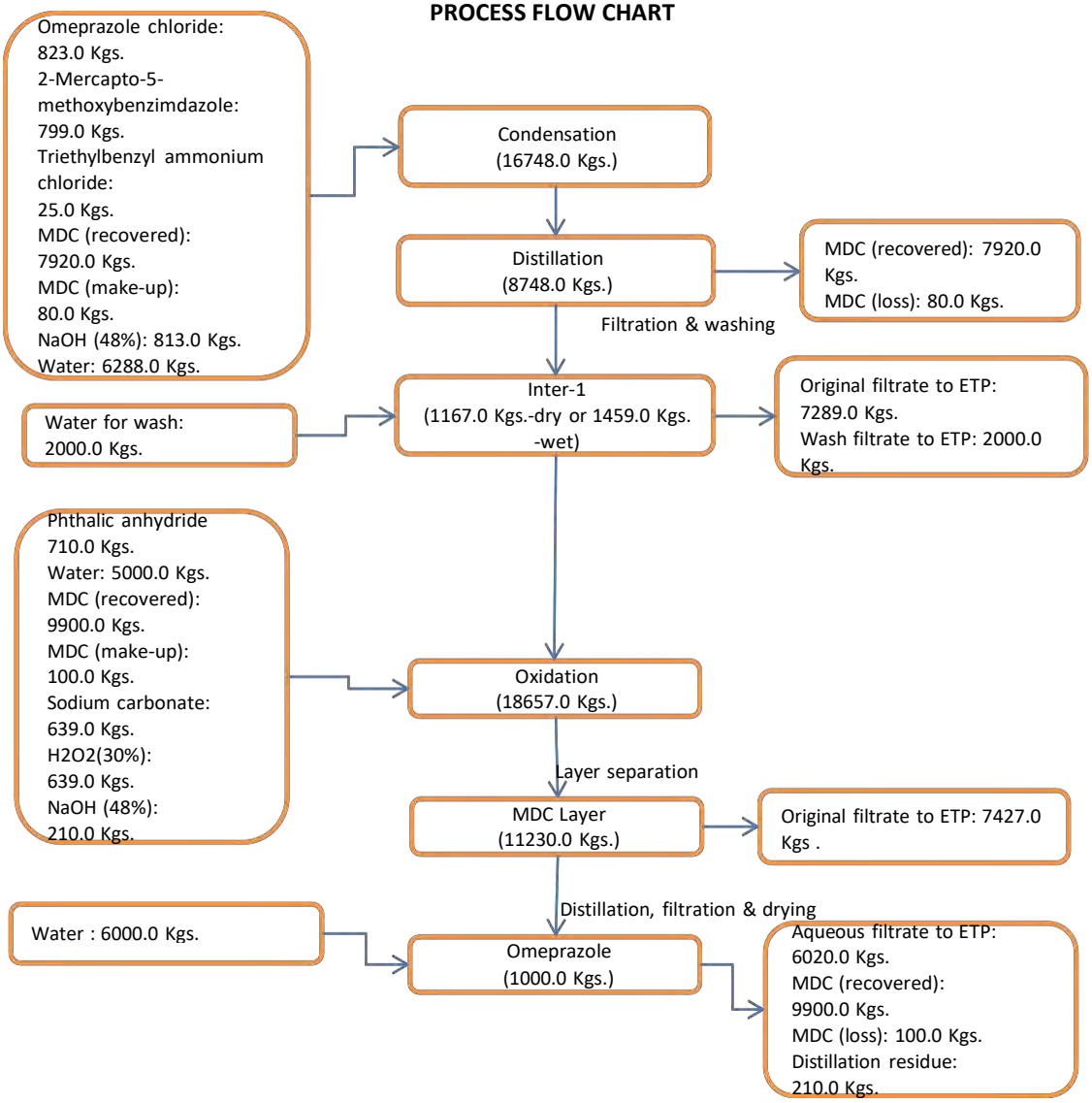
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	o-Nitroaniline	1096.00	2-Mercaptobenzimidazole	1000.00	Product
2	NaHS (30%) fresh	1647.00	NaHS (20%)	3112.00	Reuse
3	NaHS (20%) recycle	3112.00	Carbon sludge	275.00	Incineration
4	NaOH (48%)	3693.00	Water loss	250.00	Loss
5	Carbondisulphide	1144.00	Effluent	34015.00	ETP
6	Sulphuric acid (98%)	1435.00			
7	Activated carbon	132.00			
8	Water	26393.00			
	Total	38652.00		38652.00	

7. PRODUCT: Omaprazole Sodium/ Omaprazole Salts

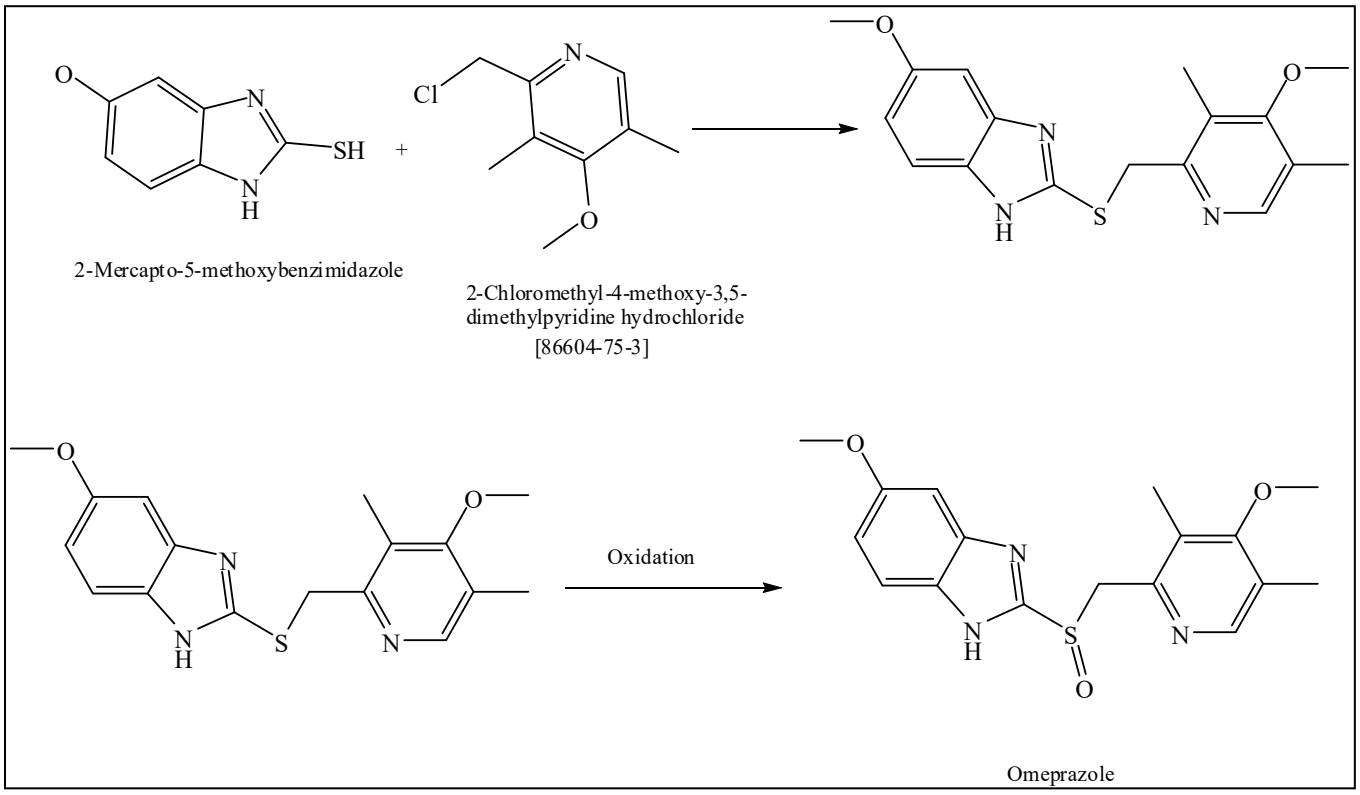
MANUFACTURING PROCESS:

Omeprazole chloride and 2-Mercapto-5-methoxybenzimidazole is condensed in presence of sodium hydroxide, extracted in solvent and distilled to affore inter-i. lnter-1is then subjectd to oxidation with Phthalic anhydride and hydrogen peroxide in presence of solvent. After layer spa ration, solvent is distilled off slurry is filtered, washed, dried & packed to yield Omeprazole sodium.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

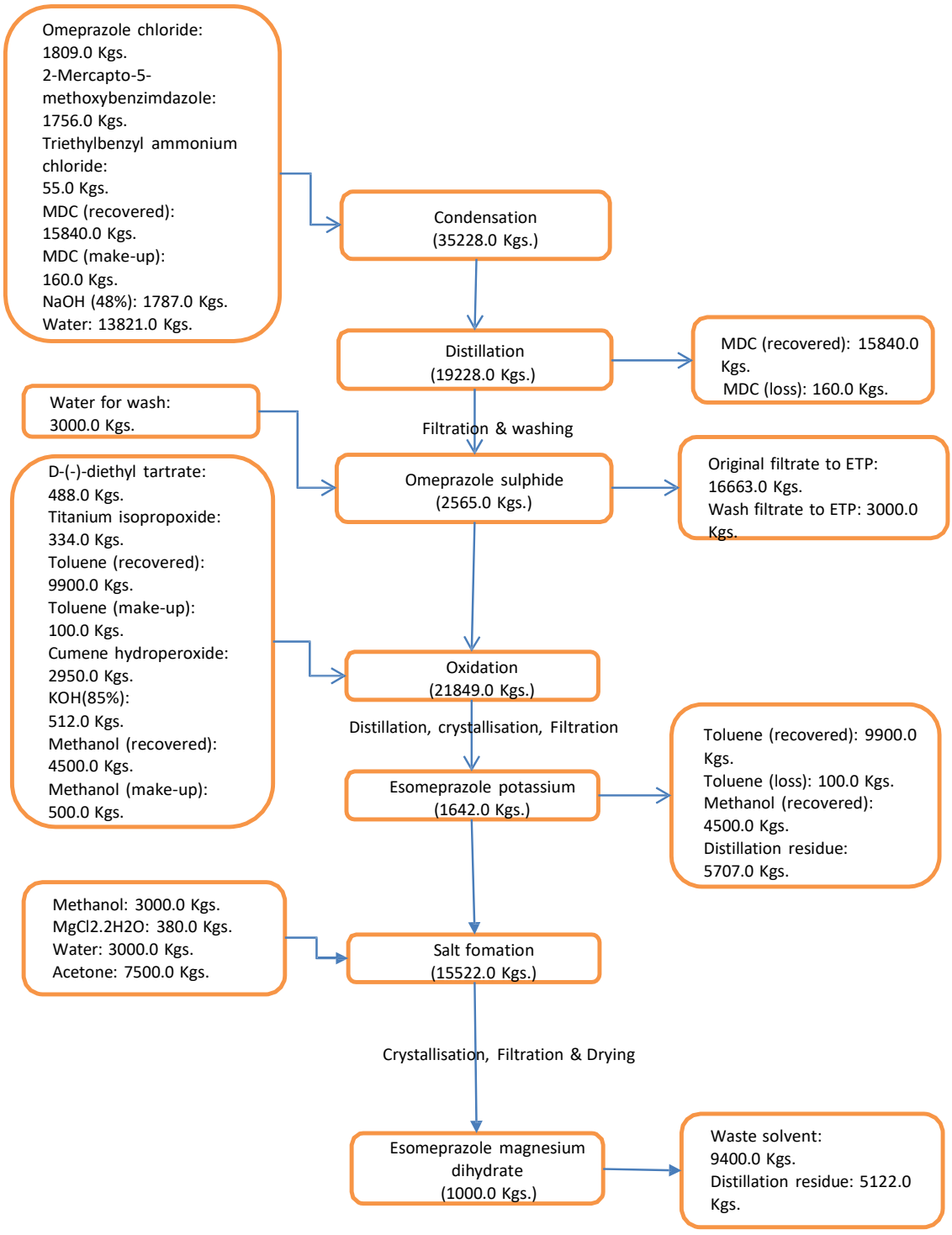
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Omeprazole chloride	823.00	Omeprazole sodium	1000.00	Product
2	2-Mercapto-5-methoxybenzimidazole	799.00	MDC (recovered)	17820.00	Recycle
3	Triethybenzyl ammonium chloride	25.00	MDC (loss)	180.00	Loss
4	NaOH (48%)	1023.00	Distillation residue	210.00	Incineration
5	MDC (recovered)	17820.00	Effluent	22736.00	ETP
6	MDC (make-up)	180.00			
7	Phthalic anhydride	710.00			
8	Sodium cabonate	639.00			
9	H2O2(30%)	639.00			
10	Water	19288.00			
	Total	41946.00		41946.00	

8. PRODUCT: Esomeprazole Salts

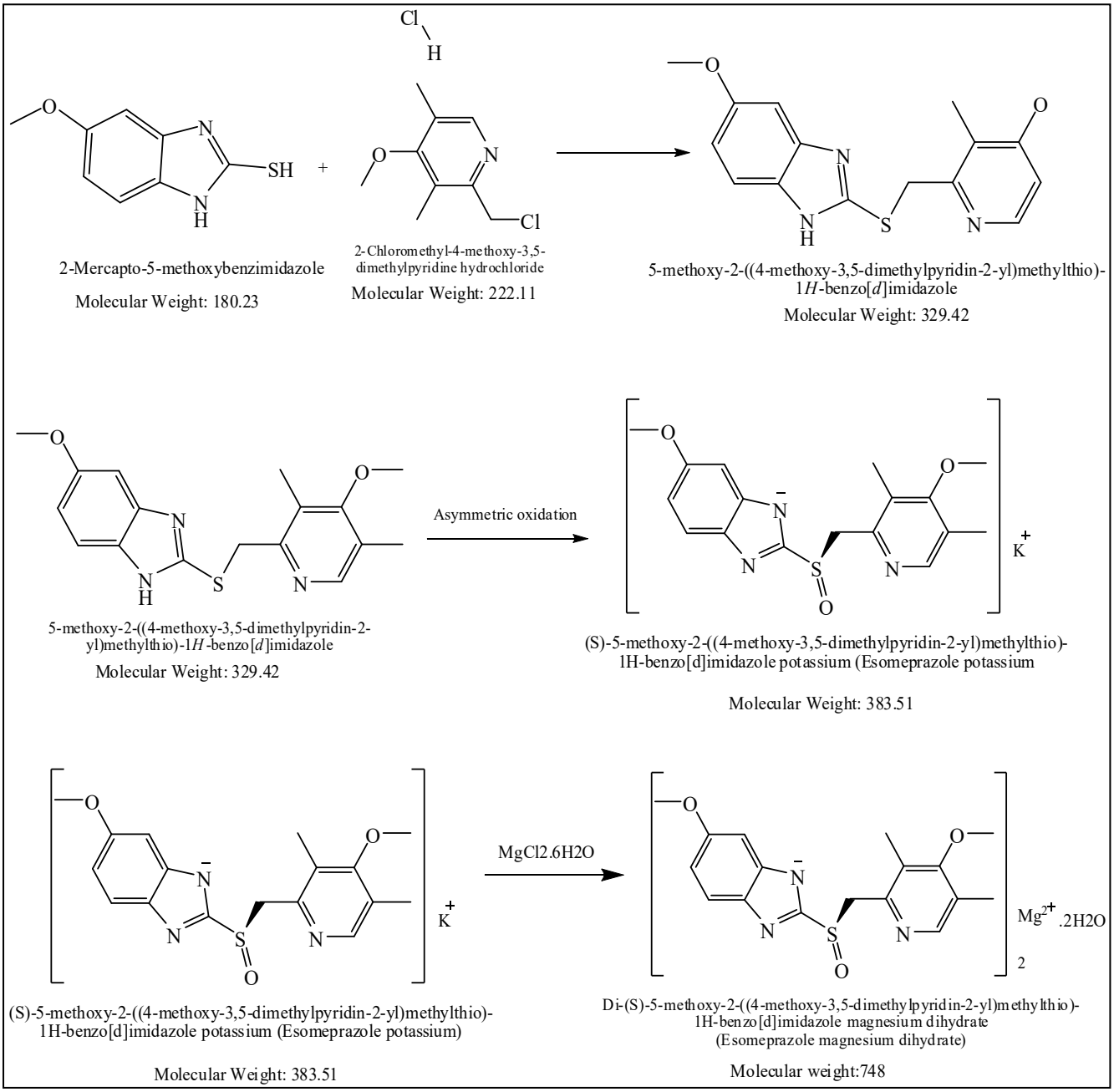
MANUFACTURING PROCESS:

Omeprazole chloride and 2-Mercapto-5-methoxybenzimidazole is condensed in presence of sodium hydroxide, extracted in solvent and distilled to affore omeprazole suplhide. It is then subjectd to asymmetric oxidation in presence of solvent. After layer sparation, solvent is distilled off slurry is filtered, washed , dried & packed to yield Esomeprazole potassium. It is then treated with MgCl2.2H2O in solvent to afford Esomeprazole magnesium dihydrate after filtration & drying.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

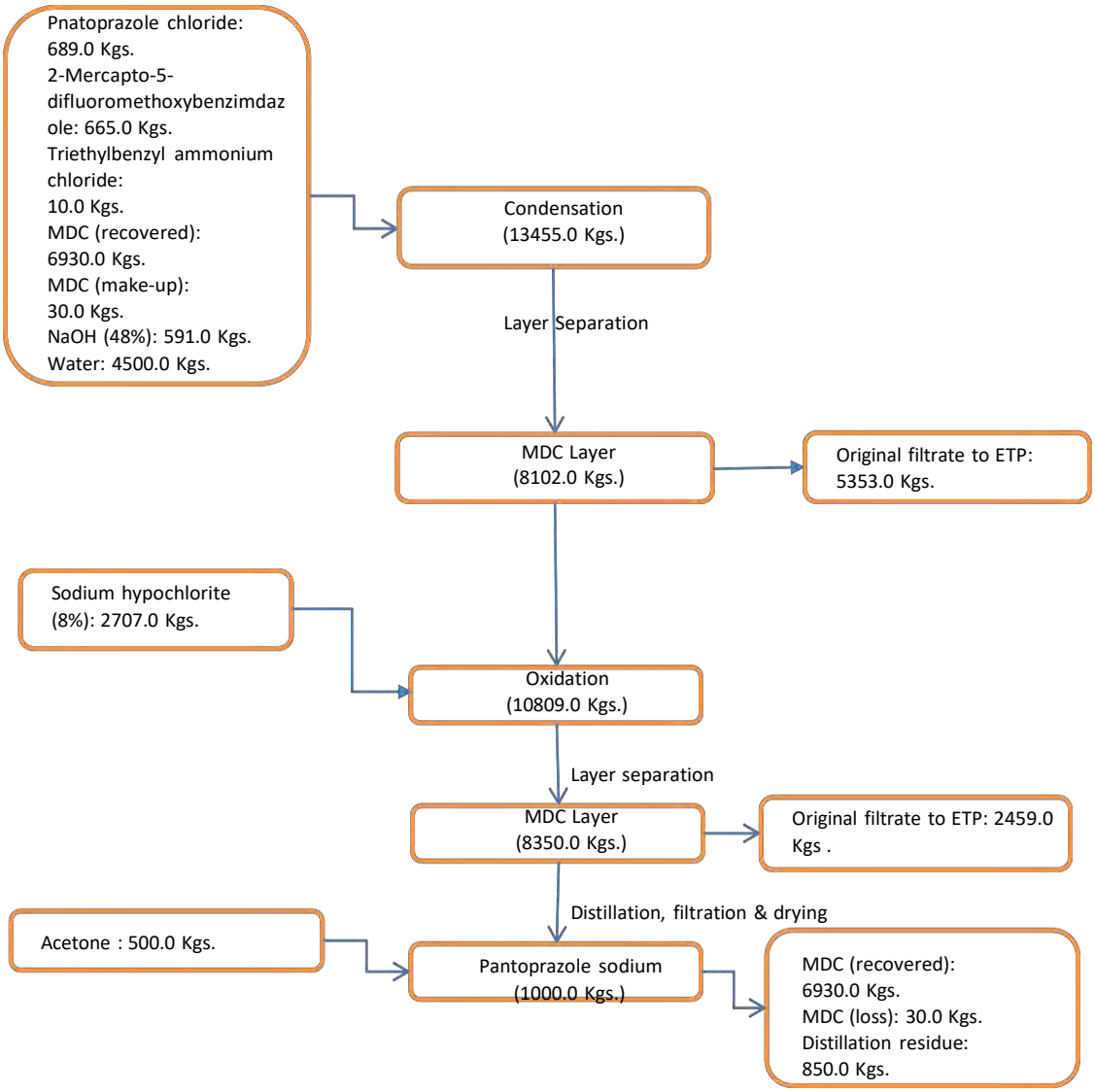
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Omeprazole chloride	1809.00	Esomeprazole magnesium dihydrate	1000.00	Product
2	2-Mercapto-5-methoxybenzimidazole	1756.00	MDC (recovered)	15840.00	Reuse
3	Triethybenzyl ammonium chloride	55.00	MDC (loss)	160.00	Loss
4	NaOH (48%)	1787.00	Toluene (recovered)	9900.00	Reuse
5	MDC (recovered)	15840.00	Toluene (loss)	100.00	Loss
6	MDC (make-up)	160.00	Methanol (recovered)	4500.00	Reuse
7	D-(-)diethyl tartrate	488.00	Waste solvent	9400.00	Sale
8	Titanium isopropoxide	334.00	Distillation residue	10829.00	Incineration
9	Toluene (recovered)	9900.00	Effluent	19663.00	ETP
10	Toluene (make-up)	100.00			
11	Cumene hydroperoxide	2950.00			
12	KOH (85%)	512.00			
13	Methanol (recovered)	4500.00			
14	Methanol (make-up)	500.00			
15	Methanol	3000.00			
16	MgCl2.2H2O	380.00			
17	Acetone	7500.00			
18	Water	19821.00			
	Total	71392.00		71392.00	

9. PRODUCT: Pantaprazole Salts

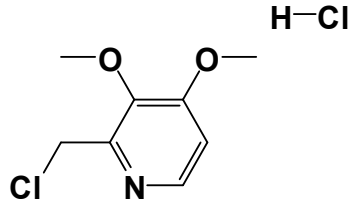
MANUFACTURING PROCESS:

Pantoprazole chloride and 2-Mercapto-5-difluoromethoxybenzimidazole is condensed in presence of sodium hydroxide, extracted in solvent and layer is separated. Solvent layer is then subjectd to oxidation with sodium hypochlorite. After layer spa ration, solvent is distilled off slurry is filtered, washed, dried & packed to yield Pantoprazole sodium.

PROCESS FLOW CHART:



CHEMICAL REACTION:

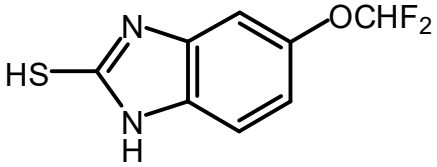


CMDMP

2-Chloromethyl-3,4-dimethoxy pyridine hydrochloride **(Pantoprazole chloride)**

Mol Wt.: 224.08

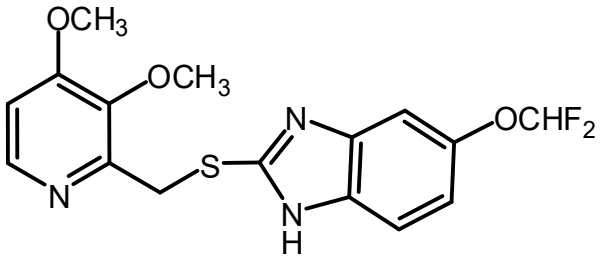
+



2-Mercapto-5-difluoromethoxybenzimidazole

Chemical Formula: $C_8H_6F_2N_2OS$

Molecular Weight: 216.21

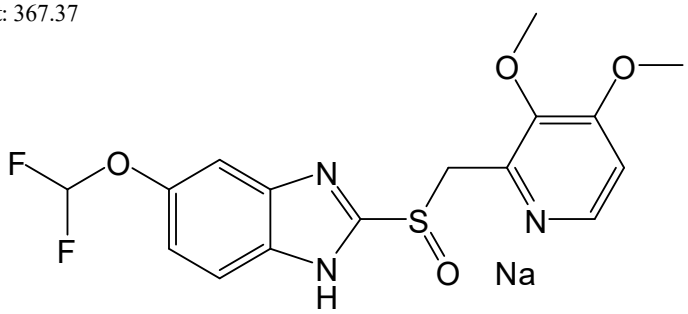


5-(difluoromethoxy)-2-((3,4-dimethoxypyridin-2-yl)methylthio)-1*H*-benzo[*d*]imidazole

Chemical Formula: $C_{16}H_{15}F_2N_3O_3S$

Molecular Weight: 367.37

NaOCl



5-(difluoromethoxy)-2-[[(3,4-dimethoxy-2-pyridinyl)methyl]sulfinyl]-1H-benzimidazole sodium (Pantoprazole Sodium)

Chemical Formula: $C_{16}H_{15}F_2N_3NaO_4S$

Molecular Weight: 406.36

MASS BALANCE:

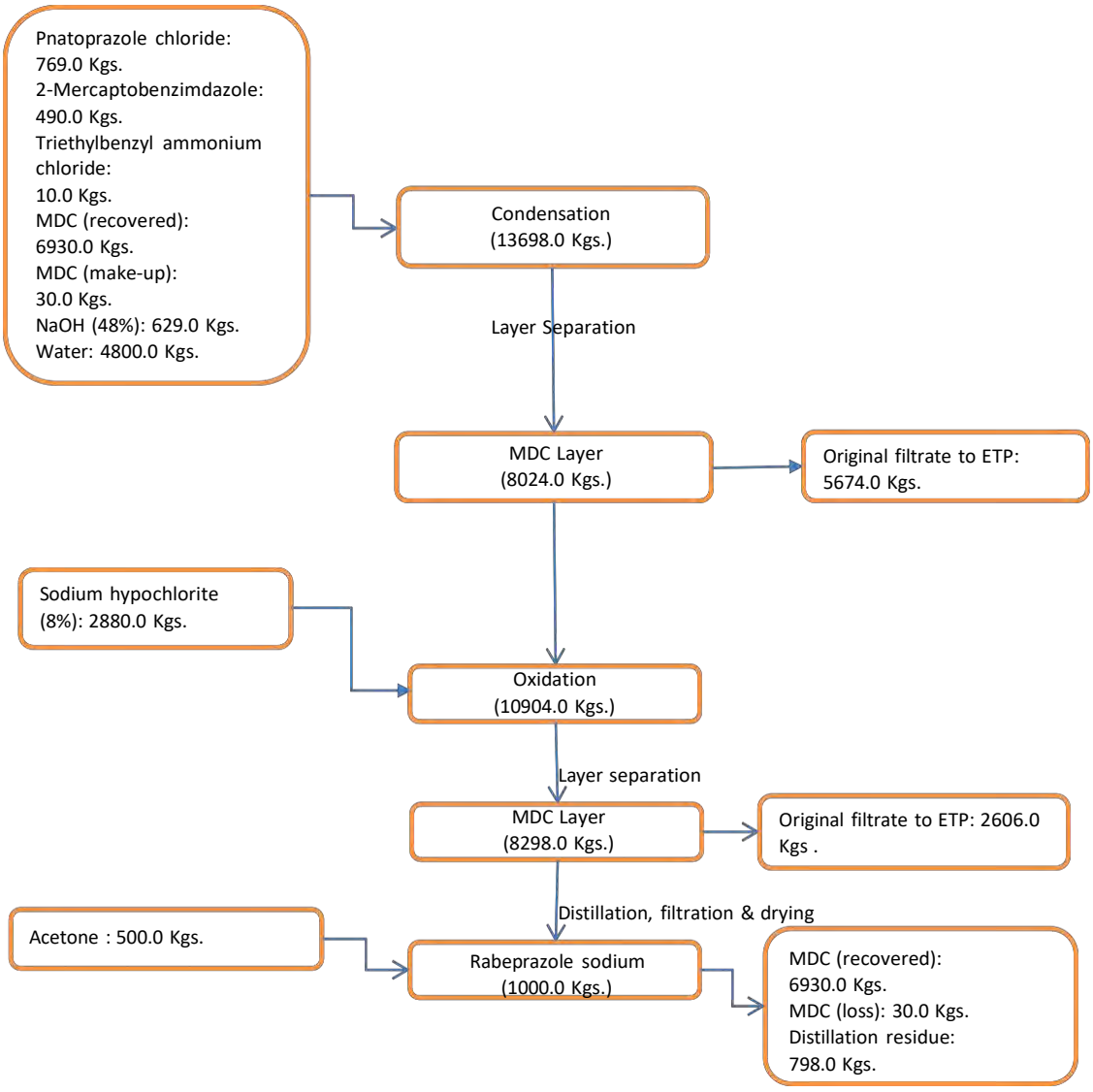
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Pantoprazole chloride	689.00	Pantoprazole sodium	1000.00	Product
2	2-Mercapto-5-difluromethoxybenzimidazole	665.00	MDC (recovered)	6930.00	Recycle
3	Triethybenzyl ammonium chloride	10.00	MDC (loss)	70.00	Loss
4	NaOH (48%)	591.00	Distillation residue	850.00	ETP
5	MDC (recovered)	6930.00	Effluent	7812.00	ETP
6	MDC (make-up)	70.00			
7	Sodium hypochlorite (8%)	2707.00			
8	Acetone	500.00			
9	Water	4500.00			
	Total	16662.00		16662.00	

10. PRODUCT: Rabeprazole Salts/ Rabeprazole Sodium

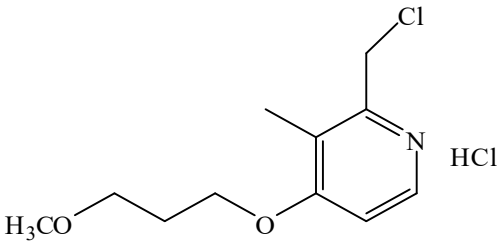
MANUFACTURING PROCESS:

Rabeprazole chloride and 2-Mercaptobenzimidazole is condensed in presence of sodium hydroxide, extracted in solvent and layer is separated. Solvent layer is then subjectd to oxidation with sodium hypochlorite. After layer spa ration, solvent is distilled off slurry is filtered, washed, dried & packed to yield Rabeprazole sodium**.**

PROCESS FLOW CHART



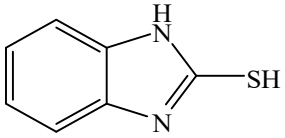
CHEMICAL REACTION:



2-Chloromethyl-4-(3-methoxypropoxy)-3-methylpyridine hydrochloride
(Rabeprazole chloride)

Chemical Formula: $C_{10}H_{14}Cl_2NO$
Molecular Weight: 235.13

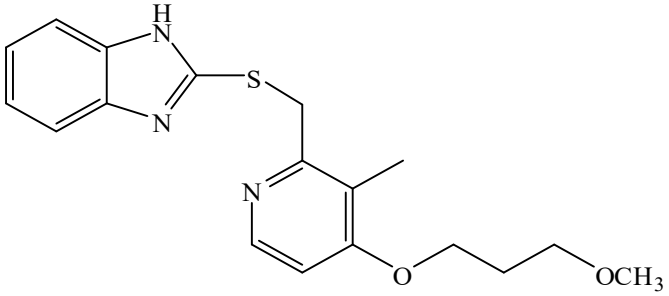
+



2-Mercaptobenzimidazole

Chemical Formula: $C_7H_6N_2S$
Molecular Weight: 150.20

NaOH

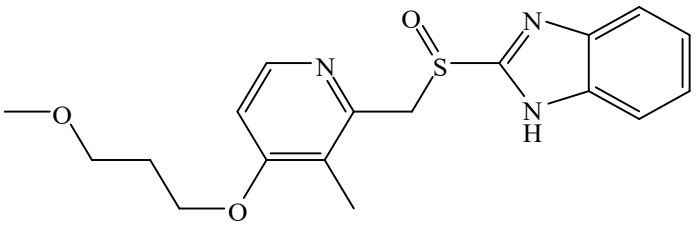


Rabeprazole Sulphide

2-((4-(3-methoxypropoxy)-3-methylpyridin-2-yl)methylthio)-1*H*-benzo[*d*]imidazole
Chemical Formula: $C_{18}H_{21}N_3O_2S$
Molecular Weight: 343.44

NaOCl

Na



2-([4-(3-Methoxypropoxy)-3-methylpyridin-2-yl]methylsulfinyl)-1H-benzo[d]imidazole sodium
(Rabeprazole Sodium)

Chemical Formula: $C_{18}H_{21}N_3NaO_3S$
Molecular Weight: 382.43

MASS BALANCE:

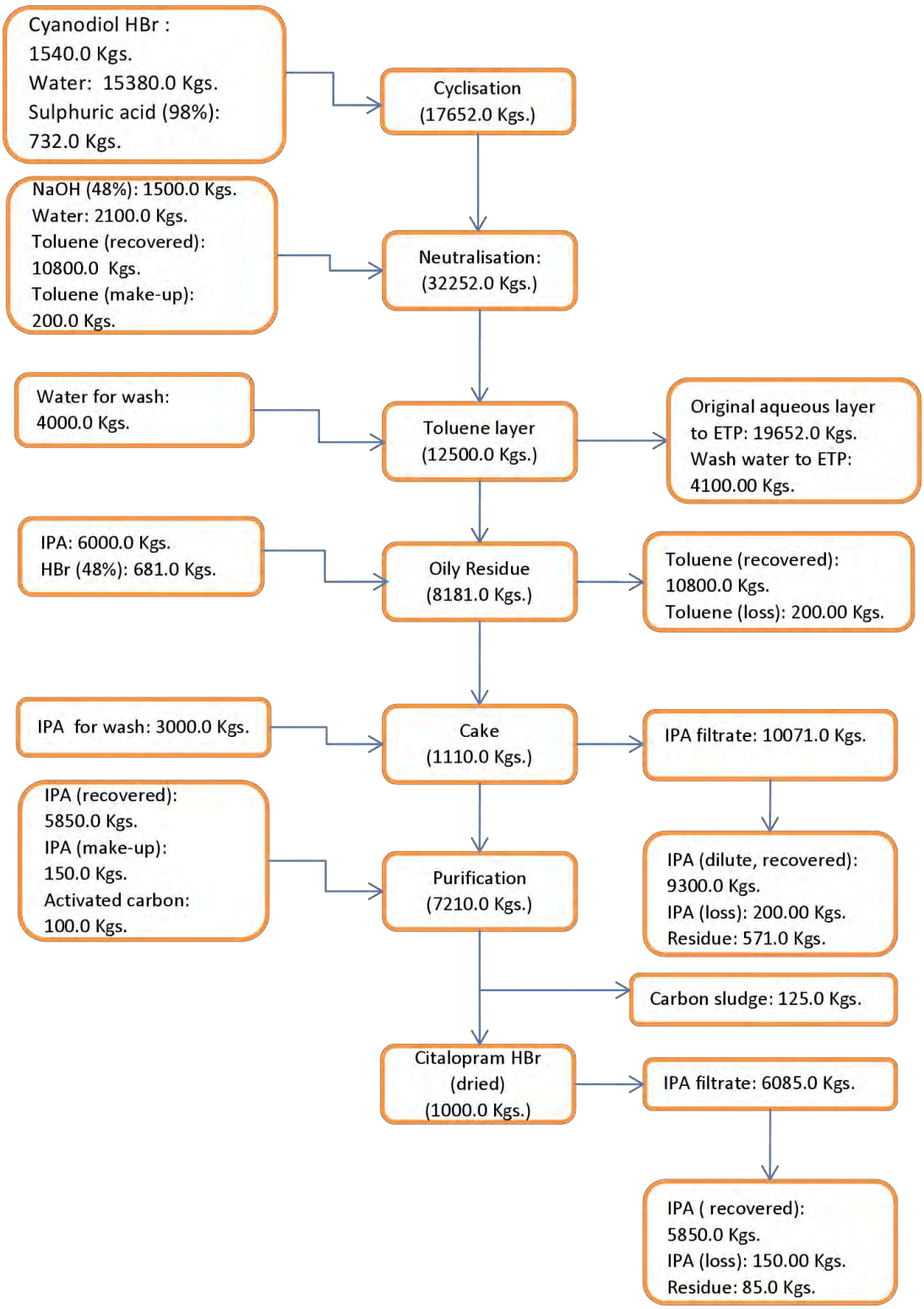
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Rabeprazole chloride	769.00	Rabeprazole sodium	1000.00	Product
2	2-Mercaptobenzimidazole	490.00	MDC (recovered)	6930.00	Recycle
3	Triethybenzyl ammonium chloride	10.00	MDC (loss)	70.00	Loss
4	NaOH (48%)	629.00	Distillation residue	798.00	ETP
5	MDC (recovered)	6930.00	Effluent	8280.00	ETP
6	MDC (make-up)	70.00			
7	Sodium hypochlorite (8%)	2880.00			
8	Acetone	500.00			
9	Water	4800.00			
	Total	17078.00		17078.00	

11. PRODUCT: Citalopram HBr/ Citalopram Salts

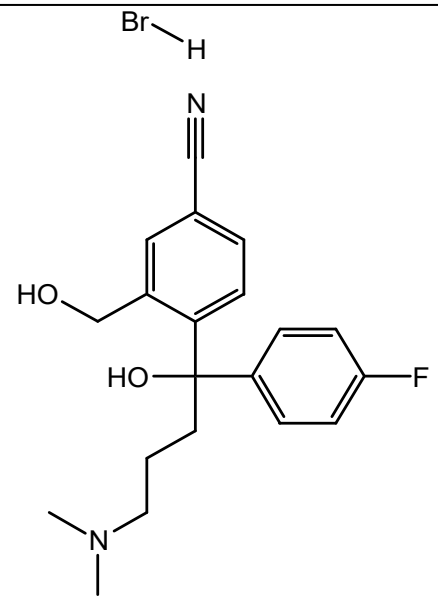
MANUFACTURING PROCESS:

Cyanodil HBr is cyclised in presence of dilute sulphuric acid at elevated temperature. Reaction mass is neutralised with alkali, extracted in solvent and oily residue is collected followed by istillation of solvent. Oily residue is taken in solvent, acidified with hydrobromic acid and filtered to obtain crude product. Crude product is purified by dissolving in solvent followed by charcoal treatment and crytallisation.Product is dried & packed.

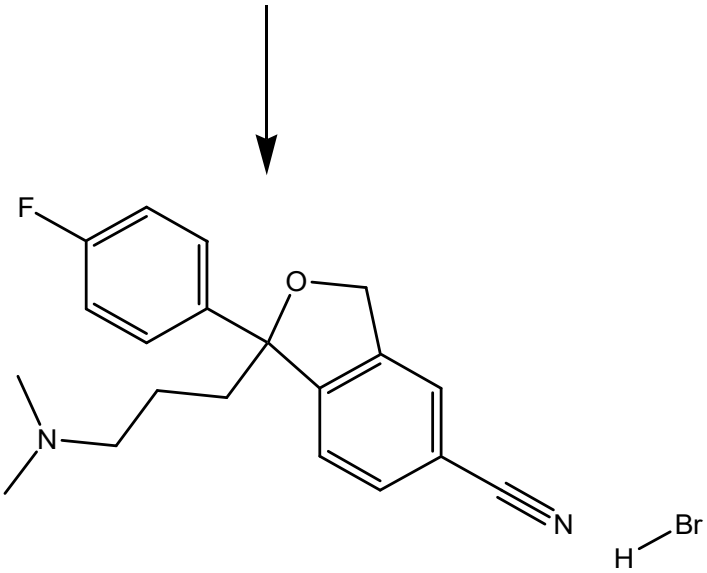
PROCESS FLOW CHART



CHEMICAL REACTION:



4-[4-Dimethylamino-1-(4-fluoro-phenyl)-1-hydroxy-butyl]-3-hydroxymethyl-benzonitrile hydrobromide
(Cyanodiol Hbr)



1-(3-Dimethylamino-propyl)-1-(4-fluoro-phenyl)-1,3-dihydro-isobenzofuran-5-carbonitrile hydrobromide
(Citalopram Hbr

MASS BALANCE:

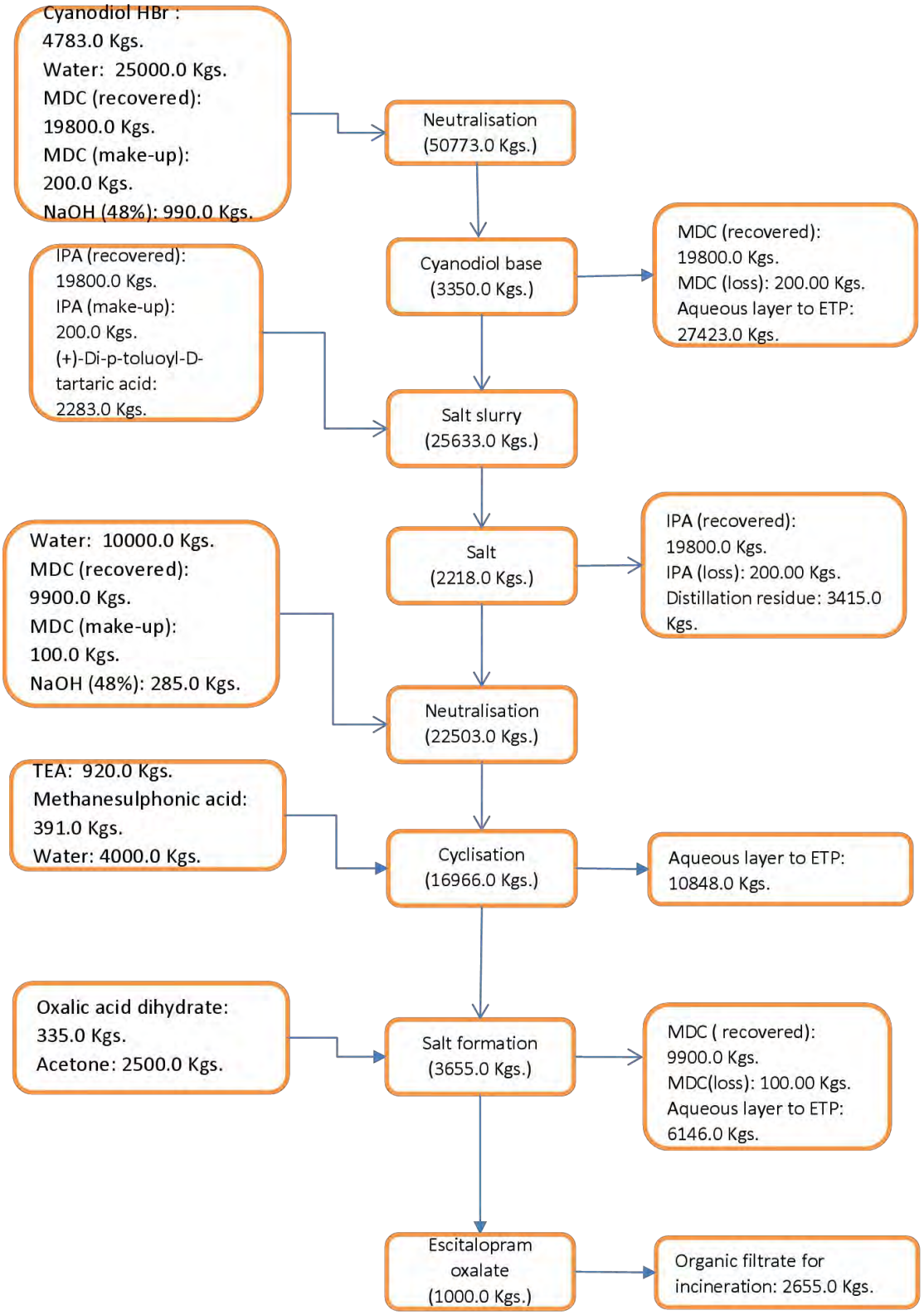
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Cyanodiol HBr	1540.00	Citalopram HBr	1000.00	Product
2	Sulphuric acid (98%)	732.00	Toluene (recovered)	10800.00	Reuse
3	NaOH (48%)	1500.00	Toluene (loss)	200.00	
4	Toluene (recovered)	10800.00	IPA (dilute, recovered)	9300.00	Sale
5	Toluene (make-up)	200.00	IPA (recovered)	5850.00	Reuse
6	IPA	9000.00	IPA (loss)	350.00	
7	IPA (recovered)	5850.00	Carbon sludge	125.00	Incineration
8	IPA (make-up)	150.00	Residue	656.00	Incineration
9	HBr (48%)	681.00	Effluent	23752.00	ETP
10	Activated carbon	100.00			
11	Water	21480.00			
		52033.00		52033.00	

12. PRODUCT: Esomeprazole Salts

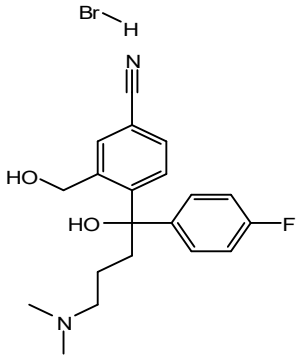
MANUFACTURING PROCESS:

Omeprazole chloride and 2-Mercapto-5-methoxybenzimidazole is condensed in presence of sodium hydroxide, extracted in solvent and distilled to affore omeprazole suplhide. It is then subjectd to asymmetric oxidation in presence of solvent. After layer sparation, solvent is distilled off slurry is filtered, washed , dried & packed to yield Esomeprazole potassium. It is then treated with MgCl2.2H2O in solvent to afford Esomeprazole magnesium dihydrate after filtration & drying.

PROCESS FLOW CHART

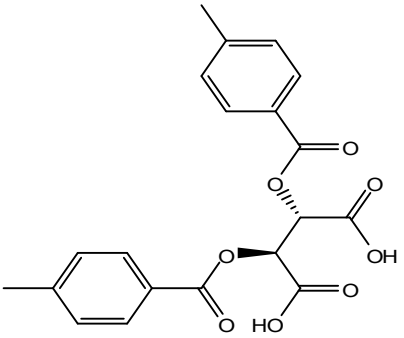


CHEMICAL REACTION:

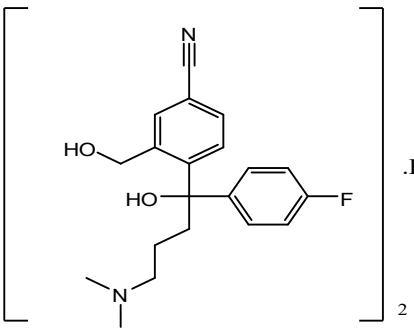


4-[4-Dimethylamino-1-(4-fluoro-phenyl)-1-hydroxy-butyl]-3-hydroxymethyl-benzonitrile; hydrobromide
(Cyanodiol HBr)
Molecular Weight: 423.32

+

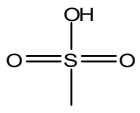


(+)-Di-p-toluoyl-D-tartaric acid
Molecular Weight: 386.35

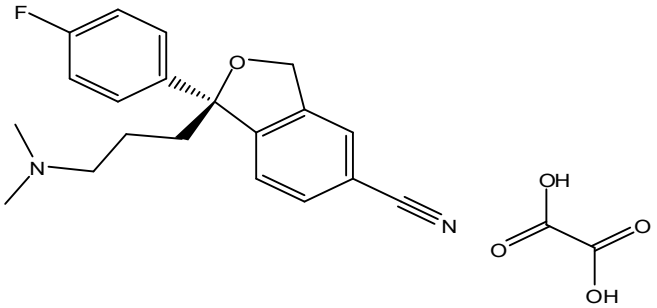


$.HOOCCH(OCOC_6H_4CH_3)CH(OCOC_6H_4CH_3)COOH$

Cyanodiol tartaric acid salt
Molecular Weight: 728.76



methanesulphonic acid
Molecular Weight: 96.11



1-[3-(Dimethylamino)propyl]-1-(4-fluorophenyl)-1,3-dihydro-S-(+)-5-isobenzofurancarbonitrile oxalate
(Escitalopram oxalate)
Molecular Weight: 414.43

MASS BALANCE:

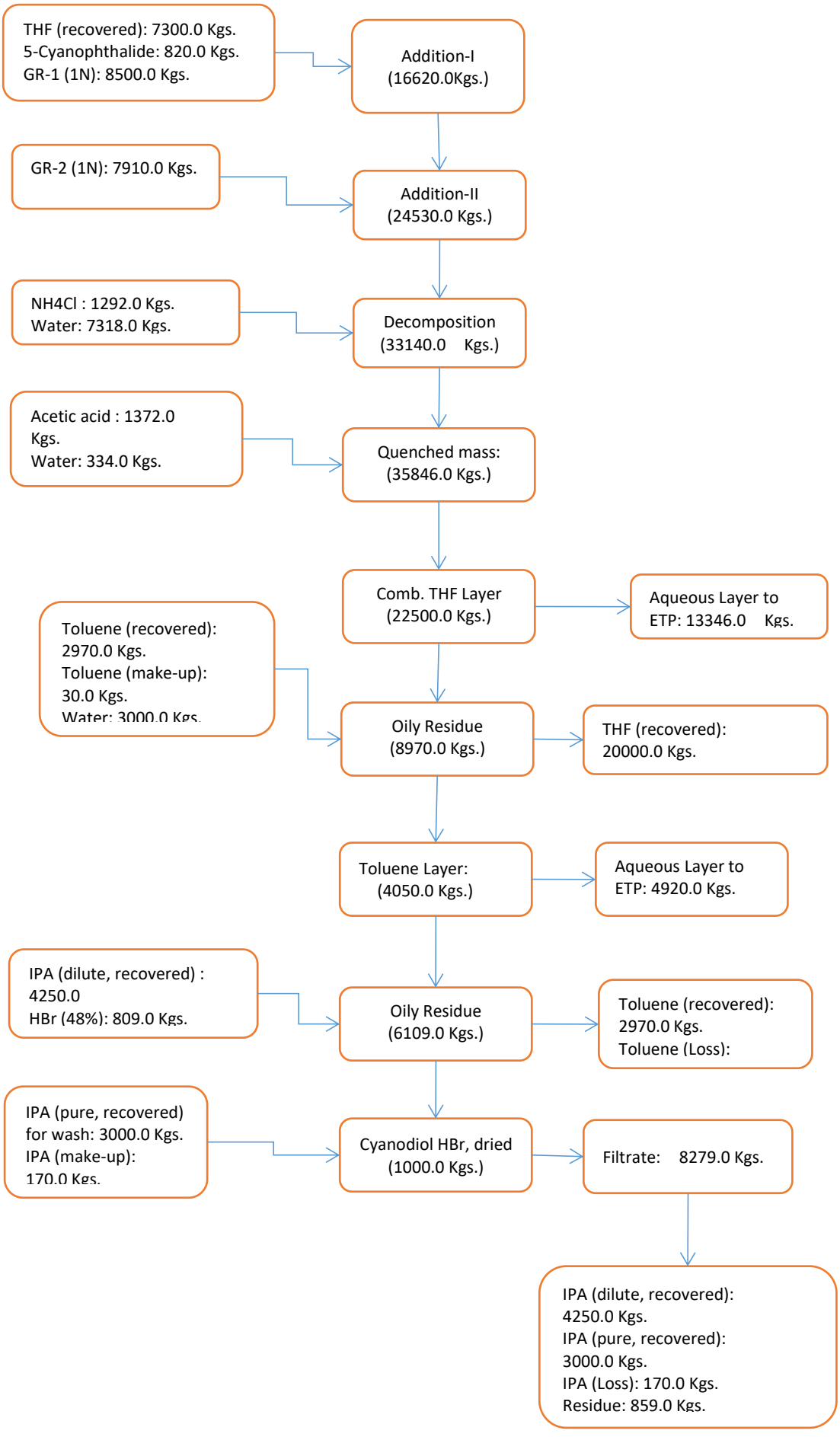
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Cyanodiol HBr	4783.00	Escitalopram oxalate	1000.00	Product
2	MDC (recovered)	29700.00	MDC (recovered)	29700.00	Recycle
3	MDC (make-up)	300.00	MDC (loss)	300.00	Loss
4	NaOH (48%)	1275.00	IPA (recovered)	19800.00	Recycle
5	TEA	920.00	IPA (loss)	200.00	Loss
6	Methane sulphonic acid	391.00	Distillation residue	6070.00	Incineration
7	IPA (recovered)	19800.00	Effluent	44417.00	ETP
8	IPA (make-up)	200.00			
9	(+)-Di-p-toluoyl-D-tartaric acid	2283.00			
10	Oxalic aicd dihydrate	335.00			
11	Acetone	2500.00			
12	Water	39000.00			
		101487.00		101487.00	

13. PRODUCT:Cyanodiol HBr/Cynodiol salts

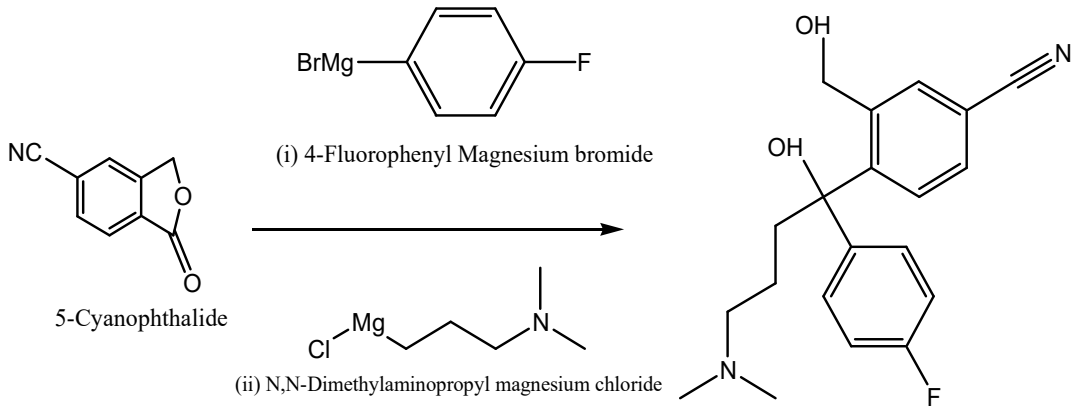
MANUFACTURING PROCESS:

To a suspension of 5-Carboxyphthalide in THF, 4-Fluorophenyl magnesium bromide solution (GR-1) is added followed by anothe solution of N,N-Dimethylaminopropyl magnesium chloride (GR-2) at lower temperature. The reaction mass is quenched by addition of aqueous solution of ammonium chloride, THF is removed by distillation and resulting oily solution is taken in IPA followed by additio of HBr (48%) solution) The crytallisee product is filtered, wahsed with IPA, dried and packed to get Cyanodiol HBr.

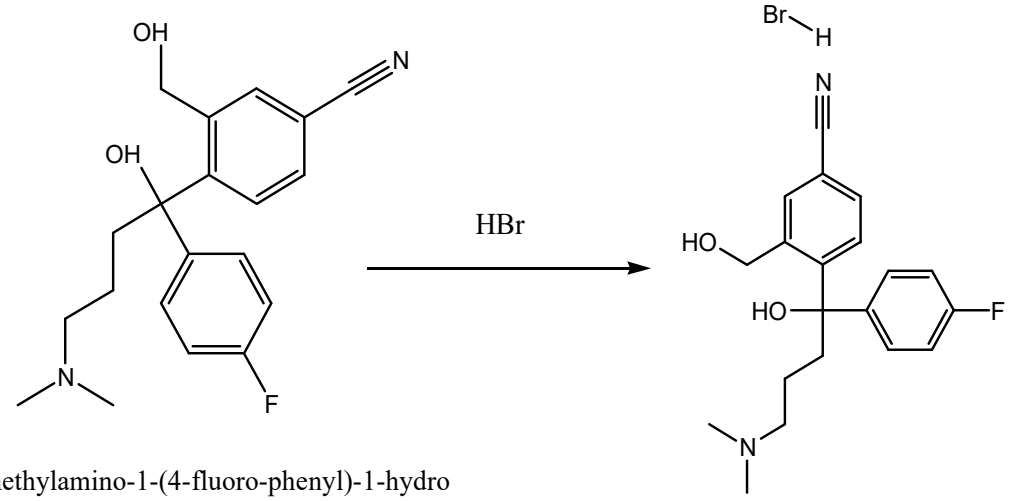
PROCESS FLOW CHART



CHEMICAL REACTION:



4-[4-Dimethylamino-1-(4-fluoro-phenyl)-1-hydroxy-butyl]-3-hydroxymethyl-benzonitrile



4-[4-Dimethylamino-1-(4-fluoro-phenyl)-1-hydroxy-butyl]-3-hydroxymethyl-benzonitrile

4-[4-Dimethylamino-1-(4-fluoro-phenyl)-1-hydroxy-butyl]-3-hydroxymethyl-benzonitrile; hydrobromide (Cyanodiol HBr)

MASS BALANCE:

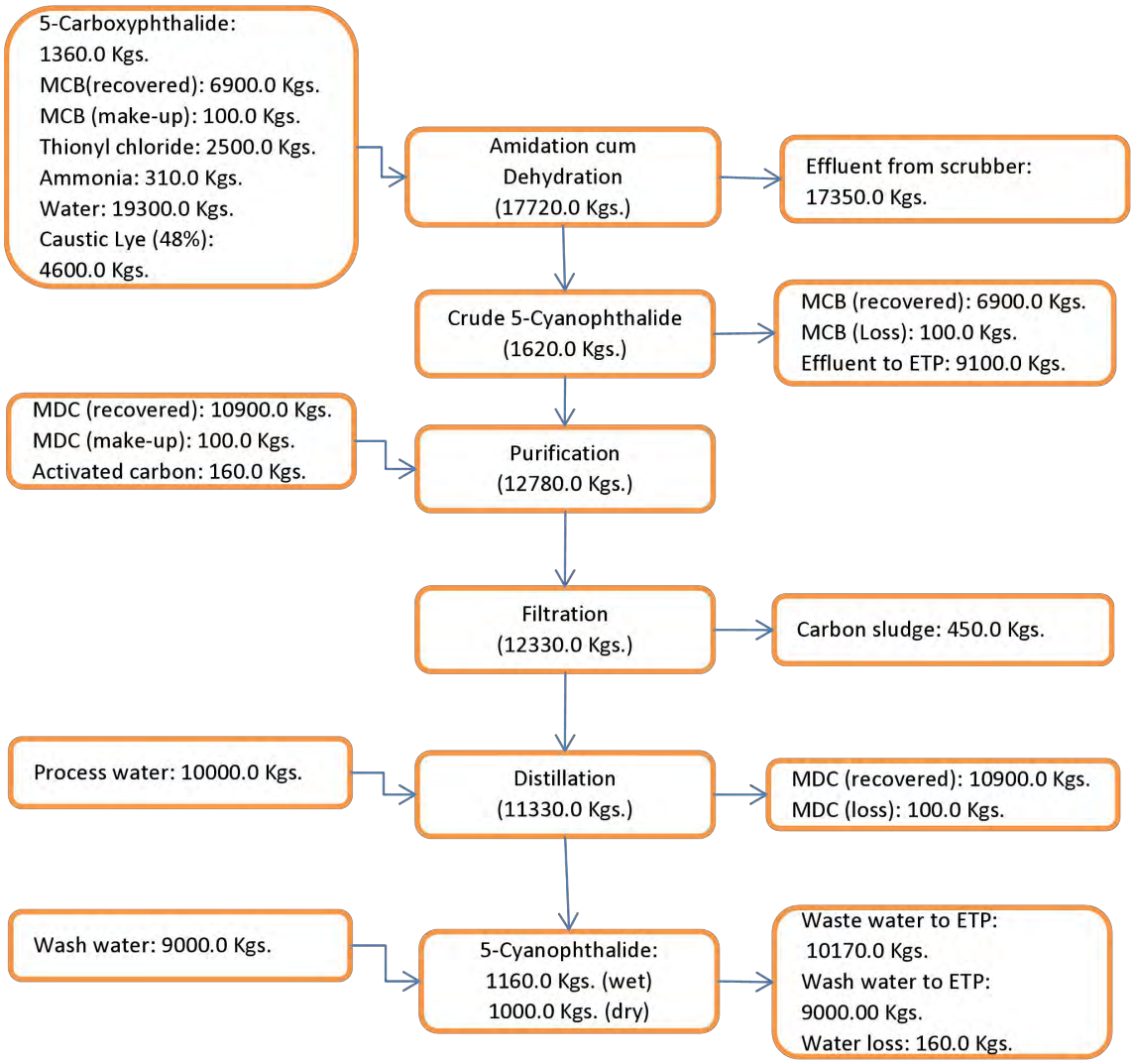
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	5-Cyanophthalide	820.00	Cyanodiol HBr (dry)	1000.00	Product
2	THF (recovered)	8300.00	THF (recovered)	7300.00	Reuse
3	GR-1 (1N)	8500.00	THF (recovered)	12700.00	Reuse in GR
4	GR-2 (1N)	7910.00	THF (Loss)	250.00	
5	Ammonium chloride	1292.00	Toluene (recovered)	2970.00	Reuse
6	Acetic acid	1372.00	Toluene (Loss)	30.00	
8	Toluene (recovered)	2970.00	IPA (20%, recovered)	4250.00	Reuse
9	Toluene (Make-up)	30.00	IPA (pure, recovered)	3000.00	Reuse
10	Ammonia solution	720.00	IPA (Loss)	170.00	
11	IPA (20%, recovered)	4250.00	Distillation residue	859.00	Incineration
12	IPA (pure, recovered)	3000.00	Effluent	18266.00	ETP
13	IPA (pure, make-up)	170.00			
14	HBr (48%)	809.00			
15	Water	10652.00			
	Total	50795.00		50795.00	

14. PRODUCT: 5-Cyanophthalide

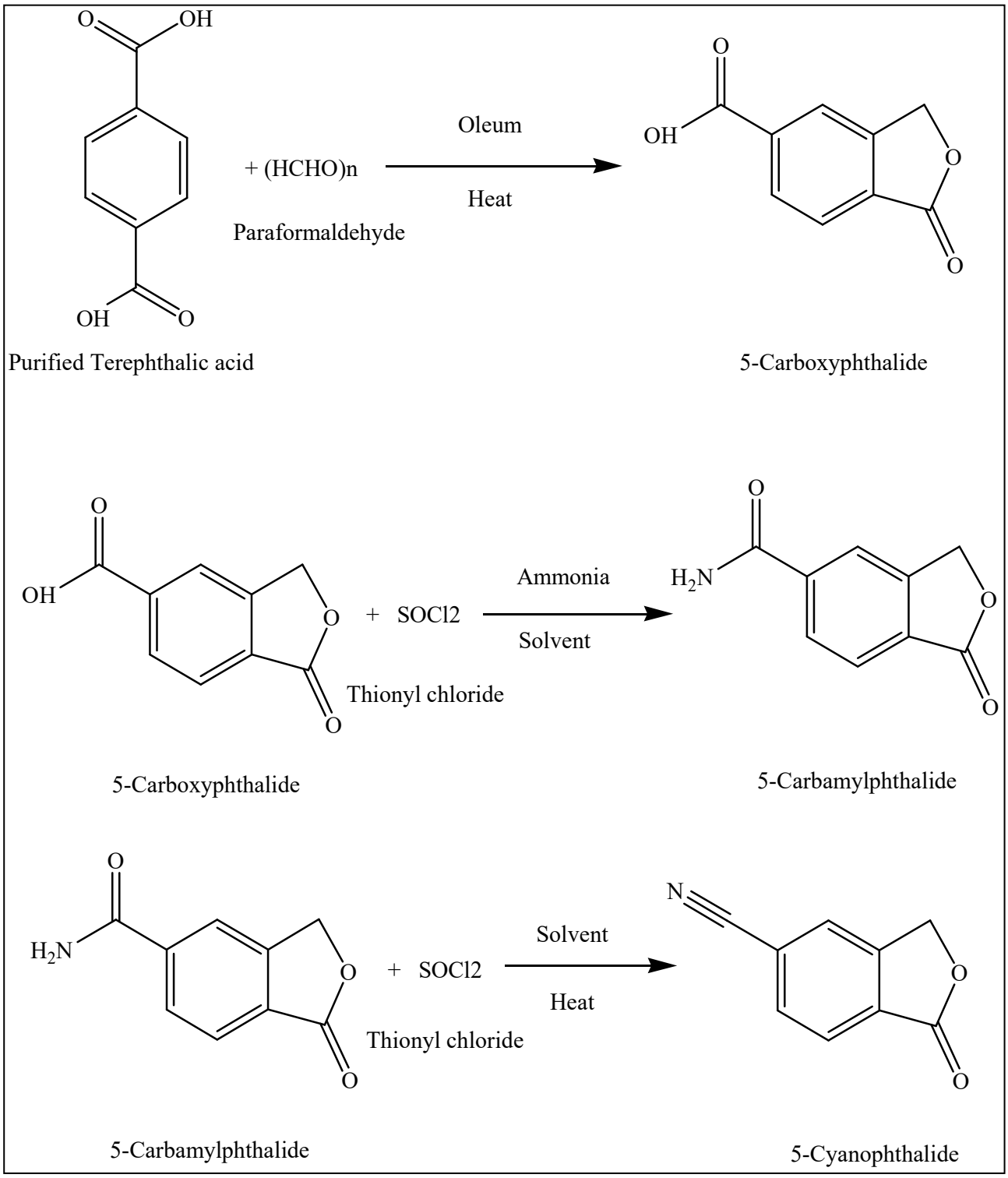
MANUFACTURING PROCESS:

5-Carboxyphthalide is taken in a solvent and reacted with thionyl chloride at elevated temperature to get Chlorocarbonyl derivative which is further reacted, without isolation, with ammonia gas to get amide derivative. The amide derivative, without isolation, is dehydrated with thionyl chloride, filtered, and evaporated solvent under vacuum to get crude 5-Cyanophthalide. The evolved gases viz. HCl & SO2 are scrubbed in two stage scrubber to obtain dilute HCl & Na2SO3 solution. The Na2SO3 solution is recycled till its saturation level; excess solid is removed by filtration and again recycled. The crude 5-Cyanophthalide is purified in solvent at elevated temperature, inorganic residues (NH4Cl etc.) are removed by filtration in a closed system. The solvent trapped with inorganic residue is removed by vacuum evaporation followed by condensation. The clarified filtered solution is subjected to distillation followed by water addition to recover the solvent. The aqueous slurry is then cooled, filtered and washed. Product is dried & packed.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

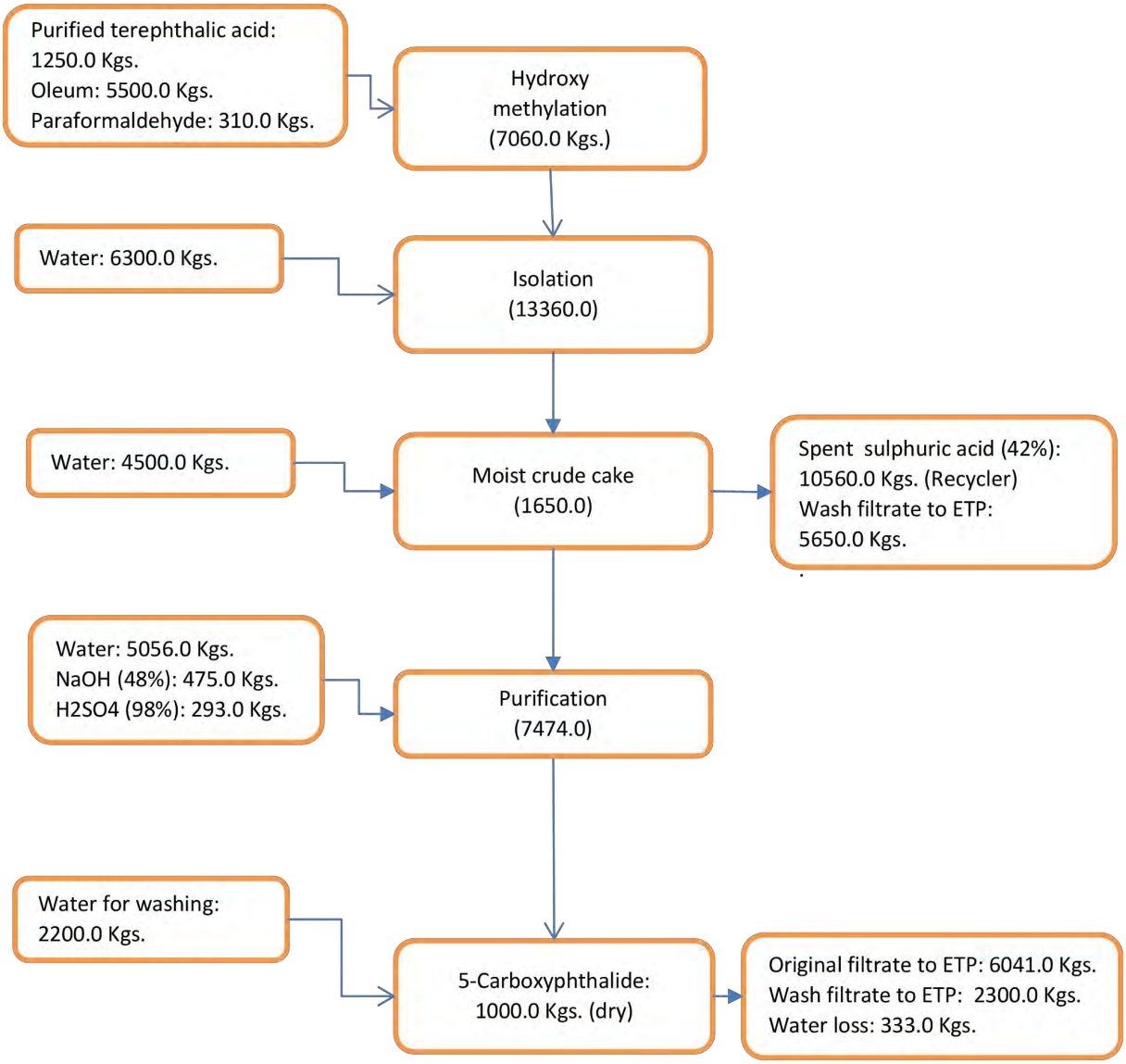
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	5-Carboxyphthalide	1360.00	5-Cyanophthalide (dry)	1000.00	Product
4	MCB (recovered)	6900.00	MCB (recovered)	6900.00	Recycle
5	MCB (make-up)	100.00	MCB (loss)	100.00	Loss
6	Thionyl chloride	2500.00	MDC (recovered)	10900.00	Recycle
7	Ammonia	310.00	MDC (loss)	100.00	Loss
8	NaOH Lye (48%)	4600.00	Carbon sludge	450.00	Incineration
9	MDC (recovered)	10900.00	Water loss	160.00	Loss
10	MDC (make-up))	100.00	Effluent	45620.00	ETP
11	Activated carbon	160.00			
12	Water	38300.00			
	Total	65230.00		65230.00	

15. PRODUCT: 5-Carboxyphthalide

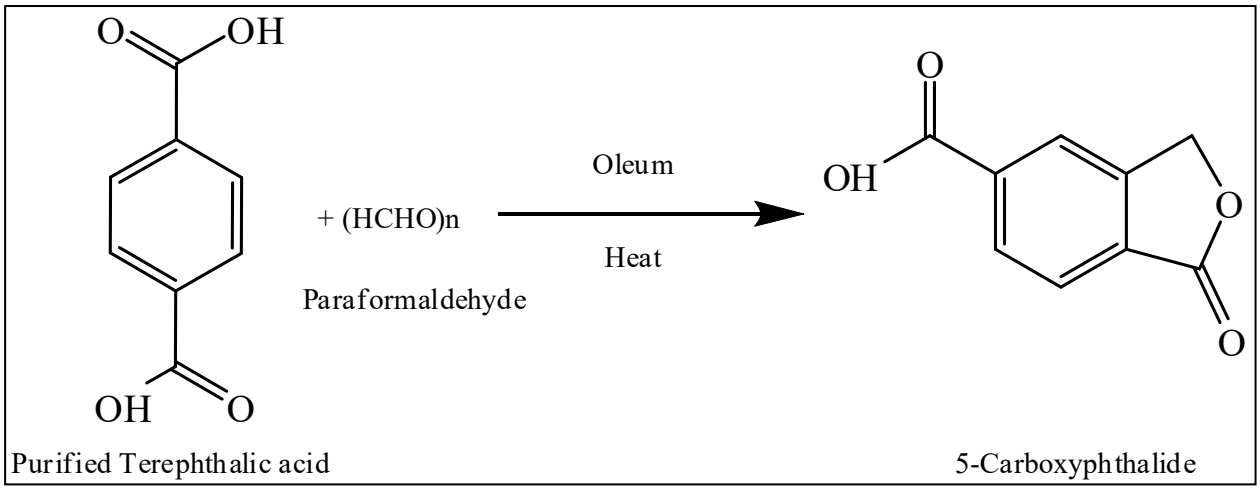
MANUFACTURING PROCESS:

Purified terephthalic acid is treated with paraformaldehyde & oleum at elevated temperature, reaction mass is quenched in water, filtered, purified, washed & dried to get 5-Carboxyphthalide.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

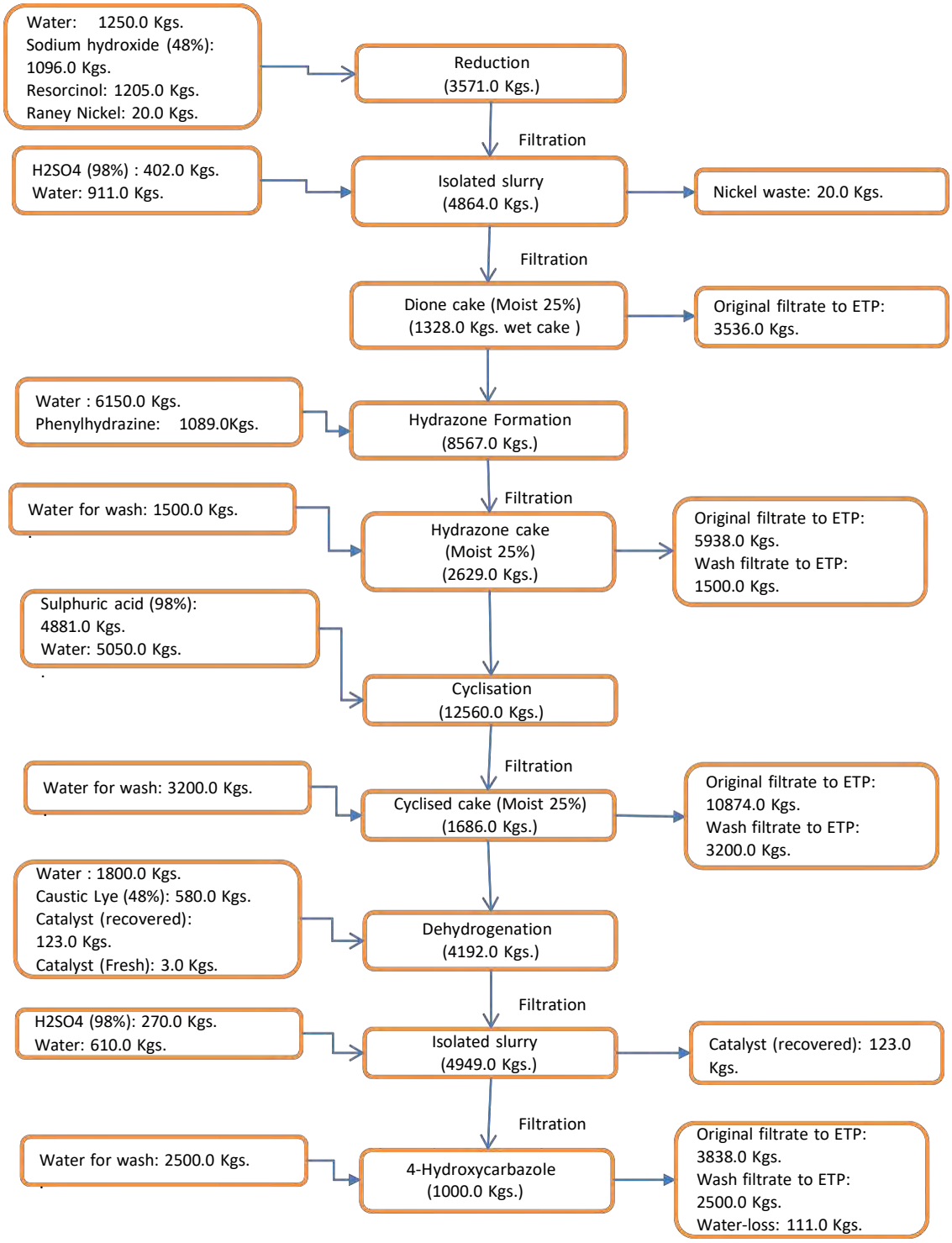
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Purified Terephthalic acid	1250.00	5-Carboxyphthalide	1000.00	Product
2	Oleum	5500.00	Spent sulphuric acid (42%)	10560.00	Recycler
3	Paraformaldehyde	310.00	Water loss	333.00	Loss
4	NaOH (48%)	475.00	Effluent	13991.00	ETP
5	H2SO4 (98%)	293.00			
6	Water	18056.00			
	Total	25884.00		25884.00	

16. PRODUCT: 4-Hydroxycarbazole

MANUFACTURING PROCESS:

Resorcinol is hydrogenated at elevated temperature in presence of raney nickel in alkaline aqueous condition, filtered and followed by acidification with HCl afford dione wet cake. The dione wet cake is reacted with phenylhydrazine, and after subsequent filtration yield hydrazone wet cake. The hydrazone is cyclised in dilute sulphuric acid, and filtered the wet cake which is dehydrogenated under catalytic conditions and after filtration and subsequent acidification and again filtration yield 4-Hydroxide carbazole as moist cake. Final product is dried & packed.

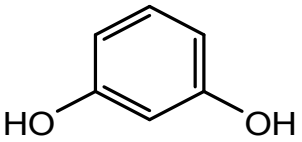
PROCESS FLOW CHART



CHEMICAL REACTION:

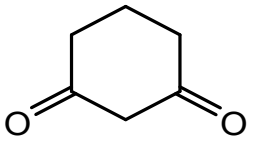
4-HYDROXYCARBAZOLE

(I)



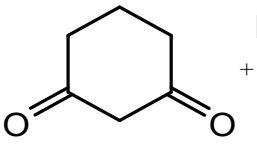
Resorcinol

H2



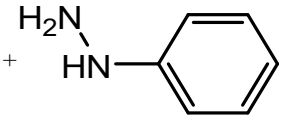
Cyclohexane-1,3-dione
Molecular Weight: 112.13

(II)



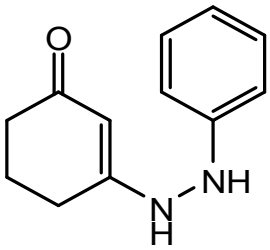
Cyclohexane-1,3-dione

+



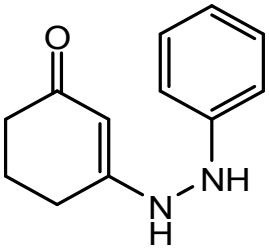
Phenylhydrazine

--H_2O



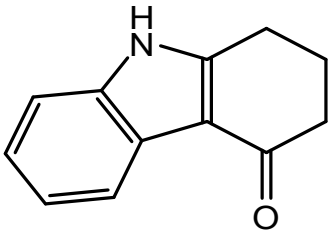
3-(Phenyl-hydrazono)-cyclohexanone

(III)



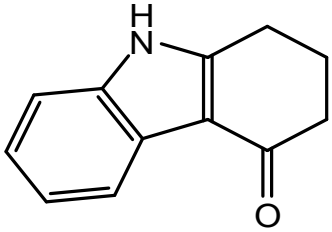
3-(Phenyl-hydrazono)-cyclohexanone

--NH_3



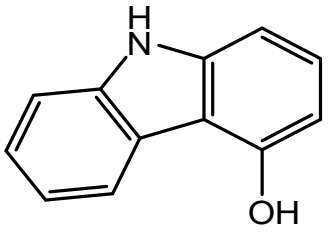
1,2,3,9-Tetrahydro-9[H]-Carbazole -4-One

(IV)



1,2,3,9-Tetrahydro-9[H]-Carbazole -4-One

--H_2



4-Hydroxycarbazole

MASS BALANCE:

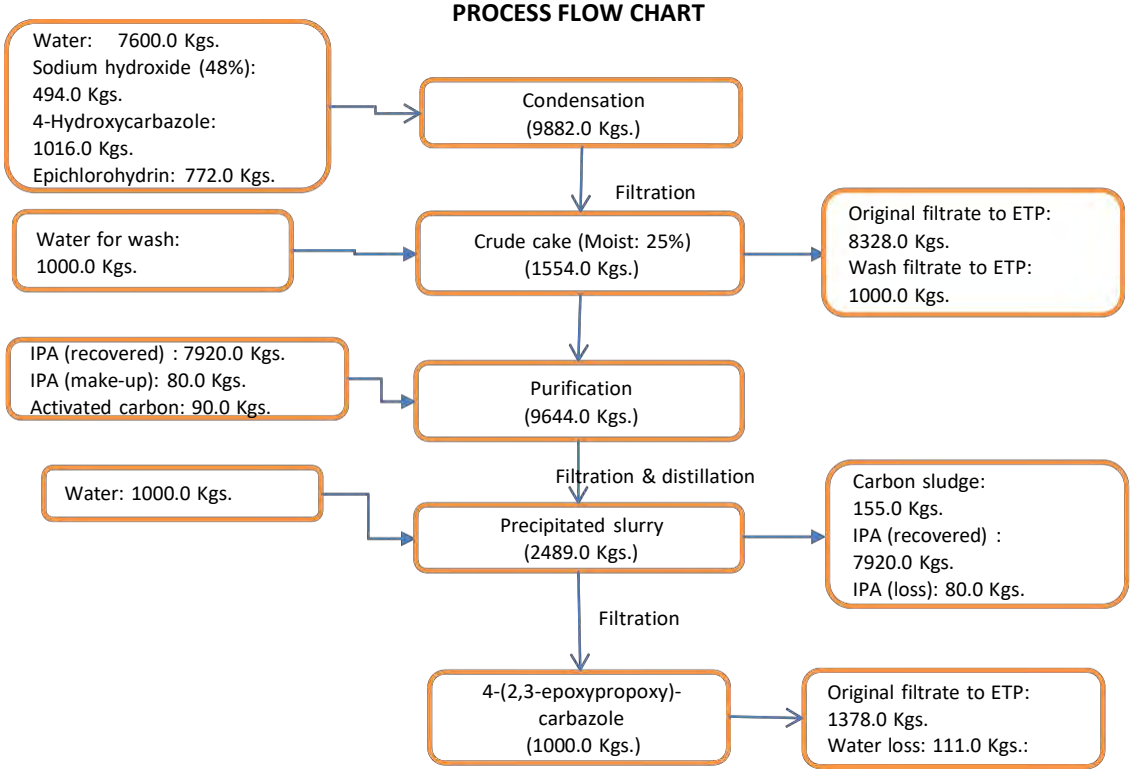
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Resorcinol	1205.00	4-Hydroxide carbazole, dry	1000.00	Product
2	Sodium hydroxide lye (48%)	1676.00	Catalyst (recovered)	123.00	Recycle
3	Raney nickel	20.00	Nickel waste	20.00	Reg. recyler
5	Phenylhydrazine	1089.00	Water loss	111.00	loss
6	Sulphuric acid (98%)	5553.00	Effluent	31386.00	ETP
8	Catalyst (recovered)	123.00			
9	Catalyst (fresh)	3.00			
10	Water	22971.00			
	Water				
	Total	32640.00		32640.00	

17. PRODUCT: 4-(2,3-epoxypropoxy)-carbazole

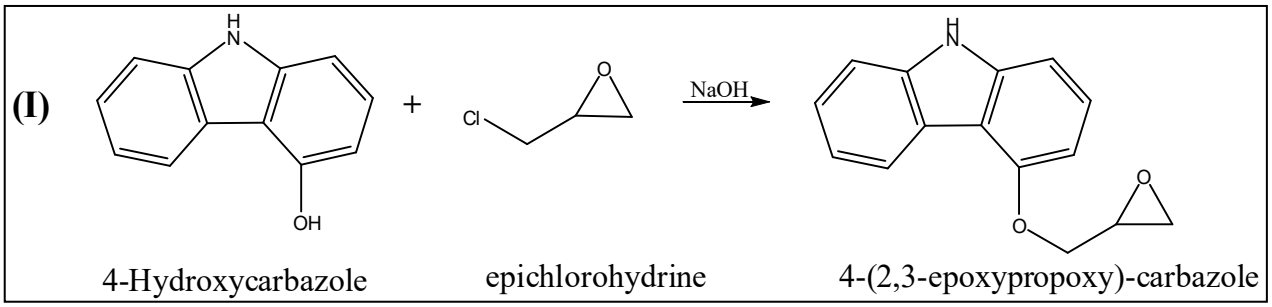
MANUFACTURING PROCESS:

4-Hydroxycarbazole is reacted with epichlorohydin in presence of sodium hydroxide and crude product is collected by filtration. Crude product is dissolved in solvent followed bt charcoal treatment and filtration and after distillation of solvent affford purified product. The purified product is then dried & packed.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

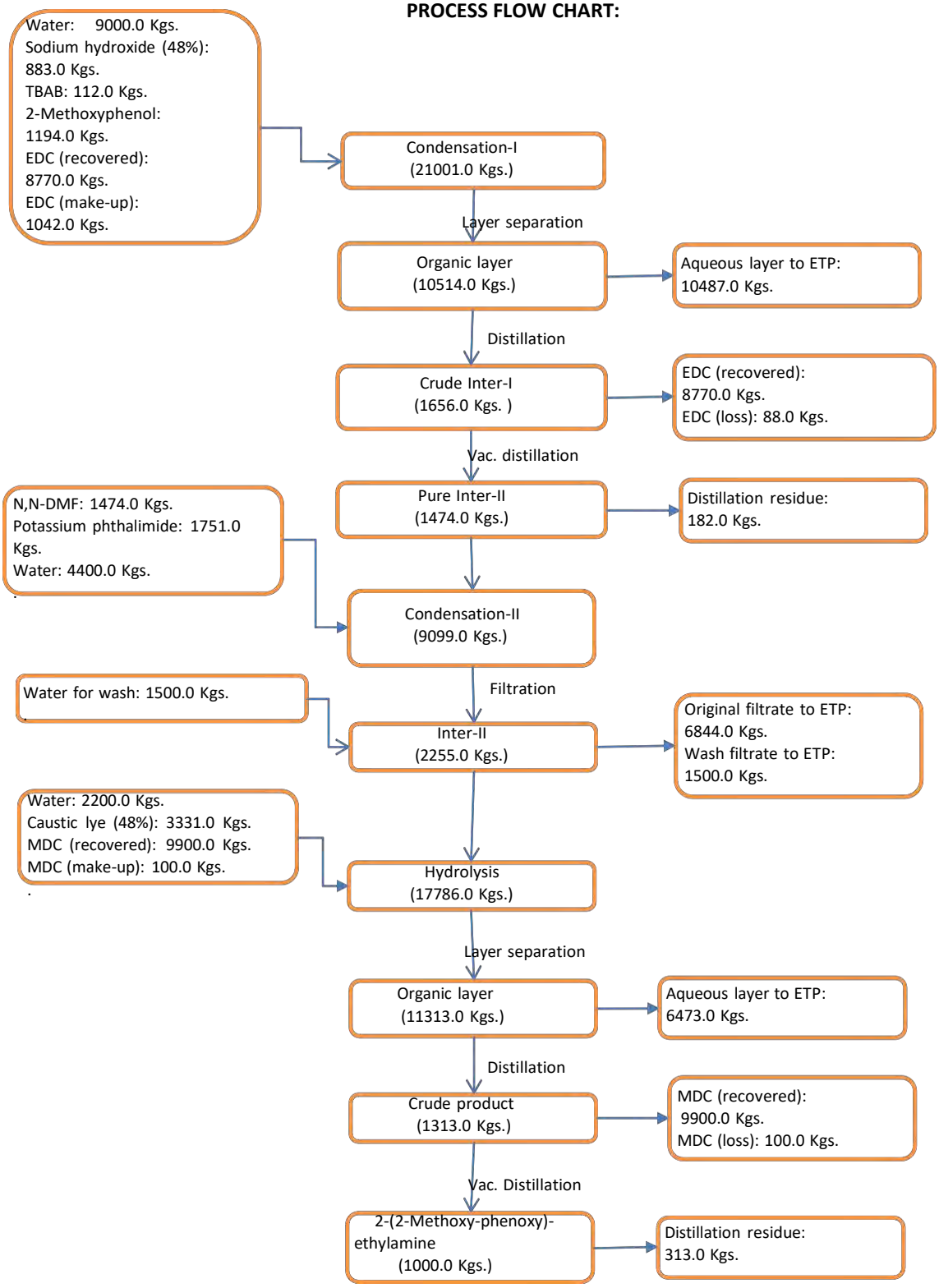
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	4-Hydroxycarbazole	1016.00	4-(2,3-epoxypropoxy)-carbazole	1000.00	Product
2	Sodium hydroxide lye (48%)	494.00	IPA (recovered)	7920.00	Recycle
3	Epichlorohydrin	772.00	IPA (loss)	80.00	Loss
4	IPA (recovered)	7920.00	Water loss	111.00	Loss
5	IPA (make-up)	80.00	Carbon sludge	155.00	Incinerable waste
6	Activated carbon	90.00	Effluent	10706.00	ETP
8	Water	9600.00			
	Total	19972.00		19972.00	

18. PRODUCT: 2-(2-Methoxy-phenoxy)-ethylamine

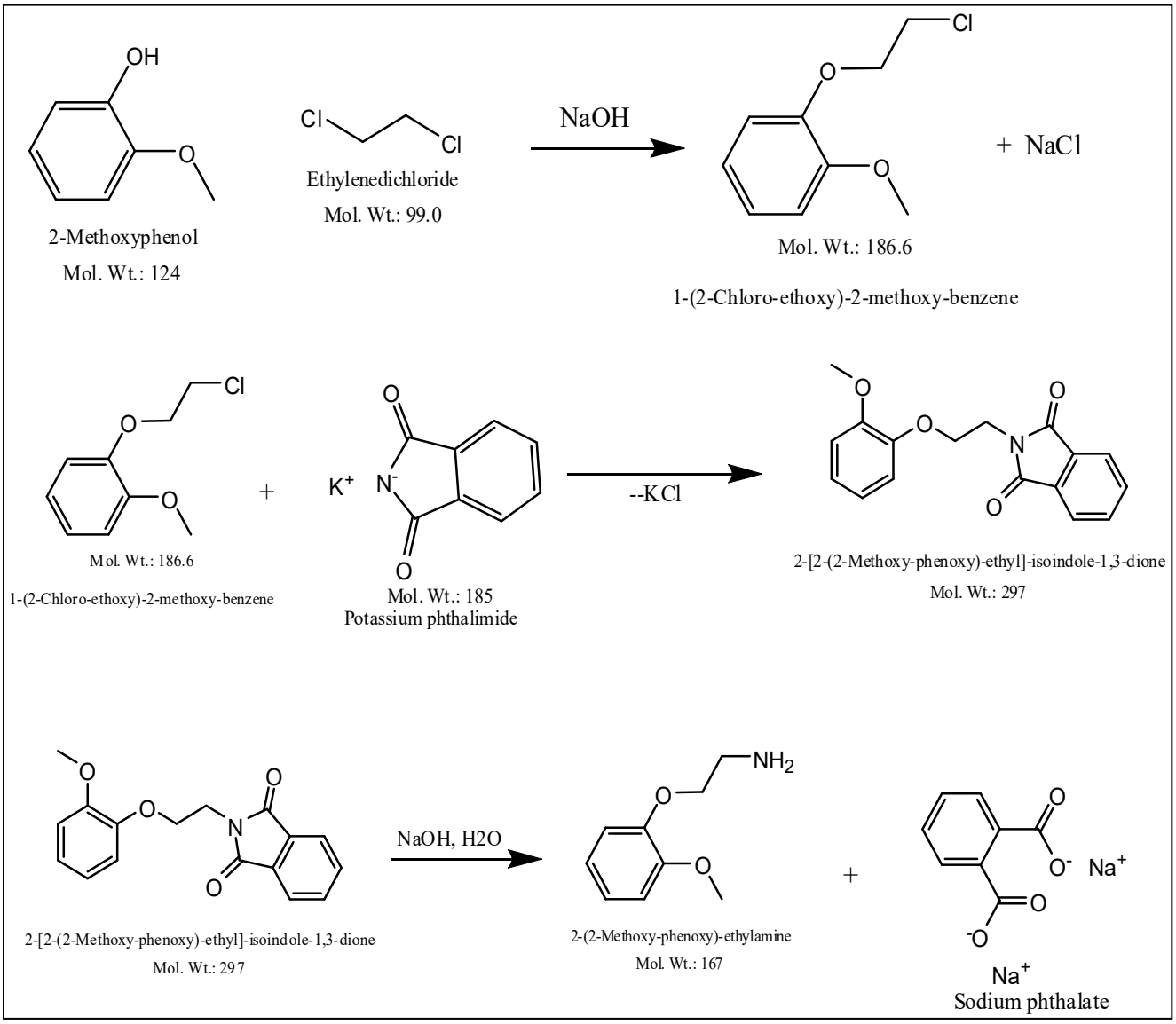
MANUFACTURING PROCESS:

2-Methoxyphenol is reacted with excess EDC in presence of sodium hydroxide & subsequent layer separation, distillation of solvent & finally, vacuum distillation afford Inter-I. The inter-I is then reacted with potassium phthalimide and filtered to get Inter-II. Finally, Inter-II is hydrolysed in presence of dilute sodium hydroxide lye and then solvent extraction, distillation of solvent & finally vacuum distillation yield product, which is packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

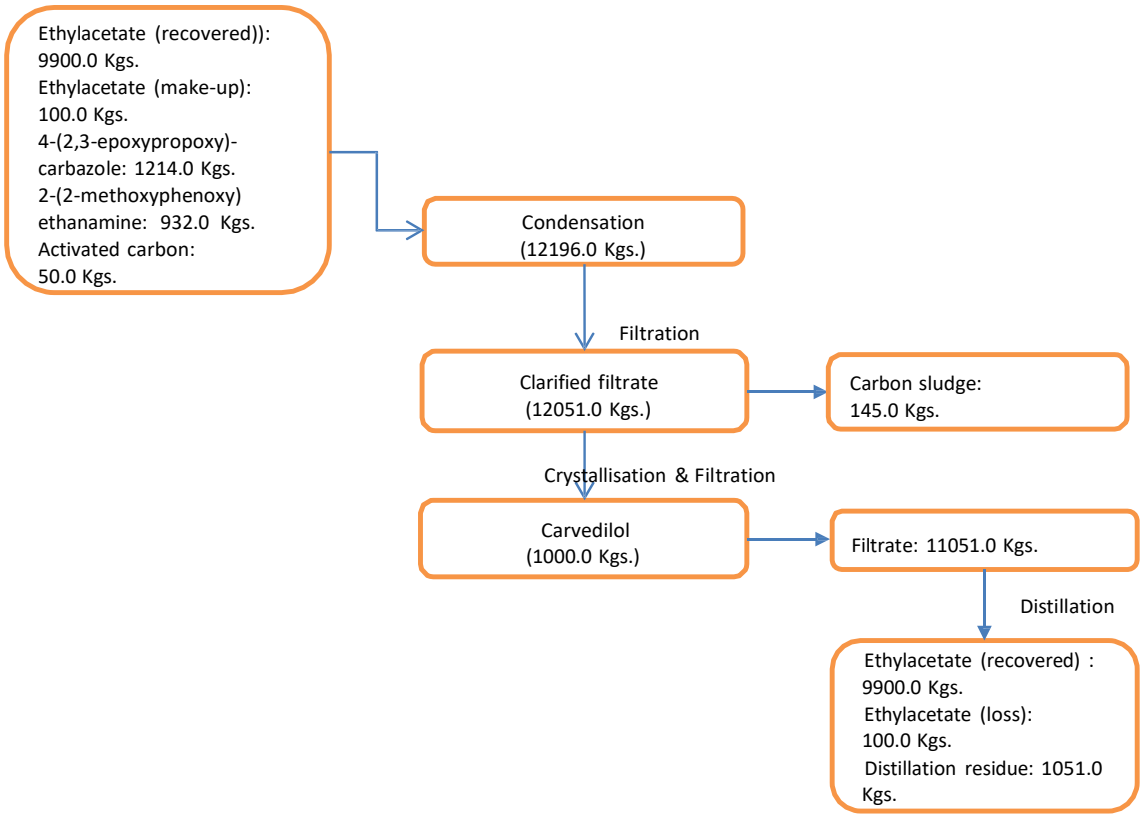
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	2-Methoxyphenol	1194.00	2-(2-Methoxy-phenoxy)-ethylamine	1000.00	Product
2	Sodium hydroxide lye (48%)	4214.00	EDC (recovered)	8770.00	Recycle
3	TBAB	112.00	EDC (loss)	88.00	loss
4	EDC (recovered)	8770.00	MDC (recovered)	9900.00	recycle
5	EDC (make-up)	1042.00	MDC (loss)	100.00	loss
6	N,N-DMF	1474.00	Distillation residue	495.00	Incineration
8	Potassium phthalimide	1751.00	Effluent	25304.00	ETP
9	MDC (recovered)	9900.00			
10	MDC (make-up)	100.00			
11	Water	17100.00			
	Total	45657.00		45657.00	

19. PRODUCT: Carvedilol

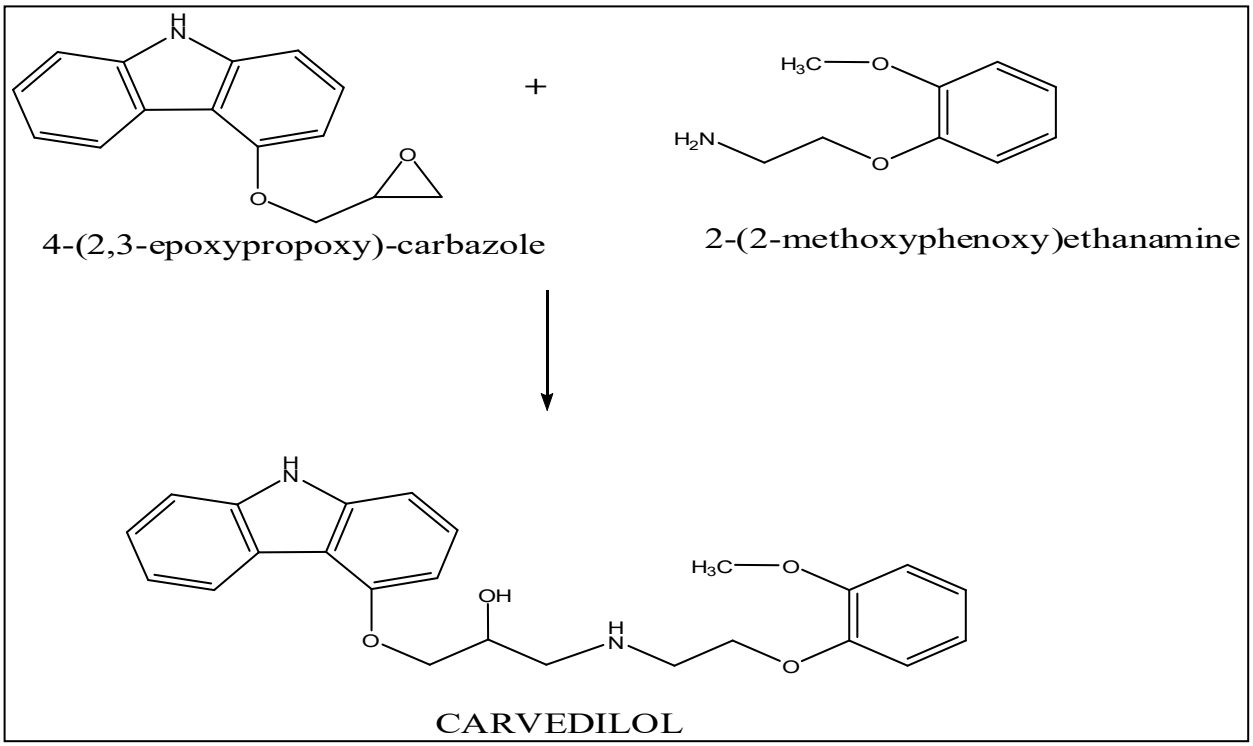
MANUFACTURING PROCESS:

4-(2,3-epoxypropoxy)-carbazole & 2-(2-methoxyphenoxy) ethanamine is reacted in solvent and after reaction is over, activated charcoal is added, filtered and chilled to crystallize the product. Product is filtered, dried & packed. Solvent is recovered & recycled.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

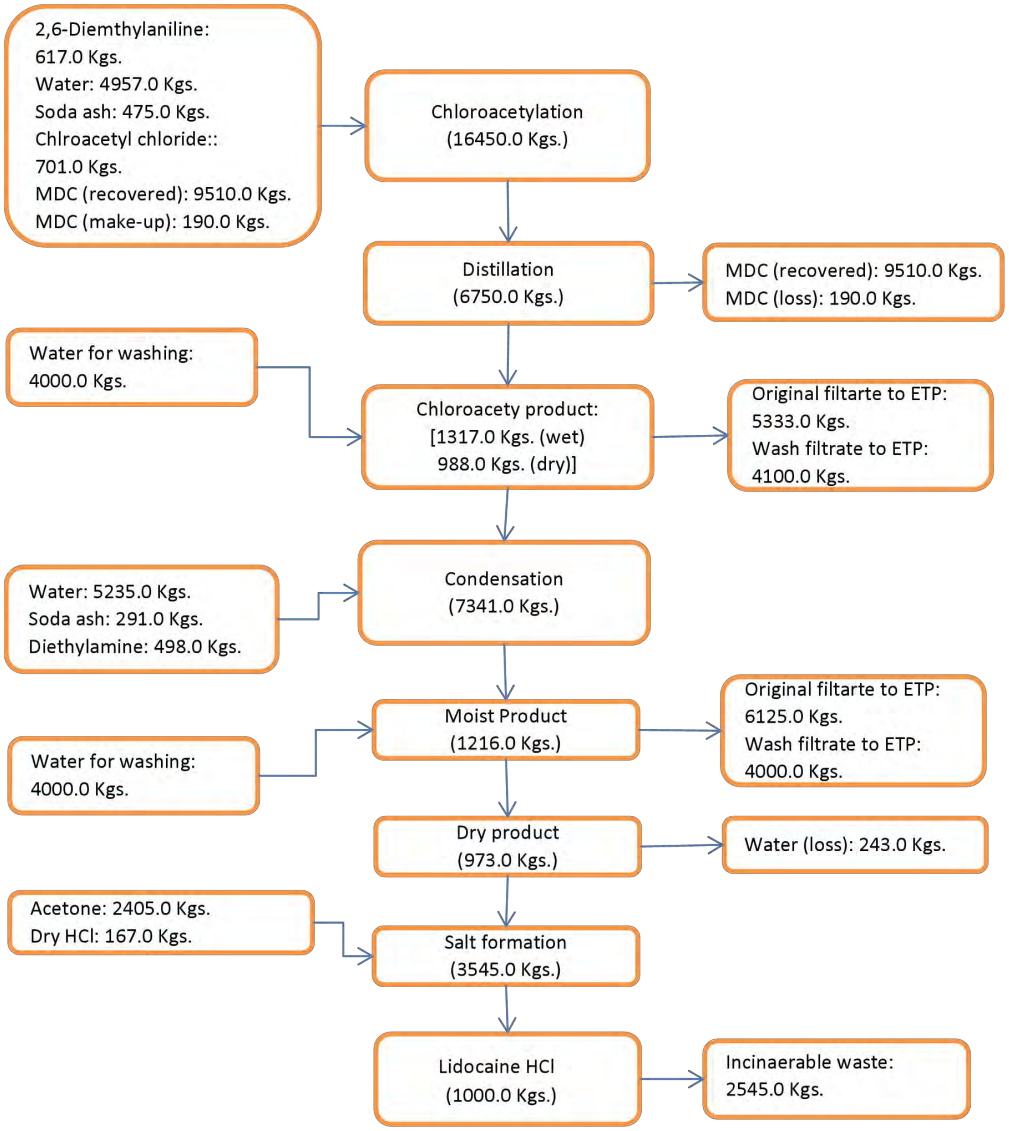
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	4-(2,3-epoxypropoxy)-carbazole	1214.00	Carvedilol	1000.00	Product
2	2-(2-methoxyphenoxy) ethanamine	932.00	Ethylacetate (recovered)	9900.00	Recycle
3	Ethylacetate (recovered)	9900.00	Ethylacetate (loss)	100.00	Loss
4	Ethylacetate (make-up)	100.00	Distillation Residue	1051.00	Incineration
5	Activated carbon	50.00	Carbon sludge	145.00	Incineration
	Total	12196.00		12196.00	

20. PRODUCT: Lidocaine HCl

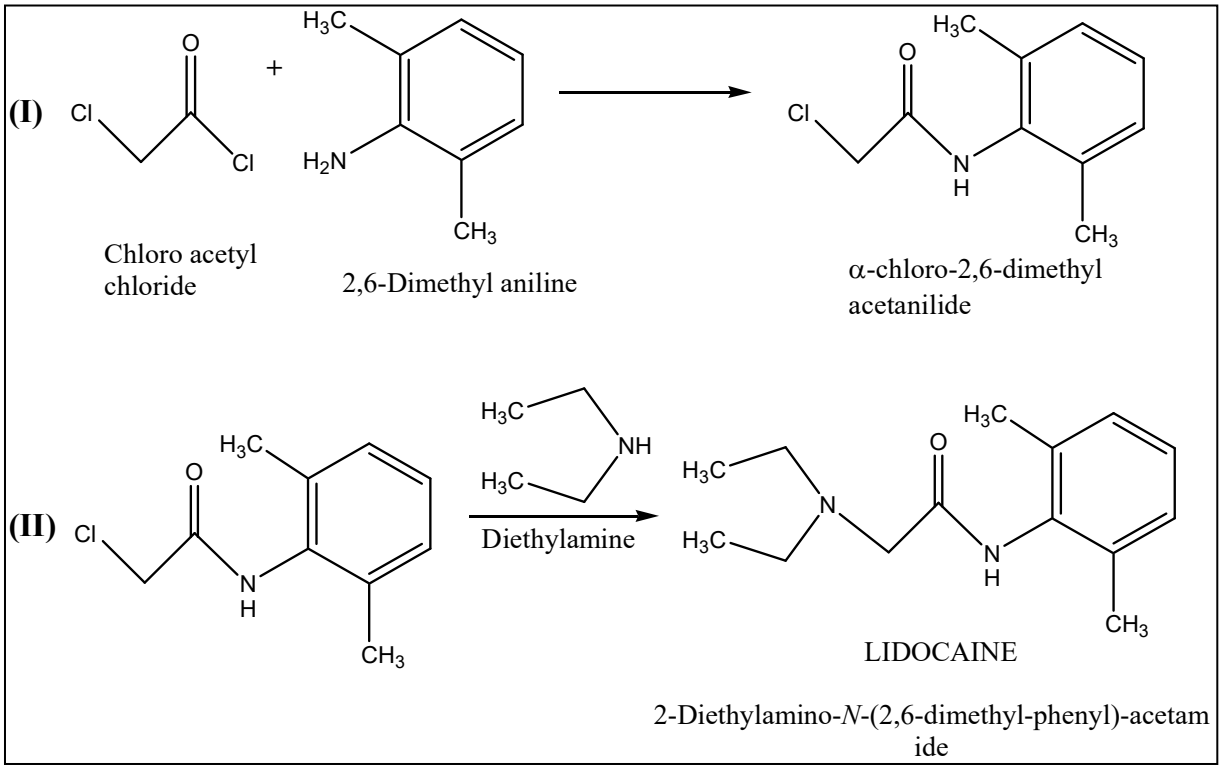
MANUFACTURING PROCESS:

2,6-Dimethylaniline is reacted with chloroacetyl chloride in presence of base to afford protected xylidine derivative followed by filtration & washing. The protected xylidine derivative so obtained was condensed with diethylamine, filtered & washed to afford Lidocaine base. Base was taken in solvent & reated with Hydrogen chloride, filtered to give Lidocaine hydrochloride. Product is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



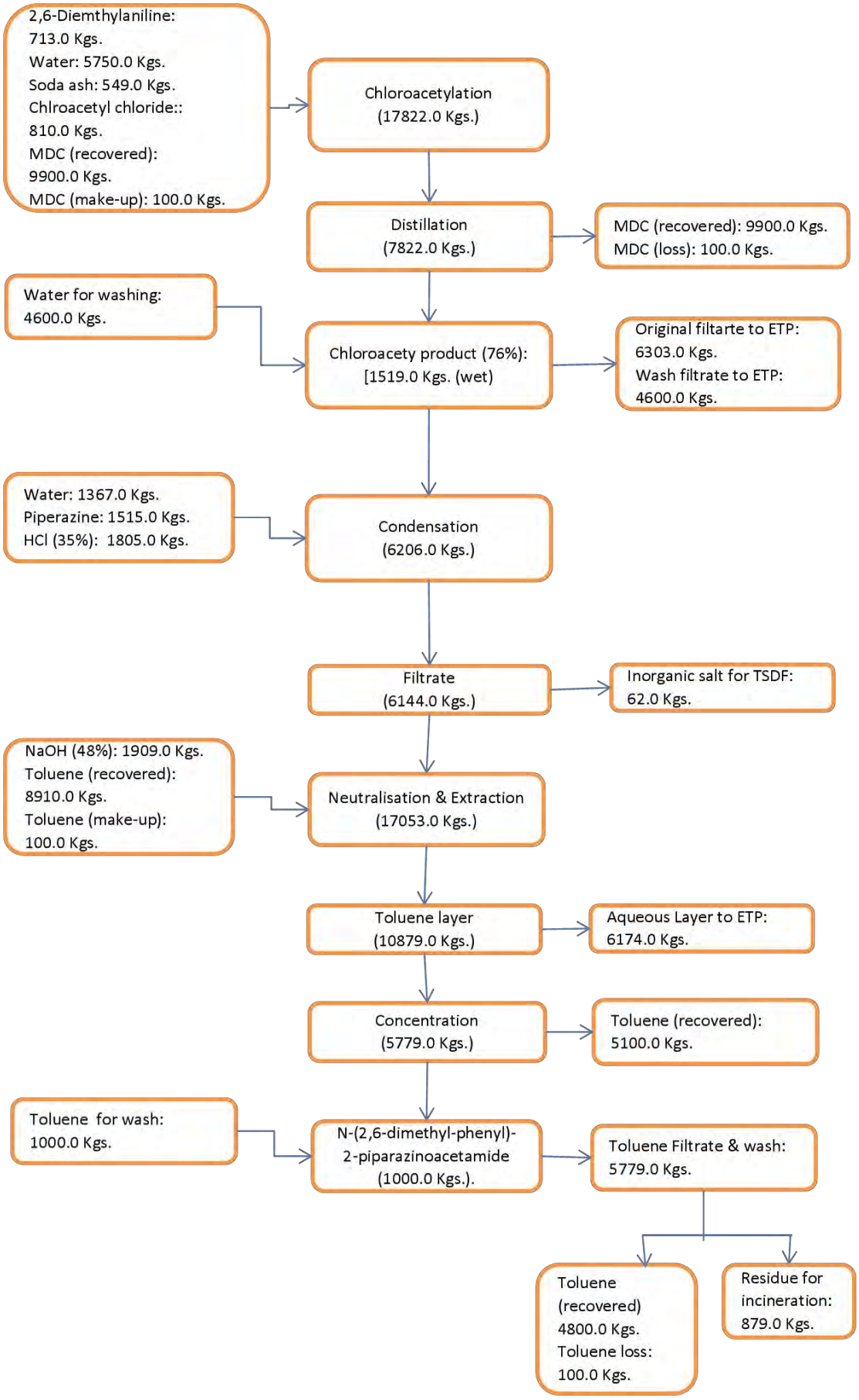
MASS BALANCE:

Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	2,6-Dimethylanilne	617.00	Lidocaine HCl (dry)	1000.00	Product
2	Soda ash	766.00	MDC (recovered)	9510.00	Reuse
3	Chloroacetyl achloride	701.00	MDC (loss)	190.00	Loss
4	MDC (recovered)	9510.00	Water loss	243.00	Loss
5	MDC (make-up)	190.00	Incinerable waste	2545.00	Incineration
6	Diethylamine	498.00	Effluent	19558.00	ETP
8	Water	18192.00			
9	Acetone	2405.00			
10	Dry HCl	167.00			
	Total	33046.00		33046.00	

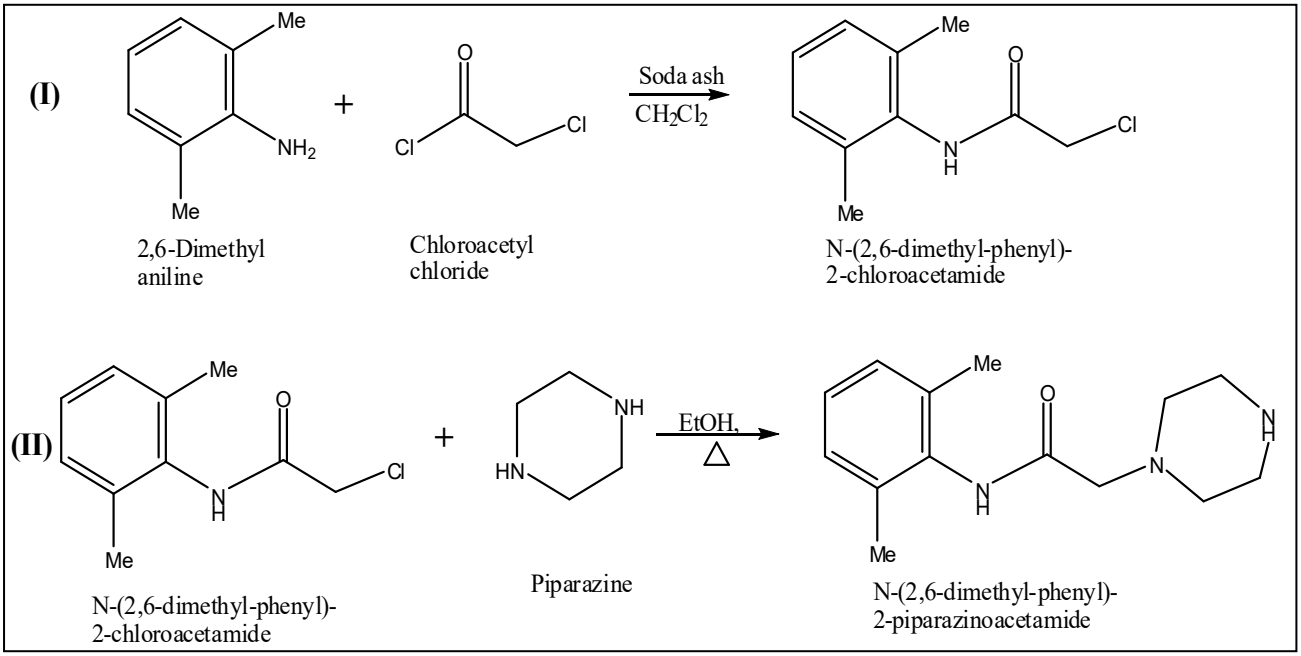
21. PRODUCT: N-(2,6-dimethyl-phenyl)-2-piparazinoacetamide

MANUFACTURING PROCESS:
2,6-Dimethylaniline is reacted with chloroacetyl chloride in presence of base to afford protected xylidine derivative followed by filtration & washing. The protected xylidine derivative so obtained was condensed with piperazine in presence of organic solvent. Solvent was distilled out & slurry was filtered & washed to afford the product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

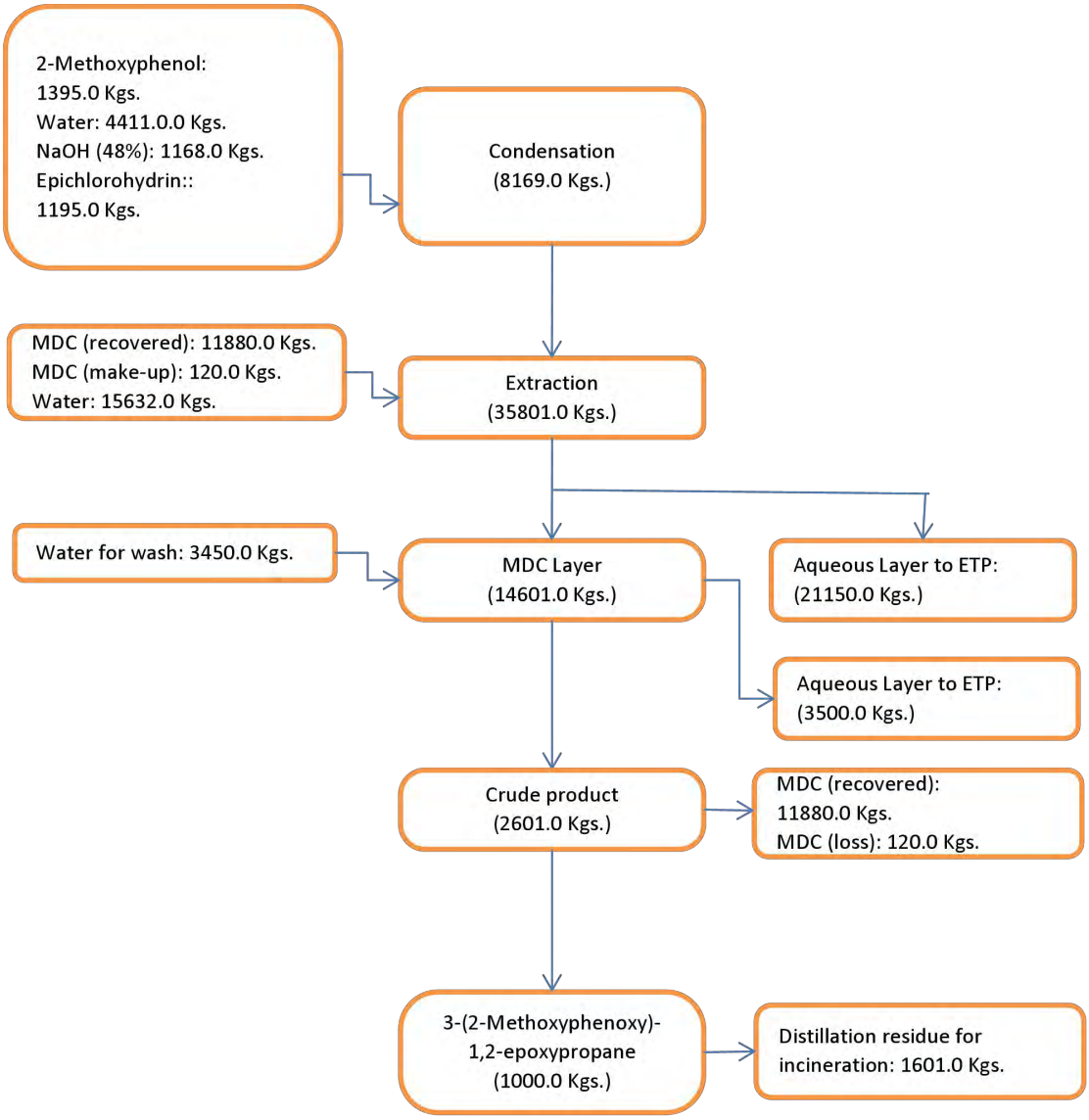
Sr.no	Input	Qty.	Out put	Qty.	Remarks
1	2,6-Dimethylanilne	713.00	N-(2,6-dimethyl-phenyl)-2-piparazinoacetamide	1000.00	Product
2	Soda ash	549.00	MDC (recovered)	9900.00	Reuse
3	Chloroacetyl achloride	810.00	MDC (loss)	100.00	Loss
4	MDC (recovered)	9900.00	Toluene (recovered)	9900.00	Reuse
5	MDC (make-up)	100.00	Toluene (loss)	100.00	Loss
6	Piperazine	1515.00	Inorganic salt	62.00	TSDF
8	HCl (35%)	1805.00	Incinerable waste	879.00	Incineration
9	NaOH (48%)	1909.00	Effluent	17077.00	ETP
10	Toluene (recovered)	9900.00			
11	Toluene (make-up)	100.00			
12	Water	11717.00			
13					
14	Total	39018.00		39018.00	

22. PRODUCT: 3-(2-MethOxyphenoxy)-1,2-epoxypropane

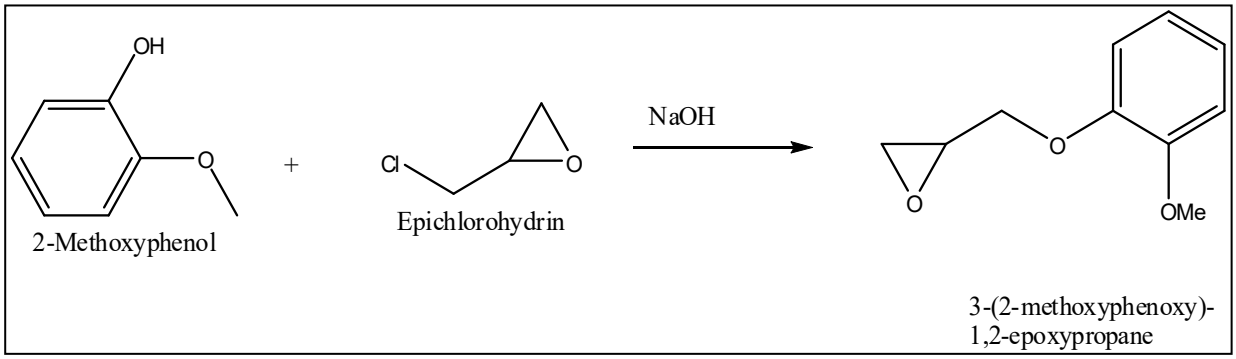
MANUFACTURING PROCESS:

2-Methoxyphenol was reacted with epichlorohydrin in presence of base, extracted product with solvent. Solvent was distilled out & slurry was filtered & washed to afford product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

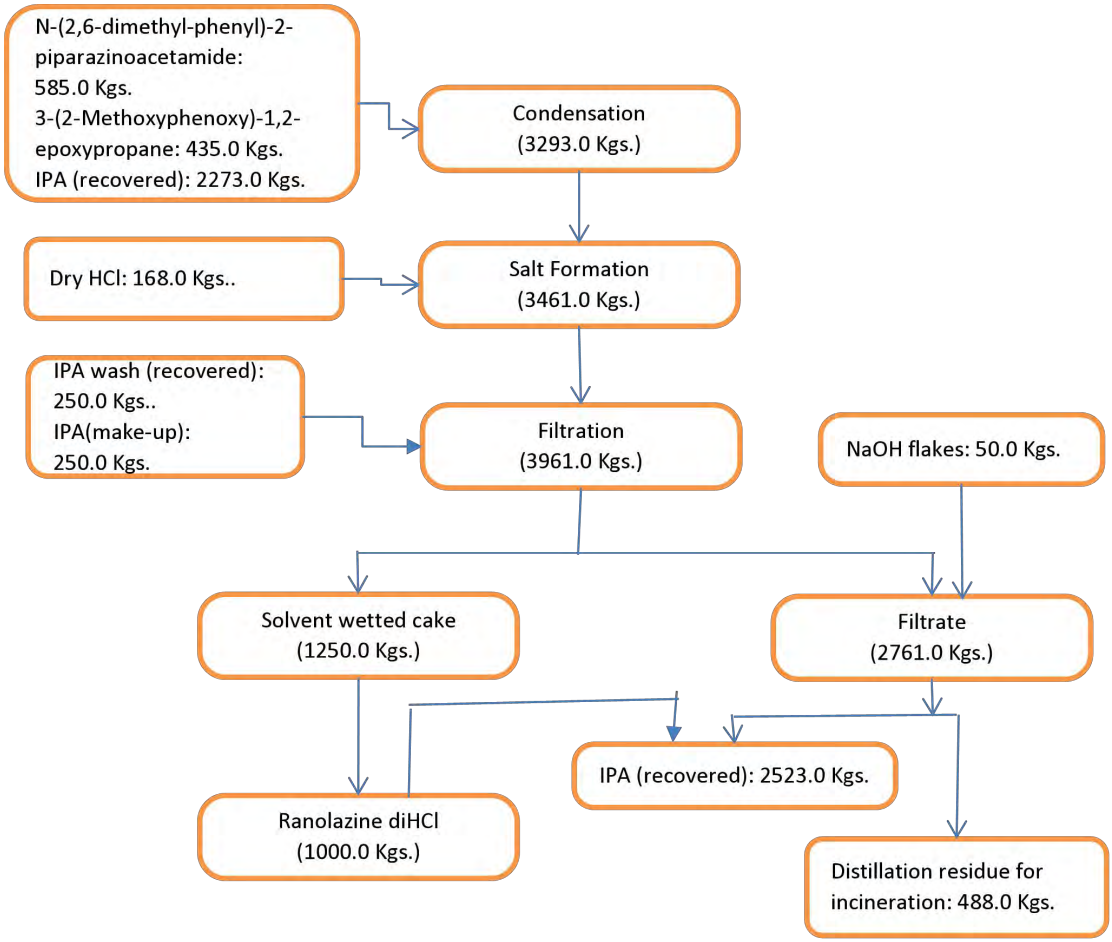
Sr.no.	Input	Qty.	Out put	Qty.	Remarks
1	2-Methoxyphenol	1395.00	2-Methoxyphenoxy)-1,2-epoxypropane	1000.00	Product
2	Epichlorohydrin	1195.00	MDC (recovered)	11880.00	Reuse
3	MDC (recovered)	11880.00	MDC (loss)	120.00	Loss
4	MDC (make-up)	120.00	Distillation residue	1601.00	Incineration
5	NaOH (48%)	1168.00	Effluent	24650.00	ETP
6	Water	23493.00			
	Total	39251.00		39251.00	

23. PRODUCT: Ranolazine DiHCL

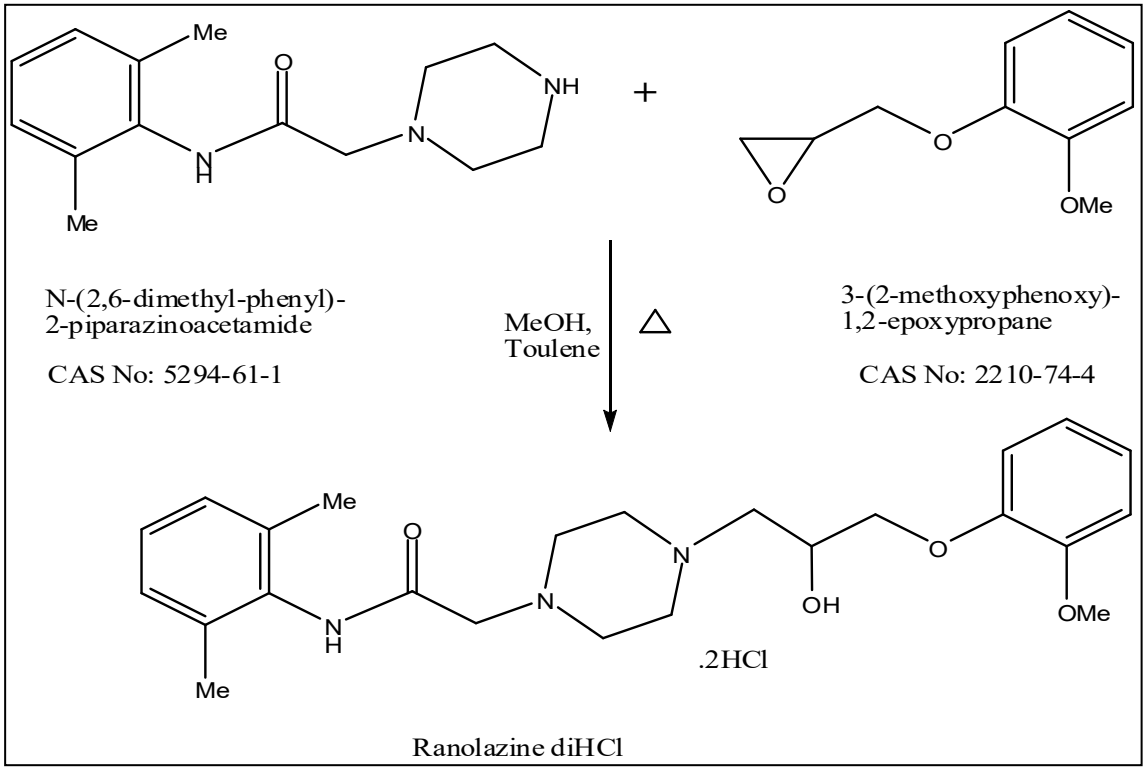
MANUFACTURING PROCESS:

N-(2,6-dimethyl-phenyl)-2-piparazinoacetamide & 3-(2-Methoxyphenoxy)-1,2- epoxypropane were added in solvent, acidified with hydrochloric acid & filtered. Product is dried & packed

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

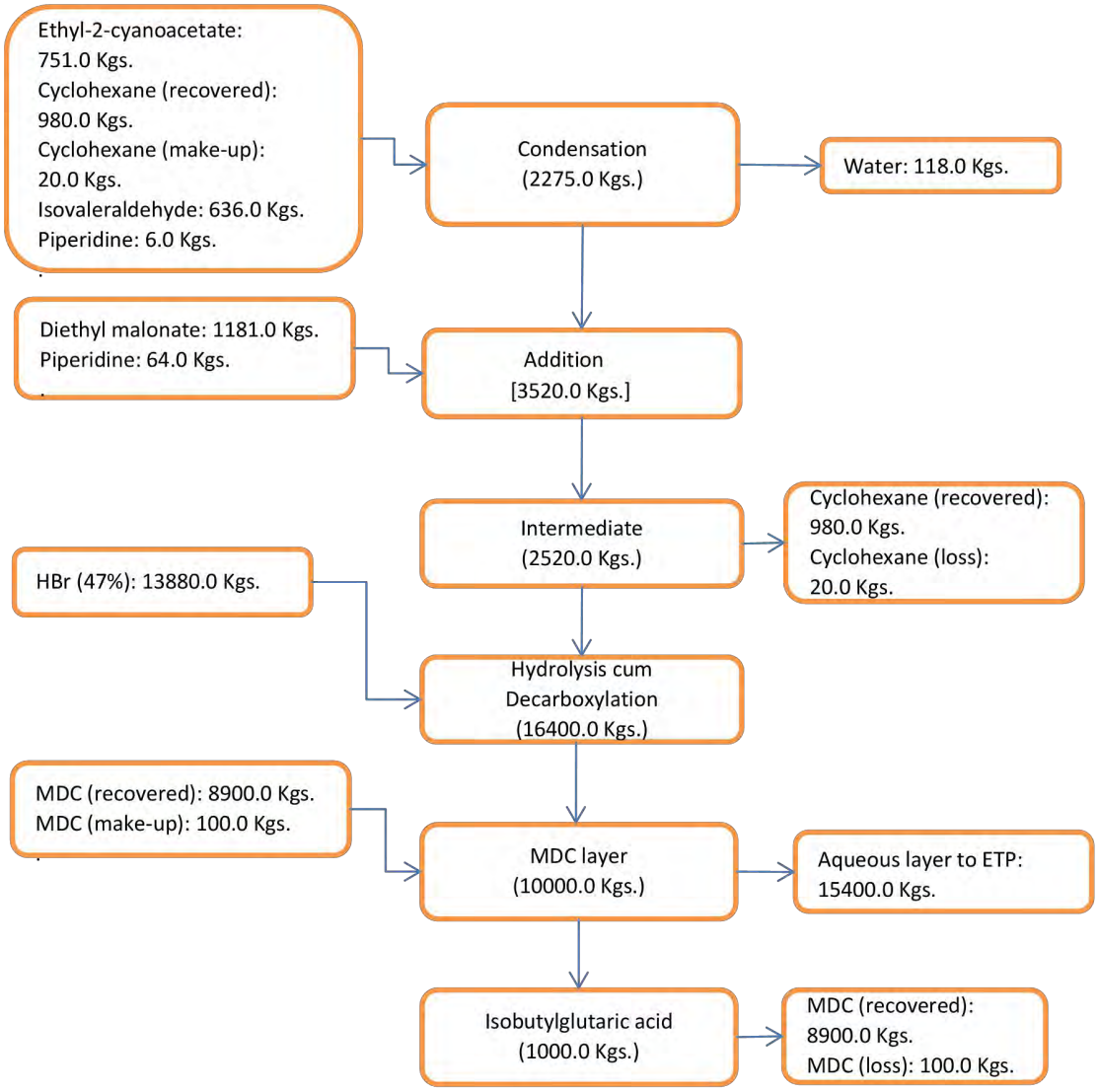
Sr.no.	Input	Qty.	Out put	Qty.	Remarks
1	N-(2,6-dimethyl-phenyl)-2-piparazinoacetamide	585.00	Ranolazine diHCl (dry)	1000.00	Product
2	3-(2-Methoxyphenoxy)-1,2-epoxypropane	435.00	IPA	2523.00	Reuse
3	IPA (recovered)	2523.00	Incinerable waste	488.00	Incineration
4	IPA (make-up)	250.00			
5	Dry HCl	168.00			
6	NaOH flakes	50.00			
	Total	4011.00		4011.00	

24. PRODUCT: 3-Isobutylglutaric acid

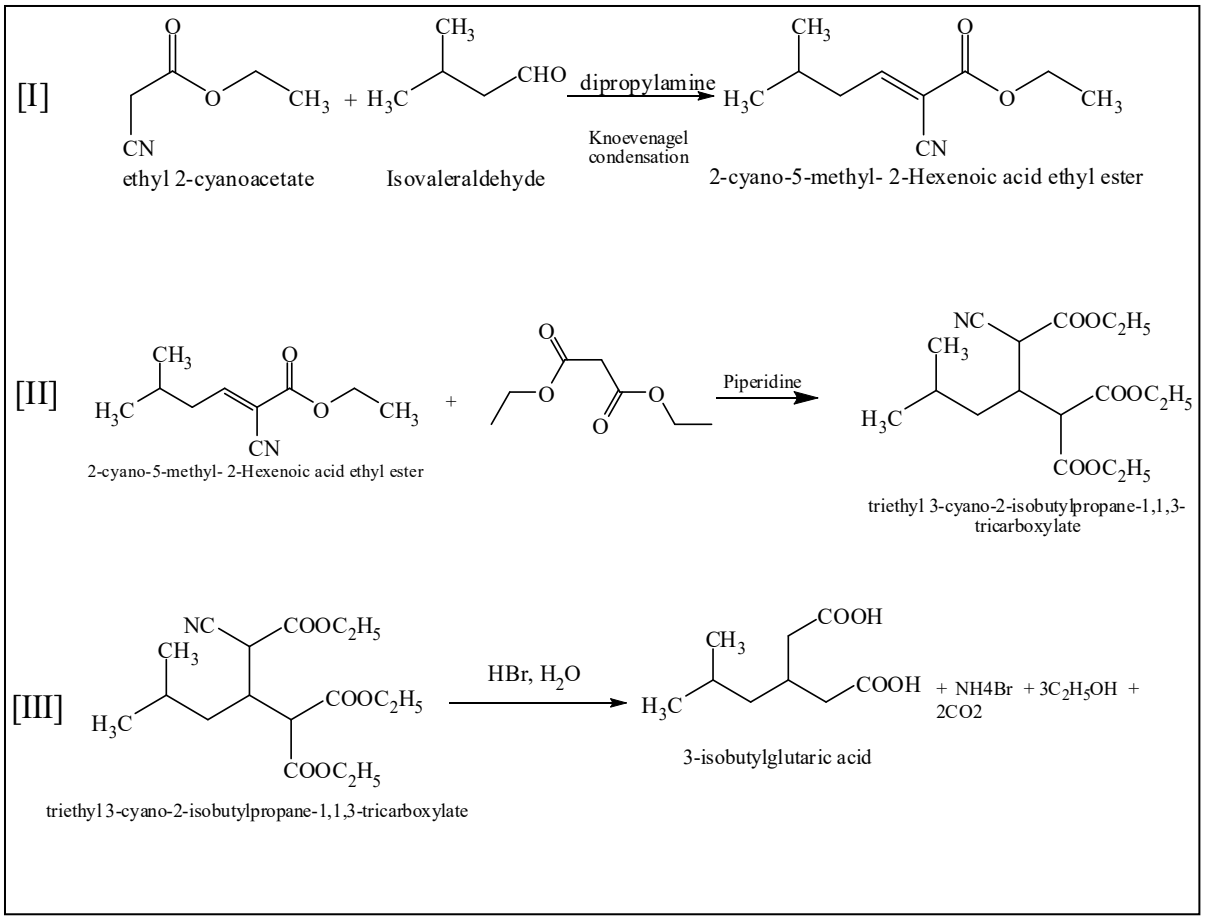
MANUFACTURING PROCESS:

Ethyl-2-cyanoacetate and Isovaleraldehyde is condensed in presence of an organic base and solvent at elevated temperature and resulting product so formed undergo addition reaction with Diethyl malonate.The Cyanotriester formed is hydrolysed & decarboxylate to yield the product. Product is extracted in orhanic solvent and finally, solvent is distilled off to get the final product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

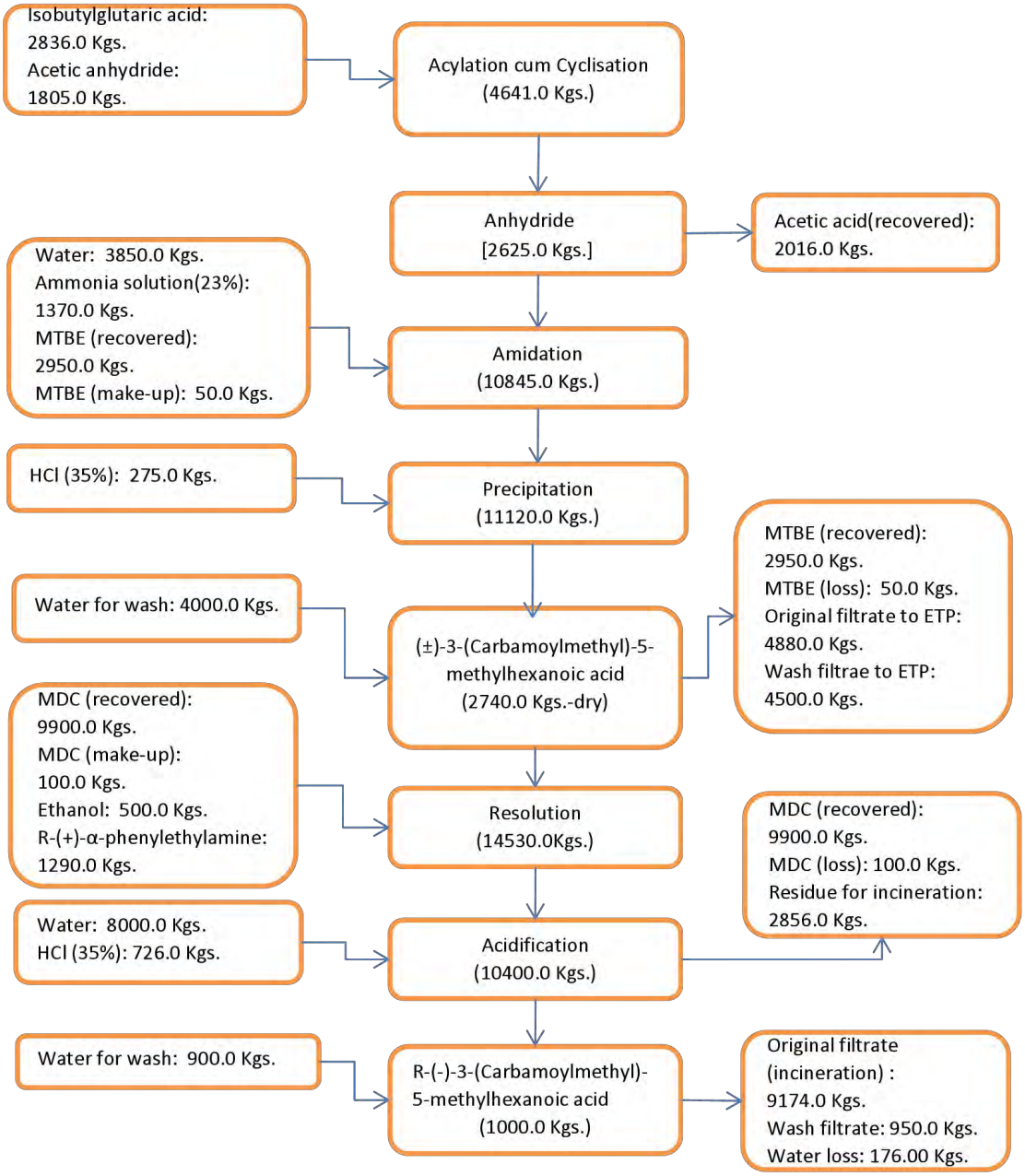
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Ethyl2-cyanoacetate	751.00	Isobutylglutaric acid	1000.00	Product
2	Cyclohexane (recovered)	980.00	Cyclohexane (recovered)	980.00	Recycle
3	Cyclohexane (make-up)	20.00	Cyclohexane (loss)	20.00	Loss
4	Isovaleraldehyde	636.00	MDC (recovered)	8900.00	Recycle
5	Piperidine	70.00	MDC (Make-up)	100.00	Loss
6	Diethyl malonate	1181.00	Effluent to ETP	15518.00	ETP
7	HBr (47%)	13880.00			
8	MDC (recovered)	8900.00			
9	MDC (Make-up)	100.00			
	Total	26518.00		26518.00	

25. PRODUCT: R-(-)-3-(Carbamoylmethyl)-5-methylhexanoic acid

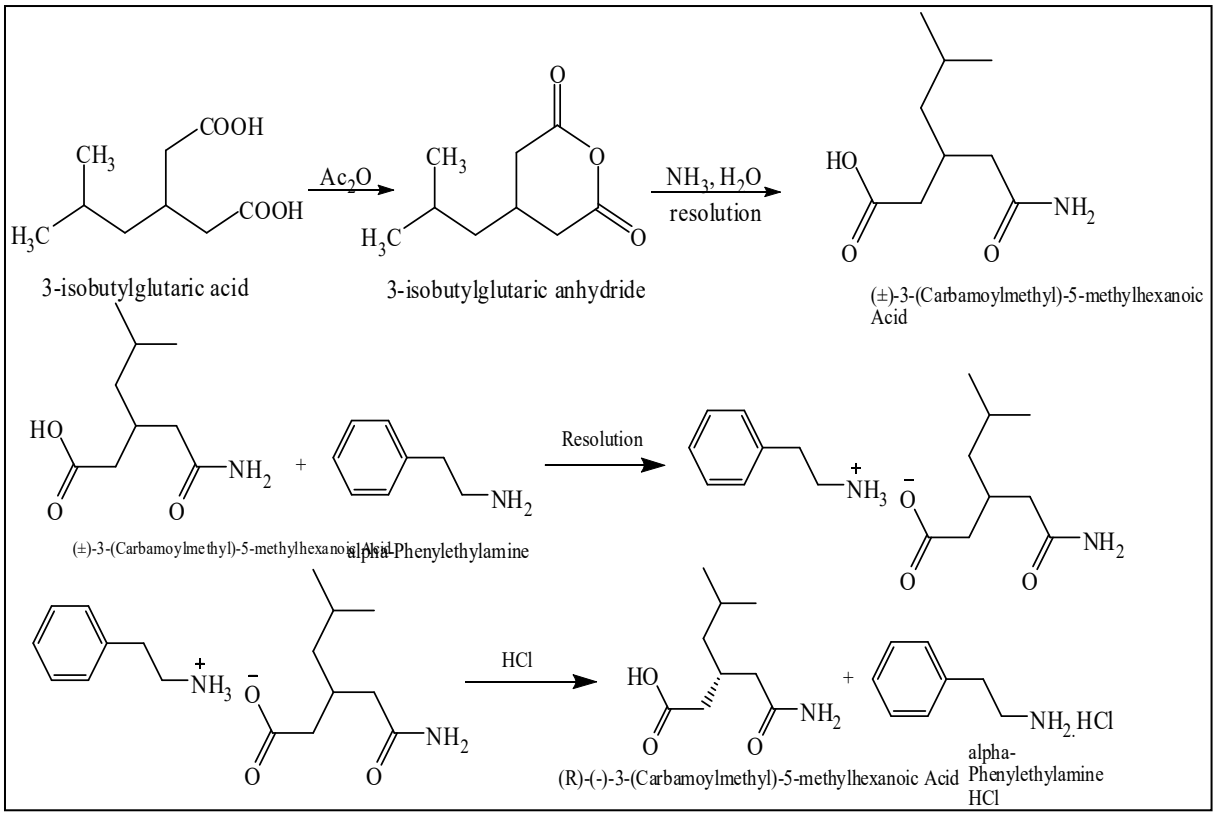
MANUFACTURING PROCESS:

sobutylglutaric acid is subjected to acylation cum cylisatio and excess acetic formed is distilled off. Anhydride so btained is reacted with dilute ammonia solution in presence of organic solvent to afford racemic product followed by acidificatio & filtration. Racemic product is then treated with R-(+)-α-phenylethylamine in presence of solvent, precipitates are filtered off and acidified with dilute HCL. It is filtered off and washed with water, drid & packed the product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Isobutylglutaric acid	2836.00	R-(-)-3-(Carbamoylmethyl)-5-methylhexanoic acid (dry)	1000.00	Product
2	Acetic anhydride	1805.00	Water loss	176.00	Loss
3	Ammonia solution (23%)	1370.00	Acetic acid	2016.00	Resale
4	MTBE (recovered)	2950.00	MTBE (recovered)	2950.00	Recycle
5	MTBE (make-up)	50.00	MTBE (Make-up)	50.00	Loss
6	HCl (35%)	1001.00	MDC (recovered)	9900.00	Recycle
7	MDC (recovered)	9900.00	MDC (Make-up)	100.00	Loss
8	MDC (make-up)	100.00	Incinerable waste	12030.00	Incineration
9	Ethanol	500.00	Effluent to ETP	10330.00	ETP
10	R-(+)-α-phenylethylamine	1290.00			
11	Water	16750.00			
	Total	38552.00		38552.00	

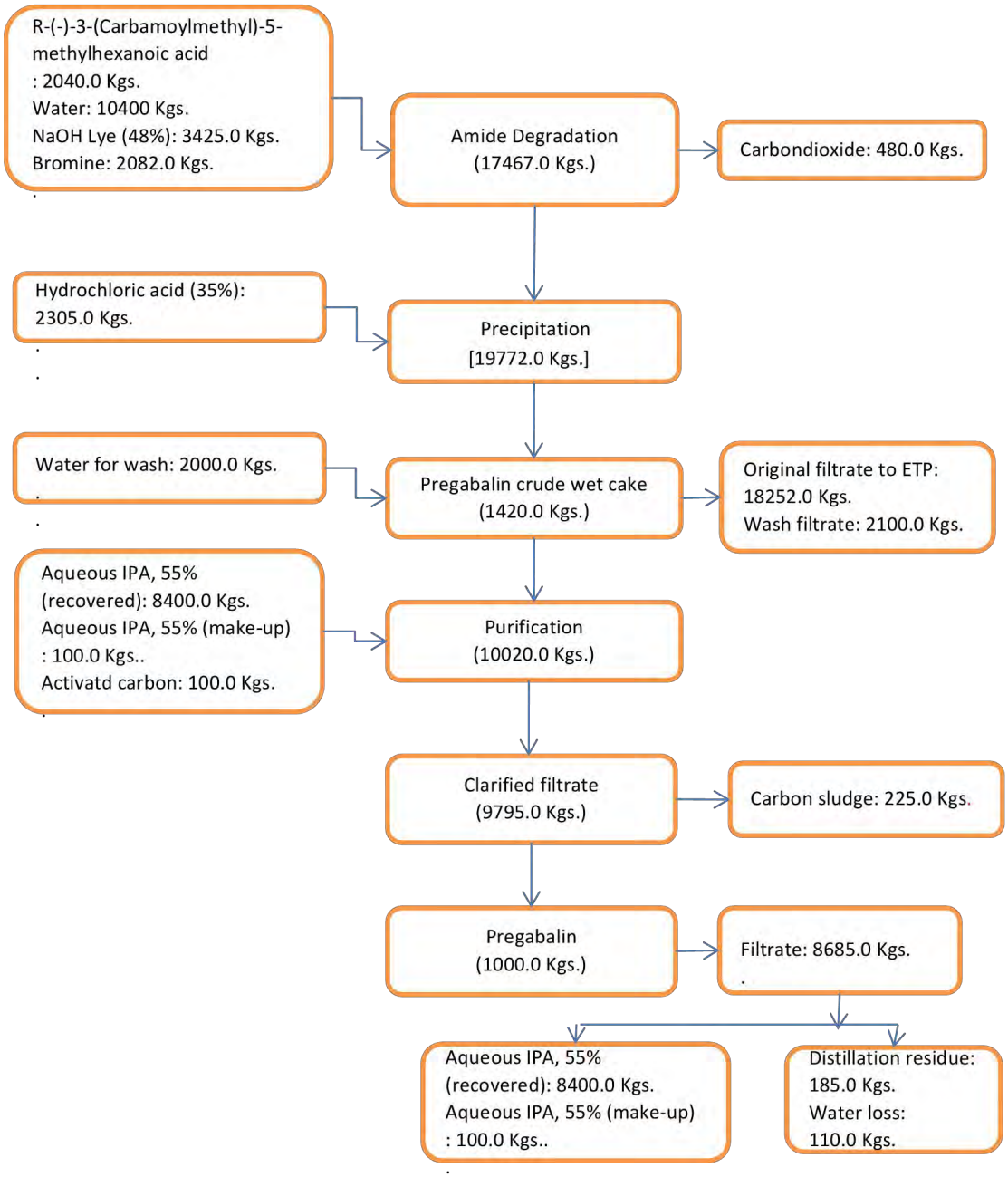
26. PRODUCT: Pregabalin

MANUFACTURING PROCESS:

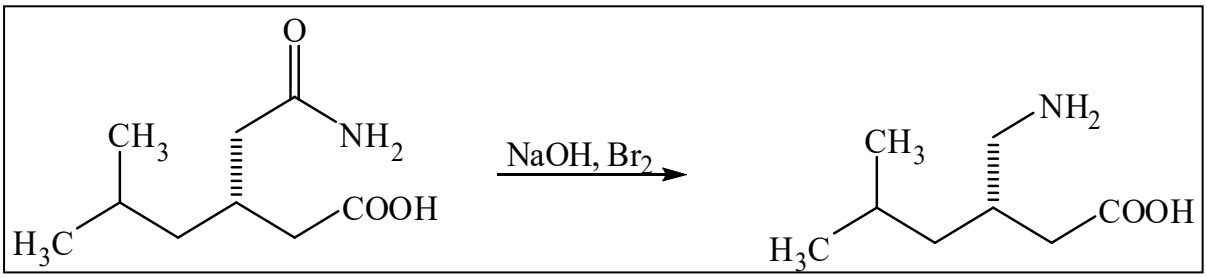
(R)-3-(2-amino-2-oxoethyl)-5-methylhexanoic acid is treated with Bromine in presence of sodium hydroxide and crude product is precipitated by addition of hydrochloric acid. Crude product is filtered

& washed. This is then purified in solvent and clarified with activated carbon. Clarified filtrate is cooled to crystallise the product and it is filtered, dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

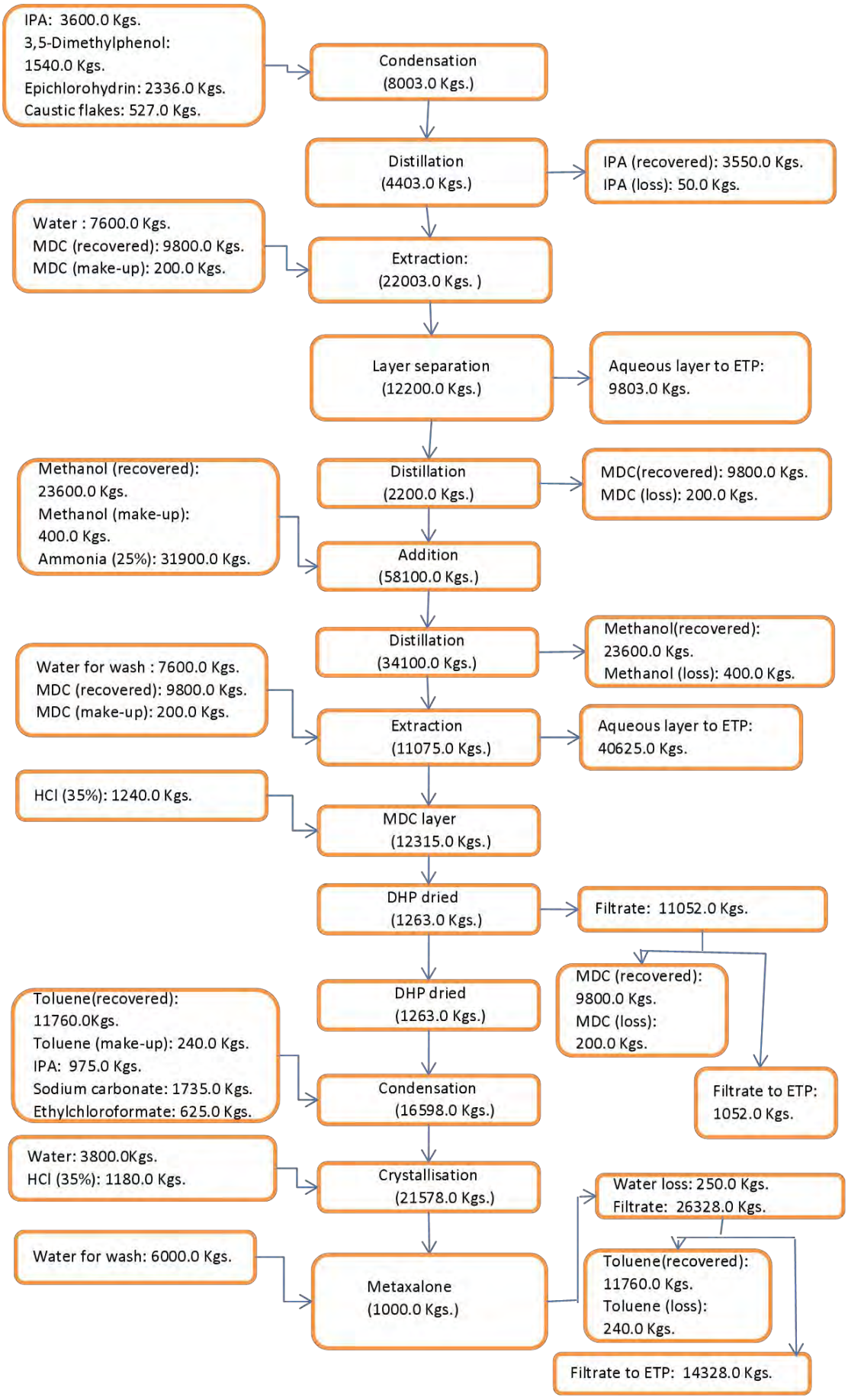
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	R-(-)-3-(Carbamoylmethyl)-5-methylhexanoic acid	2040.00	Pregabalin	1000.00	Product
2	NaOH Lye (48%)	3425.00	Water loss	110.00	Loss
3	Bromine	2082.00	Aqueous IPA, 55% (recovered)	8400.00	Recycle
4	Hydrochloric acid (35%)	2305.00	Aqueous IPA, 55% (loss)	100.00	Loss
5	Aqueous IPA, 55% (recovered)	8400.00	Carbon dioxide	480.00	Loss
6	Aqueous IPA, 55% (make-up)	100.00	Distillation residue	185.00	Incineration
7	Activated carbon	100.00	Carbon sludge	225.00	Incineration
8	Water	12400.00	Efffluent to ETP	20352.00	ETP
	Total	30852.00		30852.00	

27. PRODUCT: Metaxolone

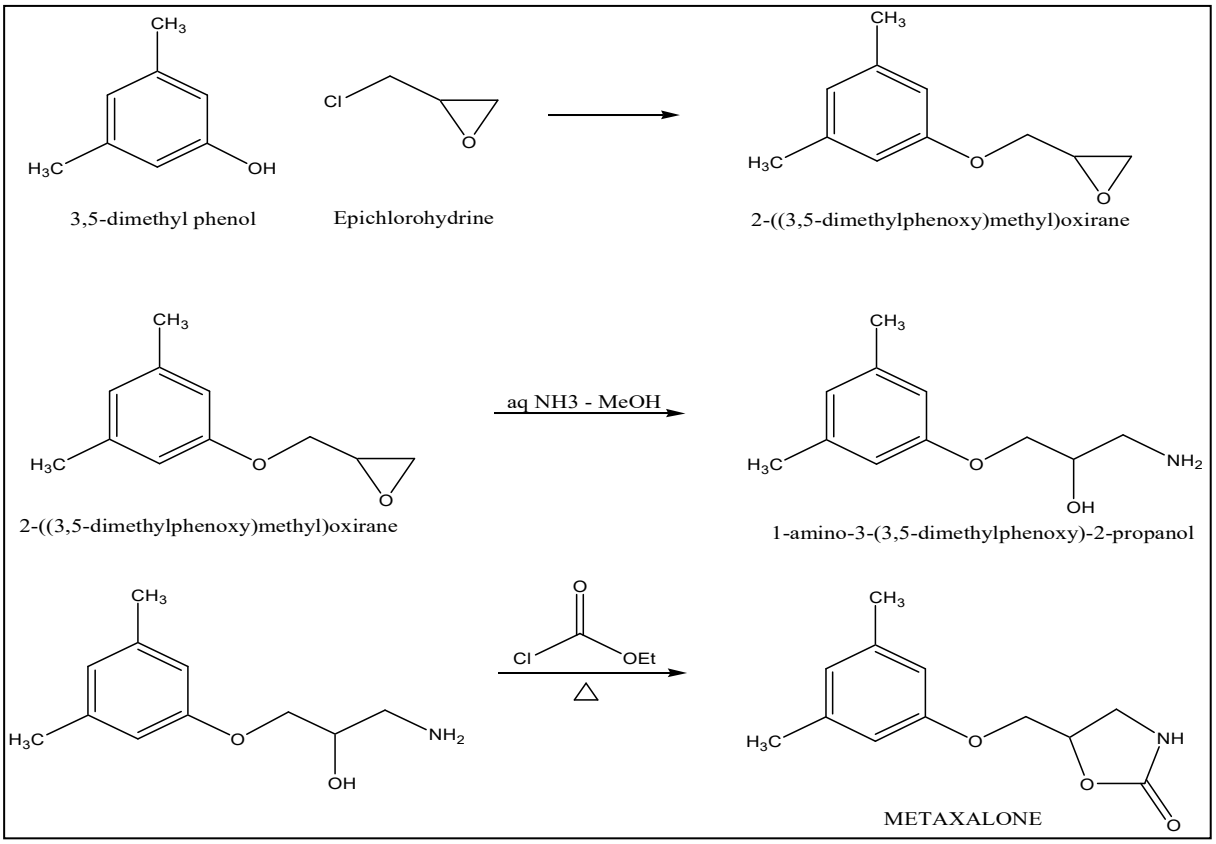
MANUFACTURING PROCESS:

3,5-Dimethylphenol is reacted with epichlorohydrin in presence of base to afford step-I moist cake followed by extraction in solvent & distillation. The step-I intermediate so obtained is treated with ammonia solution in solvent, distiiled & redissolve in solvent for extraction. Acidification & filtration gives step-II intermediate. STep-II interemediate is reacted with ethychloroformate in solvent in presence of base, acidified and chilled. Filtered, washed & purification afford moist product. Product is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



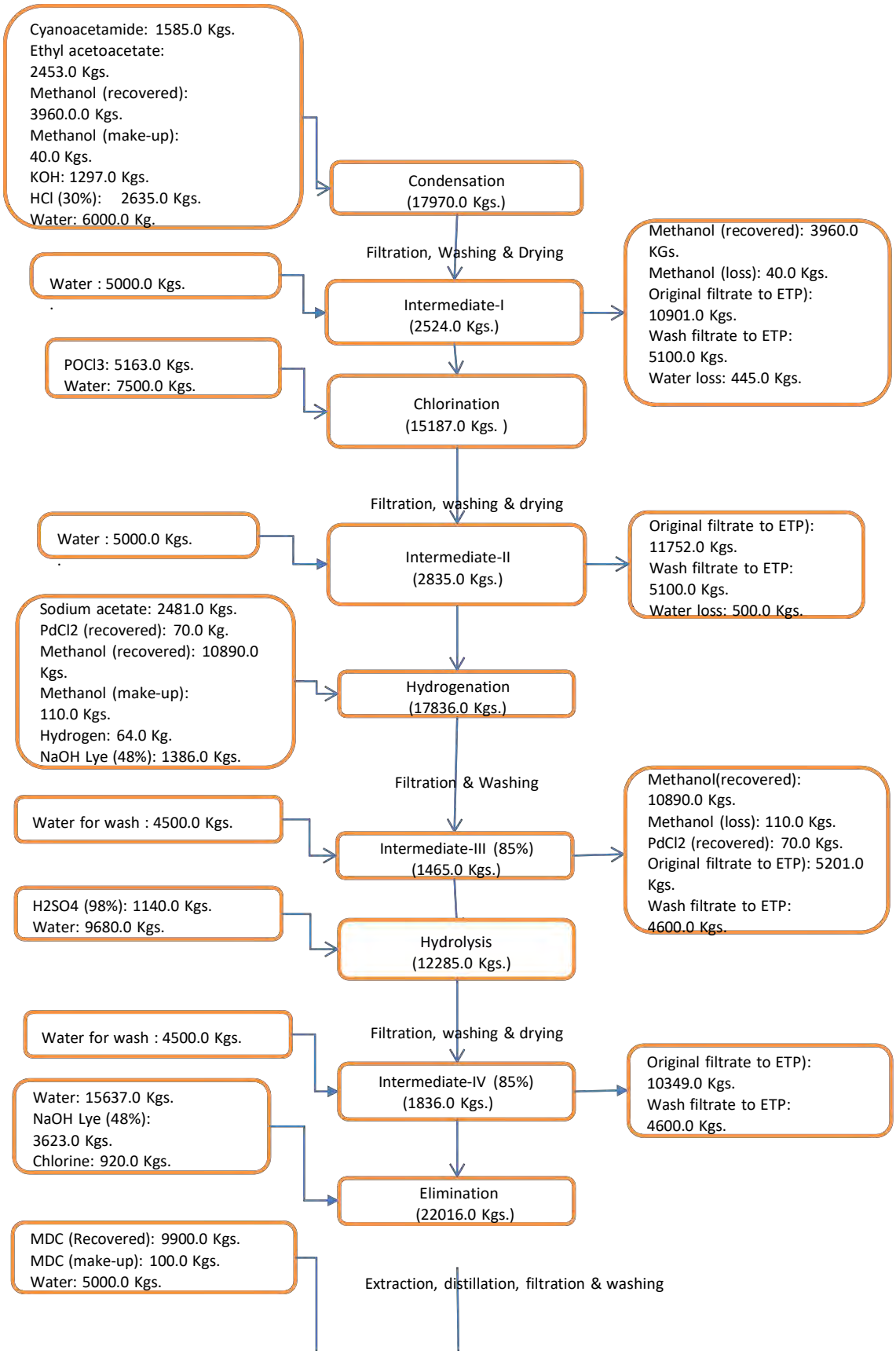
MASS BALANCE:

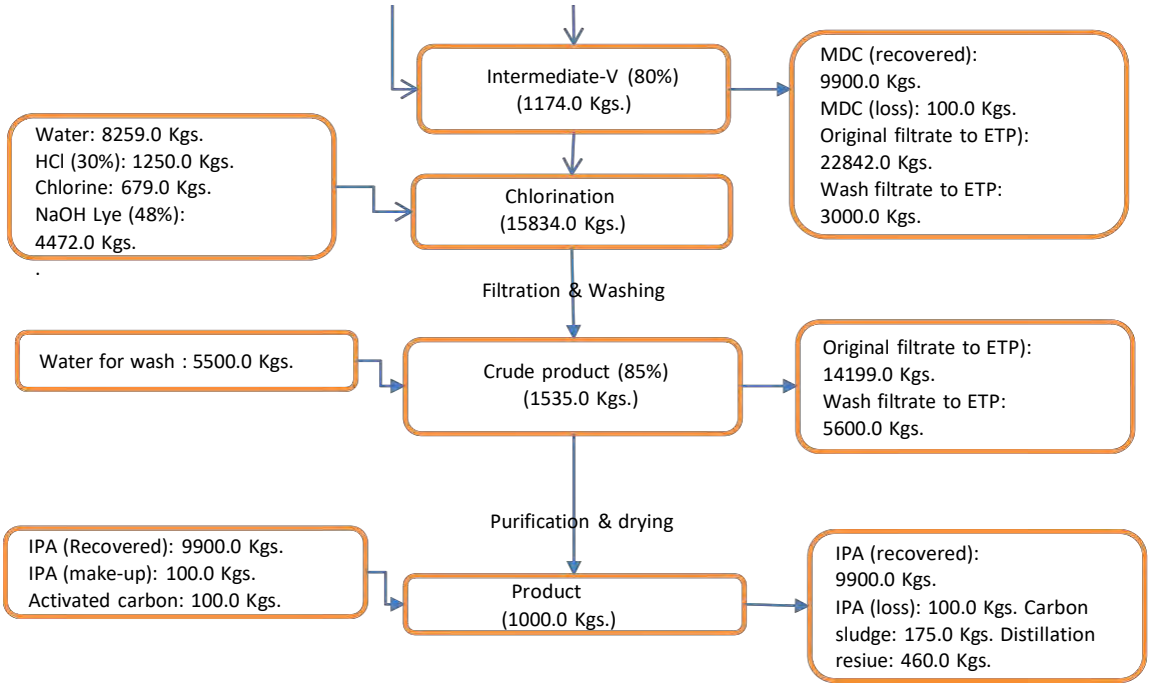
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	3,5-Dimethylphenol	1540.00	Metaxalone (dry)	1000.00	Product
2	Epichlorohydrin	2336.00	Water loss	250.00	Loss
3	Caustic flakes	527.00	IPA (recovered)	3550.00	Reuse
4	IPA (recovered)	3550.00	IPA (loss)	50.00	loss
5	IPA (make-up)	50.00	MDC (recovered)	19600.00	Reuse
6	MDC (recovered)	19600.00	MDC (Loss)	400.00	loss
8	MDC (make-up)	400.00	Methanol (recovered)	23600.00	Reuse
9	Methanol (recovered)	23600.00	Methanol (loss)	400.00	loss
10	Methanol (Loss)	400.00	Toluene (recovered)	11760.00	Reuse
11	Ammonia	31900.00	Toluene (loss))	240.00	loss
12	HCl (35%)	2420.00	Effluent	65808.00	ETP
13	Toluene (recovered)	11760.00			
14	Toluene (Loss)	240.00			
15	IPA	975.00			
16	Sodium carbonate	1735.00			
17	Ethylchloroformate	625.00			
18	Water	25000.00			
	Total	126658.00		126658.00	

28. PRODUCT: 3-Amino-2-chloro-4-methylpyridine

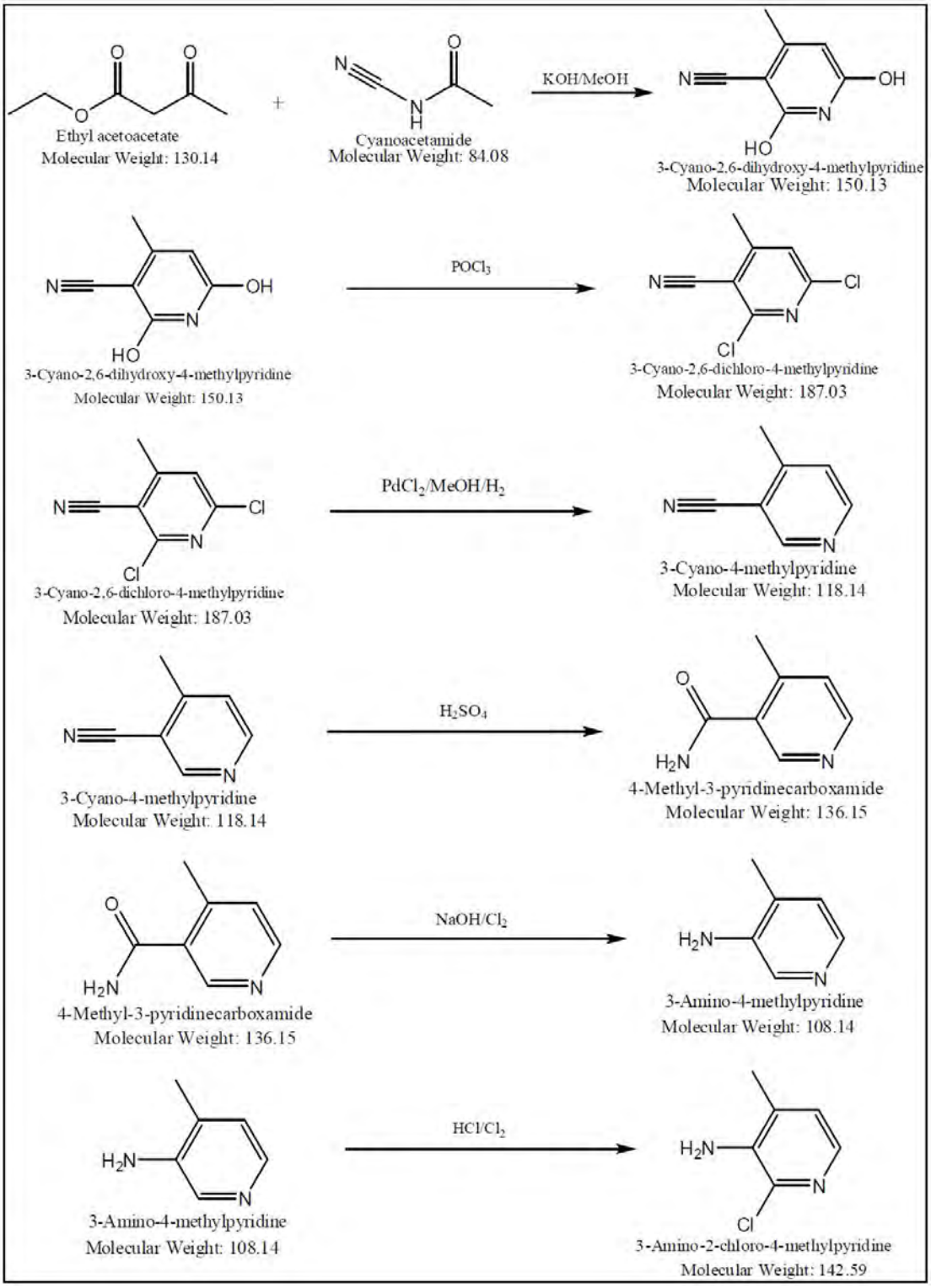
MANUFACTURING PROCESS:
Ethyl acetoacetate is condensed with cyanoacetamide and resulting product is chlorinated with POCl3. The chlorinated product is dehalohydrogenated with catalyst and hydrogen and subsequent acidic hydrolysis afford carboxamide derivative. The carboxamide derivative is subjected to Hoffmann elimination yielding amino pyridine which is chlorinated to afford the final product.

PROCESS FLOW CHART:




Intermediate-V (80%)
(1174.0 Kgs.)
MDC (recovered):
9900.0 Kgs.
MDC (loss): 100.0 Kgs.
Original filtrate to ETP):
22842.0 Kgs.
Wash filtrate to ETP:
3000.0 Kgs.
Water: 8259.0 Kgs.
HCl (30%): 1250.0 Kgs.
Chlorine: 679.0 Kgs.
NaOH Lye (48%):
4472.0 Kgs.
.
Chlorination
(15834.0 Kgs.)
Filtration & Washing
Water for wash : 5500.0 Kgs.
Crude product (85%)
(1535.0 Kgs.)
Original filtrate to ETP):
14199.0 Kgs.
Wash filtrate to ETP:
5600.0 Kgs.
Purification & drying
IPA (Recovered): 9900.0 Kgs.
IPA (make-up): 100.0 Kgs.
Activated carbon: 100.0 Kgs.
Product
(1000.0 Kgs.)
IPA (recovered):
9900.0 Kgs.
IPA (loss): 100.0 Kgs. Carbon
sludge: 175.0 Kgs. Distillation
resiue: 460.0 Kgs.

CHEMICAL REACTION:



MASS BALANCE:

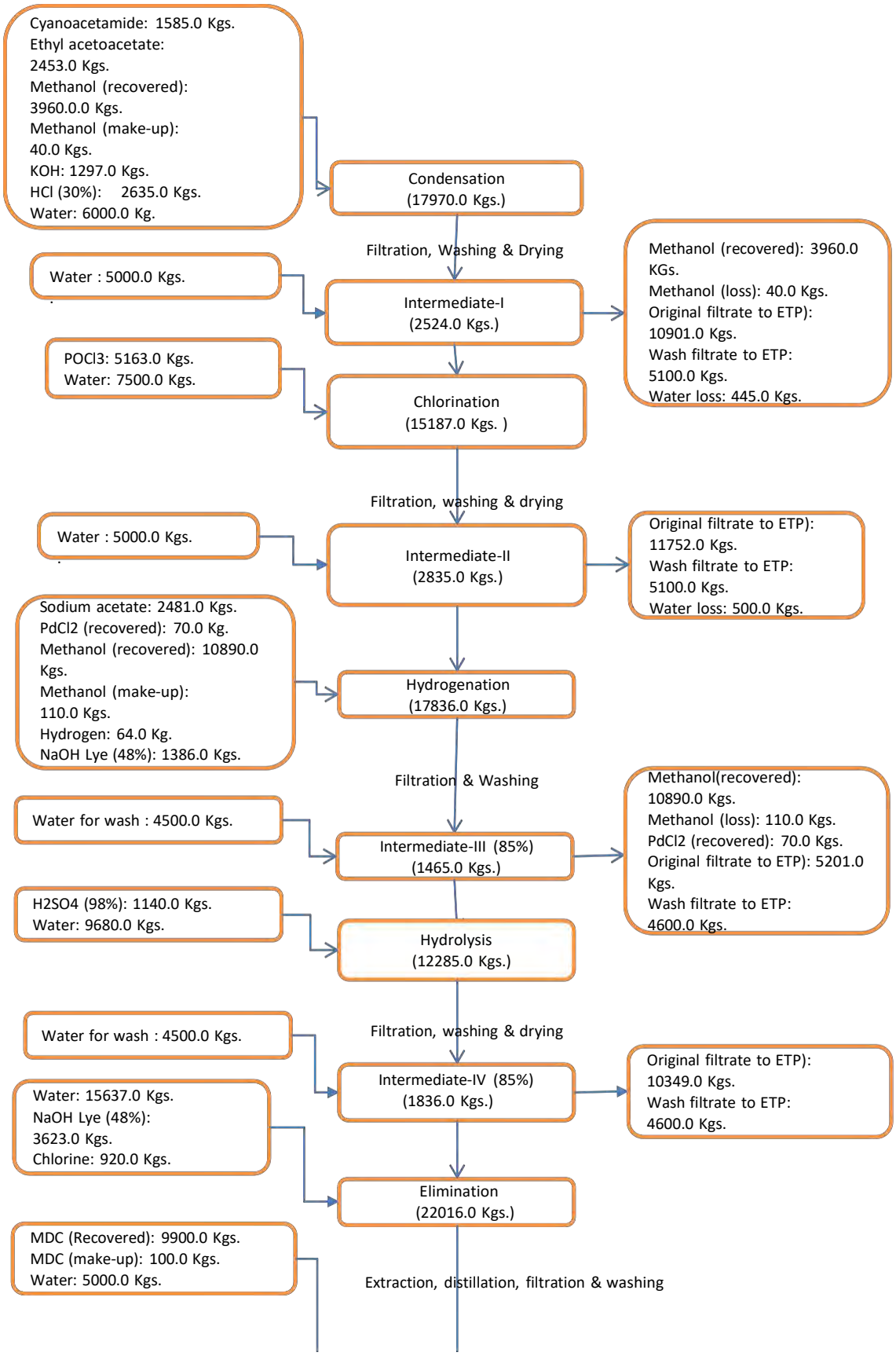
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Cyanoacetamide	1585.00	Product	1000.00	Product
2	Ethyl acetoacetate	2453.00	Methanol (recovered)	14850.00	Recycle
3	KOH	1297.00	Methanol (loss)	150.00	Reuse
4	HCl (30%)	3885.00	MDC (recovered)	9900.00	Reuse
5	POCl3	5163.00	MDC (loss)	100.00	loss
6	Sodium acetate	2481.00	IPA (recovered)	9900.00	Reuse
7	PdCl2 (recovered)	70.00	IPA (loss)	100.00	loss
8	Methanol (recovered)	14850.00	PdCl2 (recovered)	70.00	loss
9	Methanol (make-up)	150.00	Water loss	945.00	Reuse
10	Hydrogen	64.00	Carbon sludge	175.00	Incineration
11	NaOH Lye (48%)	9481.00	Distillation residue	460.00	ETP
12	H2SO4 (98%)	1140.00	Effluent	103244.00	
13	Chlorine	1599.00			
14	MDC (recovered)	9900.00			
15	MDC (make-up)	100.00			
16	Activated carbon	100.00			
17	IPA (recovered)	9900			
18	IPA (make-up)	100.00			
19	Water	76576.00			
	Total	140894.00		140894.00	

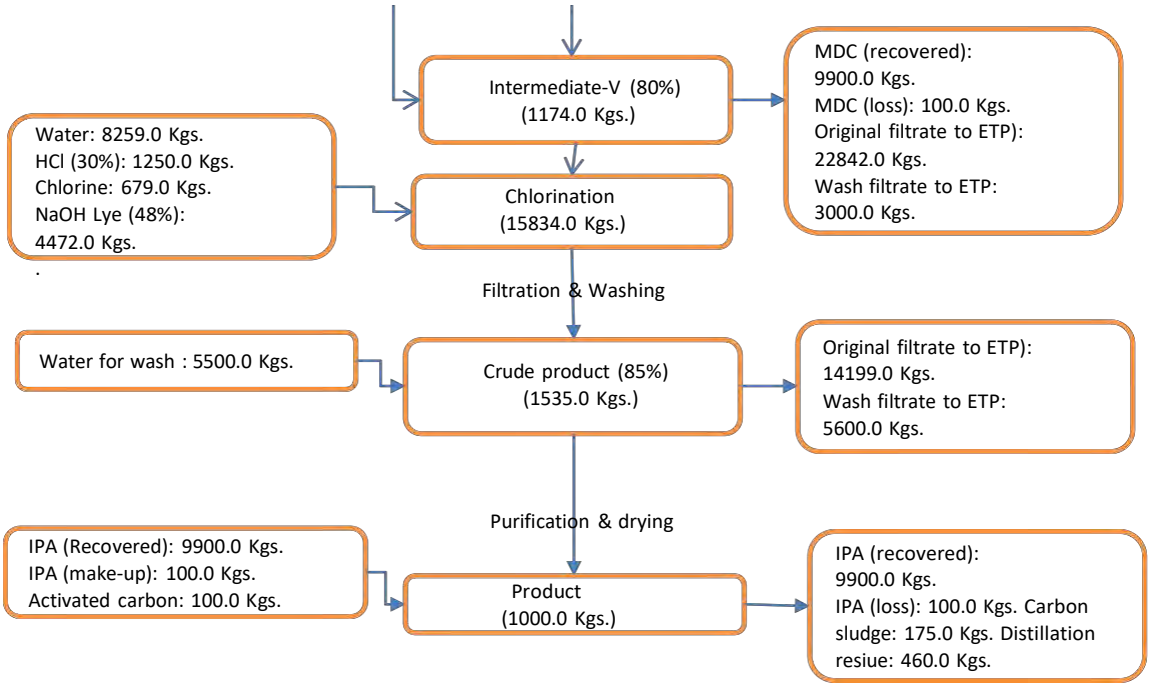
29. PRODUCT: Nevirapine

MANUFACTURING PROCESS:

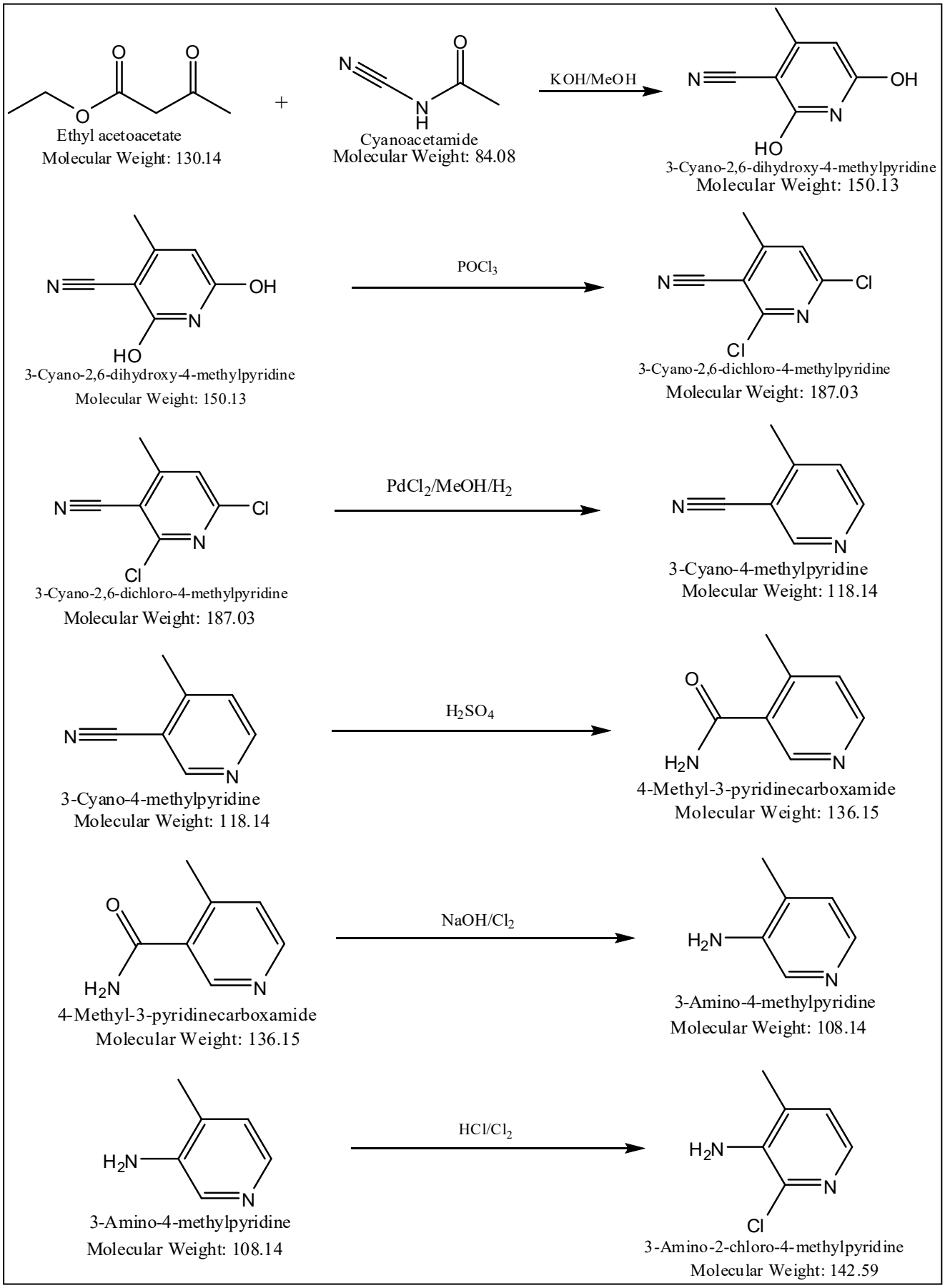
Ethyl acetoacetate is condensed with cyanoacetamide and resulting product is chlorinated with POCI3. The chlorinated product is dehalohydrogenated with catalyst and hydrogen and subsequent acidic hydrolysis afford carboxamide derivative. The carboxamide derivative is subjected to Hoffmann elimination yielding amino pyridine which is chlorinated to afford the final product.

PROCESS FLOW CHART




Intermediate-V (80%)
(1174.0 Kgs.)
MDC (recovered):
9900.0 Kgs.
MDC (loss): 100.0 Kgs.
Original filtrate to ETP):
22842.0 Kgs.
Wash filtrate to ETP:
3000.0 Kgs.
Water: 8259.0 Kgs.
HCl (30%): 1250.0 Kgs.
Chlorine: 679.0 Kgs.
NaOH Lye (48%):
4472.0 Kgs.
.
Chlorination
(15834.0 Kgs.)
Filtration & Washing
Water for wash : 5500.0 Kgs.
Crude product (85%)
(1535.0 Kgs.)
Original filtrate to ETP):
14199.0 Kgs.
Wash filtrate to ETP:
5600.0 Kgs.
Purification & drying
IPA (Recovered): 9900.0 Kgs.
IPA (make-up): 100.0 Kgs.
Activated carbon: 100.0 Kgs.
Product
(1000.0 Kgs.)
IPA (recovered):
9900.0 Kgs.
IPA (loss): 100.0 Kgs. Carbon
sludge: 175.0 Kgs. Distillation
resiue: 460.0 Kgs.

CHEMICAL REACTION:



MASS BALANCE:

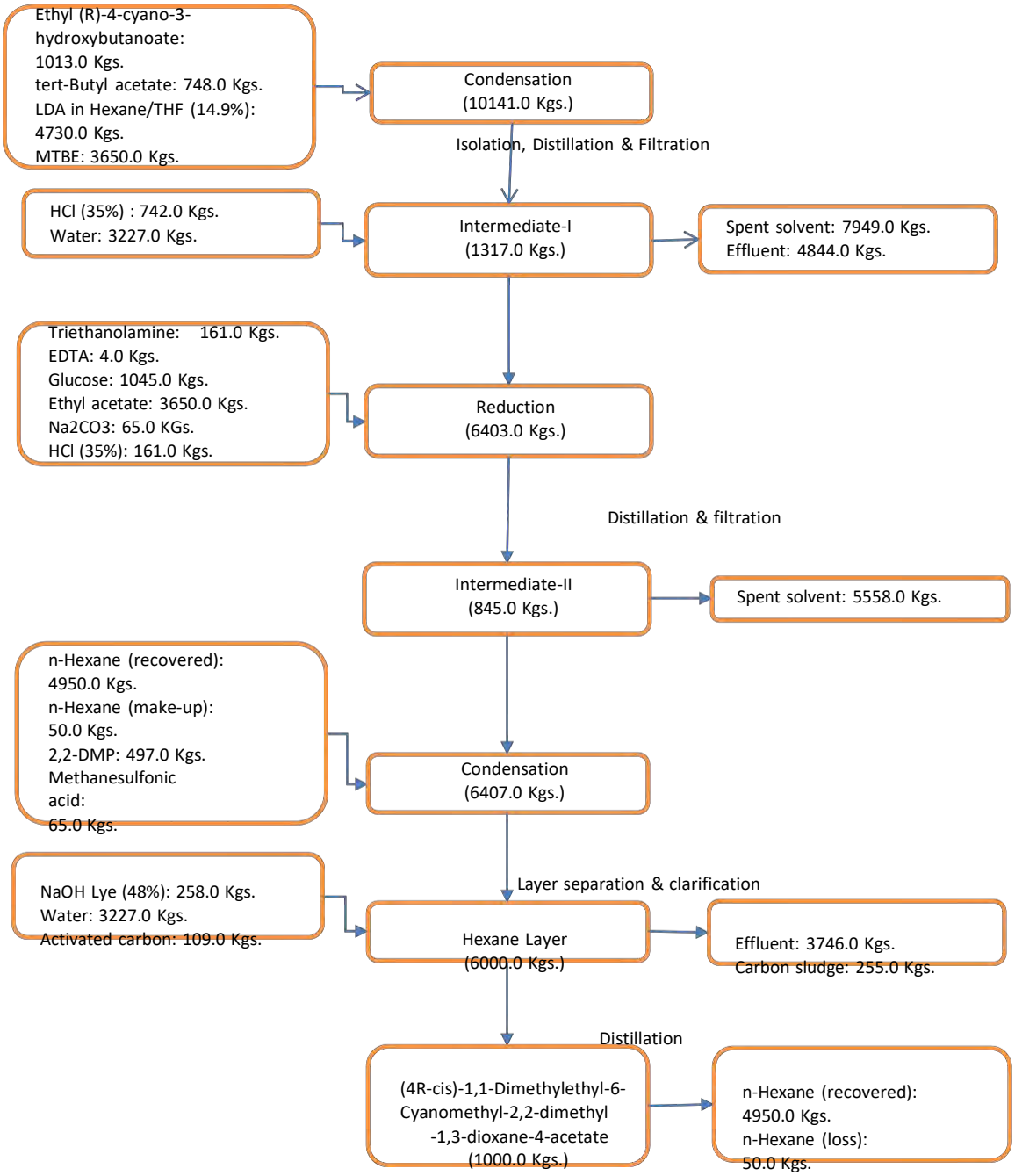
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Cyanoacetamide	1585.00	Product	1000.00	Product
2	Ethyl acetoacetate	2453.00	Methanol (recovered)	14850.00	
3	KOH	1297.00	Methanol (loss)	150.00	Reuse
4	HCl (30%)	3885.00	MDC (recovered)	9900.00	Reuse
5	POCl3	5163.00	MDC (loss)	100.00	loss
6	Sodium acetate	2481.00	IPA (recovered)	9900.00	loss
7	PdCl2 (recovered)	70.00	IPA (loss)	100.00	Reuse
8	Methanol (recovered)	14850.00	PdCl2 (recovered)	70.00	loss
9	Methanol (make-up)	150.00	Water loss	945.00	Reuse
10	Hydrogen	64.00	Carbon sludge	175.00	loss
11	NaOH Lye (48%)	9481.00	Distillation residue	460.00	ETP
12	H2SO4 (98%)	1140.00	Effluent	103244.00	
13	Chlorine	1599.00			
14	MDC (recovered)	9900.00			
15	MDC (make-up)	100.00			
16	Activated carbon	100.00			
17	IPA (recovered)	9900			
18	IPA (make-up)	100.00			
19	Water	76576.00			
	Total	140894.00		140894.00	

30. PRODUCT: (4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl -1,3-dioxane-4-acetate

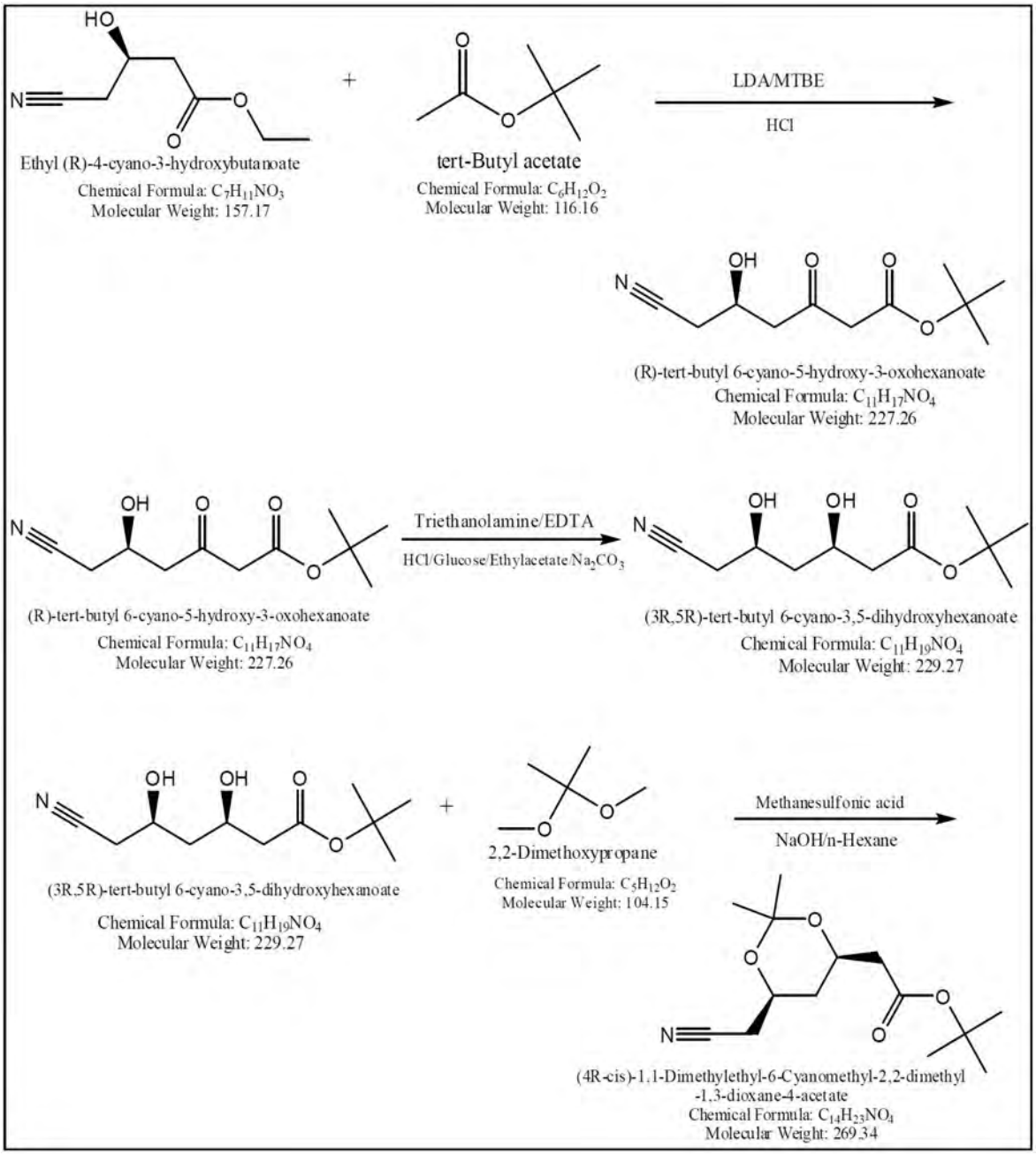
MANUFACTURING PROCESS:

Ethyl (R)-4-cyano-3-hydroxybutanoate is condensed with tert-Butyl acetatein presence of solvent to get intermediate-I after acidic work up. Intermediate-I is reduced to get intermediate-II. Intermediate-II is condensed with 2,2-DMP in presence of solvent & catalysts and after work up, layer separation, clarification and removal of solvent yield (4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl -1,3-dioxane-4-acetate. Product is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



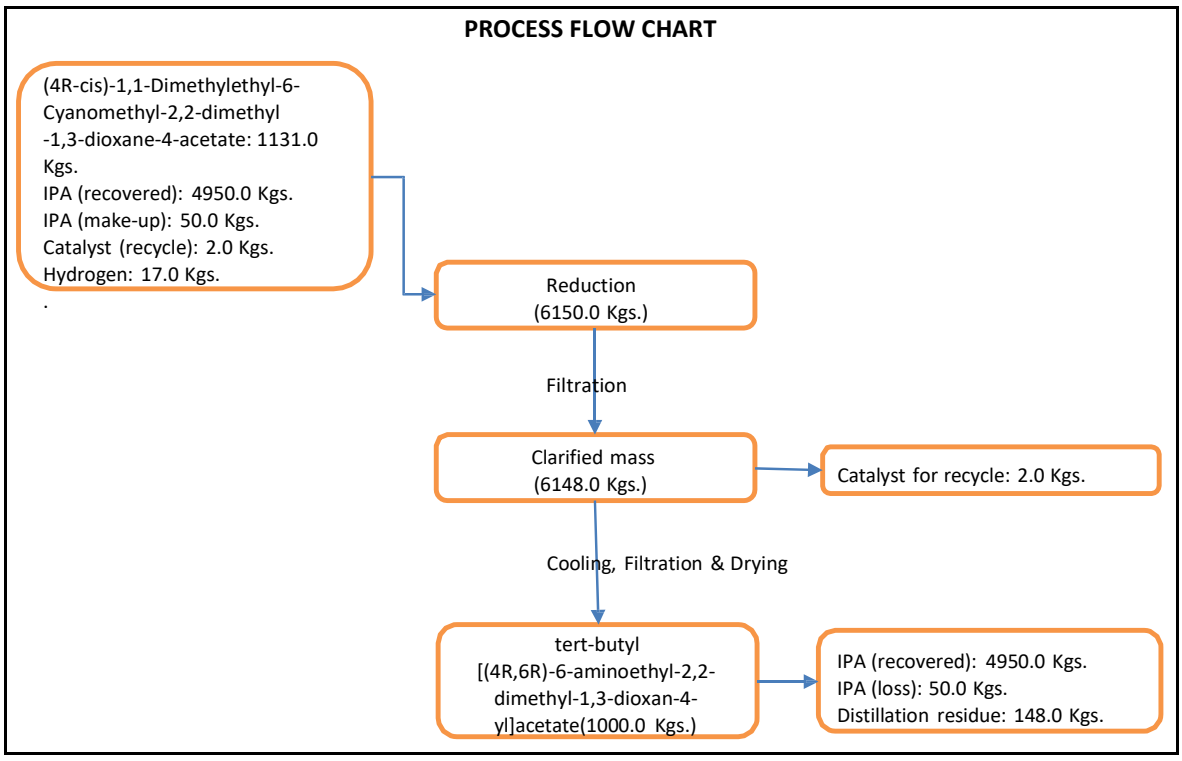
MASS BALANCE:

Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Ethyl (R)-4-cyano-3-hydroxybutanoate	1013.00	(4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl -1,3-dioxane-4-acetate	1000.00	Product
2	tert-Butyl acetate	748.00	Spent Solvent	13507.00	Resale
3	LDA in Heane/THF	4730.00	Carbon sludge	255.00	Incineration
4	MTBE	3650.00	n-Hexane (recovered)	4950.00	Reuse
5	HCl (35%)	903.00	n-Hexane (Loss)	50.00	Loss
6	Triethanolamine	161.00	Effluent	8590.00	ETP
7	EDTA	4.00			
8	Glucose	1045.00			

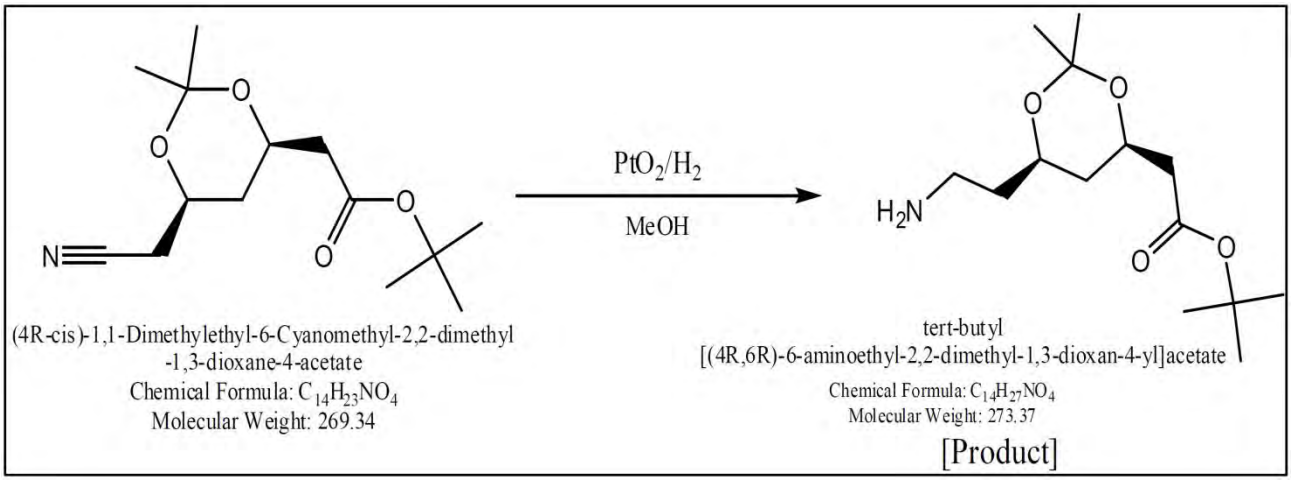
9	Ethyl acetate	3650.00			
10	Na2CO3	65.00			
11	n-Hexane (recovered)	4950.00			
12	n-Hexane (make-up)	50.00			
13	2,2-DMP	497.00			
14	Methanesulfonic acid	65.00			
15	NaOH Lye (48%)	258.00			
16	Activated carbon	109.00			
17	Water	6454.00			
	Total	28352.00		28352.00	

31. PRODUCT: tert-butyl [(4R,6 R)-6-aminoethyl-2, 2-dimethyl-1,3-dioxan-4-yl]acetate

MANUFACTURING PROCESS:
(4 R-cis)-1,1-D imethylethyi-6-Cya nom ethyl-2, 2-dim ethyl -1,3-dioxane-4-acetate is the subjected to catalytic hydrogenation and after work up, product is obtained. Product is dried & packed.



CHEMICAL REACTION:



MASS BALANCE:

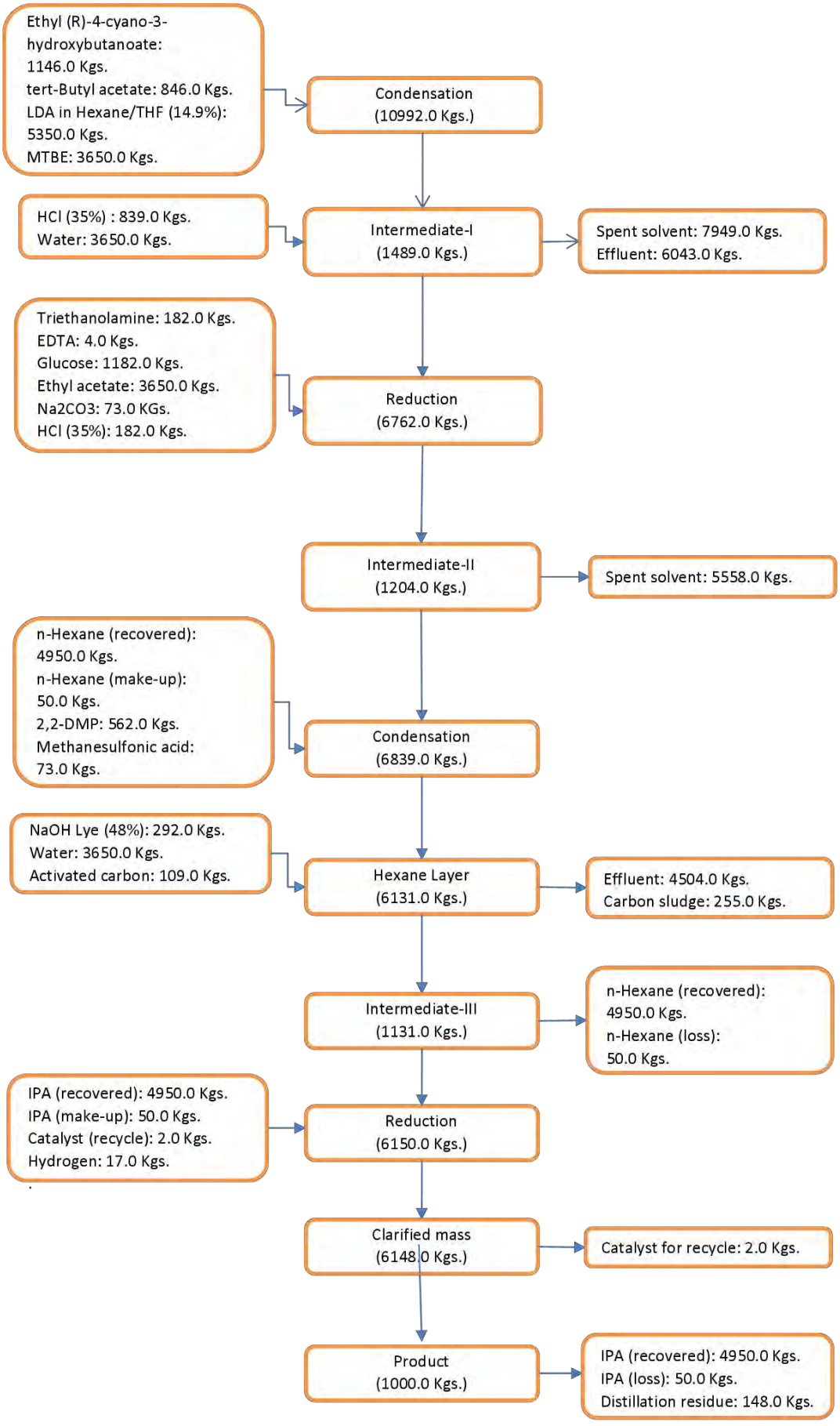
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	(4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl -1,3-dioxane-4-acetate	1131.00	tert-butyl [(4R,6R)-6-aminoethyl-2,2-dimethyl-1,3-dioxan-4-yl]acetate	1000.00	Product
2	IPA (recovered)	4950.00	Catalyst for recycle	2.00	Recycle
3	IPA (make-up)	50.00	IPA (recovered)	4950.00	Reuse
4	Catalyst (Recycle)	2.00	IPA (Loss)	50.00	Loss
5	Hydrogen	17.00	Distillation residue	148.00	Incineration
	Total	6150.00		6150.00	

32. PRODUCT: Atorvastatin

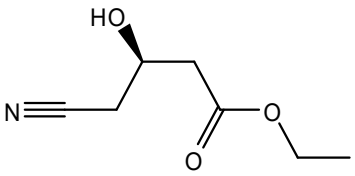
MANUFACTURING PROCESS:

Ethyl (R)-4-cyano-3-hydroxybutanoate is condensed with tert-Butyl acetate in presence of solvent to get intermeediate-1 after acidic work up. Intermediate-11 is reduced to get intermediate-11. lntermediate-11 is condensed with 2,2-DMP in presence of solvent & catalysts and after work up, layer separation, clarification and removal of solvent yield intermediate-lll. It is the subjected to catalytic hydrogenation and after work up, product is obtained. Product is dried & packed.

PROCESS FLOW CHART:

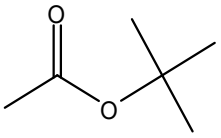


CHEMICAL REACTION:



Ethyl (R)-4-cyano-3-hydroxybutanoate
Chemical Formula: $C_7H_{11}NO_3$
Molecular Weight: 157.17

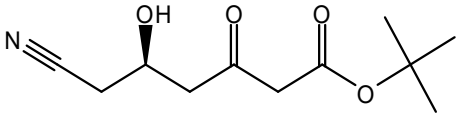
+



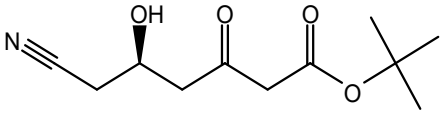
tert-Butyl acetate
Chemical Formula: $C_6H_{12}O_2$
Molecular Weight: 116.16

LDA/MTBE

HCl



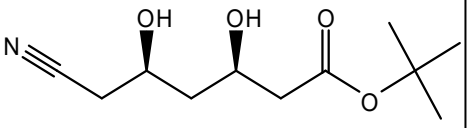
(R)-tert-butyl 6-cyano-5-hydroxy-3-oxohexanoate
Chemical Formula: $C_{11}H_{17}NO_4$
Molecular Weight: 227.26



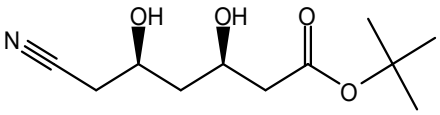
(R)-tert-butyl 6-cyano-5-hydroxy-3-oxohexanoate
Chemical Formula: $C_{11}H_{17}NO_4$
Molecular Weight: 227.26

Triethanolamine/EDTA

HCl/Glucose/Ethylacetate/Na_2CO_3

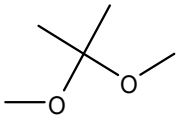


(3R,5R)-tert-butyl 6-cyano-3,5-dihydroxyhexanoate
Chemical Formula: $C_{11}H_{19}NO_4$
Molecular Weight: 229.27



(3R,5R)-tert-butyl 6-cyano-3,5-dihydroxyhexanoate
Chemical Formula: $C_{11}H_{19}NO_4$
Molecular Weight: 229.27

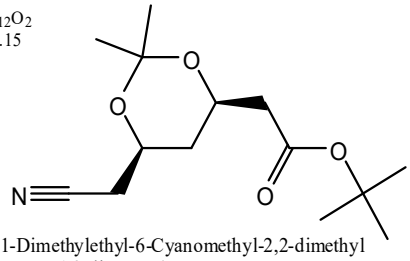
+



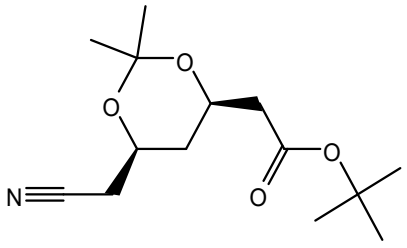
2,2-Dimethoxypropane
Chemical Formula: $C_5H_{12}O_2$
Molecular Weight: 104.15

Methanesulfonic acid

NaOH/n-Hexane



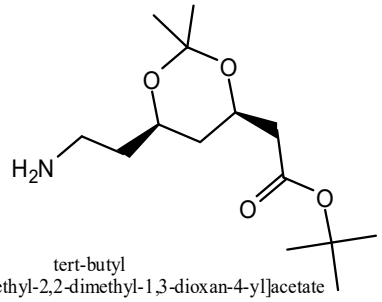
(4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl
-1,3-dioxane-4-acetate
Chemical Formula: $C_{14}H_{23}NO_4$
Molecular Weight: 269.34



(4R-cis)-1,1-Dimethylethyl-6-Cyanomethyl-2,2-dimethyl
-1,3-dioxane-4-acetate
Chemical Formula: $C_{14}H_{23}NO_4$
Molecular Weight: 269.34

PtO_2/H_2

MeOH



tert-butyl
[(4R,6R)-6-aminoethyl-2,2-dimethyl-1,3-dioxan-4-yl]acetate
Chemical Formula: $C_{14}H_{27}NO_4$
Molecular Weight: 273.37

[Product]

MASS BALANCE:

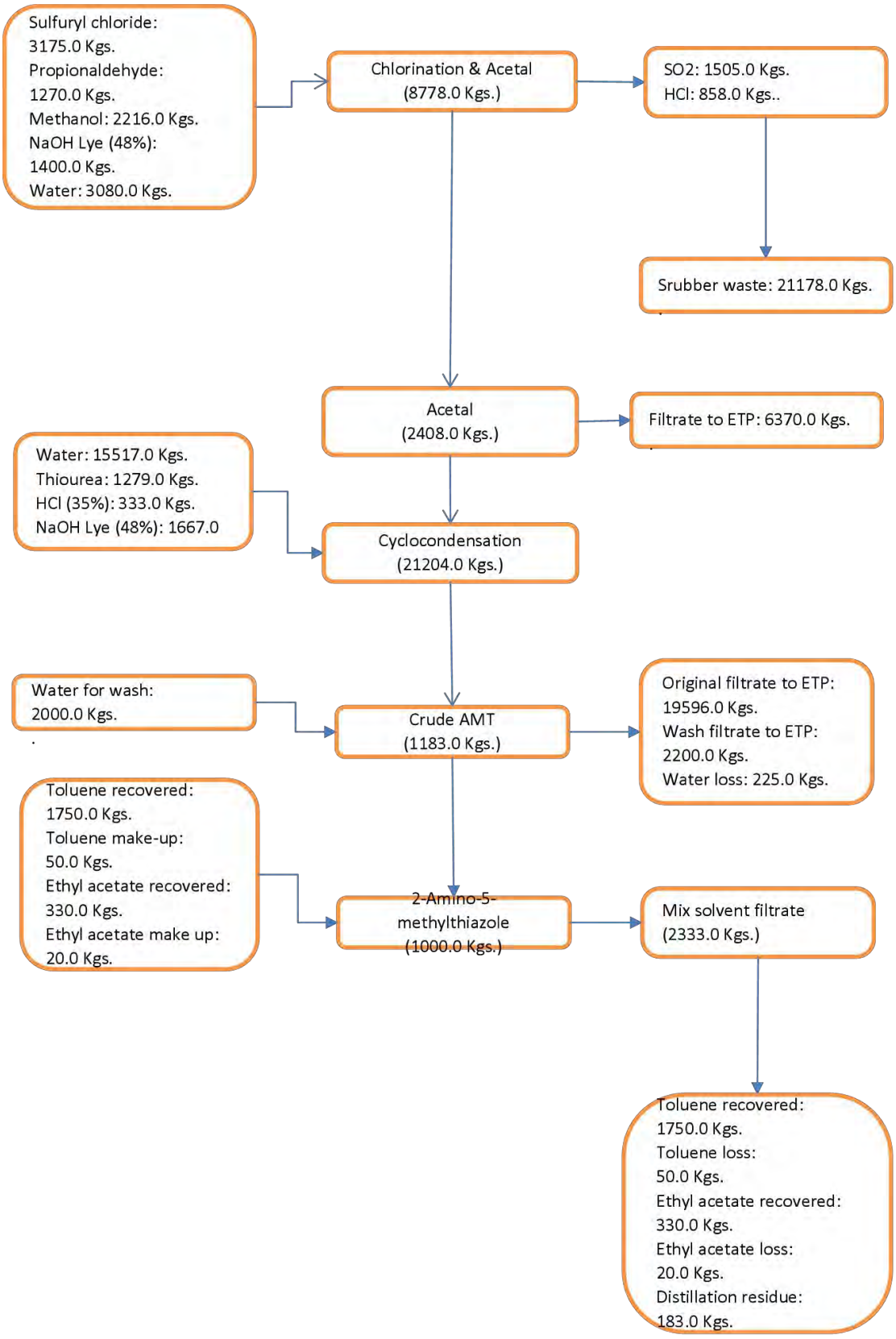
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Ethyl (R)-4-cyano-3-hydroxybutanoate	1146.00	Product	1000.00	Product
2	tert-Butyl acetate	846.00	Spent Solvent	13507.00	Resale
3	LDA in Heane/THF	5350.00	Carbon sludge	255.00	Incineration
4	MTBE	3650.00	n-Hexane (recovered)	4950.00	Reuse
5	HCl (35%)	1021.00	n-Hexane (Loss)	50.00	Loss
6	Triethanolamine	182.00	Catalyst for recycle	2.00	Recycle
7	EDTA	4.00	IPA (recovered)	4950.00	Reuse
8	Glucose	1182.00	IPA (Loss)	50.00	Loss
9	Ethyl acetate	3650.00	Distillation residue	148.00	Incineration
10	Na2CO3	73.00	Effluent	10547.00	ETP
11	n-Hexane (recovered)	4950.00			
12	n-Hexane (make-up)	50.00			
13	2,2-DMP	562.00			
14	Methanesulfonic acid	73.00			
15	NaOH Lye (48%)	292.00			
16	Activated carbon	109.00			
17	IPA (recovered)	4950.00			
18	IPA (make-up)	50.00			
19	Catalyst (Recycle)	2.00			
20	Hydrogen	17.00			
21	Water	7300.00			
	Total	35459.00		35459.00	

33. PRODUCT: 2-Amino-5-methylthiazole

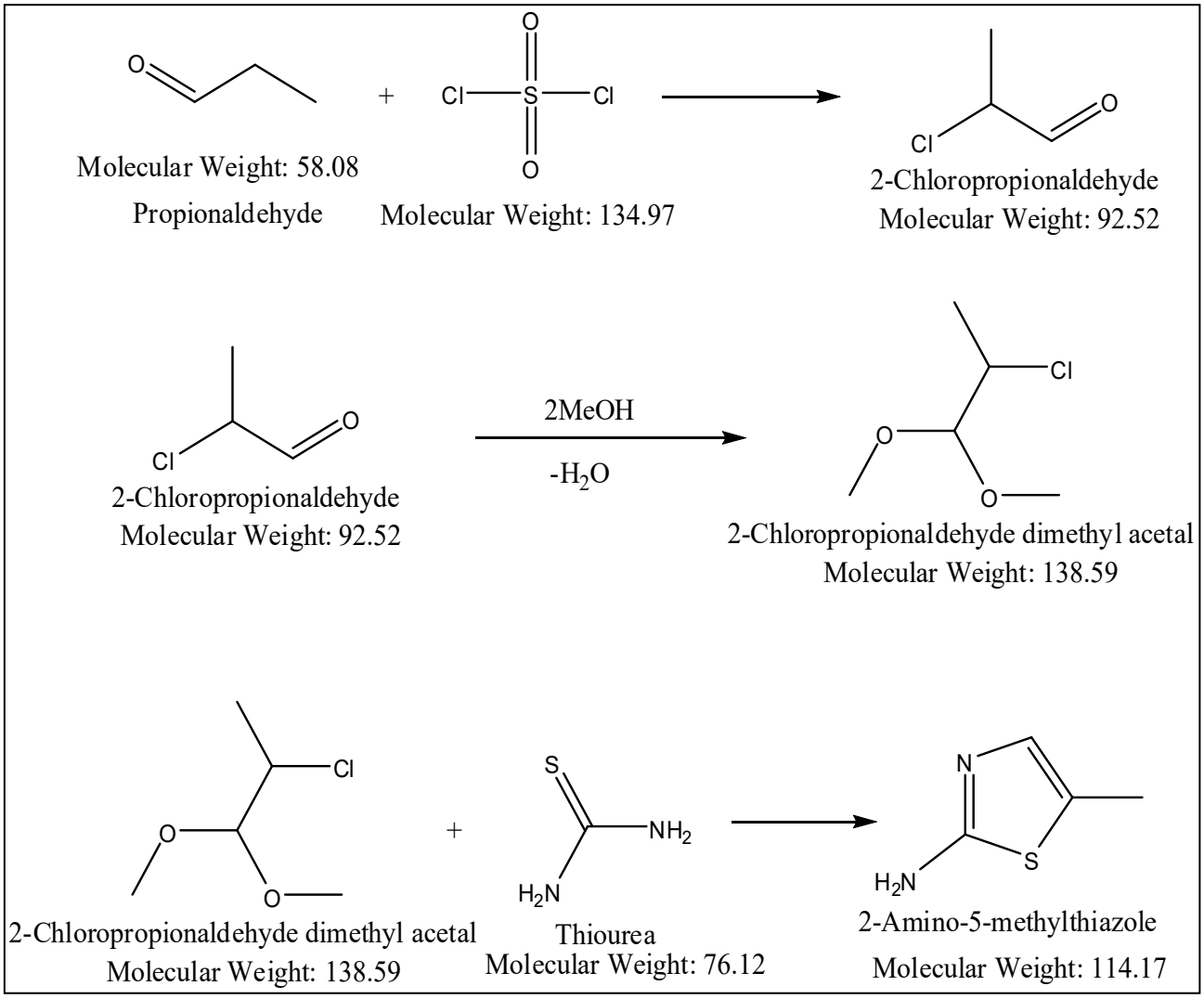
MANUFACTURING PROCESS:

Propionaldehyde is chlorinated, and reacted with methanol to form acetal. ACetal is subjected to cyclocondensation with thiourea and subsequent neutralisation and filtartion is afforded crude AMT which is purified in solvent to yield pure AMT. It is dried and packed**.**

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

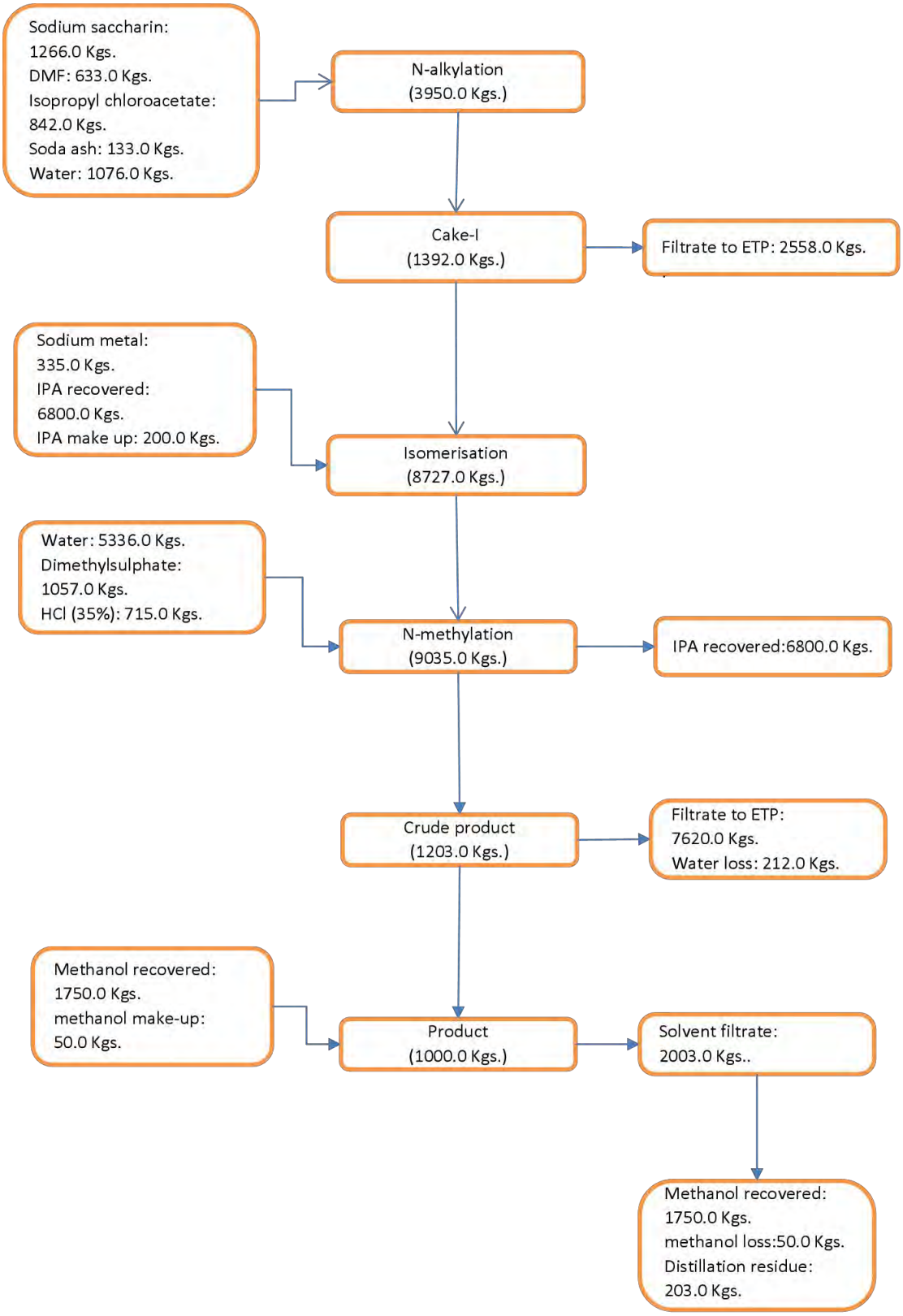
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Sulfuryl chloride	3175.00	2-Amino-5-methylthiazole	1000.00	Product
2	Propionaldehyde	1270.00	Toluene recovered	1750.00	Recycle
3	Methanol	2216.00	Toluene loss	50.00	Loss
4	NaOH Lye (48%)	8946.00	Ethyl acetate recovered	330.00	Recycle
5	Thiourea	1279.00	Ethyl aceate loss	20.00	Loss
6	HCl (35%)	333.00	Distillation residue	183.00	Incineration
7	Toluene recovered	1750.00	Water loss	225.00	Loss
8	Toluene make up	50.00	Scrubber waste	21178.00	ETP
9	Ethyl acetae recovered	330.00	Effluent	28166.00	ETP
10	Ethyl acetate make up	20.00			
11	Water	33533.00			
	Total	52902.00		52902.00	

34. PRODUCT: Isopropyl 4-hydroxy-2-methyl-2H-1,2-benzothiazine-3-carboxylate 1,1-dioxide

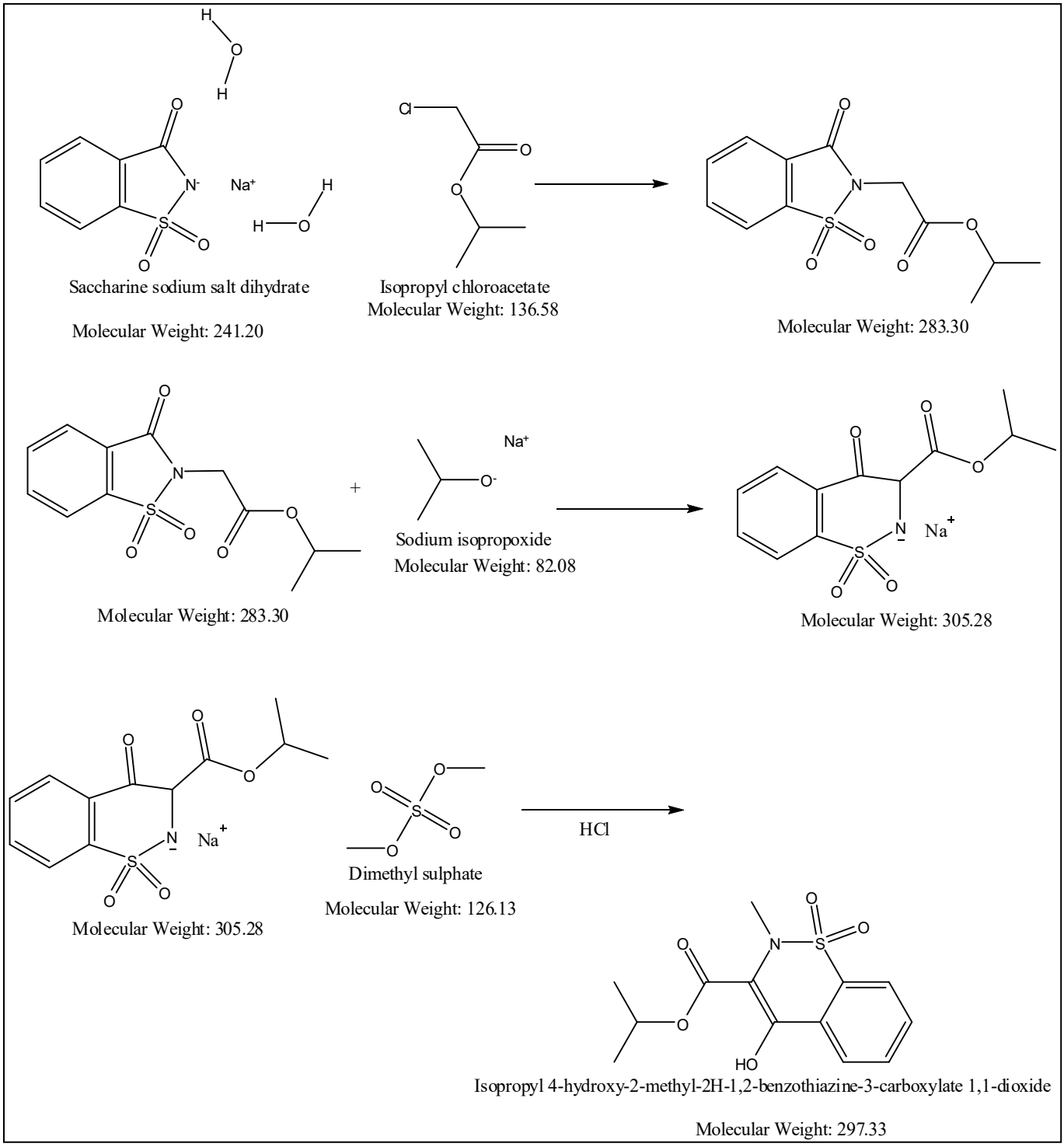
MANUFACTURING PROCESS:

Sodium saccharin is reacted with isopropyl chloroacetate and isolated in water. Filtered and dried cake is isomerised with sodium isopropoxide followed by distillation & N-methylation with DMS. Water is added and acidified with HCl to affored crude product which is purified in methanol. It is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

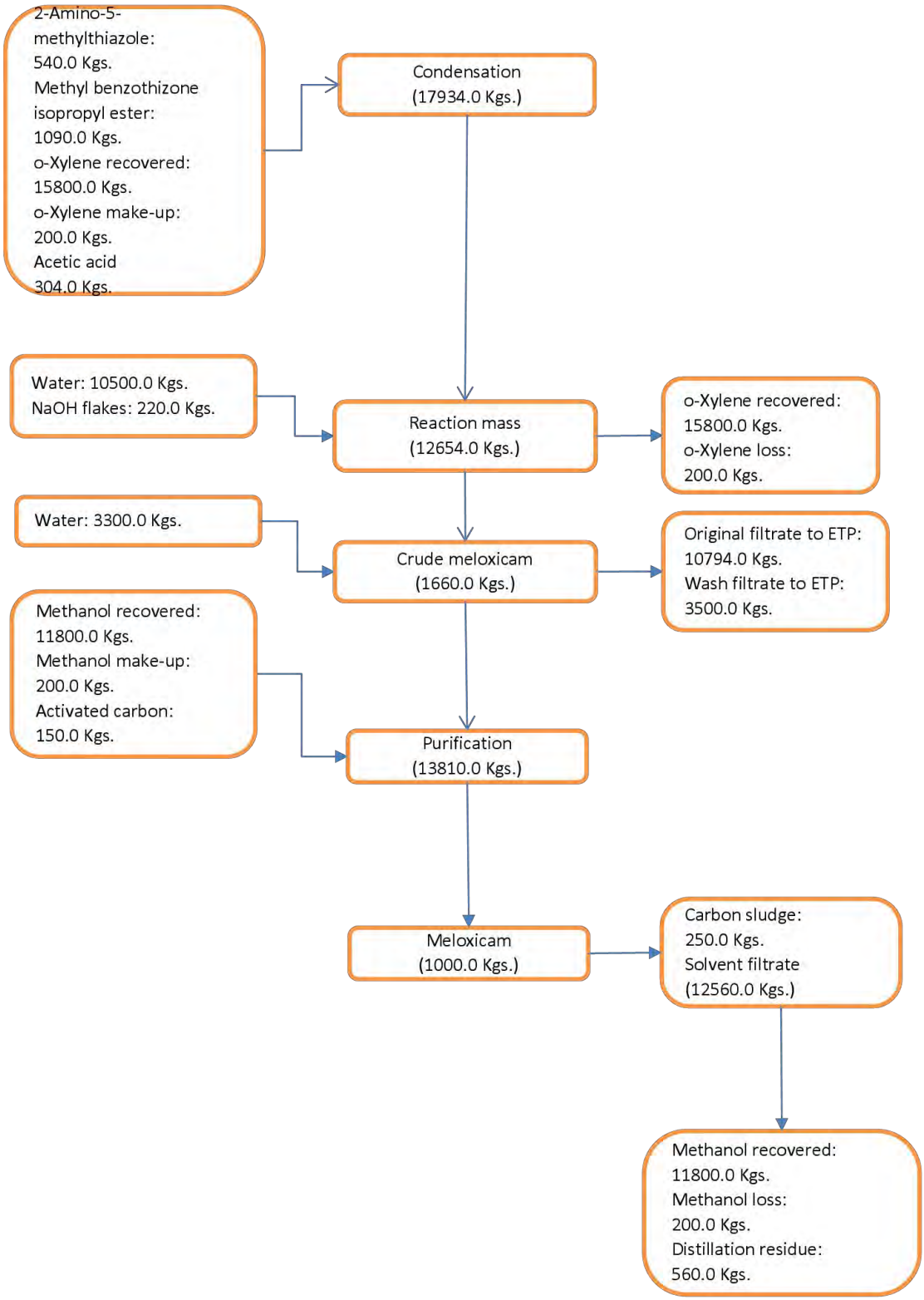
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Sodium saccharin	1266.00	Product	1000.00	Product
2	DMF	633.00	IPA recovered	6800.00	Recycle
3	Isopropyl chloroacetate	842.00	Methanol recovered	1750.00	Recycle
4	Soda ash	133.00	Methanol loss	50.00	Loss
5	Sodium metal	335.00	Distillation residue	203.00	Incineration
6	IPA recovered	6800.00	Water loss	212.00	Loss
7	IPA make up	200.00	Effluent	10178.00	ETP
8	Dimethylsulphate	1057.00			
9	HCl (35%)	715.00			
10	Methanol recovered	1750.00			
11	Methanol make up	50.00			
12	Water	6412.00			
	Total	20193.00		20193.00	

35. PRODUCT: Meloxicam (API)

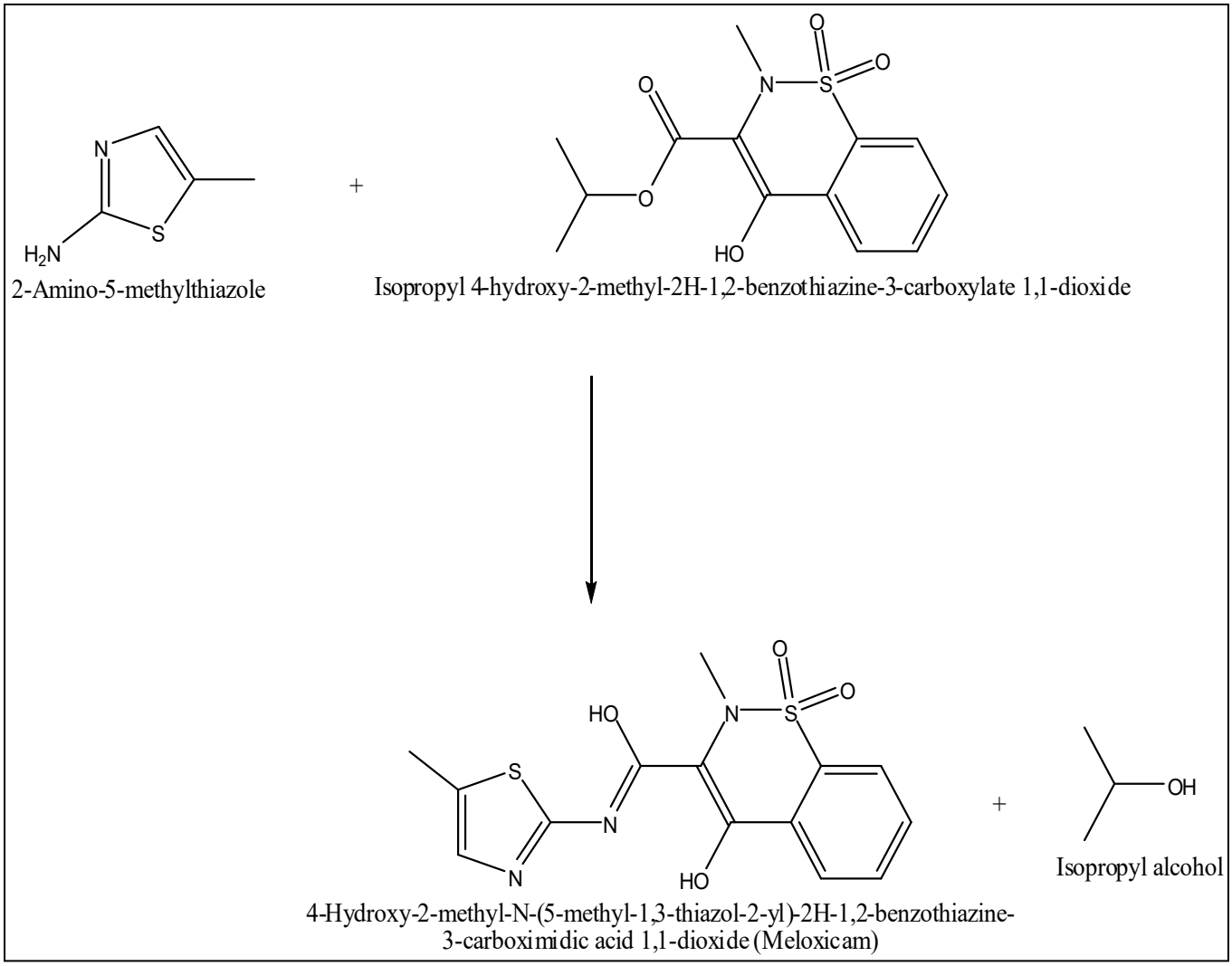
MANUFACTURING PROCESS:

2-Amino-5-methylthiazole and Methyl benzothizone isopropyl ester are condensed together in presence of solvent and subsequent distillation & filtration afford crude product.to get crude
Crude product is purified in solvent, crystallised, filtered, dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

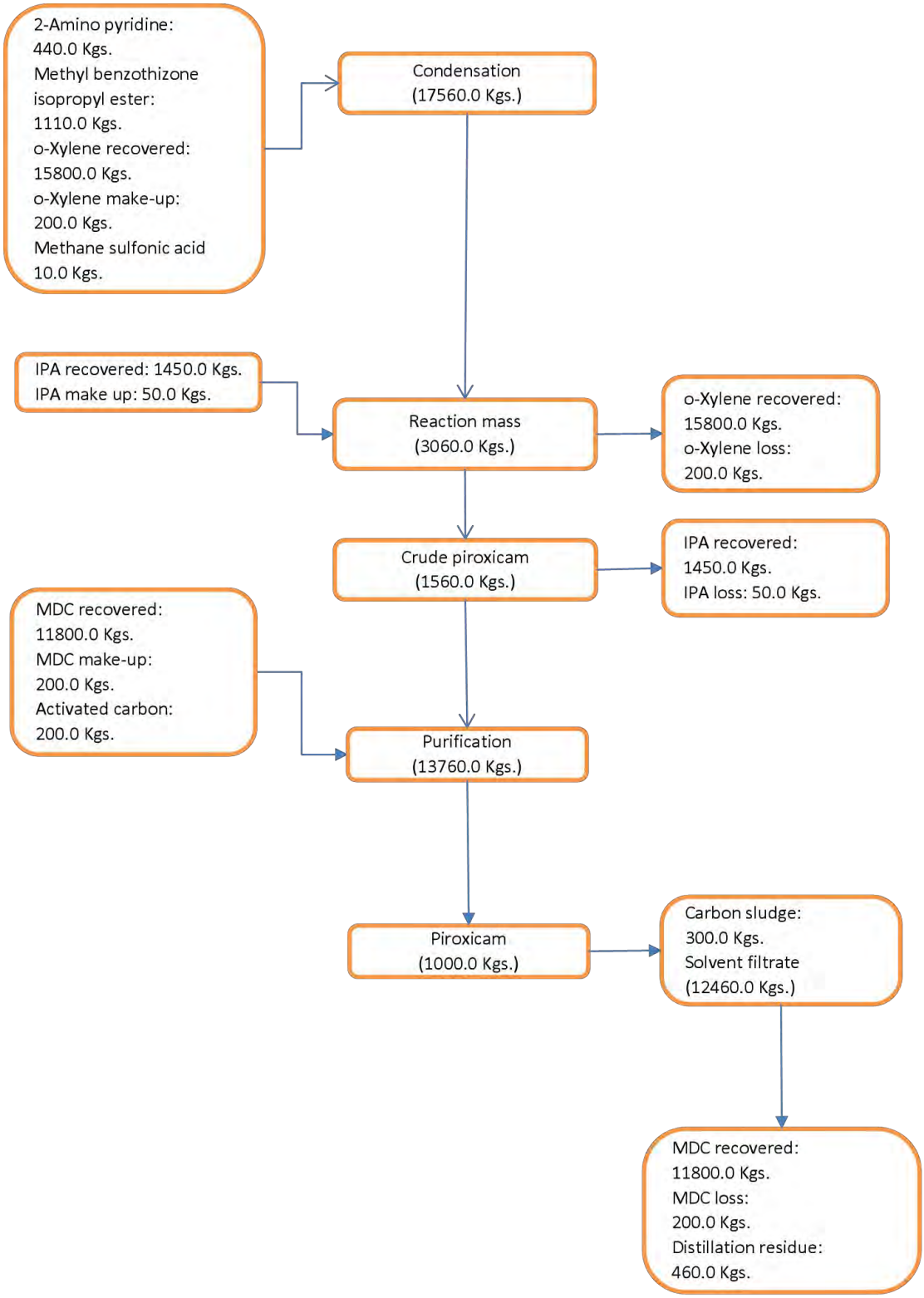
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	2-Amino-5-methylthiazole	540.00	Meloxicam	1000.00	Product
2	Methyl benzothizone isopropyl ester	1090.00	o-Xylene recovered	15800.00	Recycle
3	o-Xylene recovered	15800.00	o-Xylene loss	200.00	Loss
4	o-Xylene make-up	200.00	Methanol recovered	11800.00	Recycle
5	Acetic acid	304.00	Methanol loss	200.00	Loss
6	NaOH flakes	220.00	Carbon sludge	250.00	Incineration
7	Methanol recovered	11800.00	Distillation residue	560.00	Incineration
8	Methanol make up	200.00	Effluent	14294.00	ETP
9	Activated carbon	150.00			
10	Water	13800.00			
	Total	44104.00		44104.00	

36. Piroxicam (API)

MANUFACTURING PROCESS:

2-Amino pyridine and Methyl benzothizone isopropyl ester are condensed together in presence of solvent and subsequent distillation & filtration afford crude product.to get crude. Crude product is purified in solvent, crystallised, filtered, dried & packed.

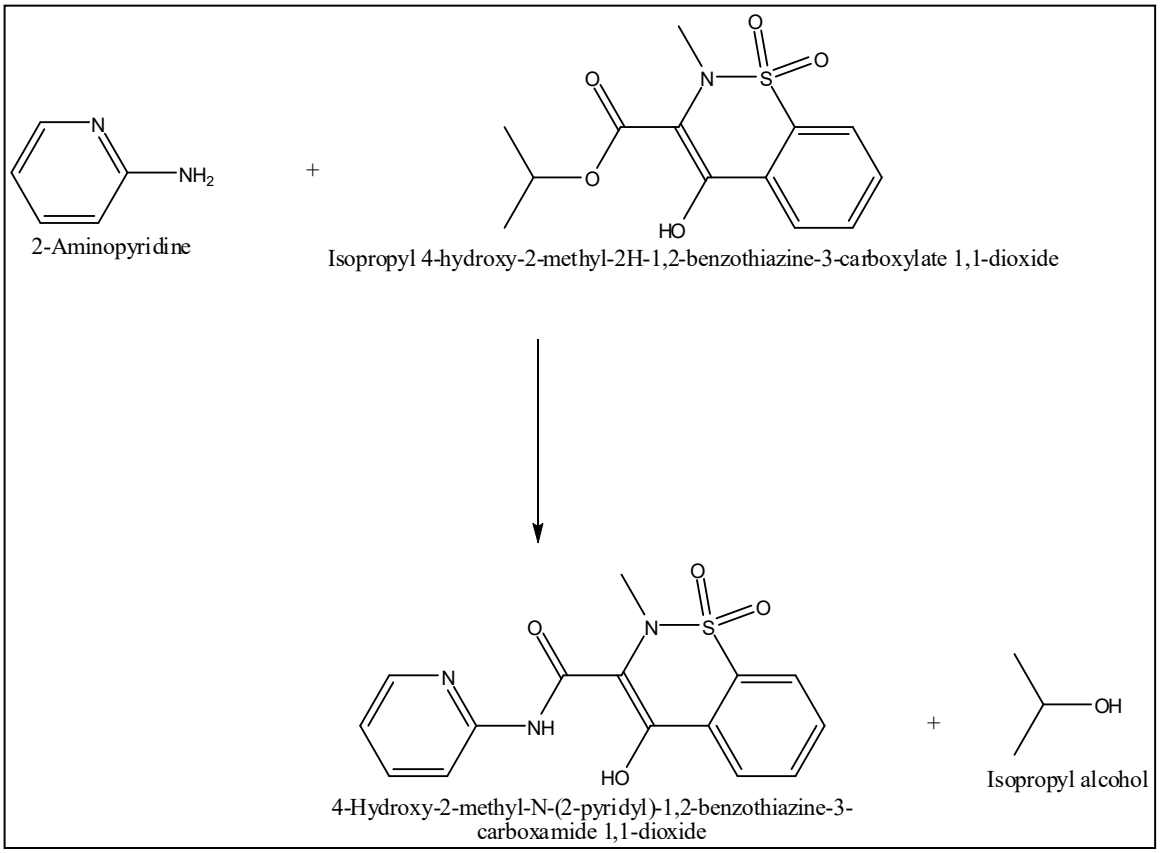
PROCESS FLOW CHART:



MASS BALANCE:

Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	2-Aminopyridine	440.00	Piroxicam	1000.00	Product
2	Methyl benzothizone isopropyl ester	1110.00	o-Xylene recovered	15800.00	Recycle
3	o-Xylene recovered	15800.00	o-Xylene loss	200.00	Loss
4	o-Xylene make-up	200.00	IPA recovered	1450.00	Recycle
5	Methane sulfonic acid	10.00	IPA loss	50.00	Loss
6	IPA recovered	1450.00	MDC recovered	11800.00	Recycle
7	IPA make up	50.00	MDC make up	200.00	Loss
8	MDC recovered	11800.00	Carbon sludge	300.00	Incineration
9	MDC make up	200.00	Distillation residue	460.00	Incineration
10	Activated carbon	200.00			
	Total	31260.00		31260.00	

CHEMICAL REACTION:

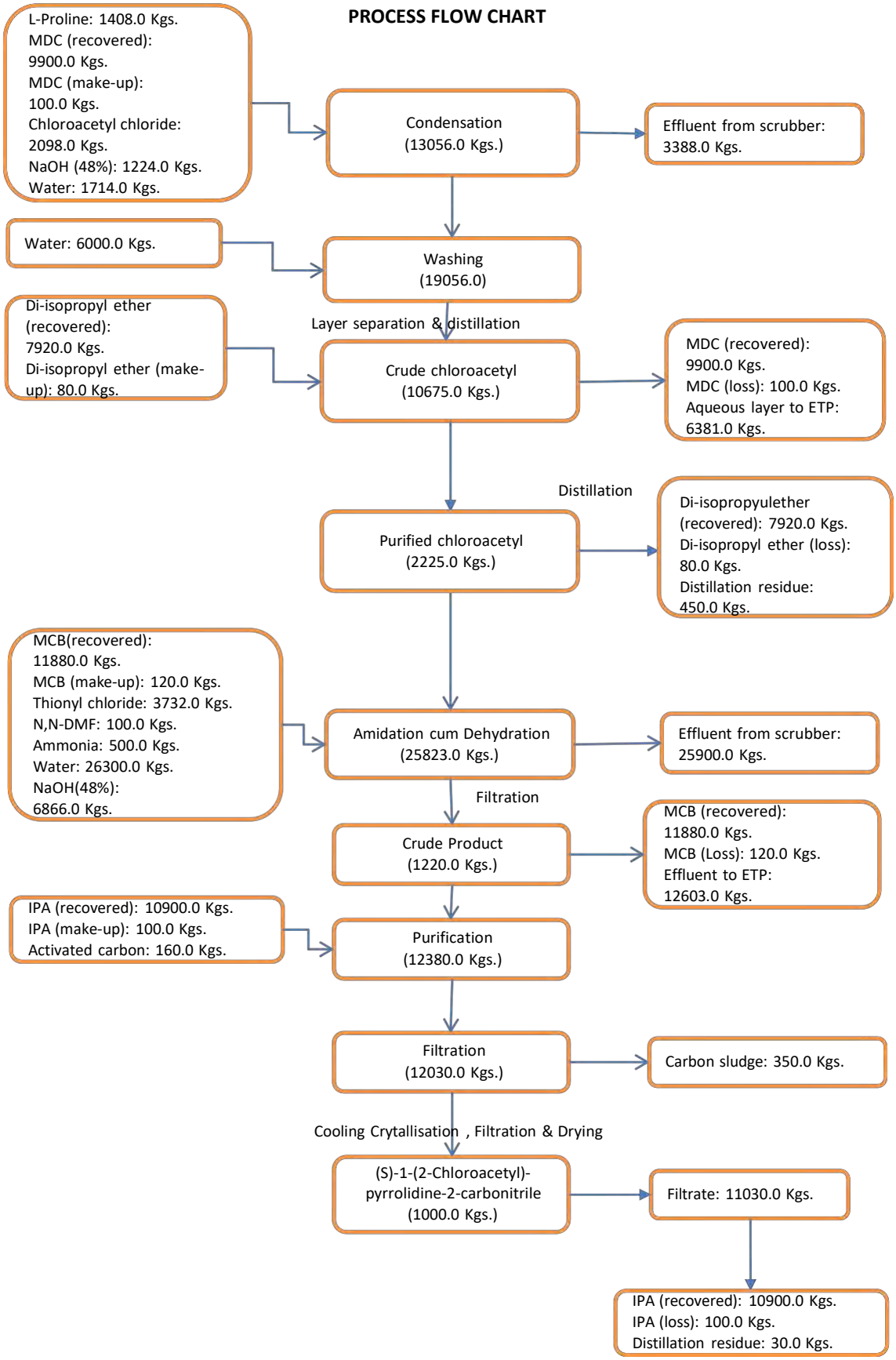


37. PRODUCT: (S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile

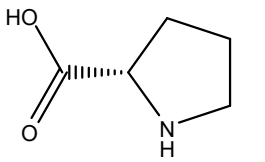
MANUFACTURING PROCESS:

L-Proline is treated with Chloroacetyl chloride in solvent, reaction mass iswashed with water, and crude chloroacetyl product is obtained which is purified in solvent. Purified chloroacetyl is taken in a solvent and reacted with thionyl chloride at elevated temperature to get Chlorocarbonyl derivative which is further reacted, without isolation, with ammonia gas to get amide derivative. The amide derivative, without isolation, is dehydrated with thionyl chloride, filtered, and evaporated solvent under vacuum to get crude 5-Cyanophthalide. The evolved gases viz. HCl & SO2 are scrubbed in two stage scrubber to obtain dilute HCl & Na2SO3 solution. The Na2SO3 solution is recycled till its saturation level; excess solid is removed by filtration and again recycled. The crude product is purified in solvent at elevated temperature and filtered. The clarified filtered solution is subjected to cooling crystallisation to afford the product which is dried.

PROCESS FLOW CHART



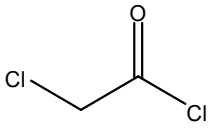
CHEMICAL REACTION:



L-Proline

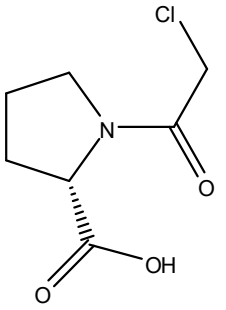
Molecular Weight: 115.13

+



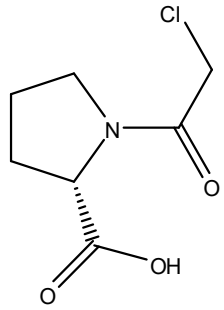
Chloroacetyl chloride

Molecular Weight: 112.94



(S)-1-(2-Chloroacetyl) pyrrolidine -2-carboxylic acid

Molecular Weight: 191.61

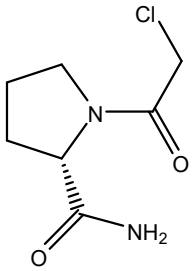


(S)-1-(2-Chloroacetyl) pyrrolidine -2-carboxylic acid

Molecular Weight: 191.61

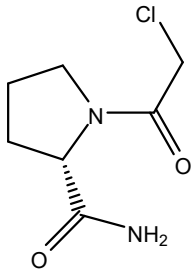
(i) $SOCl_2$ / Solvent

(ii) NH_3



(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carboxamide

Molecular Weight: 190.63

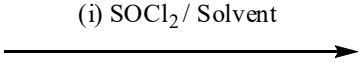


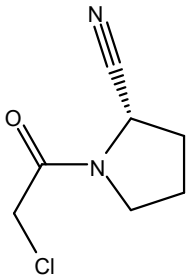
(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carboxamide

Molecular Weight: 190.63

Molecular Weight: 172.61

(i) $SOCl_2$ / Solvent





(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile

Molecular Weight: 172.61

MASS BALANCE:

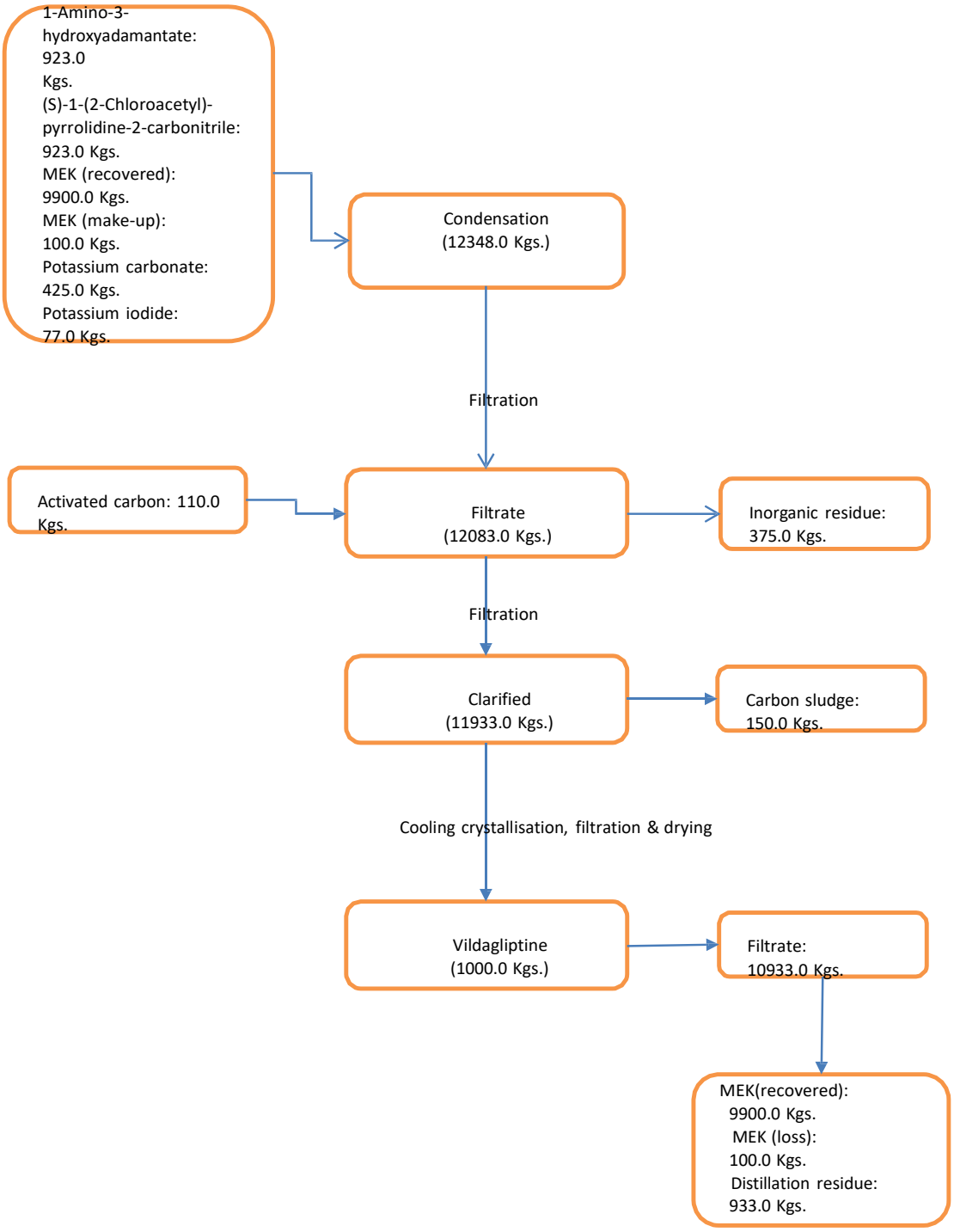
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	L-Proline	1408.00	(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile	1000.00	Product
2	MDC (recovered)	9900.00	MDC (recovered)	9900.00	Reuse
3	MDC (make-up))	100.00	MDC (loss)	100.00	Loss
4	Chloroacetyl chloride	2098.00	Di-isopropyl ether(recovered)	7920.00	Reuse
5	Di-isopropyl ether(recovered)	7920.00	Di-isopropyl ether(loss)	80.00	Loss
6	Di-isopropyl ether(make-up)	80.00	MCB (recovered)	11880.00	Reuse
7	MCB (recovered)	11880.00	MCB (loss)	120.00	Loss
8	MCB (make-up)	120.00	IPA (recovered)	10900.00	Reuse
9	Thionyl chloride	3732.00	IPA (loss)	100.00	Loss
10	N,N-DMF	100.00	Carbon sludge	350.00	Incineration
11	Ammonia	500.00	Distillation residue	480.00	Incineration
12	NaOH (48%)	8090.00	Effluent	48272.00	ETP
13	IPA (recovered)	10900.00			
14	IPA (make-up)	100.00			
15	Activated carbon	160.00			
16	Water	34014.00			
	Total	91102.00		91102.00	

38. PRODUCT: Vildagliptine

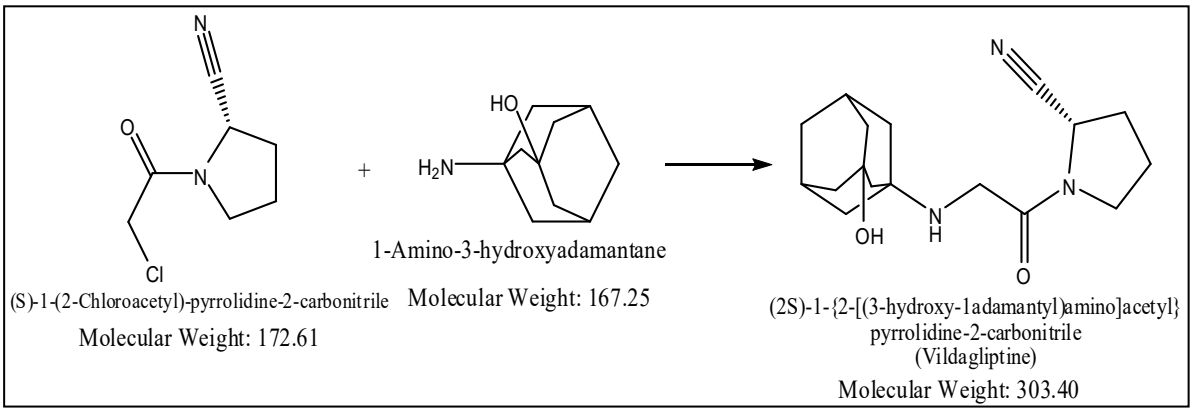
MANUFACTURING PROCESS:

1-Amino-3-hydroxyadamantate & (S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile is condensed in presence of potassium carbonate in solvent and reaction mass is filtered to remove inorganic residue. The filtrate so obtained is purified by adding activated carbon, filtered, and cooling crystallisation is done. Product is filtered & dried.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

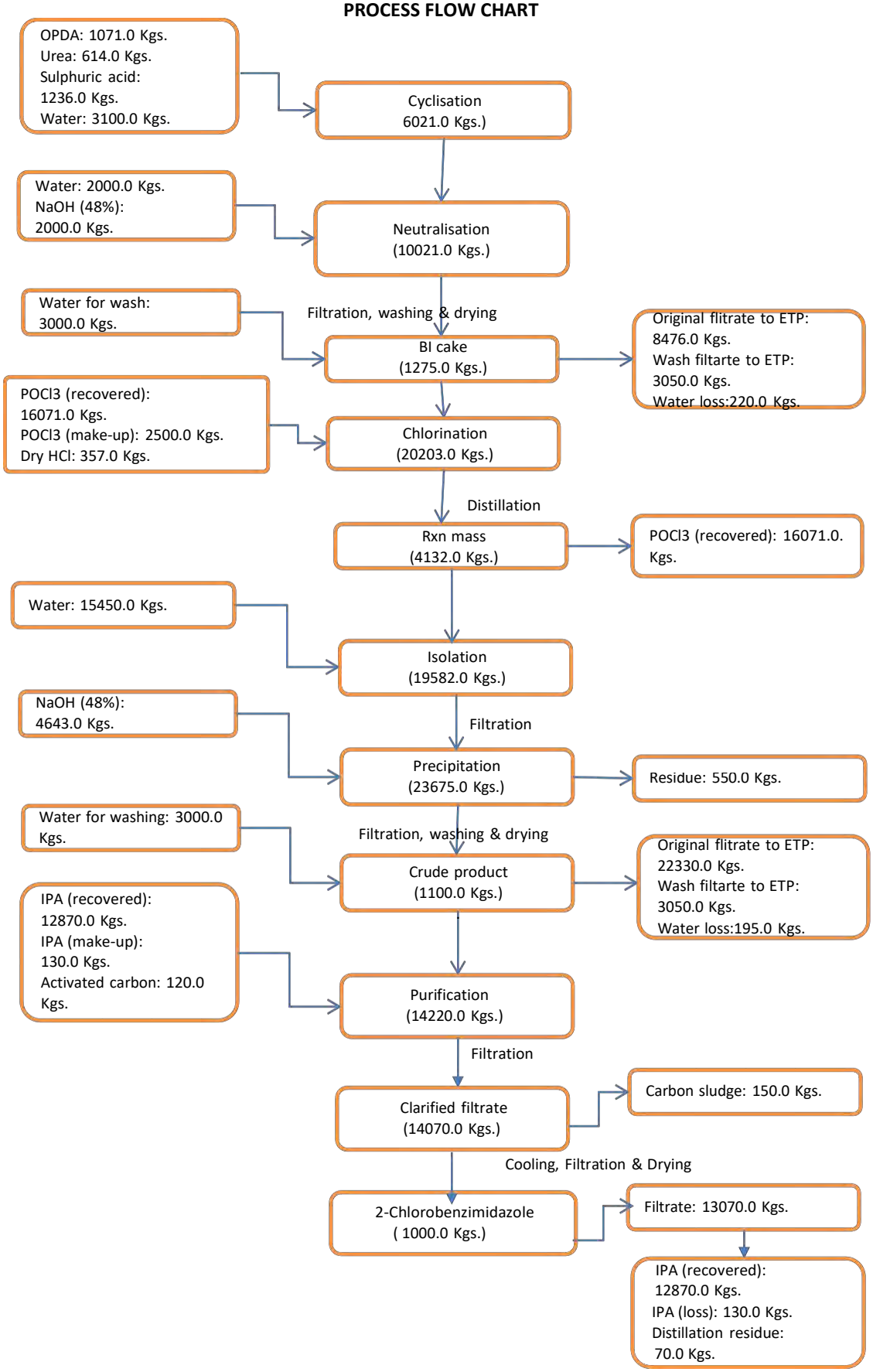
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	1-Amino-3-hydroxyadamantate	923.00	Vildagliptine	1000.00	Product
2	(S)-1-(2-Chloroacetyl)-pyrrolidine-2-carbonitrile	923.00	MEK (recovered)	9900.00	Reuse
3	MEK (recovered)	9900.00	MEK (loss)	100.00	Loss
4	MEK (make-up)	100.00	Inorganic residue	375.00	TSDF
5	Potassium carbonate	425.00	Carbon sludge	150.00	Incineration
6	Potassium iodide	77.00	Distillation residue	933.00	Incineration
7	Activated carbon	110.00			
	Total	12458.00		12458.00	

39. PRODUCT: 2-Chlorobenzimidazole

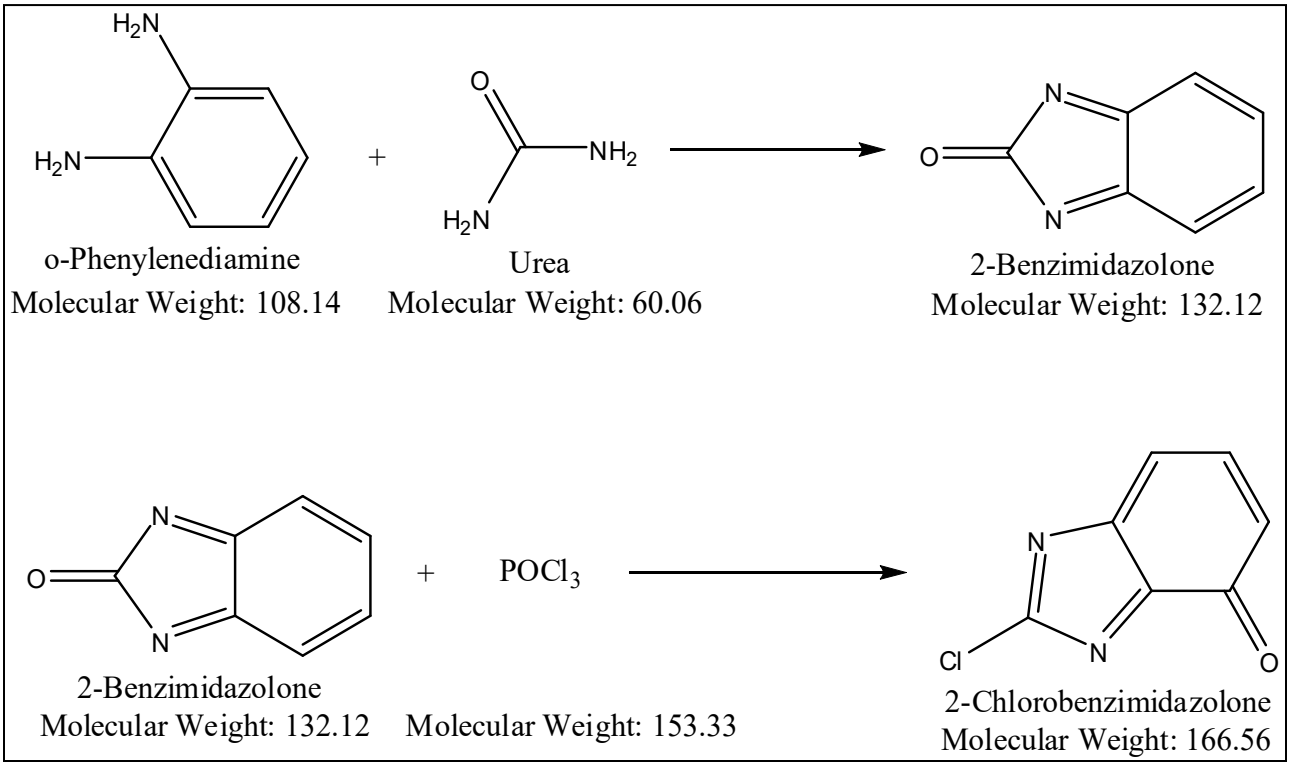
MANUFACTURING PROCESS:

OPDA is condensed with urea to get BI cake followed by filtartion & washing. BI cake is chlorinated withPOCl3, excess POCl3 distilled & recycled. Chloromass is quenched in water, filtered, neutralised with NaOH. Precipitated slurry is filtered, washed & dried to get crude product. Crude product is purified in solvent followed by activated carbon treatment and upon cooling crytallisation, filtration afford 2-Chlorobenzimidazole which is dried & packed.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

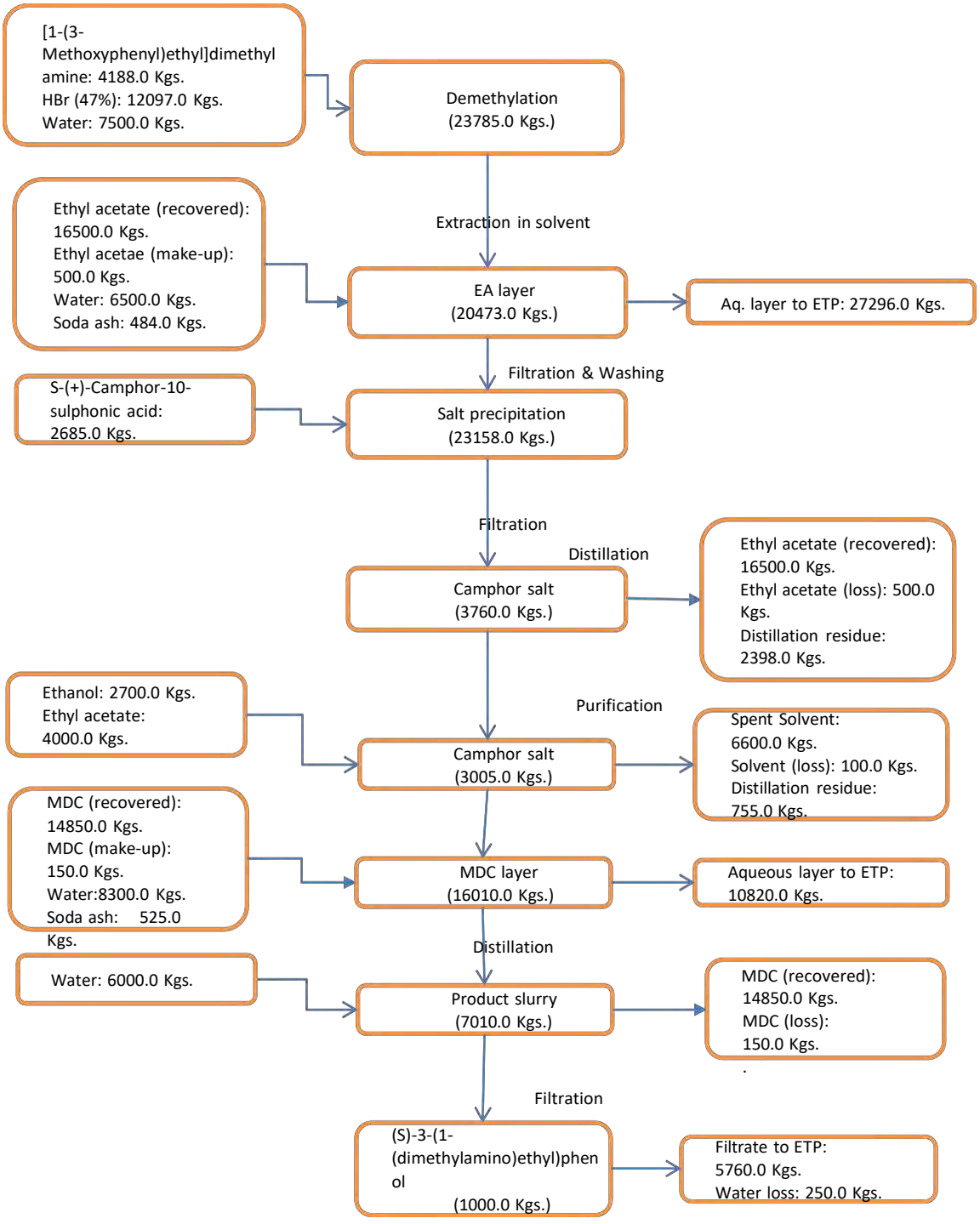
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	OPDA	1071.00	2-Chlorobenzimidazole	1000.00	Product
2	Urea	614.00	POCl3 (recovered)	16071.00	Loss
3	Sulphuric acid	1236.00	IPA (recovered)	12870.00	Reuse
4	NaOH (48%)	6643.00	IPA (loss)	130.00	Loss
5	POCl3 (recovered)	16071.00	Residue	620.00	Incineration
6	POCl3 (make-up)	2500.00	Carbon sludge	150.00	Resale
7	Dry HCl	357.00	Water loss	415.00	Incineration
8	IPA (recovered)	12870.00	Effluent	36906.00	ETP
9	IPA (make-up)	130.00			
10	Activated carbon	120.00			
11	Water	26550.00			
	Total	68162.00		68162.00	

40. PRODUCT: (S)-3-(1-(dimethylamino)ethyl)phenol

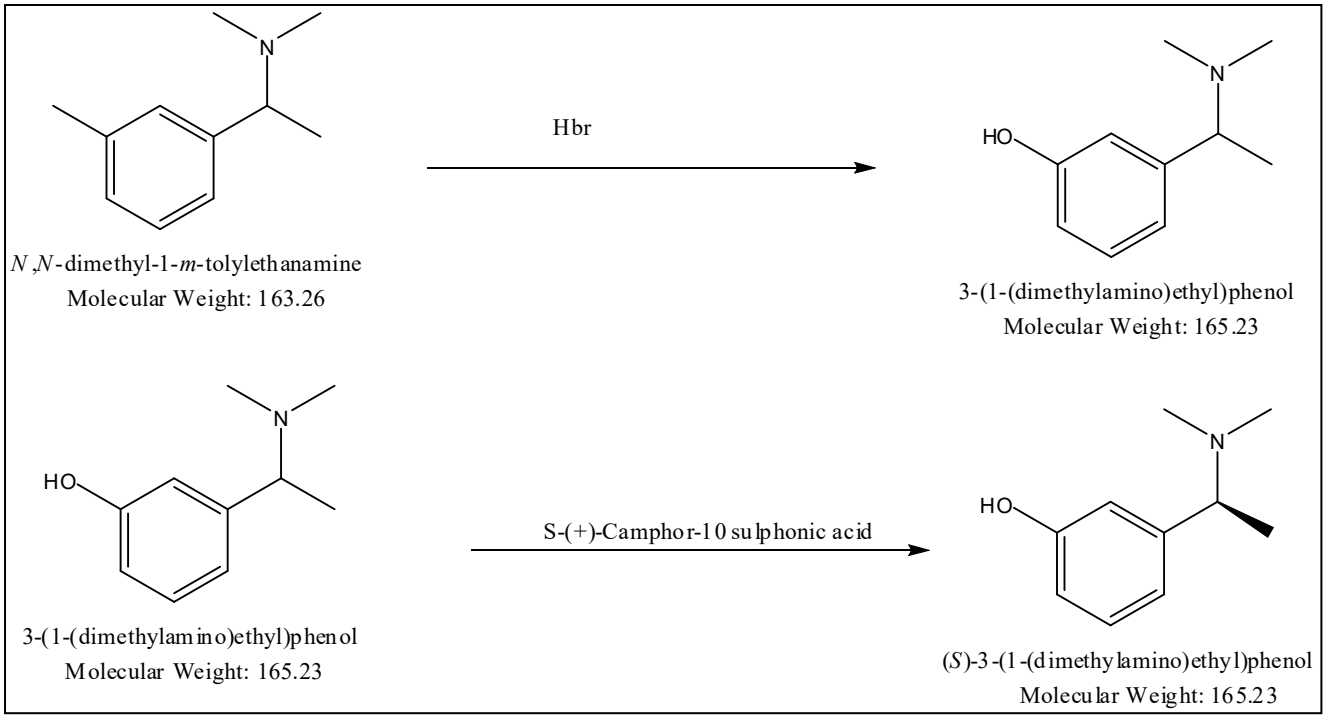
MANUFACTURING PROCESS:

[1-(3-Methoxyphenyl)ethyl]dimethyl amine is de methylated with HBr at elevated temperature and product is extracted in solvent. Product is resolved with resolving agent in solvent and filtered and again purified in solvent to afford cambhor salt. The camphor salt is taken in solvent and neutralised with aq soda ash solution. Layers are separated and solvent is distilled off and finally, product is filtered and dried.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

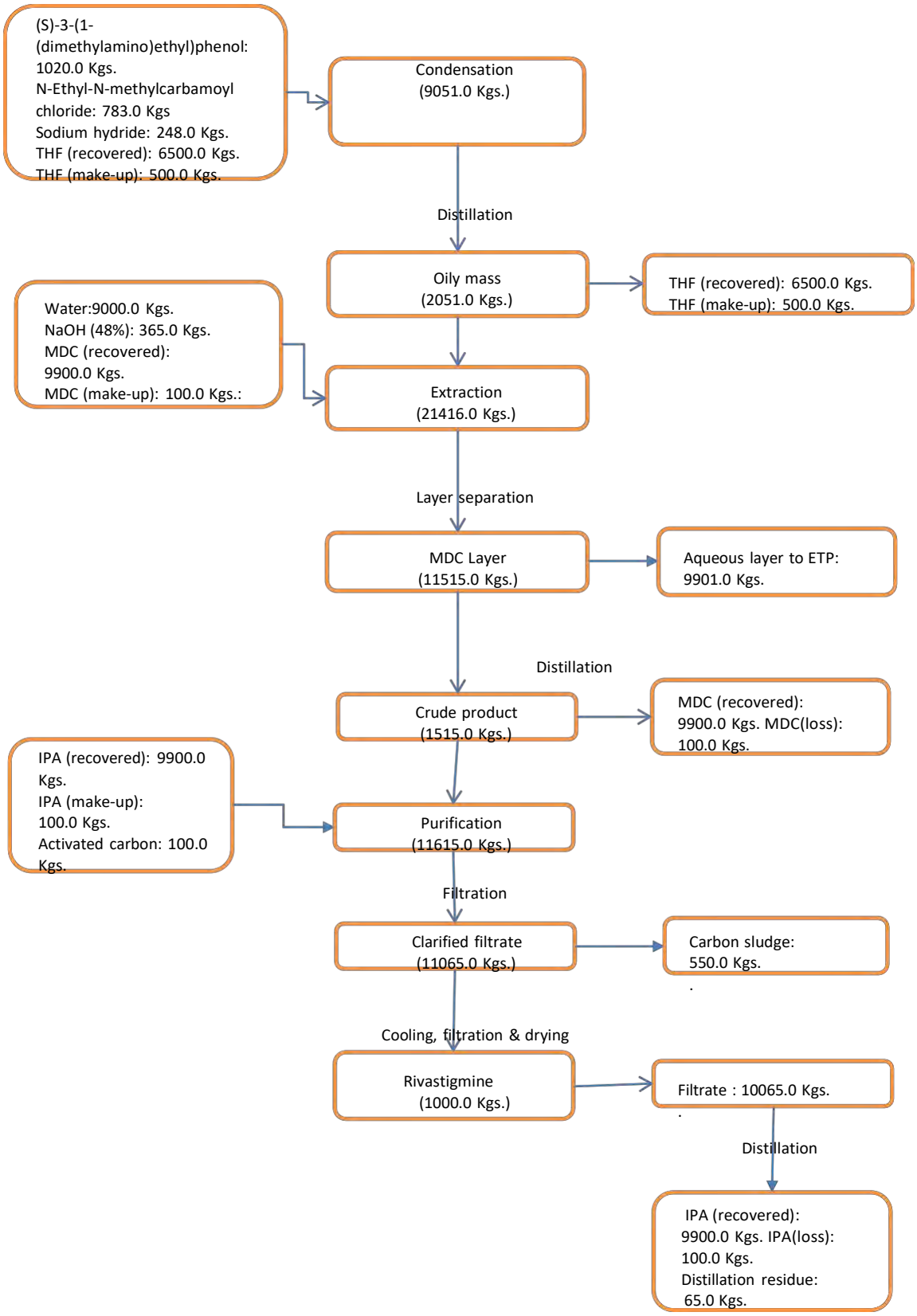
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	[1-(3-Methoxyphenyl)ethyl]dimethyl amine	4188.00	(S)-3-(1-(dimethylamino)ethyl)phenol	1000.00	Product
2	HBr (47%)	12097.00	Ethyl acetate (recovered)	16500.00	Reuse
3	Ethyl acetate (recovered)	16500.00	Ethyl acetate (loss)	500.00	Loss
4	Ethyl acetate (make-up))	500.00	MDC (recovered)	14850.00	Reuse
5	Soda ash	1009.00	MDC (loss)	150.00	Loss
6	S-(+)-Camphor-10-sulphonic acid	2685.00	Spent Solvent	6600.00	Sale
7	Ethanol	2700.00	Solvent (loss)	100.00	Loss
8	Ethyl acetate	4000.00	Distillation residue	3153.00	Incineration
9	MDC (recovered)	14850.00	Water loss	250.00	Loss
10	MDC (make-up)	150.00	Effluent	43876.00	ETP
11	Water	28300.00			
	Total	86979.00		86979.00	

41. PRODUCT: Rivastigmine

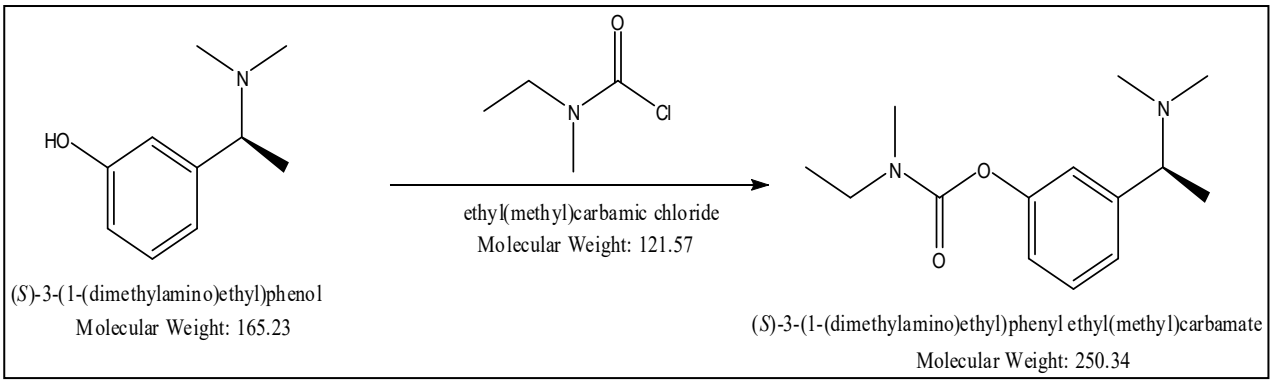
MANUFACTURING PROCESS:

(S)-3-(1-(dimethylamino)ethyl)phenol & N-Ethyi-N-methylcarbamoyl chloride is condensed & solvent is distilled off. Oily mass is extracted in solvent and crude product is obtained followed by filtration. Crude product is purified in solvent and crystalline to get the final product.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

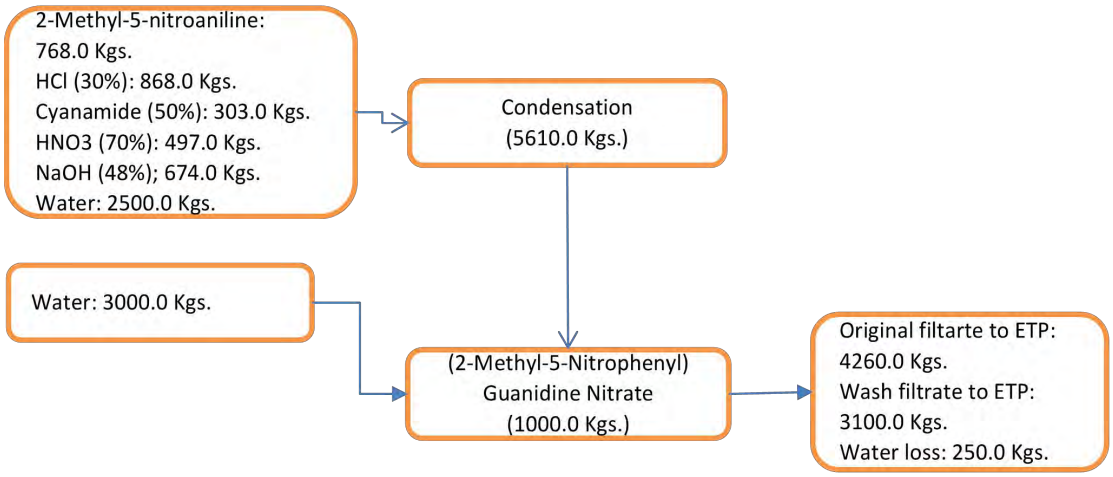
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	(S)-3-(1-(dimethylamino)ethyl)phenol	1020.00	Rivastigmine	1000.00	Product
2	N-Ethyl-N-methylcarbamoyl chloride	783.00	THF (reocvered)	6500.00	Reuse
3	Sodium hydride	248.00	THF (Loss)	500.00	Loss
4	THF (reocvered)	6500.00	MDC (recovered)	9900.00	Reuse
5	THF (make-up)	500.00	MDC (loss)	100.00	Loss
6	NaOH (48%)	365.00	IPA (recovered)	9900.00	Reuse
7	MDC (recovered)	9900.00	IPA (loss)	100.00	Loss
8	MDC (make-up)	100.00	Distillation residue	65.00	Incineration
9	IPA (recovered)	9900.00	carbon sludge	550.00	Incineration
10	IPA(make-up)	100.00	Effluent	9901.00	ETP
11	Activated carbon	100.00			
12	Water	9000.00			
	Total	38516.00		38516.00	

42. PRODUCT: (2-Methyi-5-Nitrophenyl) Guanidine Nitrate

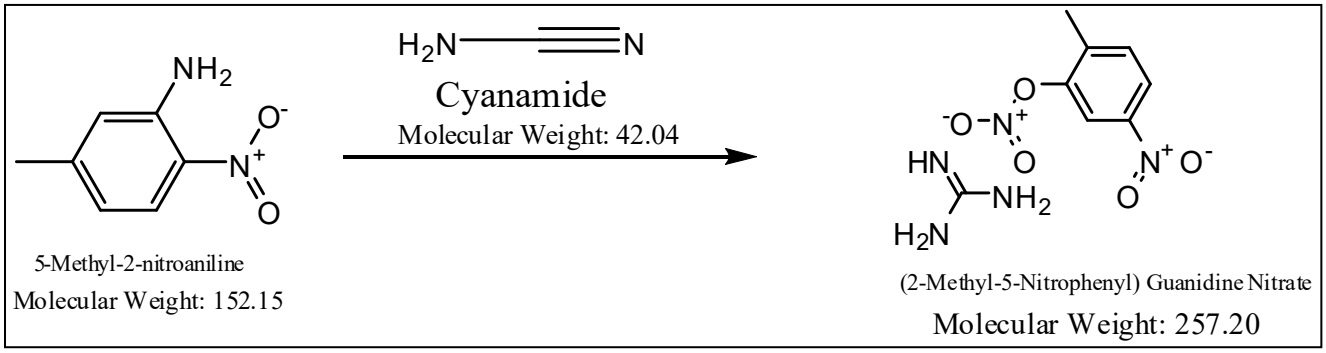
MANUFACTURING PROCESS:

2-Methyl-5-nitroaniline & cyanamide is condensed in presence of hydrochloric acid & nitric acid. Reaction mass is neutralized, filtered & dried to get the product.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

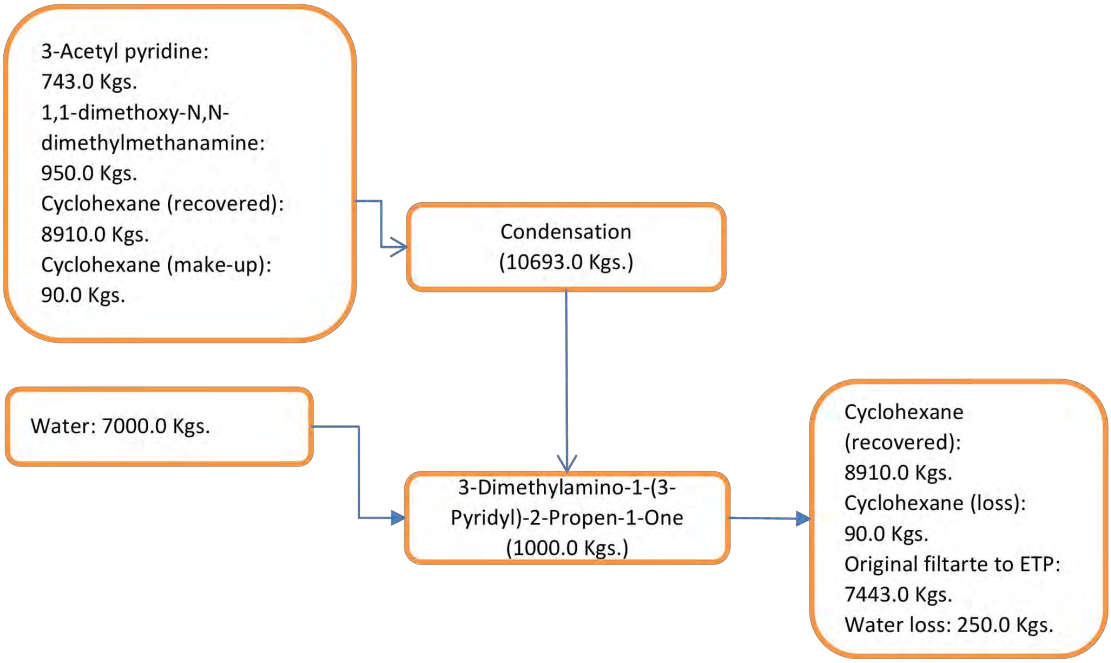
Sr.no.	Input	Qty.	Out put	Qty.	Remarks
1	2-Methyl-5-nitroaniline	768.00	(2-Methyl-5-Nitrophenyl) Guanidine Nitrate	1000.00	Product
2	HCl (30%)	868.00	Water loss	250.00	Loss
3	Cyanamide (50%)	303.00	Effluent	7360.00	RETP
4	HNO3 (70%)	497.00			
5	NaOH (48%)	674.00			
6	Water	5500.00			
	Total	8610.00		8610.00	

43. PRODUCT: 3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-0ne

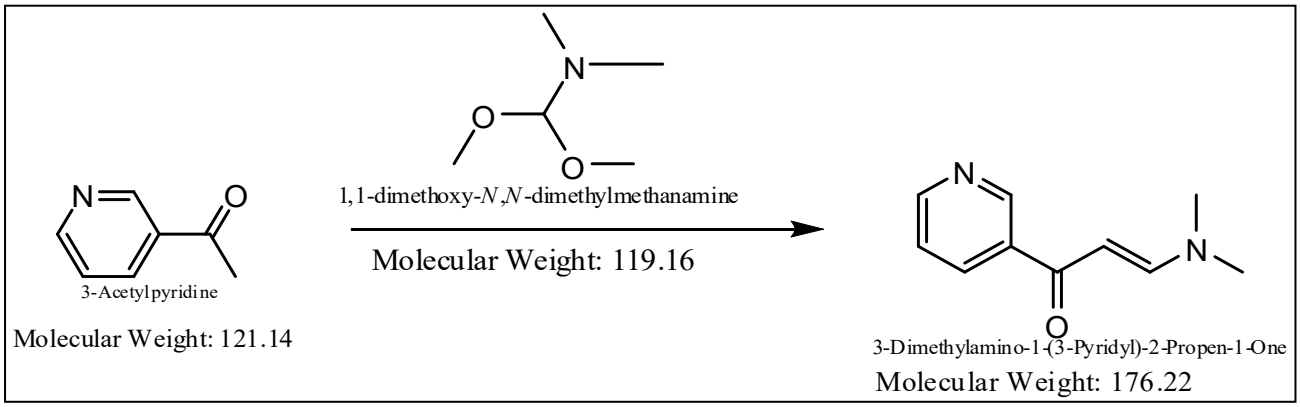
MANUFACTURING PROCESS:

3-Acetyl pyridine & 3-Dimethylamino-1-(3-Pyridyi)-2-Propen-1-0ne is condensed in presence of solvent at elevated temperature. Water is added, solvent is distilled off and product is obtained by filtration, washing & drying.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

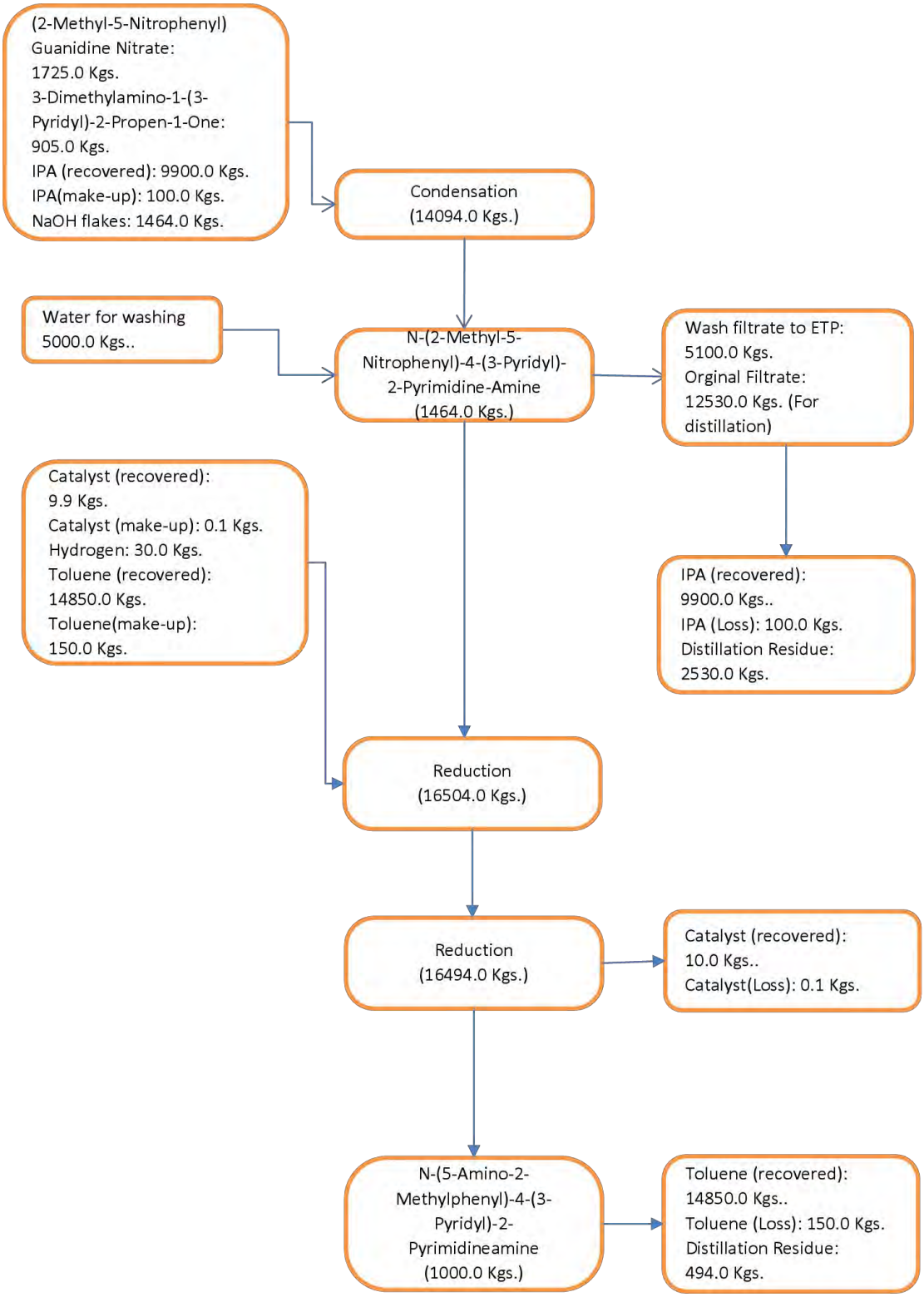
Sr.no.	Input	Qty.	Out put	Qty.	Remarks
1	3-Acetyl pyridine	743.00	3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-One	1000.00	Product
2	1,1-dimethoxy-N,N-dimethyl methanamine	950.00	Water loss	250.00	Loss
3	Cyclohexane (recovered)	8910.00	Cyclohexane (recovered)	8910.00	Reuse
4	Cyclohexane (make-up)	90.00	Cyclohexane loss)	90.00	Loss
5	Water	7000.00	Effluent	7443.00	ETP
6					
	Total	17693.00		17693.00	

44. PRODUCT: N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine

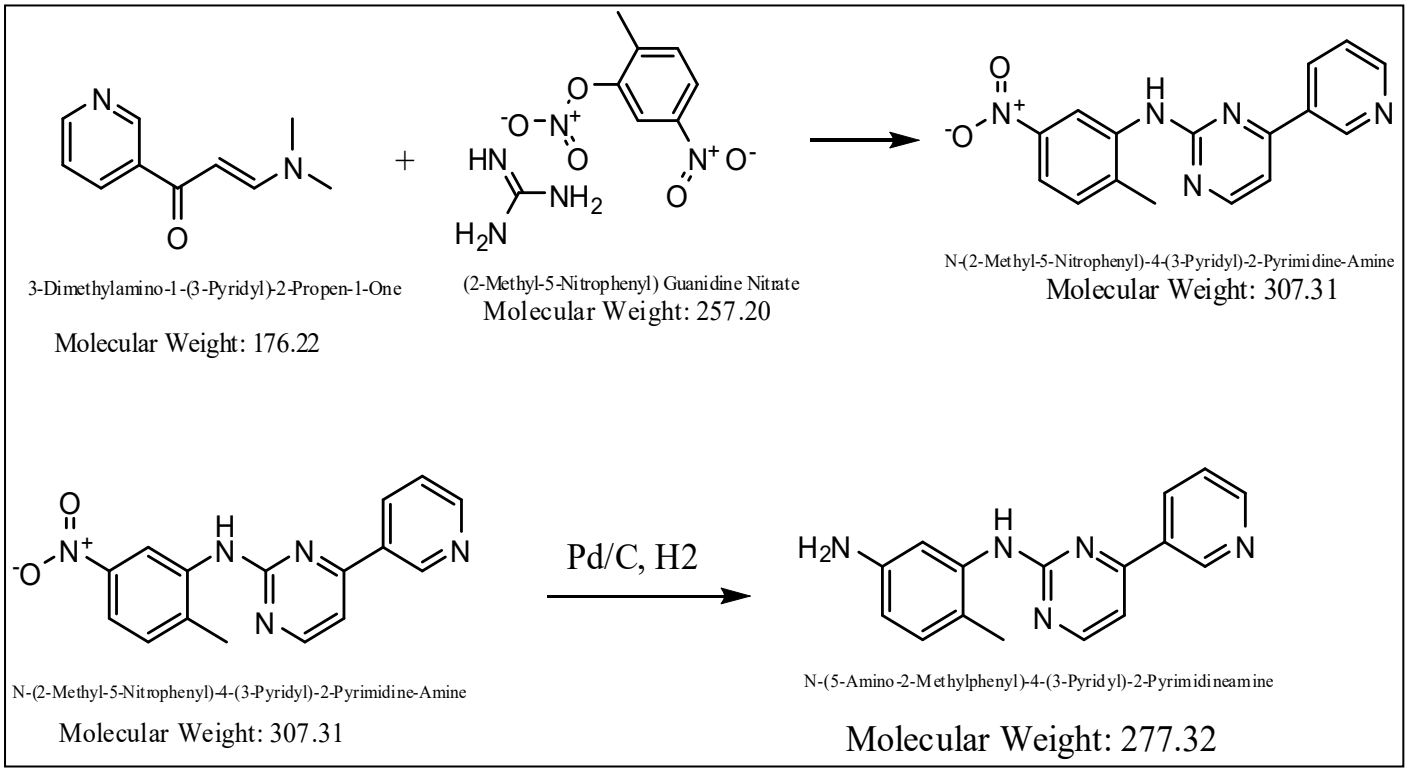
MANUFACTURING PROCESS:

(2-Methyl-5-Nitrophenyl) Guanidine Nitrate & 3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-One is condensed in presence of solvent at elevated telperature. Reaction mass is filtered, washed with water and intermediate product so obtained is subjected to catalytic hydrogen in presence of solvent. It is clarified to recover the catalyst, cooled, chilled & filtered the product. Product is dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

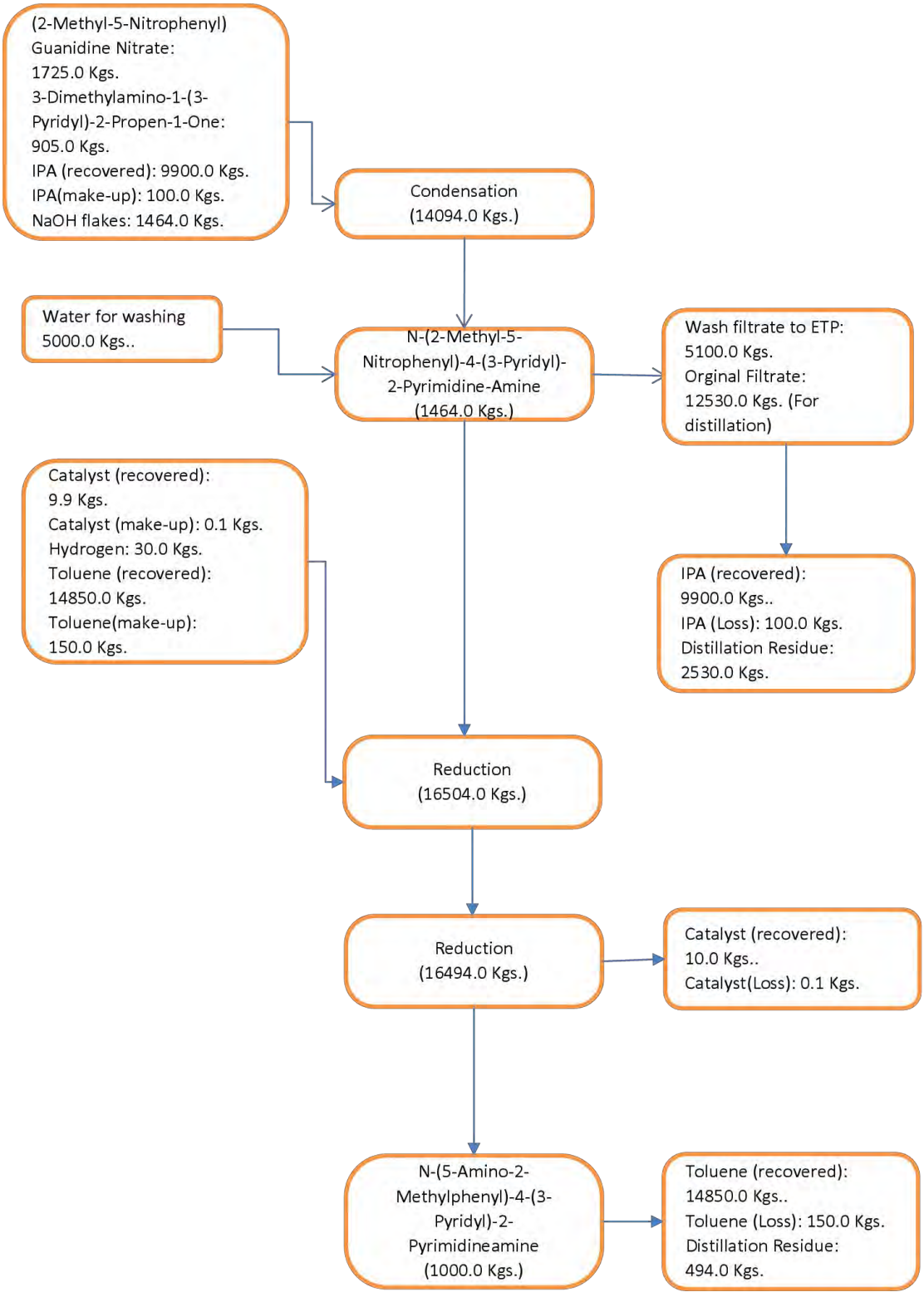
SR. NO.	Input	Qty.	Out put	Qty.	Remarks
1	(2-Methyl-5-Nitrophenyl) Guanidine Nitrate	1725.00	N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine	1000.00	Product
2	3-Dimethylamino-1-(3-Pyridyl)-2-Propen-1-One	905.00	IPA (recovered)	9900.00	Reuse
3	IPA (recovered)	9900.00	IPA (Loss)	100.00	Loss
4	IPA (make-up)	100.00	Catalyst (recovered)	9.90	Reuse
5	NaOH Flakes	1464.00	Catalyst (make-up)	0.10	Loss
6	Catalyst (recovered)	9.90	Toluene (recovered)	14850.00	Reuse
7	Catalyst (make-up)	0.10	Toluene (make-up)	150.00	Loss
8	Hydrogen	30.00	distillation residue	3024.00	Incineration
9	Toluene (recovered)	14850.00	Effluent	5100.00	ETP
10	Toluene (make-up)	150.00			
11	Water	5000.00			
	Total	34134.00		34134.00	

45. PRODUCT: Imatinib Mesylate

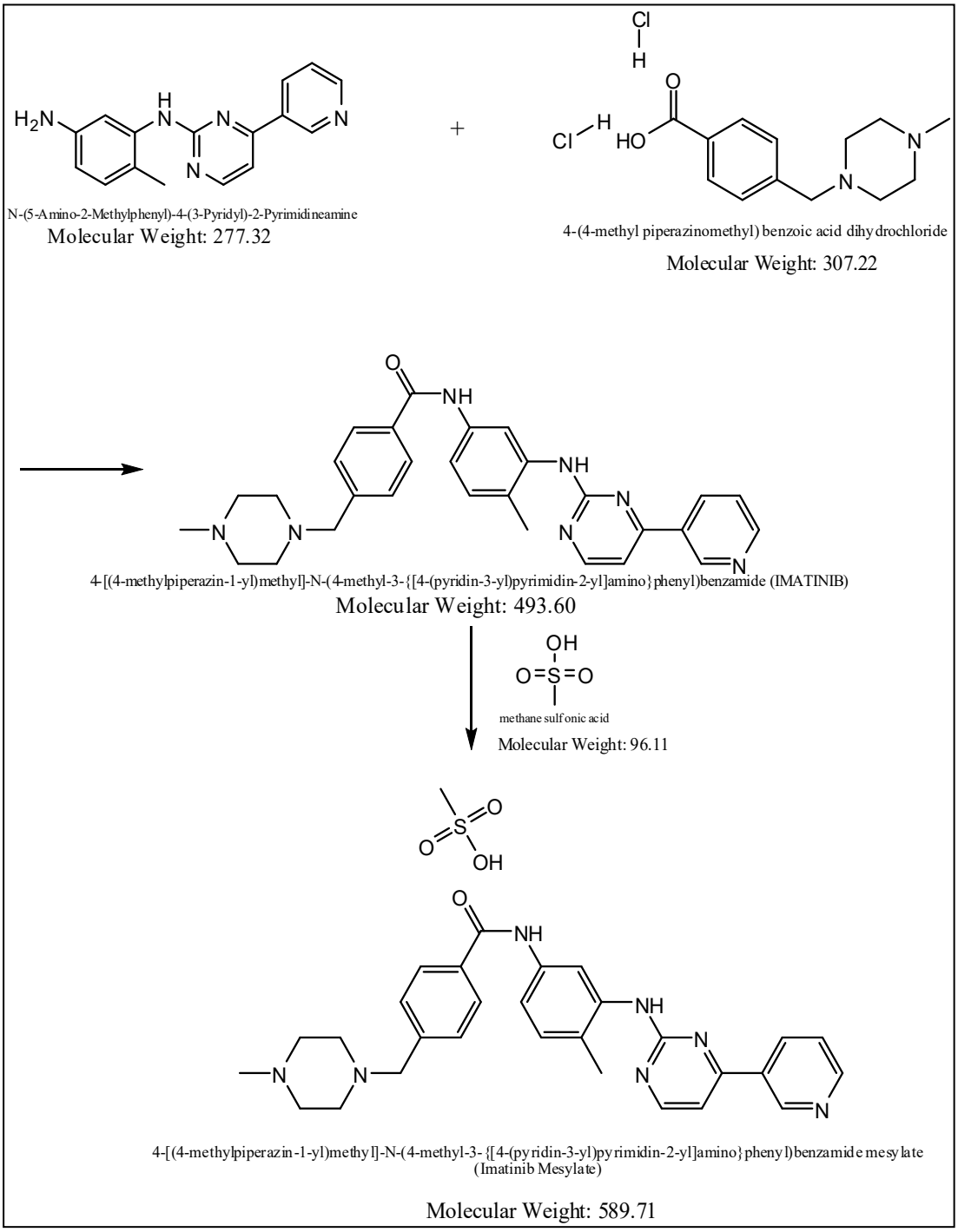
MANUFACTURING PROCESS:

N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine & 4-(4-methyl piperazinomethyl) benzoic acid dihydrochloride is reacted in presence of solvent at elevated temperature and thionyl chloride is added. Solvent is distilled off and reaction mass is filtered, washed with water and dried to afford crude imatinib base. It is purified in solvent by adding activated charcoal at elevated temperature, clarified and cooled. Methane sulfonic acid is added to preecipitate the salt which is filtered & dried.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

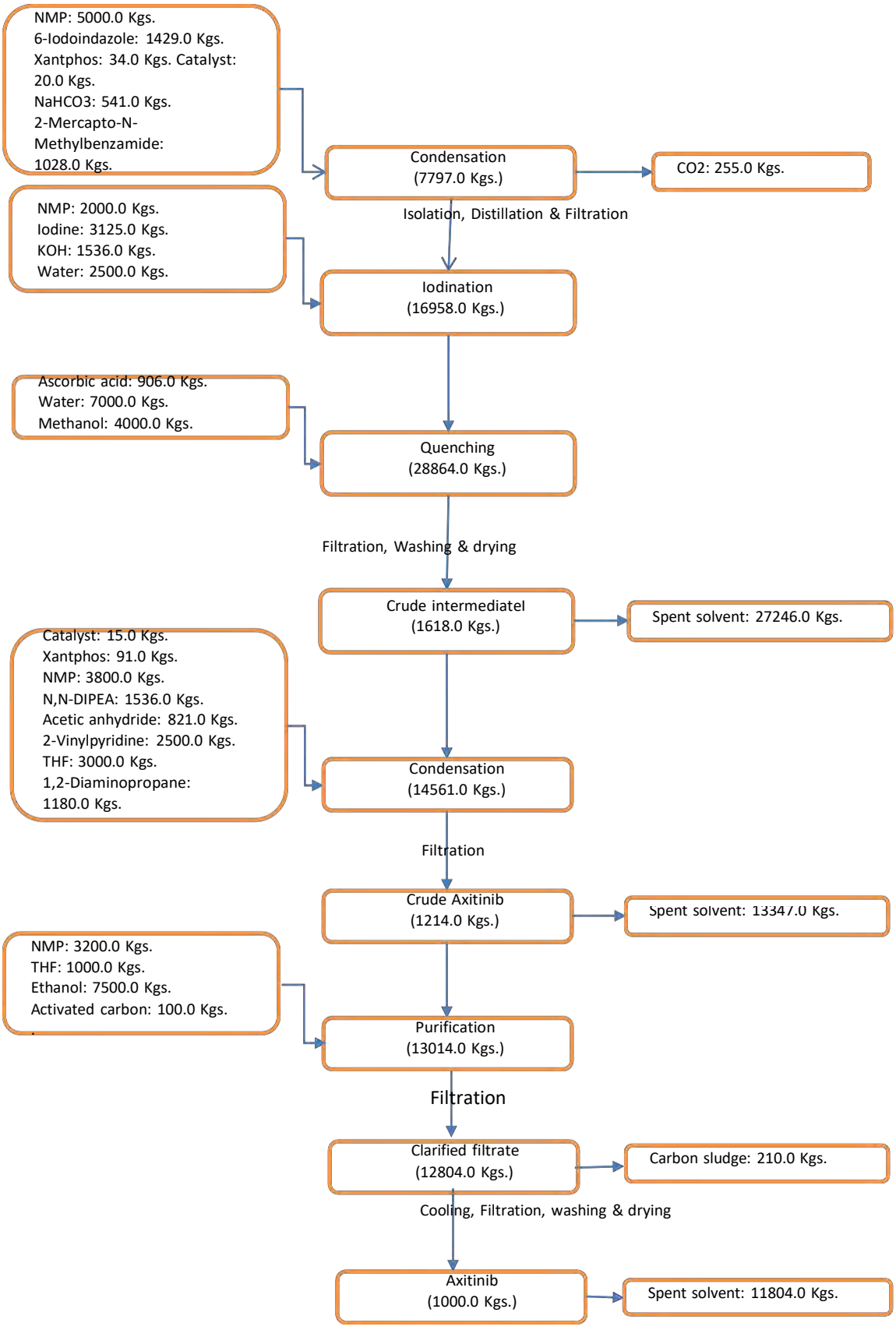
Sr.no.	Input	Qty.	Out put	Qty.	Remarks
1	N-(5-Amino-2-Methylphenyl)-4-(3-Pyridyl)-2-Pyrimidineamine	732.00	Imatinib Mesylate	1000.00	Product
2	4-(4-methyl piperazinomethyl) benzoic acid dihydrochloride	899.00	Toluene (recovered)	9900.00	Reuse
3	Toluene (recovered)	9900.00	Toluene (make-up)	100.00	Loss
4	Toluene (make-up)	100.00	IPA (recovered)	9900.00	Reuse
5	Thionyl chloride	366.00	IPA (Loss)	100.00	Loss
6	NaOH (48%)	1540.00	Carbon sludge	210.00	Incineration
7	IPA (recovered)	9900.00	Distillation residue	235.00	Incineration
8	IPA (make-up)	100.00	Effluent	9440.00	ETP
9	Activated carbon	150.00			
10	Methane sulfonic acid	198.00			
11	Water	7000.00			
	Total	30885.00		30885.00	

46. PRODUCT: Axitinib

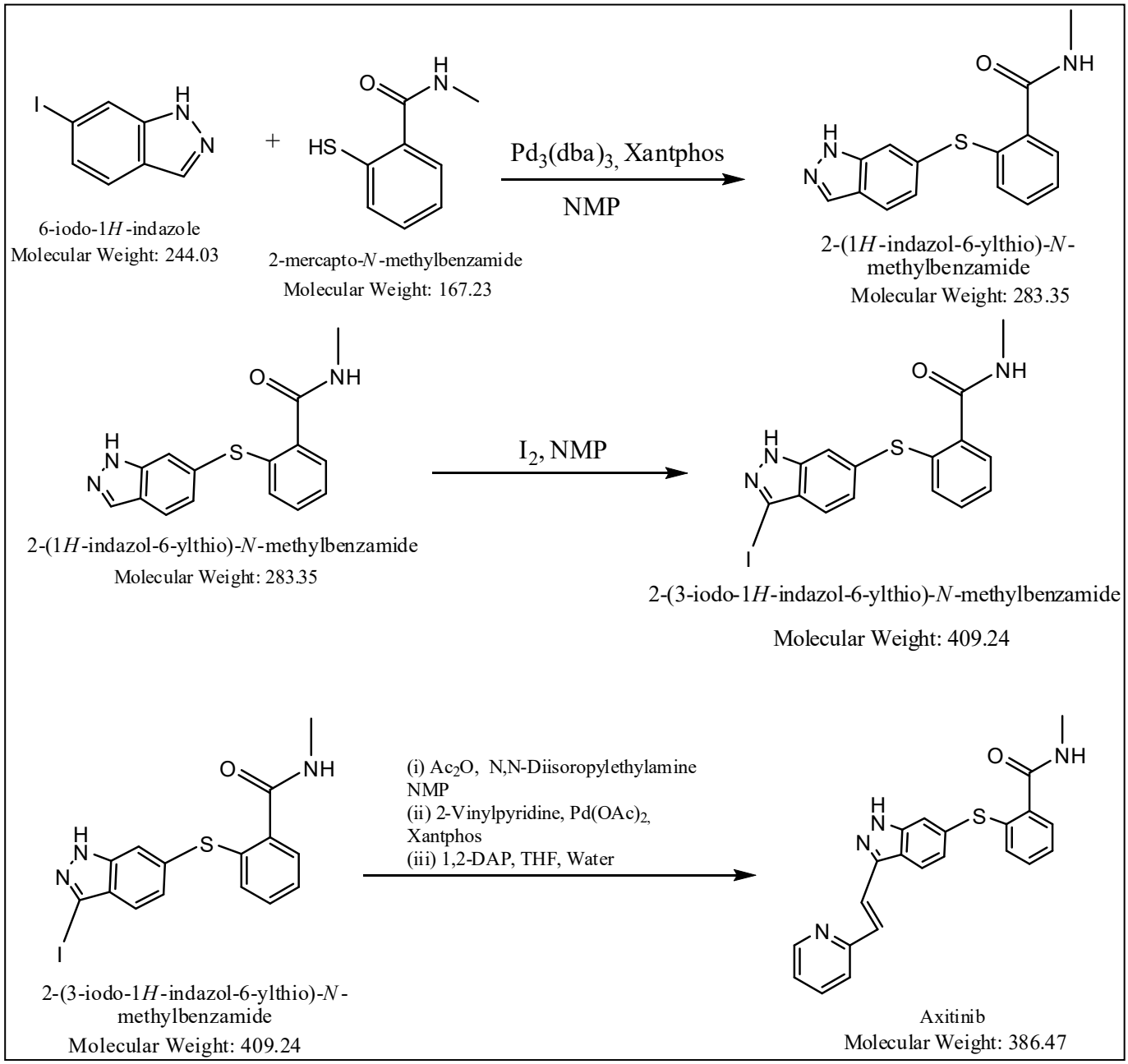
MANUFACTURING PROCESS:

6-Nitroindazole & 2-Methyl-N-methylbenzamine is reacted in presence of catalyst and then added a solution of iodine in solvent. Reaction mass is quenched in a solution of ascorbic acid in water methanol mixture. Crude intermediate is filtered, washed & dried. This intermediate is then reacted with 20Vinylpyridine in presence of acetic anyhydride & catalyst. Reaction mass is filterd to affford crude product. It is purified in mixture of solvent followed bt charcoal treatment, filtration, washing & drying yield Axitinib.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

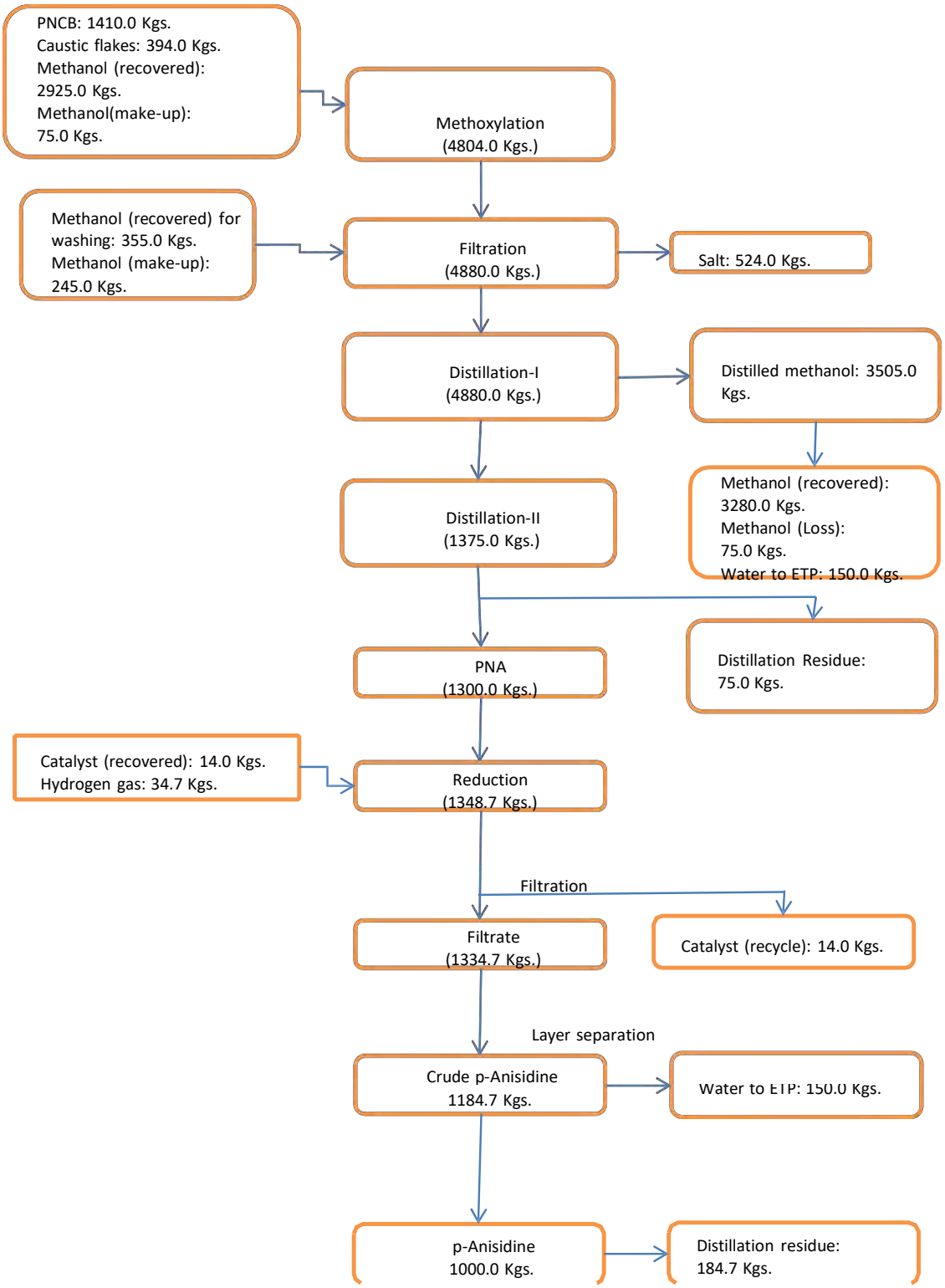
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	6-Iodoindazole	1429.00	Axitinib	1000.00	Product
2	NMP	14000.00	CO2	255.00	Resale
3	Xantphos	125.00	Carbon sludge	210.00	Incineration
4	Catalyst	35.00	Spent solvent	52397.00	Recovery/Incineration
5	NaHCO3	541.00			
6	2-Mercapto-N-methylbenzamide	1028.00			
7	Iodine	3125.00			
8	KOH	1536.00			
9	Ascorbic acid	906.00			
10	Methanol	4000.00			
11	N,N-DIPEA	1536.00			
12	Acetic anhydride	821.00			
13	2-Vinylpyridine	2500.00			
14	THF	4000.00			
15	1,2-Diaminopropane	1180.00			
16	Activated carbon	100.00			
17	Ethanol	7500.00			
18	Water	9500.00			
	Total	53862.00		53862.00	

47. PRODUCT: p-Anisidine

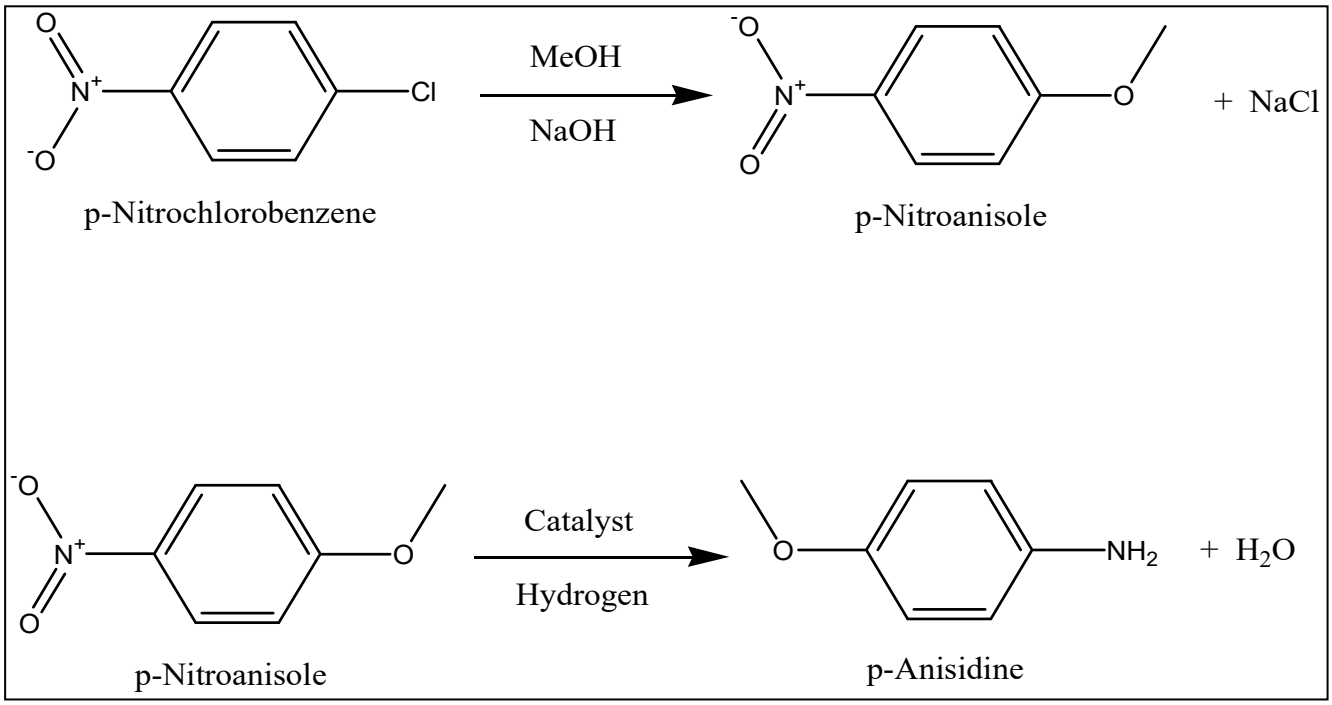
MANUFACTURING PROCESS:

p-Nitrochlorobenzene (PNCB) is reacted with caustic flakes in methanol at elevated temperature, reaction mass is filtered and crude p-Nitroanisole (PNA) is obtained followed by distillation of methanol. crude PNA is distilled to obtain pure PNA. Pure PNA is reduced by hydrogen at elevated temperature in presence of catalyst. Crude p-Anisidine (PA) is obtained by filtration followed by layer separation. Crude PA is distilled to get pure PA.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

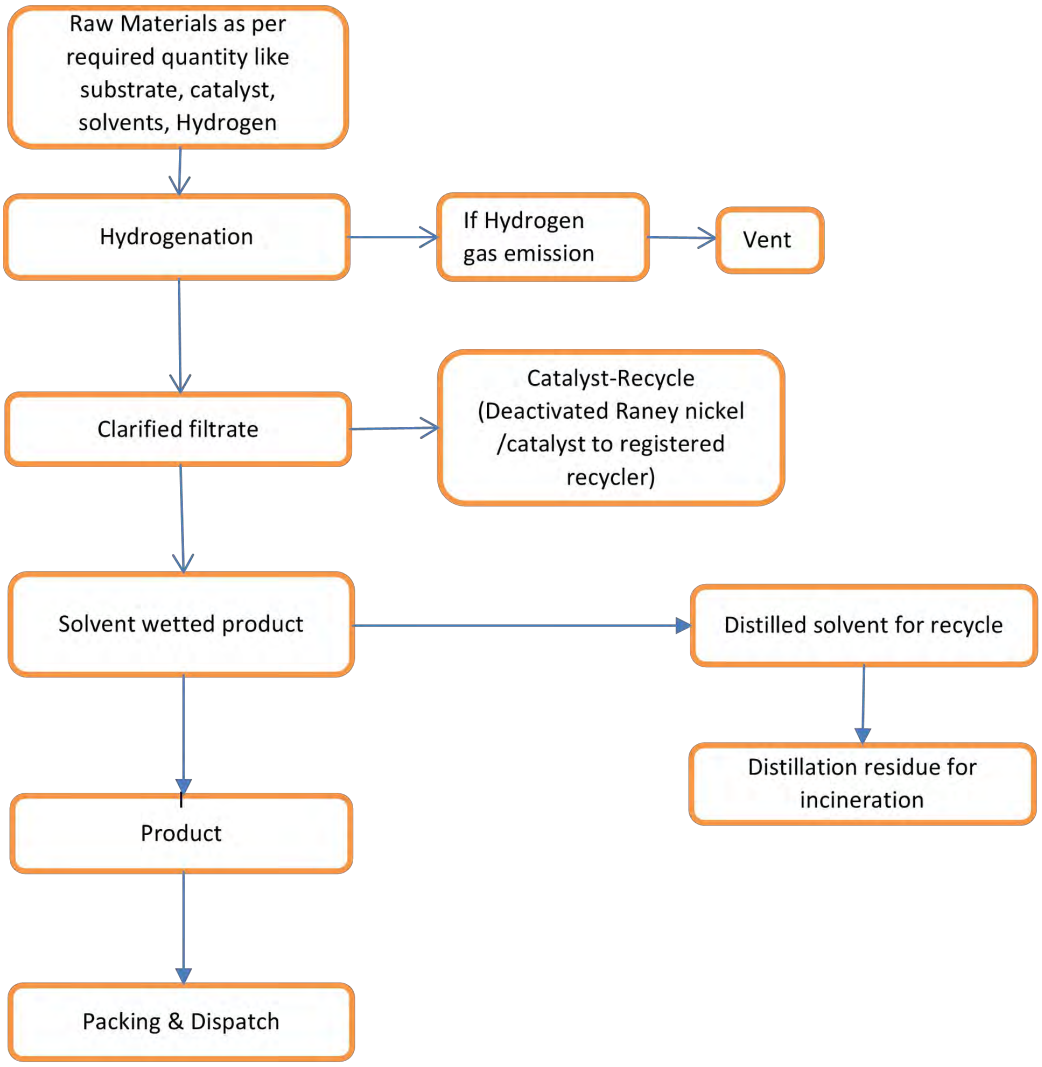
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	PNCB	1410.00	p-Anisidine	1000.00	Product
2	Caustic flakes	394.00	Methanol (recovered)	3280.00	Reuse
3	Methanol (recovered)	3280.00	Methanol (loss)	75.00	
4	Methanol (make-up)	320.00	Catalyst (recovered)	14.00	Reuse
5	Catalyst (recovered)	14.00	Salt	524.00	Resale
6	Hydrogen gas	34.70	Distillation residue	259.70	Incineration
7	Water	950.00	Effluent	1250.00	ETP
	Total	6402.70		6402.70	

PRODUCT: Catalytic Hydrogenation (Under required conditions as per requirement (like Nitro to amino, keto to alcohol, debenzoylation, aromatisation, dearomatisation etc.))

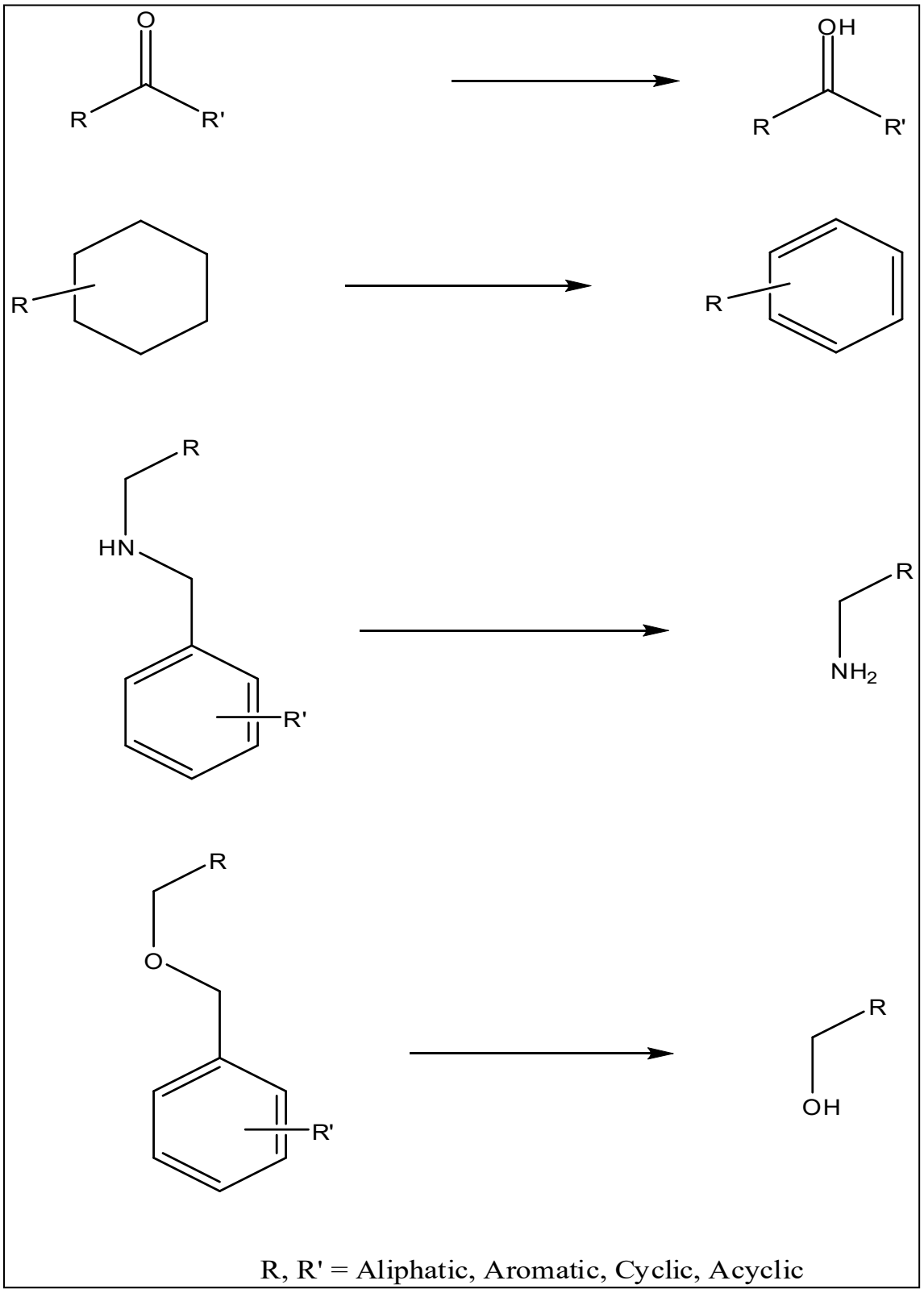
MANUFACTURING PROCESS:

Raw Materials are charged into reactors and subjected to hydrogenation / dehydrogenation as per requirements. After reaction is over, filtered the catalyst for recycle clarified filtrate is subjected to crystallisation. It is then filtered, dried & packed. Solvent is recovered & rercycled.

PROCESS FLOW CHART:



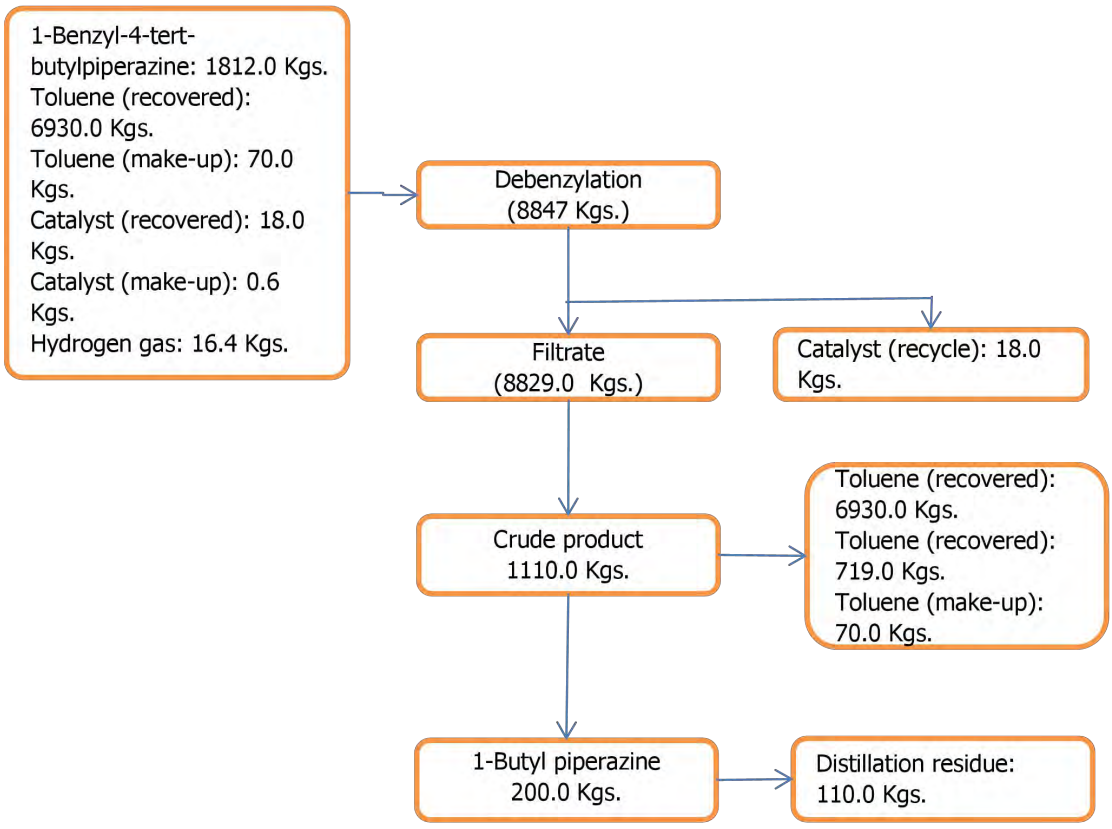
CHEMICAL REACTION:



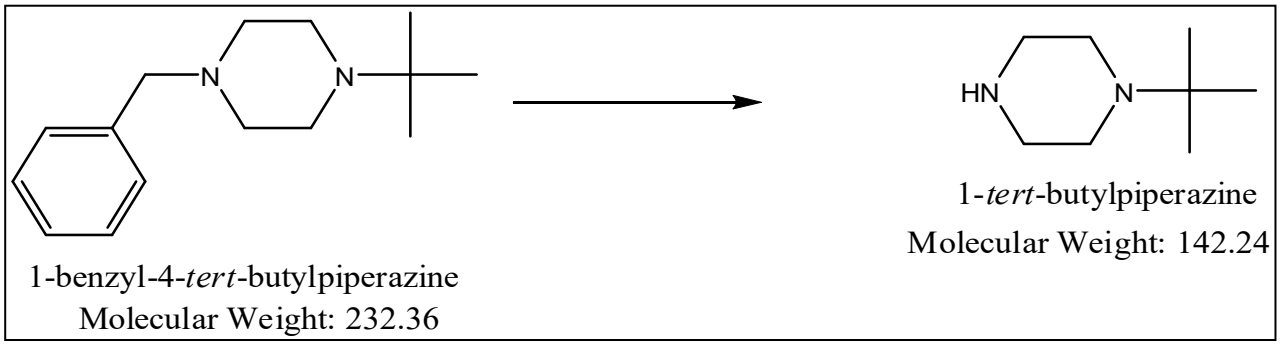
48. PRODUCT: 1-Butyl piperazine

MANUFACTURING PROCESS:
1-Benzyl-4-tert-butylpiperazine is dehydrogenated by hydrogen at elevated temperature in presence of catalyst. Crude product) is obtained by filtration followed by solvent distillation. Crude product is distilled to get pure 1-Butyl piperazine.

PROCESS FLOW CHART:



CHEMICAL REACTION:



1-benzyl-4-*tert*-butylpiperazine
Molecular Weight: 232.36

1-*tert*-butylpiperazine
Molecular Weight: 142.24

MASS BALANCE:

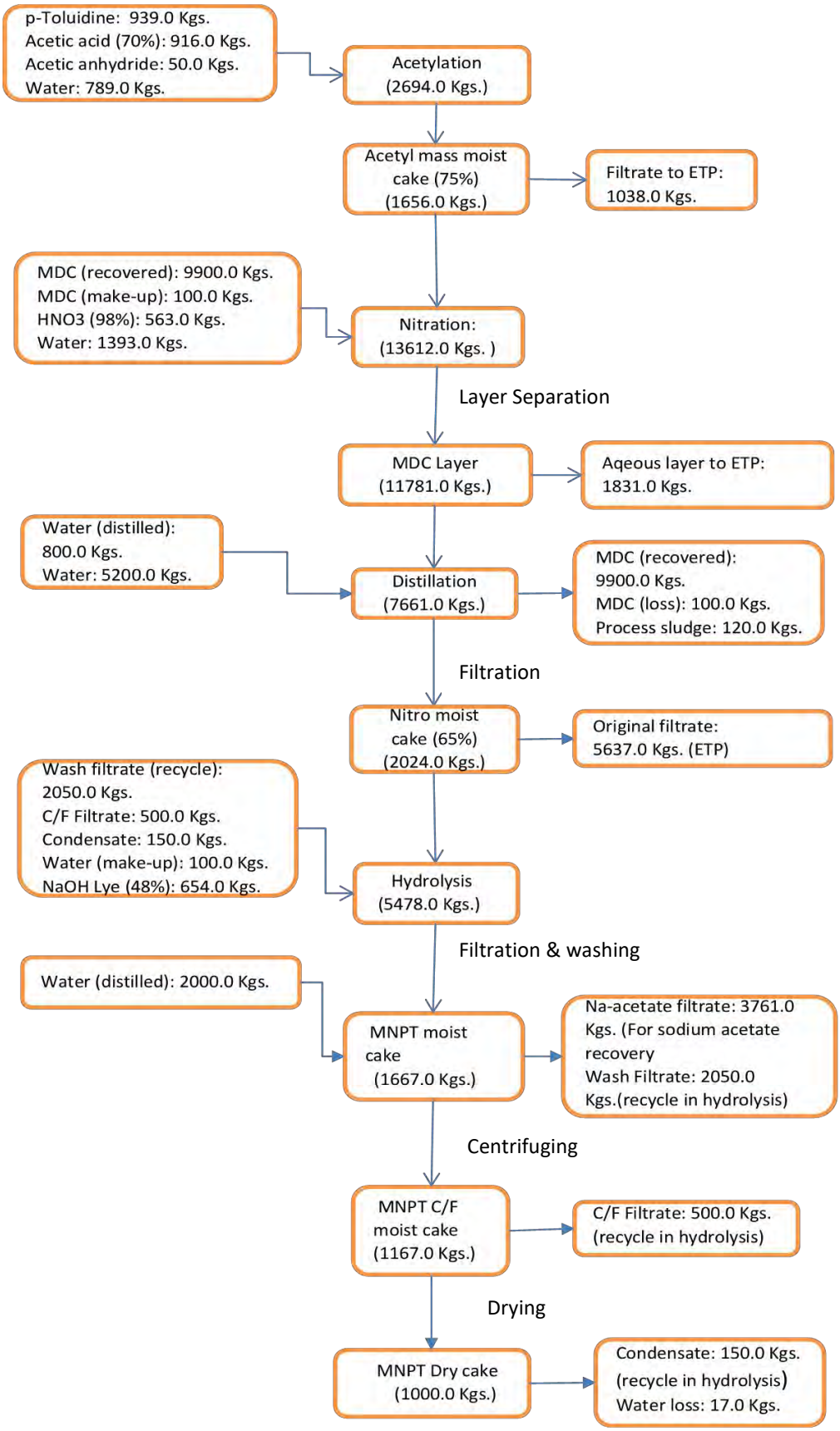
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	1-Benzyl-4-tert-butylpiperazine	1812.00	1-Butyl piperazine	1000.00	Product
2	Toluene (recovered)	6930.00	Toluene (recovered)	6930.00	Reuse
3	Toluene(make-up)	70.00	Toluene (Recovered)	719.00	Sale
4	Catalyst (recovered)	18.00	Toluene (Loss)	70.00	Loss
5	Catalyst (make-up)	0.60	Catalyst (recovered)	18.00	Reuse
6	Hydrogen gas	16.40	Distillation residue	110.00	Incineration
7	Water	300.00	Water Loss	50.00	Loss
			Effluent	250.00	ETP
	Total	9147.00		9147.00	

49. PRODUCT: MNPT

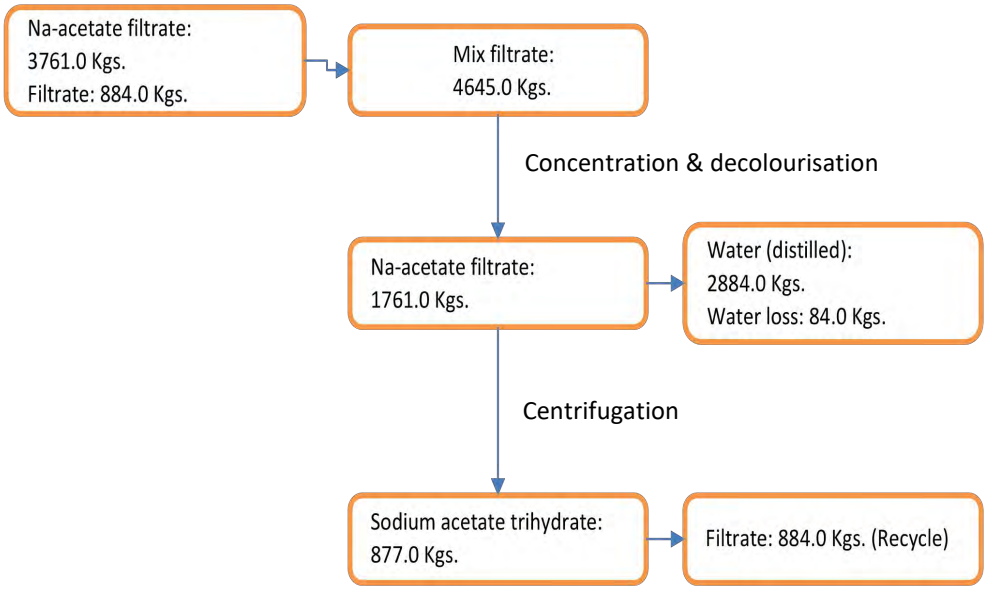
MANUFACTURING PROCESS:

p-Toluidine is acetylated with acetic acid & acetic anhydride & resulting acetyl mass after work up is nitrated with nitric acid in MDC as solvent. Excess nitric acid is removed by water wash and then solvent is distilled out & nitro is filtered. Nitro is hydrolysed in dilute NaOH solution, filtered, washed & dried to get final product. Original filtate of hydrolysis is taken for Sodium acetate recovery.

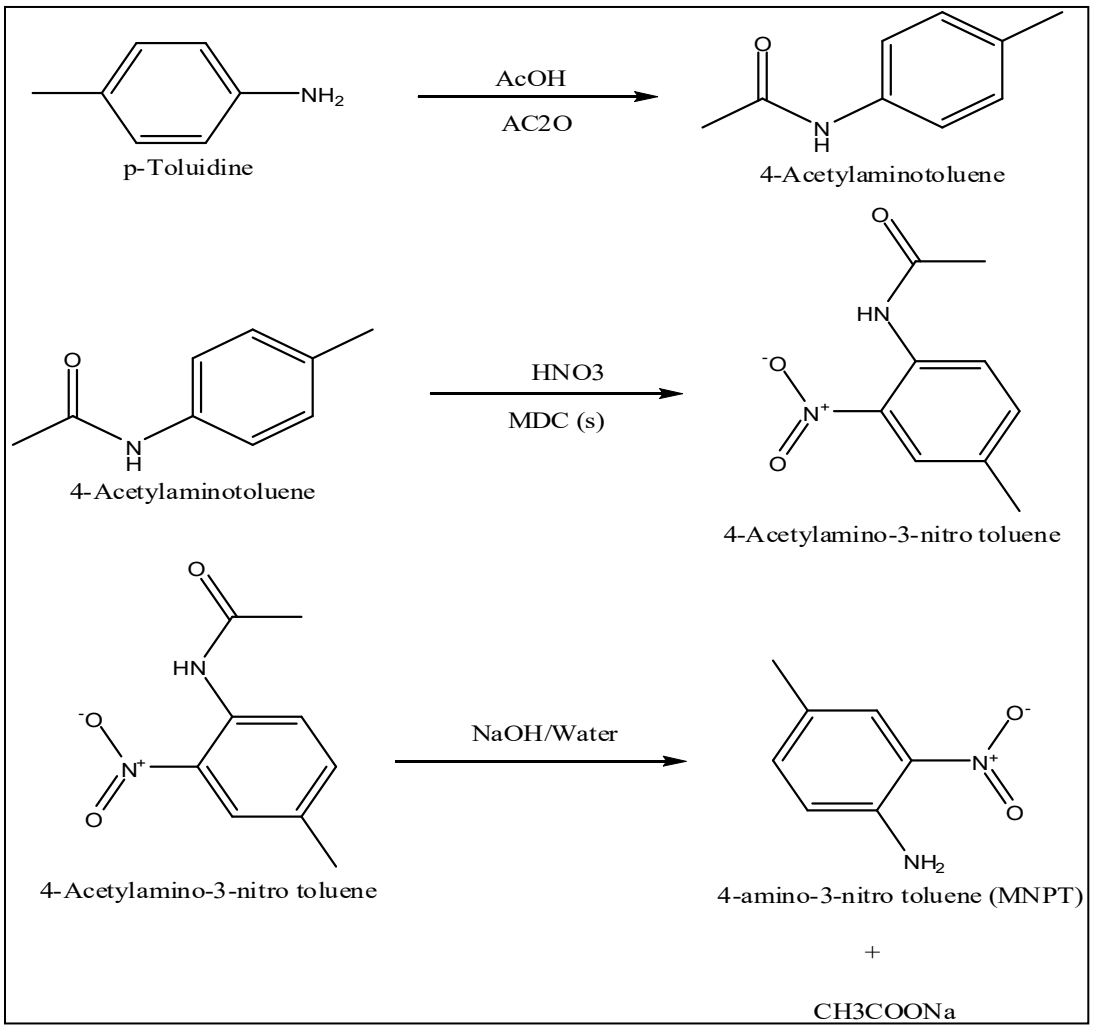
PROCESS FLOW CHART:



Recovery of Sodium acetate, trihydrate:



CHEMICAL REACTION:



MASS BALANCE:

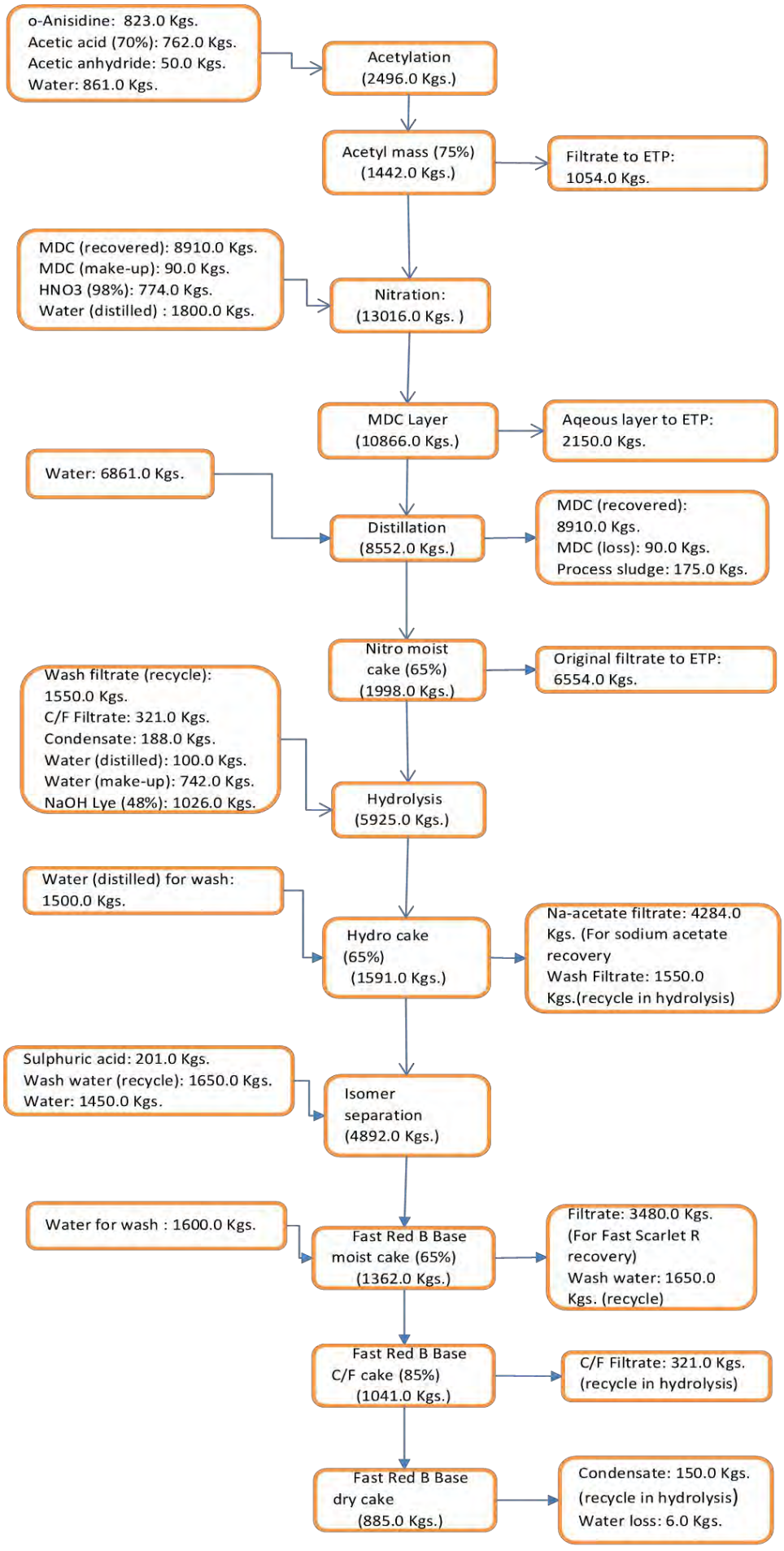
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	p-Toluidine	939.00	MNPT	1000.00	Product
4	Acetic anhydride	50.00	Sodium acetate trihydrate	877.00	Product
5	MDC (recovered)	9900.00			
6	MDC (make-up)	100.00	MDC (recovered)	9900.00	Recycle
7	HNO3(98%)	563.00	MDC (Loss)	100.00	Loss
8	Wash filtrate	2050.00	Process sludge	120.00	Incineration
9	C/F Filtrate	500.00	Water (distilled)	2800.00	Recycle
10	Condensate	150.00	Wash filtrate	2050.00	Recycle
11	NaOH Lye (48%)	654.00	C/F Filtrate	500.00	Recycle
12	Water	7482.00	Condensate	150.00	Recycle
13	water (distilled)	2800	Water loss	101.00	Loss
14	Acitic Acid (70%)	916	Effluent	8506.00	ETP
	Total	26104.00		26104.00	

50. Fast Red B Base & Fast Scarlet R Base

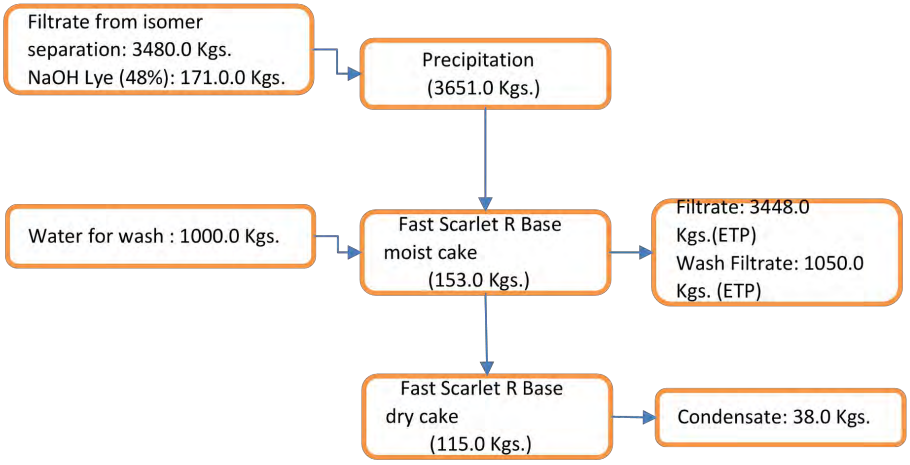
MANUFACTURING PROCESS:

o-Anisidine is acetylated with acetic acid & acetic anhydride & resulting acetyl mass after work up is nitrated with nitric acid in MDC as solvent. Excess nitric acid is removed by water wash and then solvent is distilled out & nitro is filtered. Nitro is hydrolysed in dilute NaOH solution, filtered & washed to get hydro cake. Hydrocake is treated with dilute sulphuric acid, filtered washed and dried to get Fast red B Base. Filtrate from isomer separation is treated with NaOh lye, filtered, washed and dried to get Fast Scarlet R Base. Original filtate of hydrolysis is taken for Sodium acetate recovery.

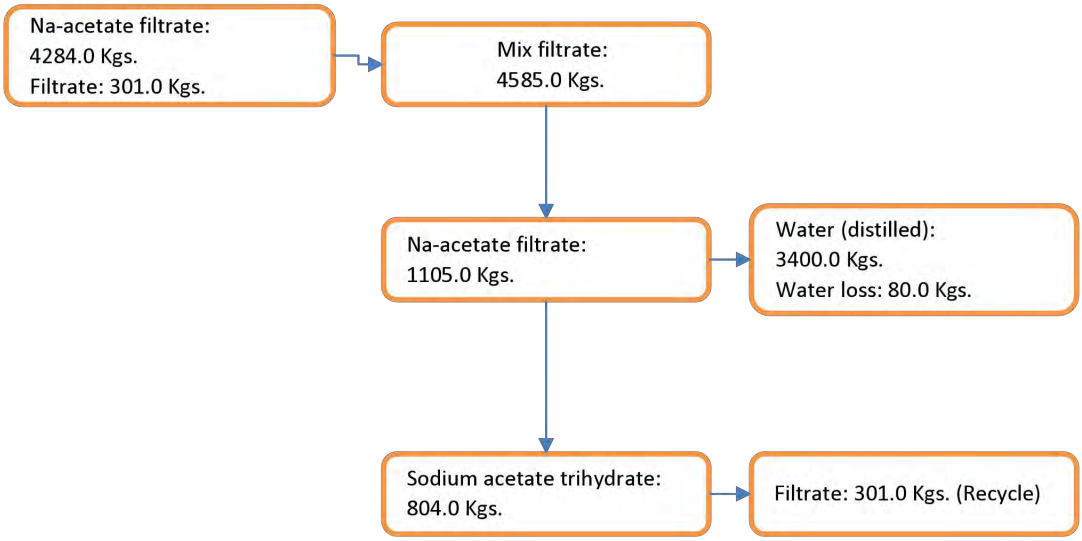
PROCESS FLOW CHART:



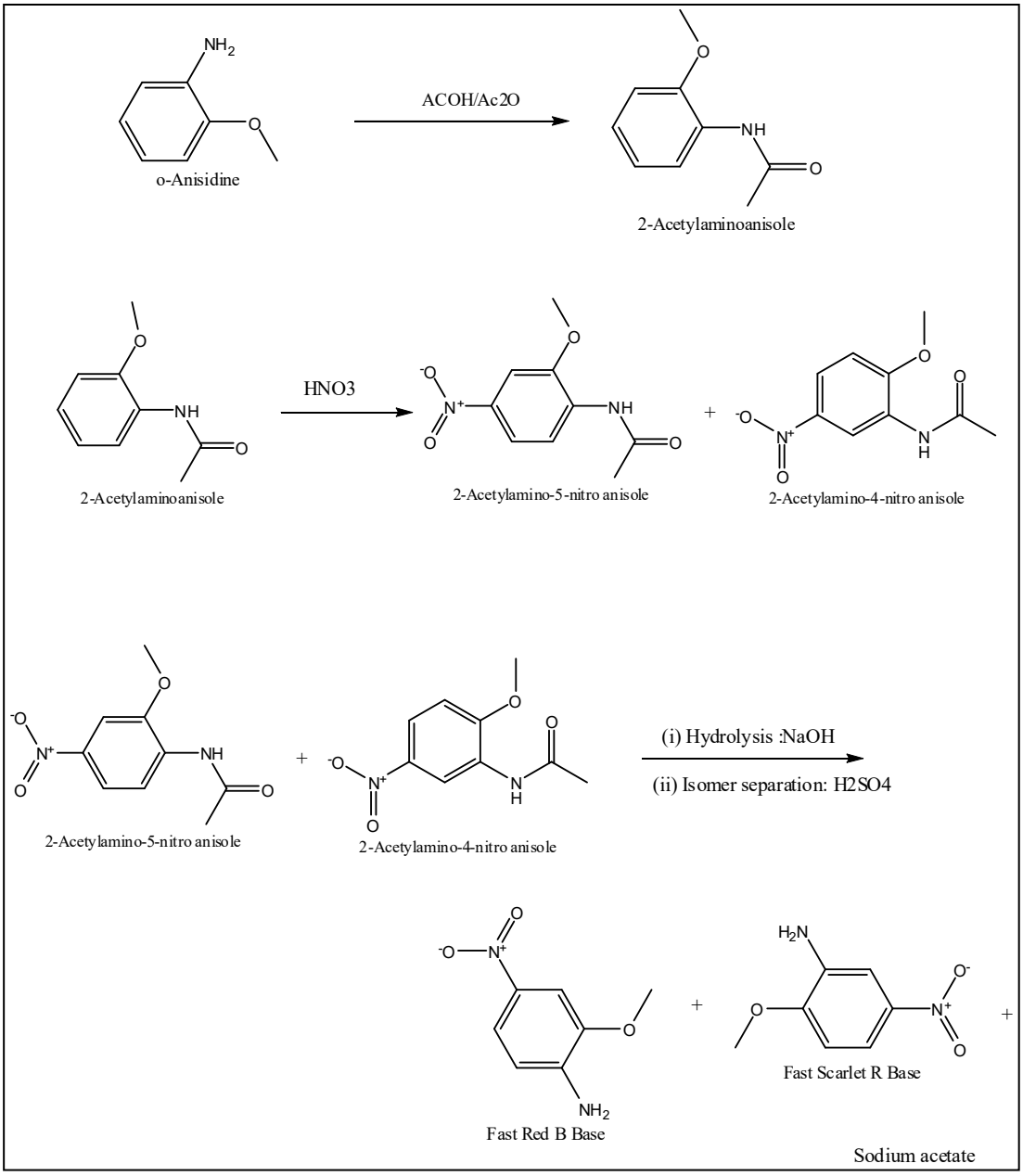
Recovery of Fast Scarlet R Base



Recovery of Sodium acetate, trihydrate



CHEMICAL REACTION:



MASS BALANCE:

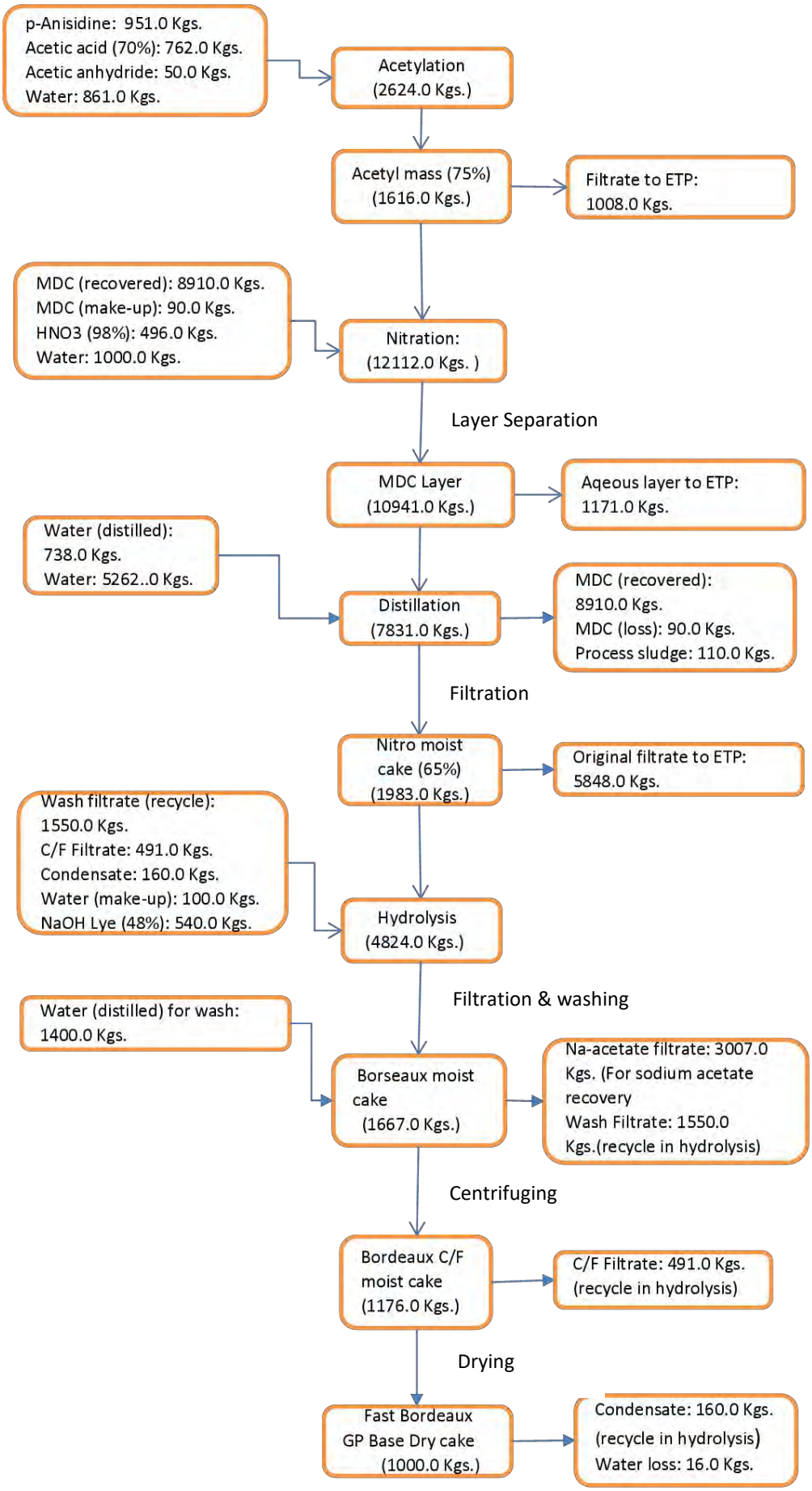
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	o-Anisidine	823.00	Fast Red B Base/Fast Scarlet R Base	1000.00	Product
2	Acetic acid (70%)	762.00	Fast Scarlet R Base	115.00	Co-product
3	Acetic anhydride	50.00	Sodium acetate trihydrate	804.00	Bye-product
4	MDC (recovered)	8910.00	MDC (recovered)	8910.00	Recycle
5	MDC (make-up)	90.00	MDC (Loss)	90.00	Loss
6	HNO3(98%)	774.00	Process sludge	175.00	Incineration
7	Wash filtrate	3200.00	Water (distilled)	3400.00	Recycle
8	C/F Filtrate	321.00	Wash filtrate	3200.00	Recycle
9	Condensate	188.00	C/F Filtrate	321.00	Recycle
10	NaOH Lye (48%)	1197.00	Filtrate	301.00	Recycle
11	Water (distilled)	3400.00	Condensate	188.00	Recycle
12	Sulphuric acid	201.00	Water loss	86.00	Loss
13	Filtrate	301.00	Effluent	14256.00	ETP
14	Water	12514.00			
	Total	32731.00		32846.00	

51. PRODUCT: Fast Bordeaux GP Base

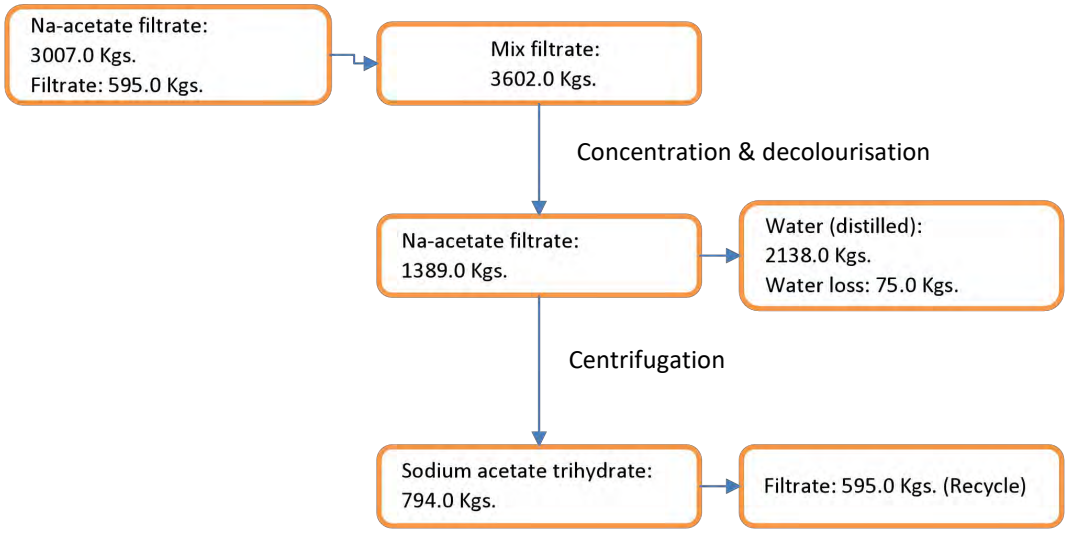
MANUFACTURING PROCESS:

p-Anisidine is acetylated with acetic acid & acetic anhydride & resulting acetyl mass after work up is nitrated with nitric acid in MDC as solvent. Excess nitric acid is removed by water wash and then solvent is distilled out & nitro is filtered. Nitro is hydrolysed in dilute NaOH solution, filtered, washed & dried to get final product. Original filtate of hydrolysis is taken for Sodium acetate recovery.

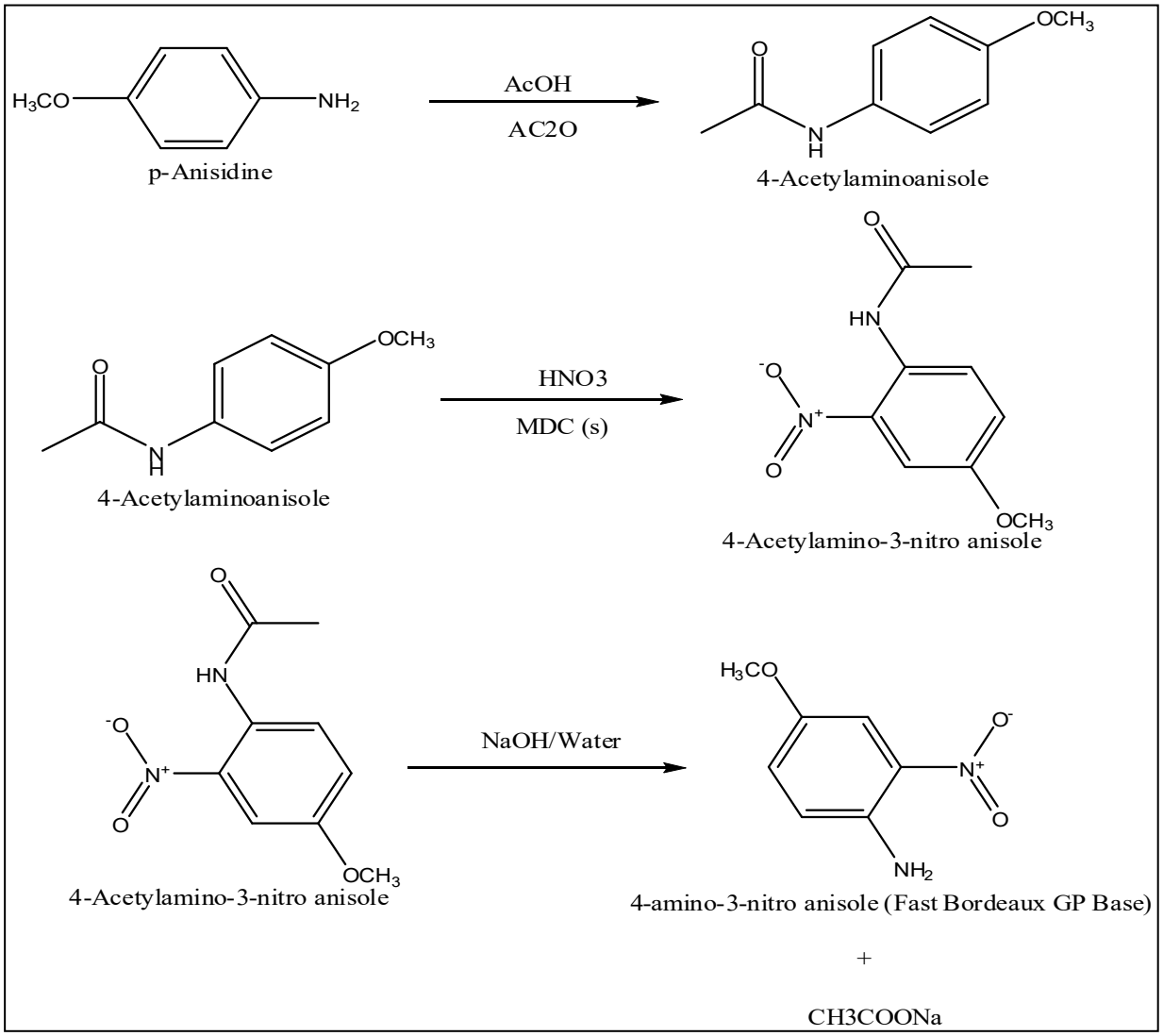
PROCESS FLOW CHART:



Recovery of Sodium acetate, trihydrate:



CHEMICAL REACTION:



MASS BALANCE:

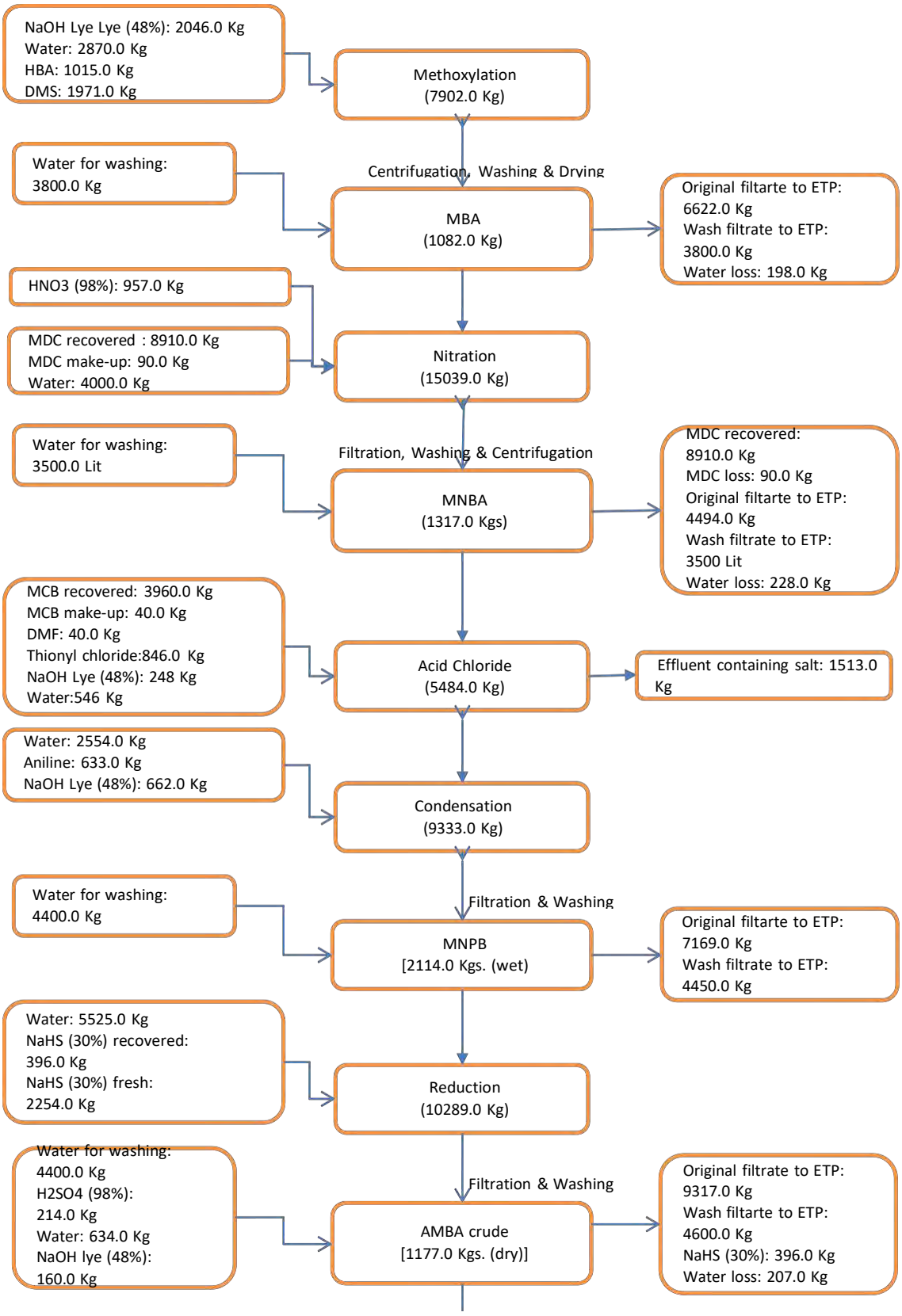
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	p-Anisidine	951.00	Fast Bordeaux GP Base	1000.00	Product
4	Acetic acid(70%)	762.00	Sodium acetate trihydrtae	794.00	Product
5	MDC (recovered)	8910.00			
6	MDC (make-up)	90.00	MDC (recovered)	8910.00	Recycle
7	HNO3(98%)	496.00	MDC (Loss)	90.00	Loss
8	Wash filtrate	1550.00	Process sludge	110.00	Incineration
9	C/F Filtrate	491.00	Water (distilled)	2138.00	Recycle
10	Condensate	160.00	Wash filtrate	1550.00	Recycle
11	NaOH Lye (48%)	540.00	C/F Filtrate	491.00	Recycle
12	Water(distilled)	2138.00	Condensate	160.00	Recycle
13	Water	7223	Water loss	16.00	Loss
14	Acetic anhydride	50.00	Effluent	8027.00	ETP
	Total	23361.00		23286.00	

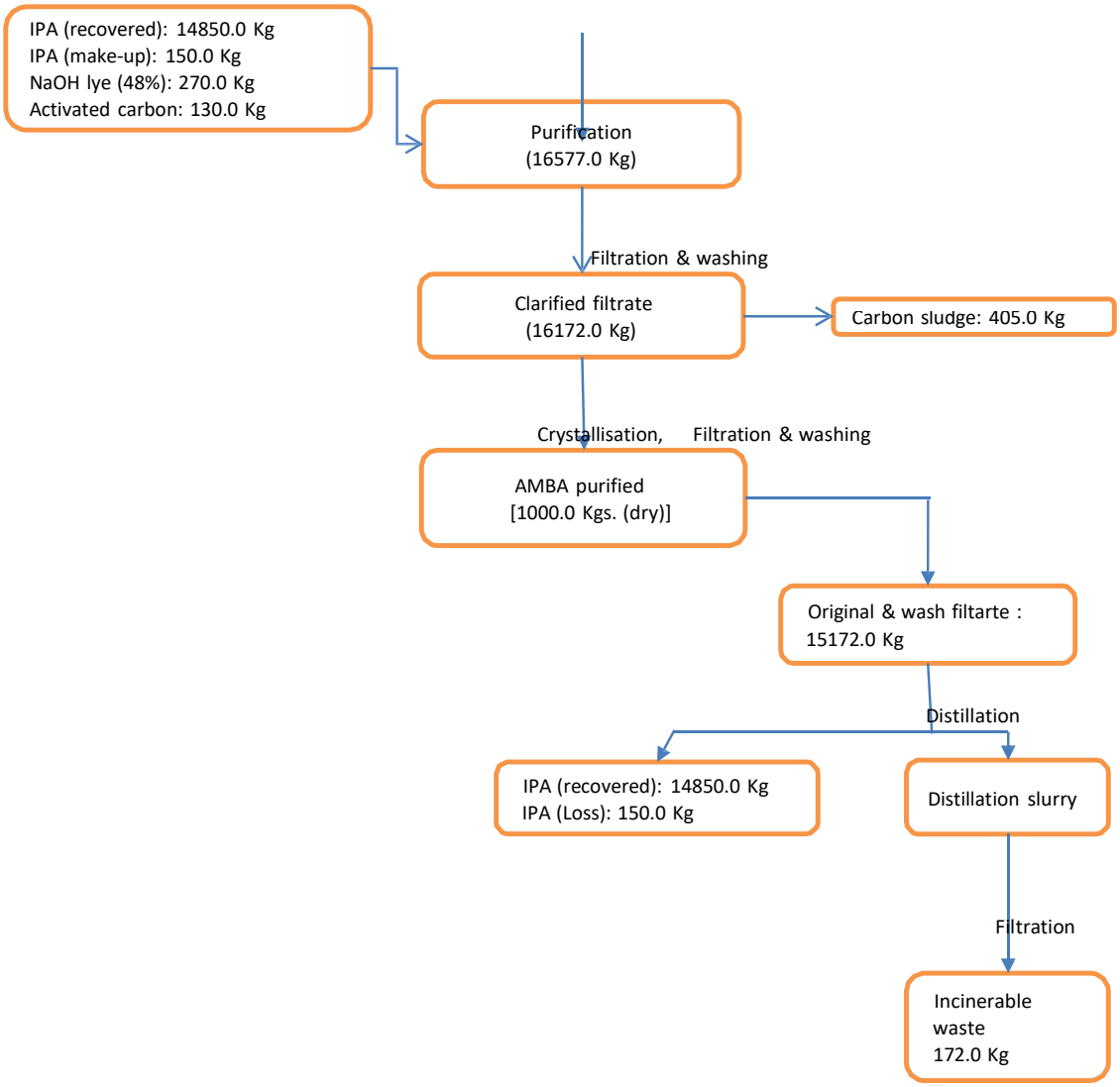
52. PRODUCT: Fast Red KD Base

MANUFACTURING PROCESS:

4-Hydroxybenzoic acid is a-methylated with DMS and filtered out the cake. Methylated cake is nitarted with fuming nitric acid to get nitro product. Nitro product is reacted with thionyl chloride in solvent which is then condensed with aniline. The condensed derivative is reduced, filtered and purified. Purified product is dried, blended & packed.

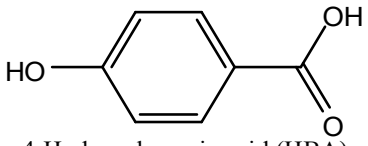
PROCESS FLOW CHART:



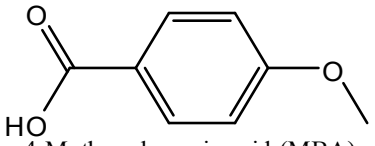

IPA (recovered): 14850.0 Kg
IPA (make-up): 150.0 Kg
NaOH lye (48%): 270.0 Kg
Activated carbon: 130.0 Kg
Purification
(16577.0 Kg)
Filtration & washing
Clarified filtrate
(16172.0 Kg)
Carbon sludge: 405.0 Kg
Crystallisation,
Filtration & washing
AMBA purified
[1000.0 Kgs. (dry)]
Original & wash filtarte :
15172.0 Kg
Distillation
IPA (recovered): 14850.0 Kg
IPA (Loss): 150.0 Kg
Distillation slurry
Filtration
Incinerable
waste
172.0 Kg

CHEMICAL REACTION:

(I)

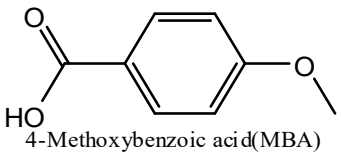


4-Hydroxybenzoic acid (HBA)
Molecular Weight: 138.12

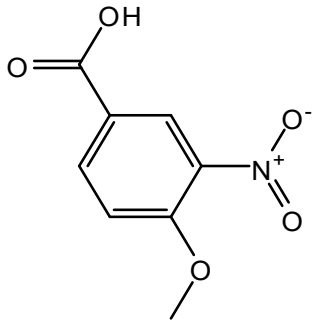


4-Methoxybenzoic acid (MBA)
Molecular Weight: 152.15

(II)

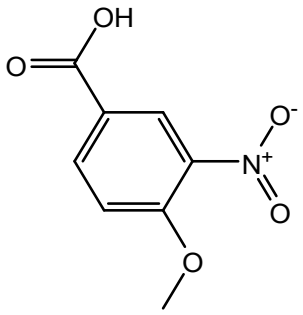


4-Methoxybenzoic acid(MBA)
Molecular Weight: 152.15

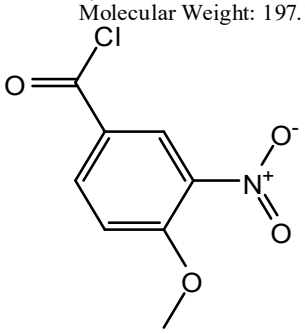


4-Methoxy-3-nitrobenzoic acid (MNBA)
Molecular Weight: 197.14

(III)

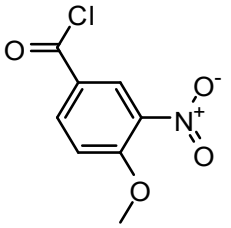


4-Methoxy-3-nitrobenzoic acid (MNBA)
Molecular Weight: 197.14

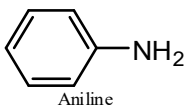


4-methoxy-3-nitrobenzoyl chloride (MNBC)
Molecular Weight: 215.59

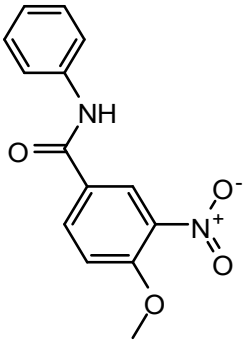
(IV)



4-methoxy-3-nitrobenzoyl chloride (MNBC)
Molecular Weight: 215.59

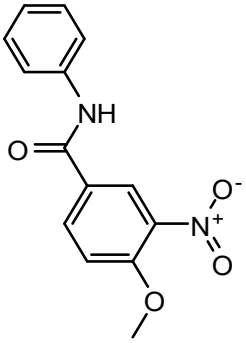


Aniline

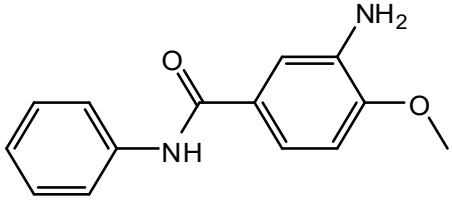


4-methoxy-3-nitro-*N*-phenylbenzamide(MNPB)
Molecular Weight: 272.26

(V)



4-methoxy-3-nitro-*N*-phenylbenzamide(MNPB)
Molecular Weight: 272.26



3-Amino-4-methoxy benzanilide (AMBA)

Molecular Weight: 242.27

MASS BALANCE:

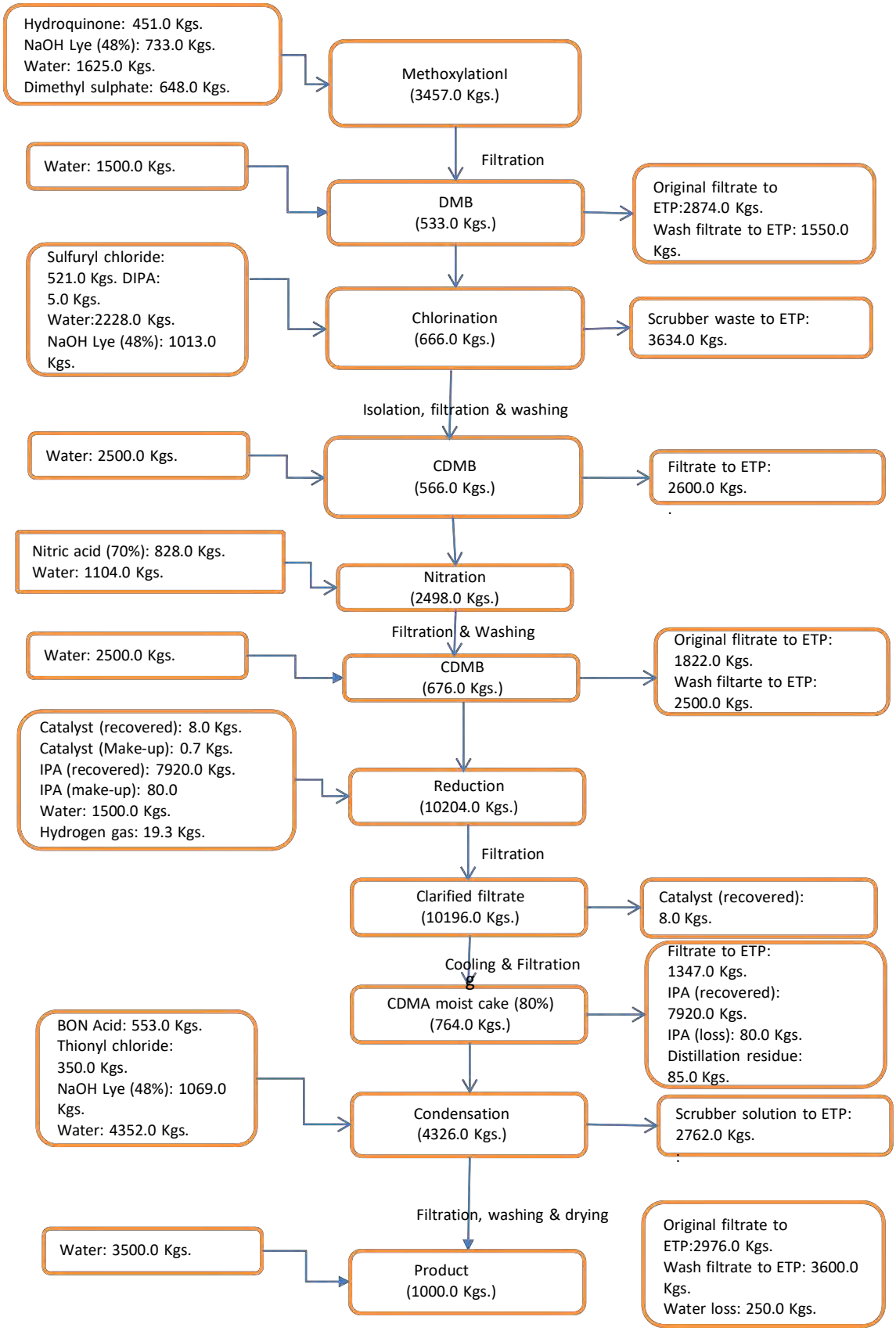
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	HBA	1015.00	Fast Red KD Base	1000.00	Product
2	NaOH (Lye (48%)	3386.00	MDC (recovered)	8910.00	Sale
3	DMS	1971.00	MDC (loss)	90.00	Recycle
4	HNO3 (98%)	957.00	NaHSS (30%) recocered	396.00	Loss
5	MDC (recovered)	8910.00	IPA (recovered)	14850.00	Recycle
6	MDC (make-up)	90.00	IPA (loss))	150.00	Loss
7	MCB recoevered	3960.00	Water loss	633.00	Recycle
8	MCB (make-up)	40.00	Carbon sludge	405.00	Loss
9	Thionyl chloride	846.00	Incinerable waste	172.00	Incineration
10	DMF	40.00	Effluent	45465.00	Loss
11	Aniline	633.00			ETP
12	NaHS (30%) recovered	396.00			
13	NaHS (30%) fresh	2254.00			
14	H2SO4 (98%)	214.00			
15	IPA (recovered)	14850.00			
16	IPA (make-up))	150.00			
17	Activated carbon	130.00			
18	Water	32229.00			
	Total	72071.00		72071.00	

53. PRODUCT: Napthol ASLC

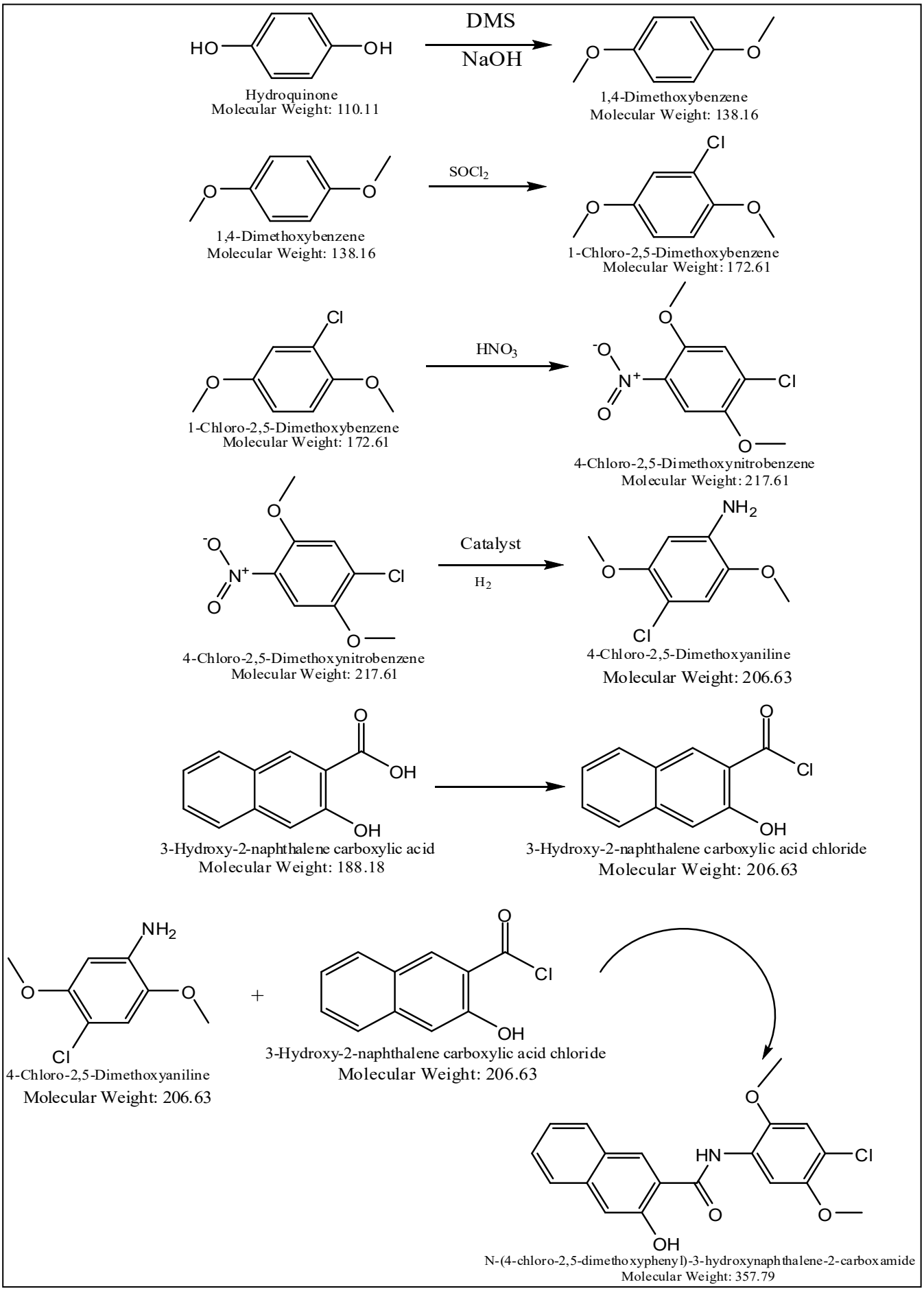
MANUFACTURING PROCESS:

Hydroquinone is alkylated with DMS and alkylated product is chlorinated with sulfuryl chloride and subsequent work up yields Chlorinated product. It is then nitrated and filtered to get nitro product. Nitro product is then catalytically reduced , filtered and condensed with BON acid chloride formed by BON acid & thionyl chloride and filtered & washed. Product is centrifuged & dried.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

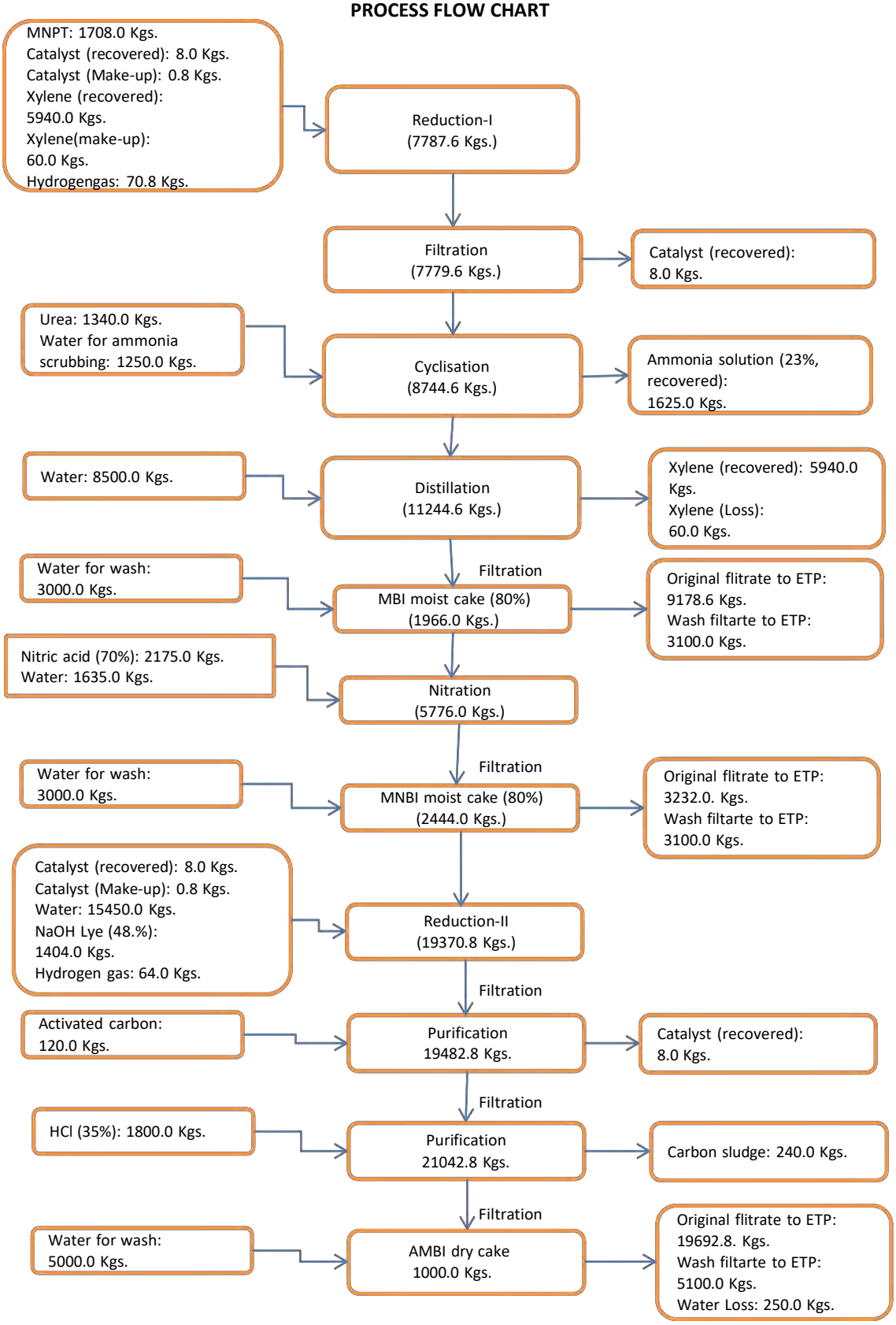
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Hydroquinone	451.00	Product	1000.00	Product
2	NaOH Lye (48%)	2815.00	Water loss	250.00	Loss
3	Dimethyl sulphate	648.00	IPA (recovered)	7920.00	Reuse
4	DIPA	5.00	IPA (loss)	80.00	Loss
5	Sulfuryl chloride	521.00	Catalyst (recovered)	8.00	Reuse
5	Nitric acid (70%)	828.00	Distillation residue	85.00	Incineration
6	Hydrogen gas	19.30	Effluent	25665.00	ETP
7	Catalyst (recovered)	8.00			
8	Catalyst (make-up)	0.70			
9	IPA (recovered)	7920.00			
10	IPA (make-up)	80.00			
11	BON acid	553.00			
12	Thionyl chloride	350.00			
13	Water	20809.00			
	Total	35008.00		35008.00	

54. PRODUCT: 5-Amino-6-methylbenzimidazoleone

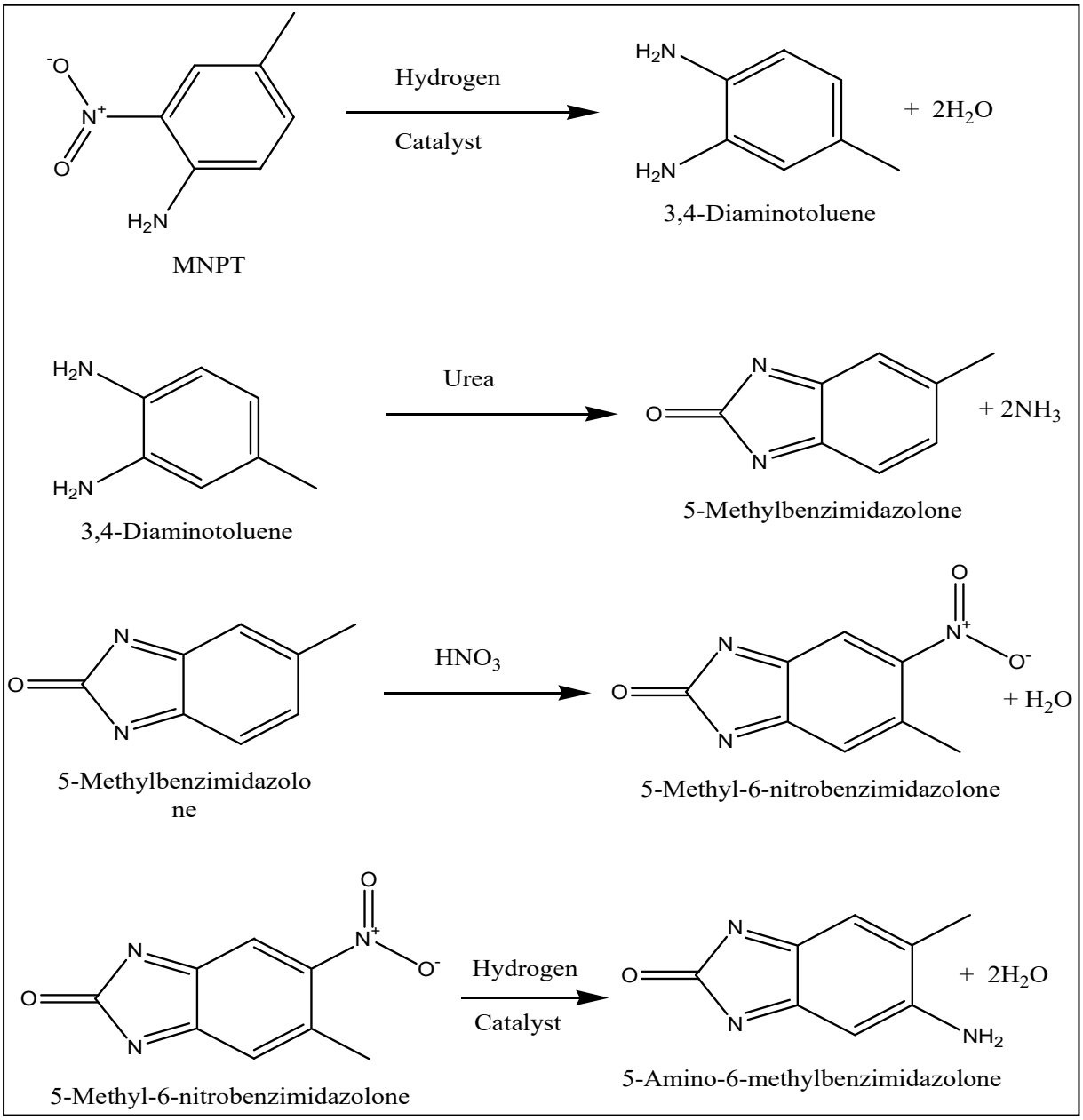
MANUFACTURING PROCESS:

MNPT is catalytically reduced to Diaminotoluene at elevated temperature in presence of catalyst, filtered and cyclised with urea to get MBI moist cake followed by filtartion & washing. MBI moist cake is nitrated with nitric acid, filtered & washed with water to afford MNBI moist cake. MNBI is then catalytically reduced , filtered and purified by activated charcoal treatment. Product is precipitated by addition of acid, filtered & washed with water to afford AMBI moist cake, which is centrifuged & dried.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

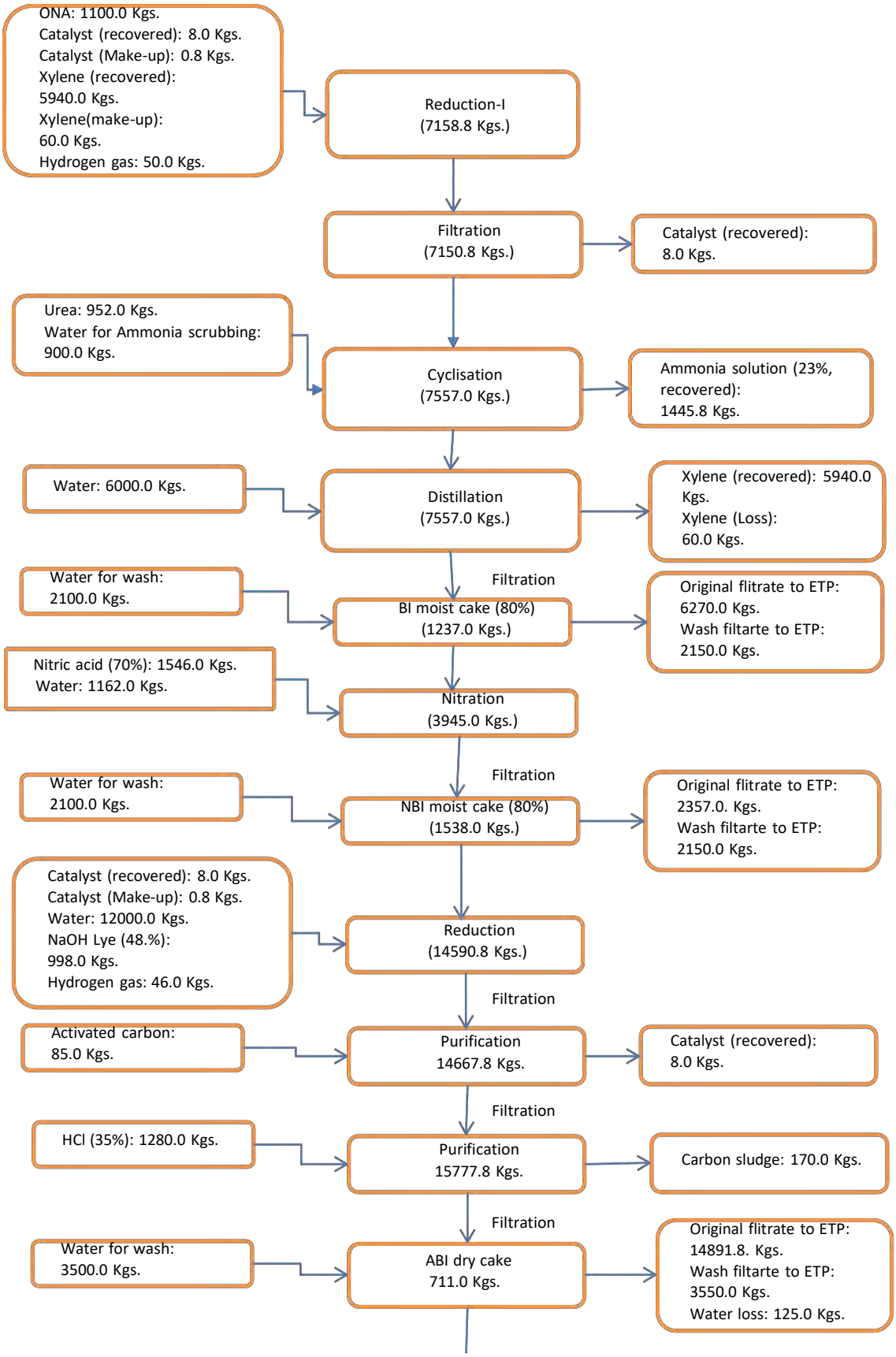
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	MNPT	1708.00	AMBI dry	1000.00	Product
2	Catalyst (recovered)	16.00	Water loss	250.00	Loss
3	Catalyst (Make-up)	1.60	Xylene (recovered)	5940.00	Reuse
4	Xylene (recovered))	5940.00	Xylene (loss)	60.00	Loss
5	Xylene (make-up)	60.00	Catalyst (recovered)	16.00	Reuse
6	Hydrogen gas	134.80	Ammonia solution (23%)	1625.00	Resale
7	Urea	1340.00	Carbon sludge	240.00	Incineration
8	Nitric acid (70%)	2175.00	Effluent	43403.40	ETP
10	NaOH Lye (48%)	1404.00			
11	HCl (35%)	1800.00			
12	Activated carbon	120.00			
13	Water	37835.00			
	Total	52534.40		52534.40	

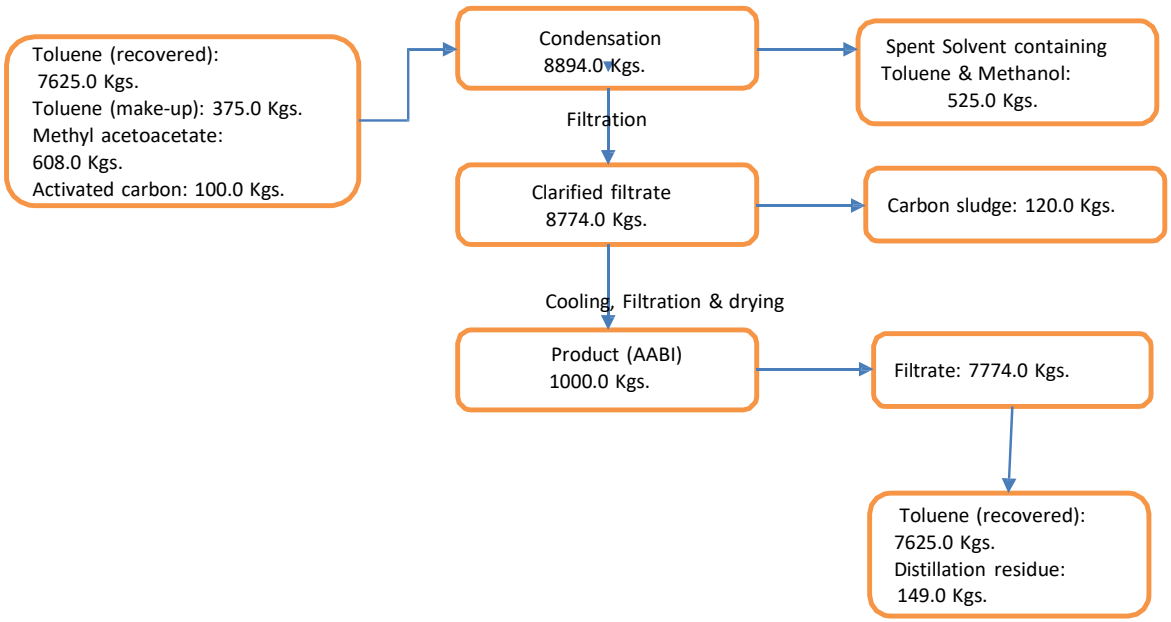
55. PRODUCT: AABI dry

MANUFACTURING PROCESS:

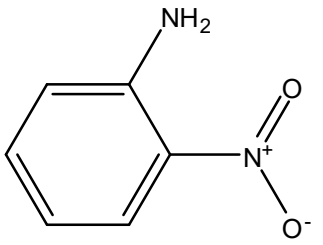
ONA is catalytically reduced to Diaminotoluene at elevated temperature in presence of catalyst, filtered and cyclised with urea to get BI moist cake followed by filtartion & washing. MBI moist cake is nitrated with nitric acid, filtered & washed with water to afford NBI moist cake. NBI is then catalytically reduced , filtered and purified by activated charcoal treatment. Product is precipitated by addition of acid, filtered & washed with water to afford ABI moist cake, which is centrifuged & dried. ABI is condensed with methyl acetoacetate in solvent, clarified & filtered. Clarified filtrate is colled, filtered & dried to get the product.

PROCESS FLOW CHART:

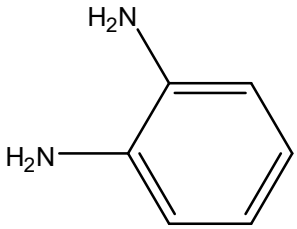



Toluene (recovered):
7625.0 Kgs.
Toluene (make-up): 375.0 Kgs.
Methyl acetoacetate:
608.0 Kgs.
Activated carbon: 100.0 Kgs.
Condensation
8894.0 Kgs.
Spent Solvent containing
Toluene & Methanol:
525.0 Kgs.
Filtration
Clarified filtrate
8774.0 Kgs.
Carbon sludge: 120.0 Kgs.
Cooling, Filtration & drying
Product (AABI)
1000.0 Kgs.
Filtrate: 7774.0 Kgs.
Toluene (recovered):
7625.0 Kgs.
Distillation residue:
149.0 Kgs.

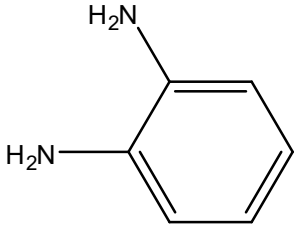
CHEMICAL REACTION:



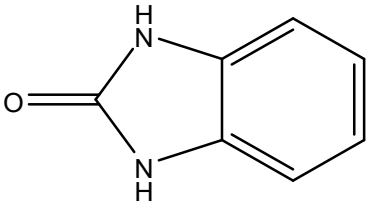
o-nitroaniline
Molecular Weight: 138.12



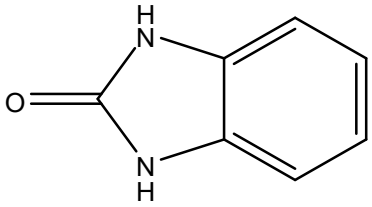
o-phenylenediamine
Molecular Weight: 108.14



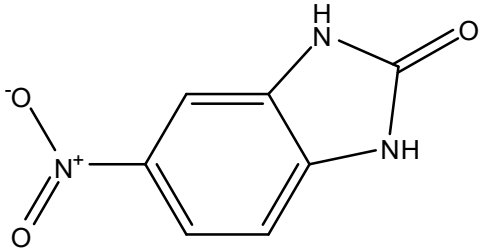
o-phenylenediamine
Molecular Weight: 108.14



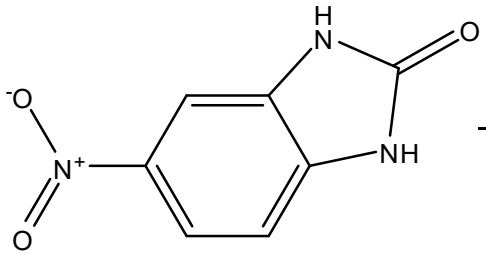
2-Benzimidazolinone
Molecular Weight: 134.14



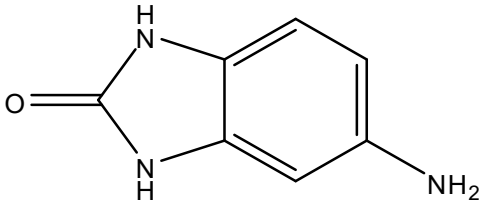
2-Benzimidazolinone
Molecular Weight: 134.14



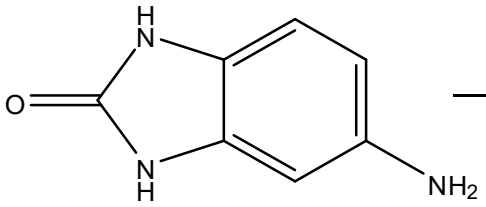
5-Nitro-2-Benzimidazolinone
Molecular Weight: 179.13



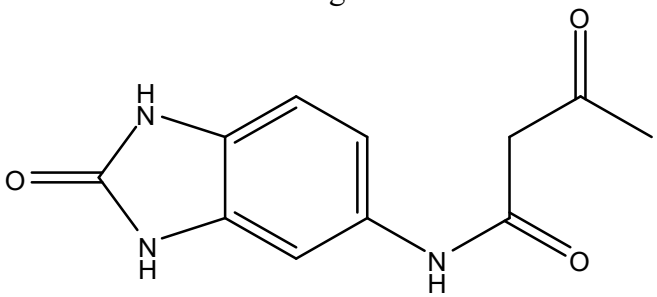
5-Nitro-2-Benzimidazolinone
Molecular Weight: 179.13



5-Amino-2-Benzimidazolinone
Molecular Weight: 149.15



5-Amino-2-Benzimidazolinone
Molecular Weight: 149.15



5-(Acetoacetamido)-2-benzimidazolinone
Molecular Weight: 233.22

MASS BALANCE:

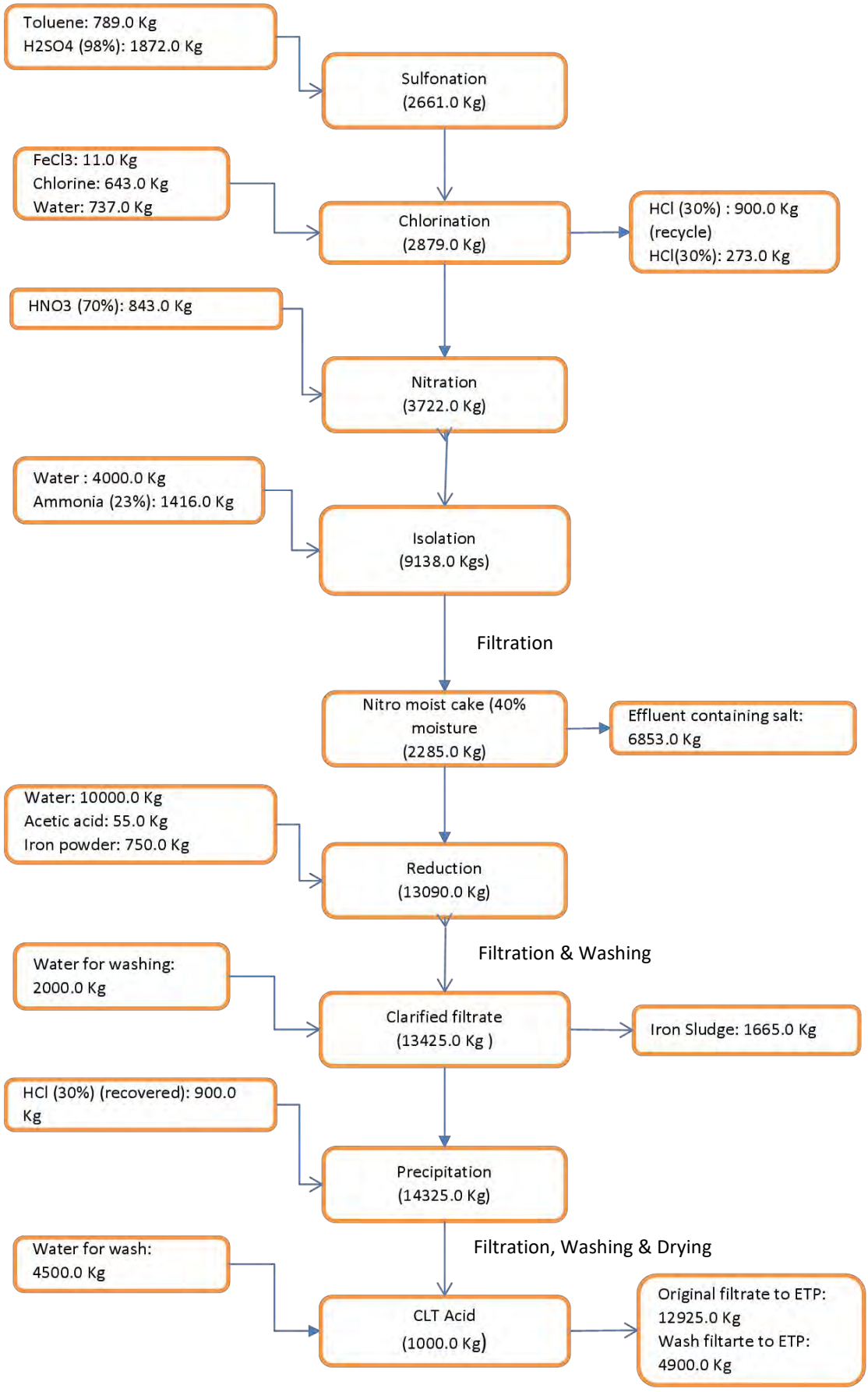
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	ONA	1100.00	AABI dry	1000.00	Product
2	Catalyst (recovered)	16.00	Water loss	125.00	Loss
3	Catalyst (Make-up)	1.60	Xylene (recovered)	5940.00	Reuse
4	Xylene (recovered))	5940.00	Xylene (loss)	60.00	Loss
5	Xylene (make-up)	60.00	Catalyst (recovered)	16.00	Reuse
6	Hydrogen gas	96.00	Ammonia solution (23%)	1445.80	Resale
7	Urea	952.00	Toluene (recovered)	7625.00	Reuse
8	Nitric acid (70%)	1546.00	Carbon sludge	290.00	Incineration
9	NaOH Lye (48%)	998.00	Spent solvent	525.00	Resale
10	HCl (35%)	1280.00	Distillation residue	149.00	Incineration
11	Activated carbon	185.00	Effluent	31368.80	ETP
12	Toluene (recovered)	7625.00			
13	Toluene (make-up)	375.00			
14	Methyl acetoacetate	608.00			
15	Water	27762.00			
	Total	48544.60		48544.60	

56. PRODUCT: CLT Acid

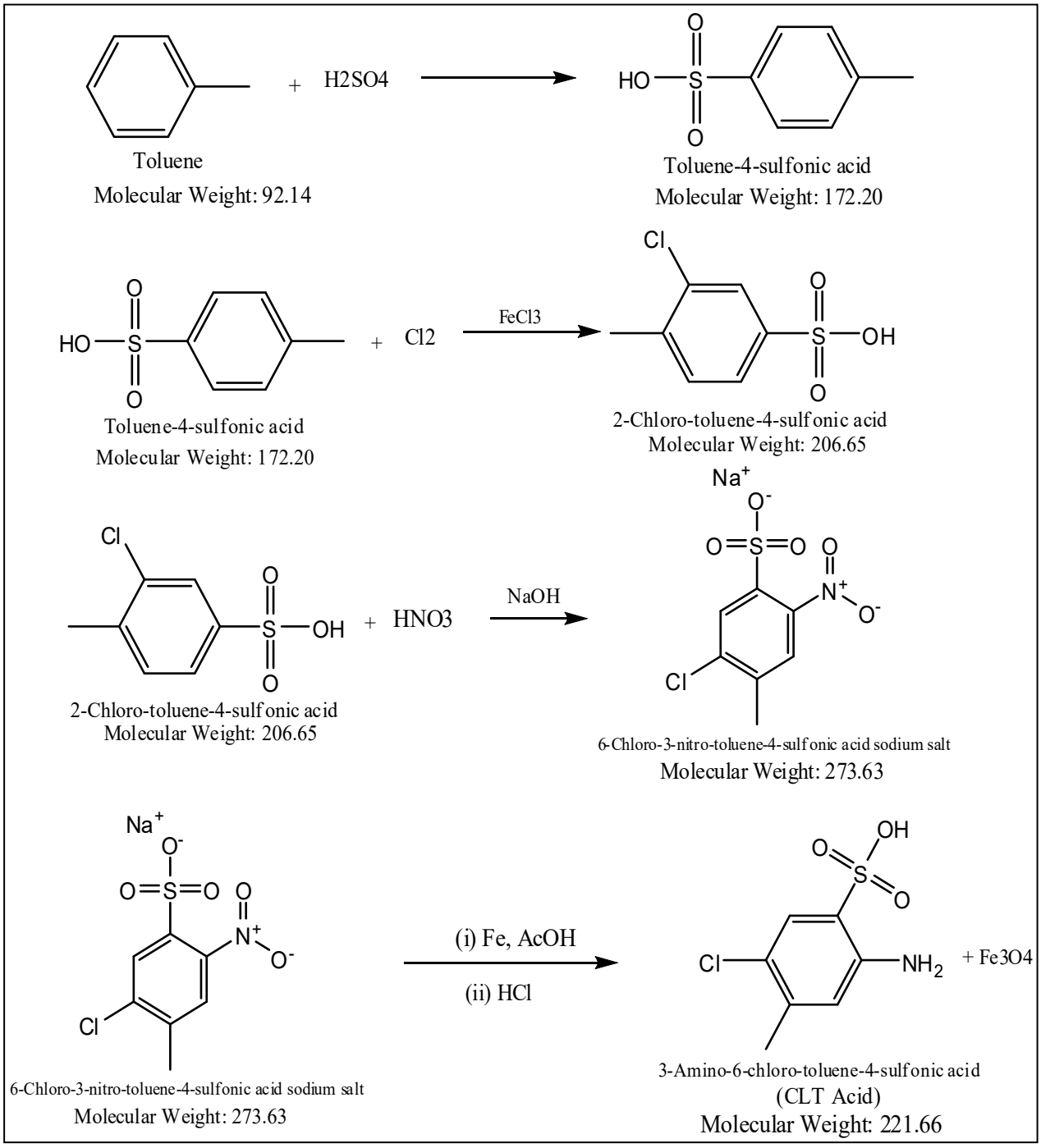
MANUFACTURING PROCESS:

Toluene is sulfonated at elevated temeperature and then chlorinated. Chloromass is nitrated, isolated and precipitated by partial neutralisation by sodium hydroxide. Nitro cake is filtered. This nitro cake is reduced with iron and acetic acid, & then neutralised and filtered iron sludge. PRoduct is precipitated by addition of hydrochloric acid into clarified filtrate & it is is filtered, washed, dried & packed.

PROCESS FLOW CHART:



CHEMICAL REACTION:



MASS BALANCE:

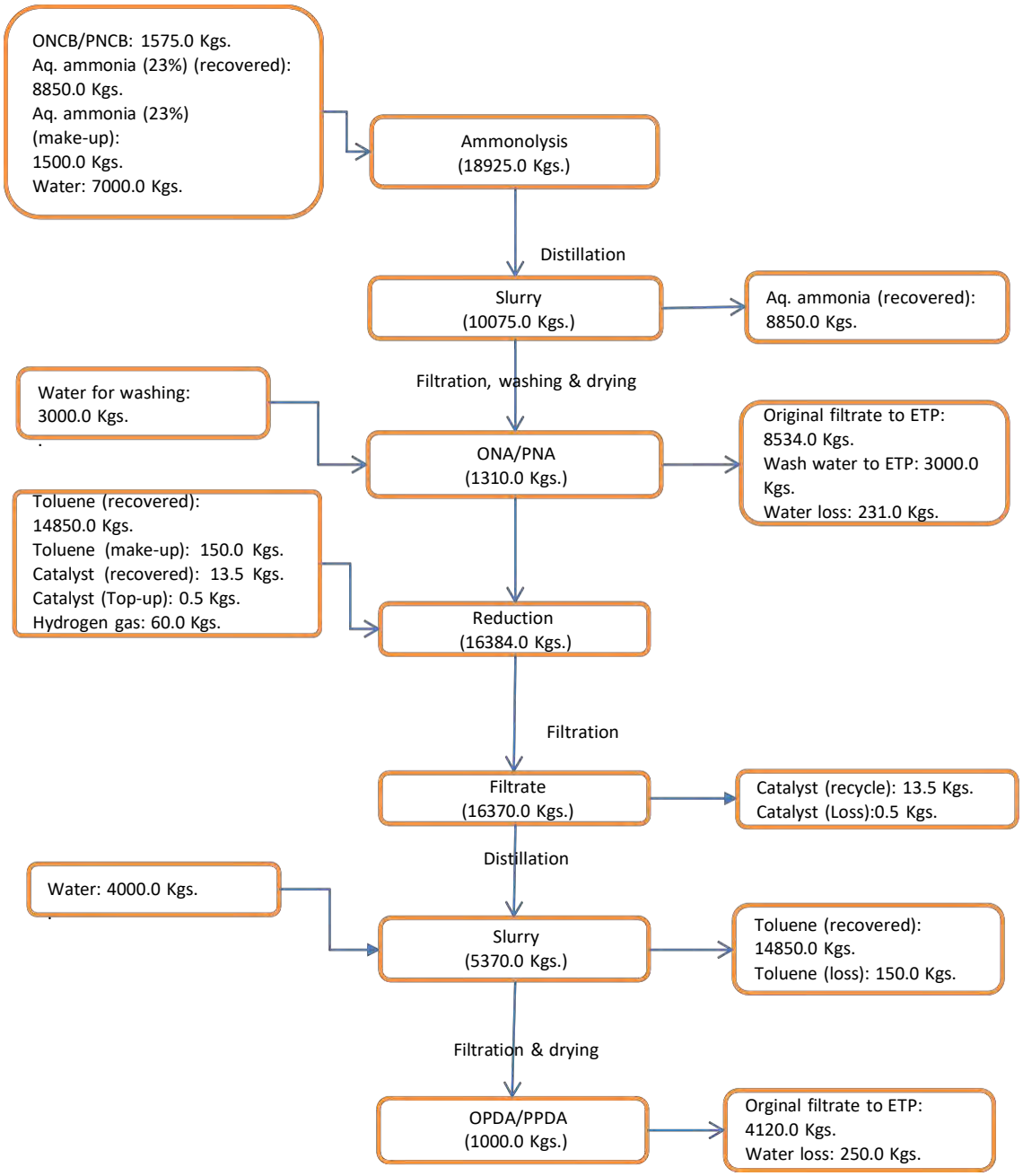
Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	Toluene	789.00	CLT Acid	1000.00	Product
2	H2SO4(98%)	1872.00	HCl (30%)	900.00	Recycle
3	FeCl3	11.00	HCl (30%)	273.00	Bye product
4	Chlorine	643.00	Iron sludge	1665.00	TSDF
5	HNO3 (70%)	843.00	Effluent	24678.00	ETP
6	Ammonia (23%)	1416.00			
7	Acetic acid	55.00			
8	Iron powder	750.00			
9	HCl (recovered)	900.00			
10	Water	21237.00			
	Total	28516.00		28516.00	

57. PRODUCT: OPDA/PPDA

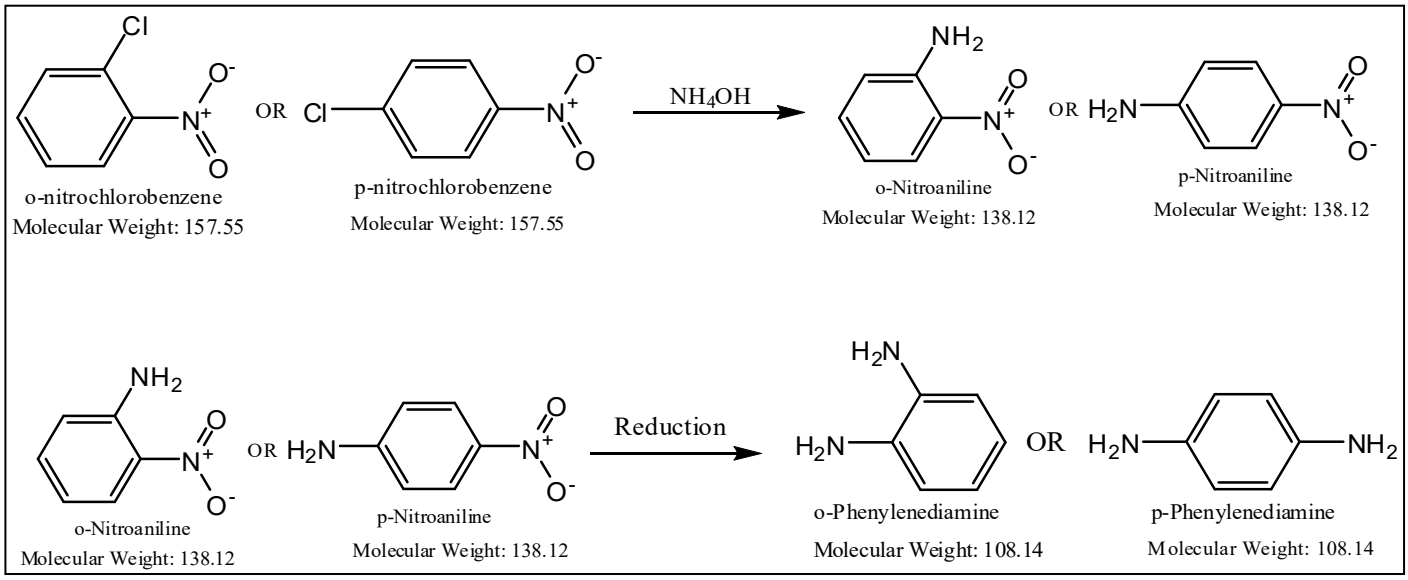
MANUFACTURING PROCESS:

ONCB/PNCB is reacted with aq. ammonia solutionat elevated temperature,and after completion of reaction, exceaa aq. ammonia is distilled off. ONA/PNA is filtered & washed. ONA/PNA is reduced by hydrogen at elevated temperature in presence of catalyst in solvent. Catalyst is filtered off, and sovent is distilled out. Product is filtered & dried.

PROCESS FLOW CHART



CHEMICAL REACTION:



MASS BALANCE:

Sr. No.	Input	Qty.	Out put	Qty.	Remarks
1	ONCB/PNCB	1575.00	OPDA/PPDA	1000.00	Product
2	Aq. Ammonia (recovered)	8850.00	Aq. Ammonia (recovered)	8850.00	Reuse
3	Aq. Ammonia (make-up)	500.00	Toluene (recovered)	14850.00	Reuse
4	Toluene (recovered)	14850.00	Toluene (loss)	150.00	Loss
5	Toluene (make-up)	150.00	Catalyst (recovered)	13.50	Recycle
6	Hydrogen gas	60.00	Catalyst (loss)	0.50	Incineration
7	Catalyst (recovered)	13.50	Water loss	601.00	Incineration
8	Catalyst (Top-up)	0.50	Wash water	1000.00	Reuse
9	Original filtrate (recycle)	8000.00	Original filtrate	8000.00	Reuse
10	Wash water (recycle)	1000.00	Effluent	1800.00	ETP
11	Water	1266.00			
	Total	36265.00		36265.00	

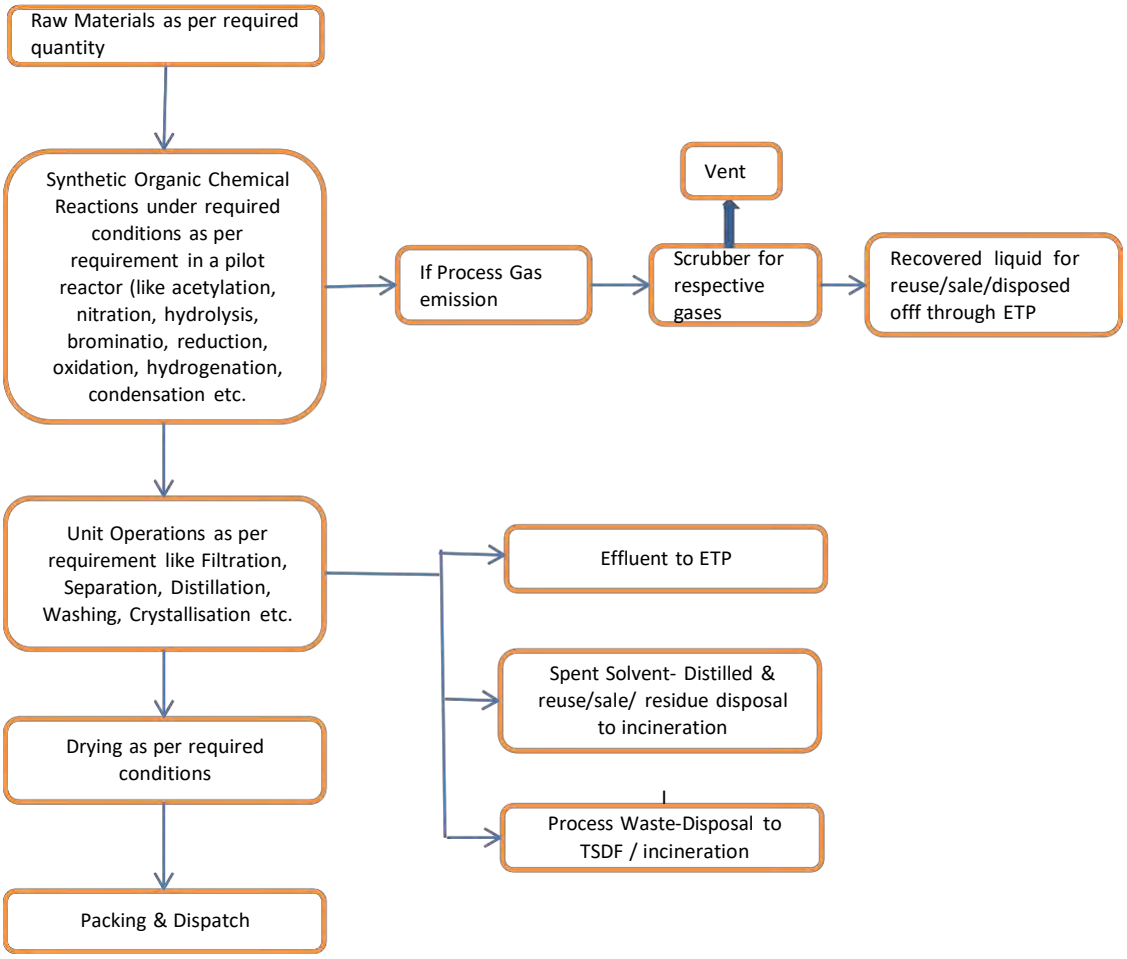
58. R & D Centre

Research activities of synthetic organic chemicals comprising of various unit processes & unit operations in a pilot reactor (like acetylation, nitration, hydrolysis, brominatio, reductio, oxidation, hydrogenation, condensation etc.)

MANUFACTURING PROCESS:

Raw Materials are charged into pilot reactors and subjected to unit processes as per requirements. Reaction mass is taken for unit processes as per requirement. Effluents are sent to ETP for treatment. Product is dried & packed.

PROCESS FLOW CHART FOR PILOT PLANT



ANNEXURE-IV:

Details of Water Consumption Wastewater Generation

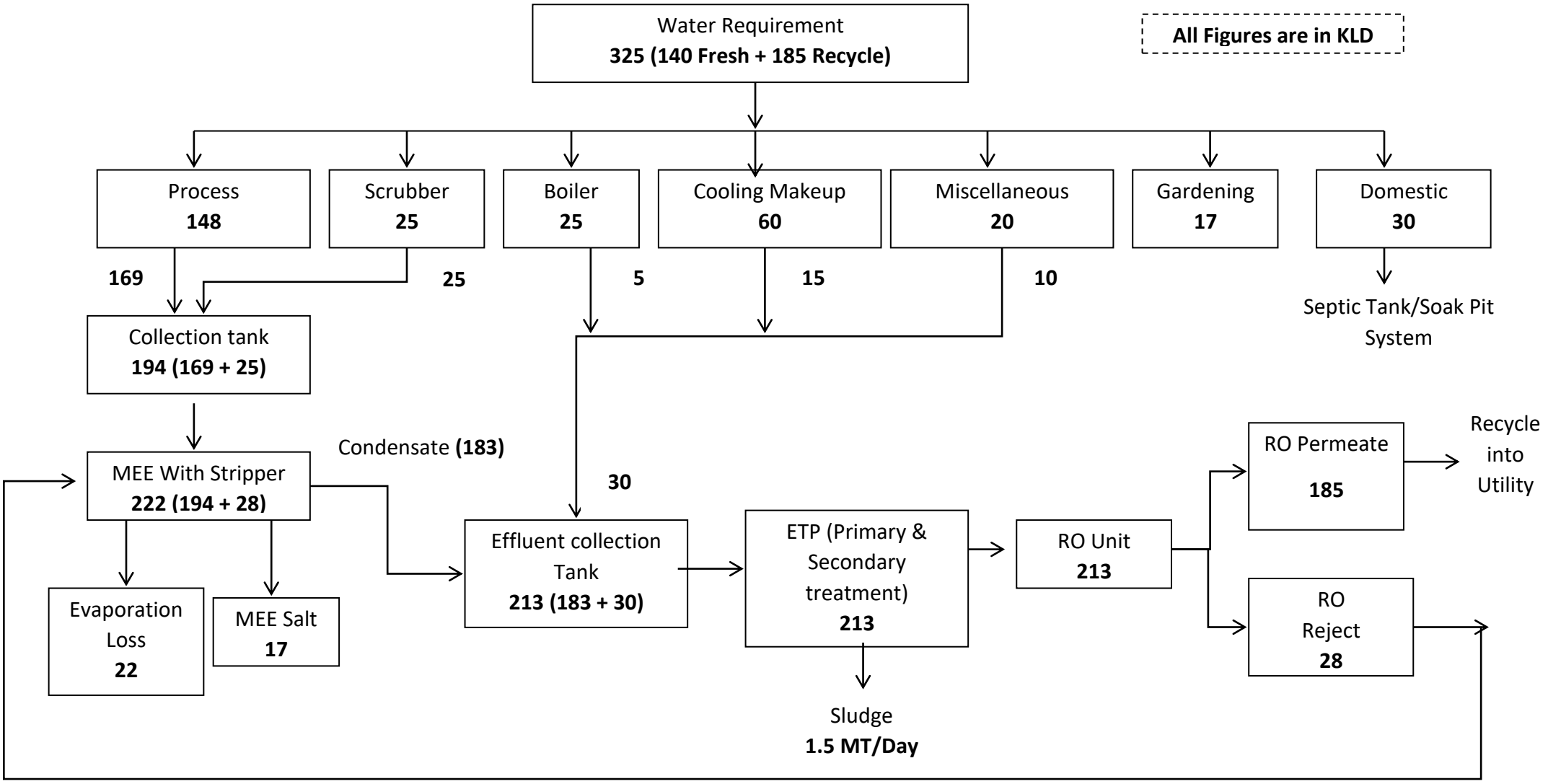
Details of Water Consumption

Sr. No.	Purpose	As per TOR Granted Total (KLD)	As per TOR Amendment Total (KLD)	Remarks
1	Domestic	**30**	**30**	No Change
2	Gardening	**0**	**17**	
3	Industrial	**290**	**278**	Water Consumption is changed due to change in product list and production capacity
(A)	Processing	160	148	
(B)	Boiler feed (make up)	25	25	No Change
(C)	Cooling make up	60	60	No Change
(D)	Scrubbing	25	25	No Change
(E)	Miscellaneous (including washing, softening etc)	20	20	No Change
TOTAL		**320**	**325**	**Overall water consumption is increased by 5 KLD**
Out of Total Water Requirement, 140 KLD will be Fresh water and 185 KLD will be recycled water				

Details of Waste Water Generation

Sr. No.	Source	As per TOR Granted Total (KLD)	As per TOR Amendment Total (KLD)	Remarks
1	Domestic	30	30	No Change
2	Gardening	0	0	
3	Industrial	**247**	**224**	Waste water generation is changed due to change in product list and production capacity.
(A)	Processing	192	169	
(B)	Boiler Blow down	5	5	No Change
(C)	Cooling bleed off	15	15	No Change
(D)	Scrubbing	25	25	No Change
(E)	Washing	10	10	No Change
TOTAL of Industrial & Domestic		**277**	**254**	**Overall waste water generation is decreased by 23 KLD.**

Water Balance Diagram



ANNEXURE-V:

PROPOSED ETP DETAILS & DIAGRAM

DESCRIPTION OF EFFLUENT TREATMENT PLANT

During manufacturing process high and low concentration effluent stream shall be generated from various operations. The effluent stream shall be segregated such two stream from the process.

1. Concentrated effluent stream - 194 KL/Day
2. Dilute effluent stream – 30 KL/Day

Treatment of Concentrated Stream:

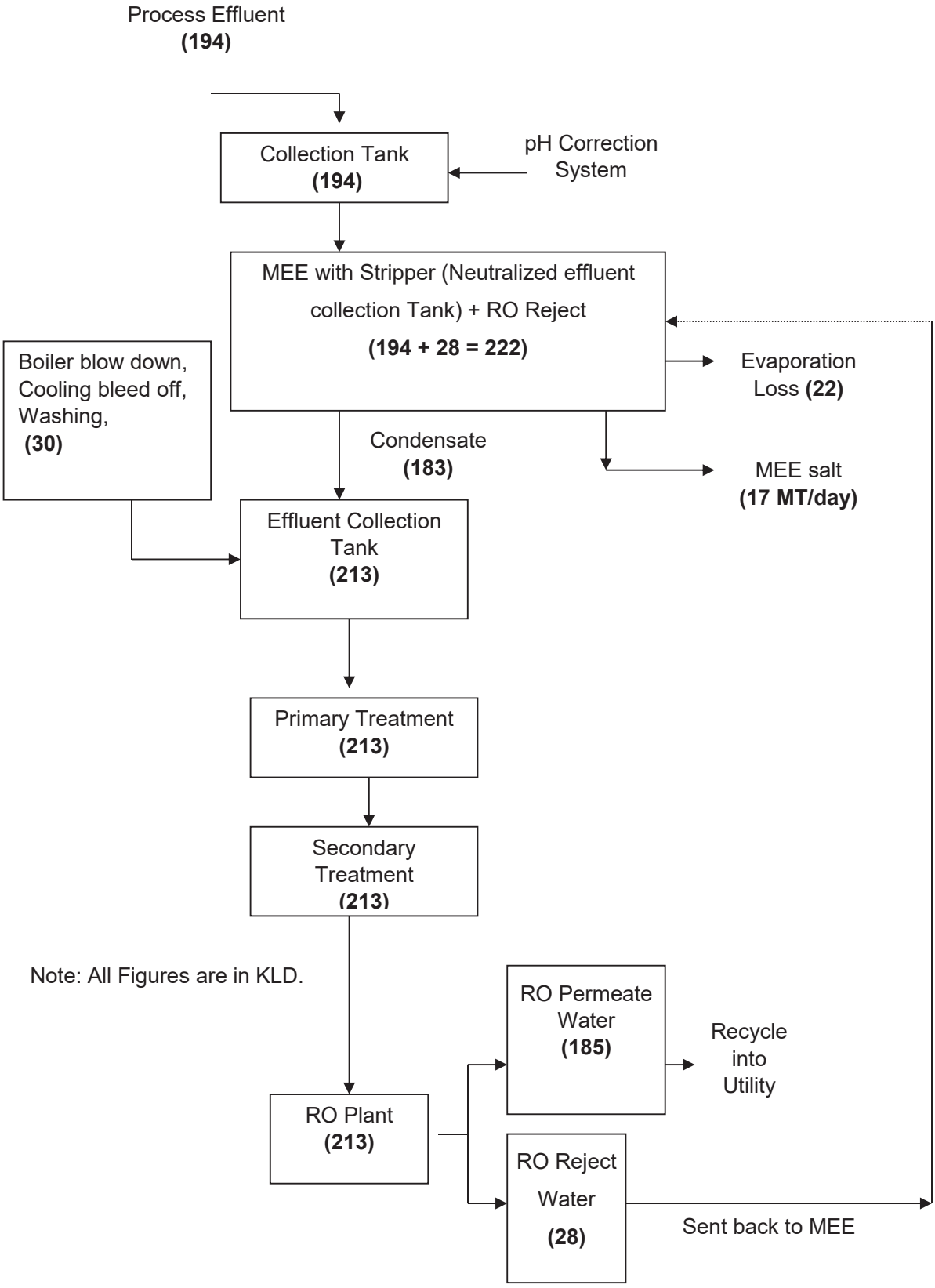
Concentrated stream generated from manufacturing of Group-I (API's, Intermediates for API's & derivatives), Group-II (Catalytic hydrogenation/dehydrogenation), Group-III (Fine Speciality Chemicals) , Group IV (Intermediate for Pigments), Group-V (R&D Centre) and scrubber shall be collected in Collection Tank, after pH correction it shall be transferred to MEE (Neutralized effluent collection Tank) in which it shall be with Lime / $FeSO_4$. MEE / condensate effluent shall be sent to ETP and treated along with other stream.

Treatment of Dilute Stream:

Dilute stream generated from Boiler, Cooling &Washing shall be given primary treatment in Effluent Treatment Plant along with MEE condensate.

Raw effluent is collected in the collection tank after removal of oil and grease from oil & grease traps.Here, primary treatment is first given by addition of required quantity of Lime slurry & FeSO4 Solution in Flash Mixer and Polyelectrolyte in flocculator. This effluent shall be fed to primary settler where flocs will be settled by gravity. The clear supernatant shall be fed to aeration tank where activated biomass will degrade the organic mass. Effluent from aeration tank shall be sent to secondary settler. Hence, Biomass will be settled & recycled back to aeration tank. The clear supernatant shall be collected in RO feed tank, from the Tank effluent shall be fed to packaged RO system or 300 KLD capacity. The RO Permeate (about 185 KLD) shall be reused.

Schematic Flow diagram of Effluent treatment plant is as under



ANNEXURE - VI

DETAILS OF HAZARDOUS /SOLID WASTE GENERATION, HANDLING AND DISPOSAL

Cat. of waste	Type of Solid / Hazardous Waste	Source of Waste	Proposed Quantity Generated as per TOR Granted	Proposed Quantity Generated as per TOR Amendment	Treatment	Remarks
CONSTRUCTION PHASE						
-	Brick-bats, debris etc.	from construction activity	As per generation	As per generation	Used in pavements, roads, etc. / through existing solid waste disposal facility	No Change
-	Steel scrap				Sold to steel scrap dealers	No Change
-	Packing wood scrap				Sold to wooden scrap dealers	No Change
OPERATION PHASE						
CAT. NO.	**TYPE OF SOLID / HAZARDOUS WASTES**	**SOURCE OF WASTE**	**Proposed Quantity Generated as per TOR Granted**	**Proposed Quantity Generated as per TOR Amendment**	**Method of Disposal**	**Remarks**
34.3	ETP Sludge	From Effluent Treatment Plant	1.5 MT/Day	1.5 MT/Day	Shall be Sent to TSDF site of M/s. VGEL, Vapi for secured land filling.	No Change
5.1	Used Oil	Oil used as lubricant in various applications & Thermopack unit	250 Liters/Year	250 Liters/Year	Shall be Sent to GPCB approved for suitable treatment	No Change
33.3	Discarded containers / bags / liners	Raw material packaging	25000 Nos./ Year	25000 Nos./ Year	Shall be Sent back to supplier / to GPCB approved recycler for suitable treatment	No Change

#C18	MEE Salt	From MEE	19 MT/day	17 MT/day	Sent to TSDF site of M/s. VGEL, Vapi for secured land filling.	Quantity Changed due to Amendment
28.1	Carbon Sludge	From process	30.875 MT/Month	23.76 MT/Month	Shall be sent to TSDF site of M/s. VGEL / Vapi for Secure land filling.	
-	Incinerable waste	From Process	150 +MT/Month	78.414 MT/Month	Shall be Sent to TSDF site for incineration	
-	Inorganic Salt Residue	From process	3.561 MT/Month	3.375 MT/Month	Shall be sent to TSDF site of M/s. VGEL / Vapi for Secure land filling.	
28.6	Spent Solvent	From process	294.141 MT/Month	49.57 MT/Month	To be Sale	
-	Acetic acid (70%)	From process	65.786 MT/Month	65.786 MT/Month	To be Sale	No Change
-	Sodium Acetate solution	From process	53.466 MT/Month	53.466 MT/Month	To Be Recover & Sale	No Change
-	Ammonia Solution	From process	963.83 MT/Month	283.83 MT/Month	To be Reuse	Quantity Changed due to Amendment
-	Acetic acid (Recovered)	From process	65.786 MT/Month	24.5 MT/Month	To be sale	
-	Salt	From process	104.8 MT/Month	52.4 MT/Month	To be Resale	

Details of Solid / Hazardous Waste Storage Area:

Industry has provided hazardous waste storage area of about 200 sq. m. size for storage of hazardous waste.

Industry shall become a member of TSDF site of M/s. Vapi Green Enviro Ltd., Vapi for the disposal of Solid / Hazardous Waste.

ANNEXURE – VII

DETAILS OF AIR POLLUTION CONTROL SYSTEM (STACK & VENT)

A	**FLUE GAS EMISISON**			
Sr. No	**Stack attached to**	**Stack Height & Diameter**	**Fuel Consumption**	**Air Pollution Control System**
1.	Thermopack Unit Capacity : 200,000 Kcal/hr	Height: 20 Meter Dia.: 150 mm	Natural Gas 16000Nm^3/Day	As natural gas is used as a fuel, adequate stack height will be provided
2.	Hot Air Generator	Height : 20 Meters Diameter : 150 mm		As natural gas is used as a fuel, adequate stack height will be provided
3.	Boiler Capacity: 1 MT/ Hr	Height : 20 Meters Dia.: 150 mm		As natural gas is used as a fuel, adequate stack height will be provided
4	D G Set Capacity: 250 KVA x 2nos.	Height: 10 meters Dia: 100 mm	LDO 40 lit/hr	As LDO is used as a fuel, adequate stack height will be provided
B	**PROCESS EMISSION**			
Sr. No	**Vent attached to**	**Pollutants**	**Stack Height & Diameter**	**Air Pollution Control System**
1.	Acid Chloride Vessels-1	HCl, SO_2	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber
2.	Acid Chloride Vessels-2	HCl, SO_2	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber
3.	Acid Chloride Vessels-3	HCl, SO_2	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber
4.	Dehydration Vessel	HCl, SO_2	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber
5.	Chlorination Vessel (Alcohol Chlorination)	HCl, SO_2	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber
6.	Chlorination Vessel	HCl	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber
7.	Cyclisation Vessel	NH_3	Height : 20 Meters Dia.: 100 mm	Water Scrubber
8.	Cyclisation Vessel	H_2S	Height : 20 Meters Dia.: 100 mm	Alkali Scrubber

The details of air pollution control system are as under

Technical specification of Alkali Scrubber

Sources of Air Pollutant generated from industry and their measures taken is as under

Sr. No.	Pollutants	Source of Pollutants	Measures To be Taken
1	SO_2, HCl, H_2S	Acid Chloride Vessels, Dehydration Vessel and Chlorination of alcohol Vessel	SO_2, HCl and H_2S from this scrubber are taken to scrubber Process Vent Diameter: 100 mm Height: 200 m from G.L.

Alkali Scrubber

Duty:	To scrub SO_2, HCl and H_2S traces from SO_2, HCl and H_2S scrubber in alkali solution	
Type:	Counter current packed bed type scrubber	
Qty.:	1 nos	
Process Condition:		
	Scrubbing Solution:	Alkaline Solution
Dimensions:		
	Diameter:	300 mm
	Packed Height:	1500 mm
	Total Height:	6000 mm
	Water distributor:	Pipe type
	Droplet Separator:	Dry packing
	MOC	HDPE

Technical specification of Water Scrubber

Sr. No.	Pollutants	Source of Pollutants	Measures To be Taken
1	NH_3	Cyclisation Vessel	$NH_3$from this scrubber are taken to scrubber Process Vent Diameter: 100 mm Height: 200 m from G.L.

Water Scrubber

Duty:	To scrub NH_3 traces from NH_3 scrubber in water Solution	
Type:	Counter current packed bed type scrubber	
Qty.:	1nos.	
Process Condition:		
	Scrubbing Solution:	Alkaline Solution
Dimensions:		
	Diameter:	300 mm
	Packed Height:	1500 mm
	Total Height:	6000 mm
	Water distributor:	Pipe type
	Droplet Separator:	Dry packing
	MOC	HDPE

ANNEXURE – VIII

DETAILS OF HAZARDOUS CHEMICALS STORAGE & HANDLING

Sr.No.	Raw Materials	Storage Capacity (MT)	Type of Storage & MOC	No. of Vessel	Vessel Capacity (MT)	Type of Hazard
1	Sulfuric acid - 98%	10	MS Tank	1	10	Corrosive
2.	Oleum -25%	20	MS Tank	2	10	Corrosive
3.	HCL	20	MS Tank	3	10	Corrosive

ANNEXURE-IX

SOCIO-ECONOMIC IMPACTS

1) EMPLOYMENT OPPORTUNITIES

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

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

2) INDUSTRIES

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

3) PUBLIC HEALTH

The company shall regularly examine, inspects and test 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 are proposed under the EMP.

4) TRANSPORTATION AND COMMUNICATION

Since the proposed unit shall be located in existing GIDC industrial estate, which is having proper linkage for the transport and communication, the development of this project will not cause any additional impact.

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

ANNEXURE-X

PROPOSED 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.
- Existing infrastructure facilities
- Water source and utilization including proposed water balance.
- List of Products and their capacity
- List of hazardous chemicals with their toxicity levels.
- Mass balance of each product along with the batch size
- Storage and Transportation of raw materials and products.

2. Description of the Environment and Baseline Data Collection

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

3. Socio Economic Data

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

4. Impacts Identification and Mitigatory Measures.

- Impact on air and mitigation measures including green belt
- Impact on water environment and mitigation measures
- Soil pollution source and mitigation measures

- Noise generation and control.
- Solid waste quantification and disposal.
- Control of fugitive emissions

5. Environmental Management Plan

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

6. Risk Assessment

- Details on storage facilities
- Identification of hazards
- Consequence analysis
- Recommendations on the basis of risk assessment done
- Disaster Management Plan.

7. Information for Control of Fugitive Emissions

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

9. Occupational Health and Safety Program for the Project.