

**Standard Operating Procedure and Checklist of Minimal Requisite Facilities for utilization of hazardous waste under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016**

**Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries in manufacturing of Aluminium Hydroxide Chloride/Poly Aluminium Chloride  
(Revised)**



**cpcb**

**May, 2022**

**Central Pollution Control Board**

**(Ministry of Environment, Forest & Climate Change, Government of India)**

**Parivesh Bhawan, East Arjun Nagar,**

**Shahdara, Delhi – 110032**

**Utilization of Spent Aluminium Chloride generated during manufacturing process of dye  
& dye intermediates, pharmaceuticals & pesticide industries**

**Procedure for grant of authorization by State Pollution Control Boards (SPCBs)/  
Pollution Control Committee (PCCs) for utilization of Hazardous waste**

- 1) While granting authorisation for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorisation is given only to those wastes for which SoPs on utilisation have been circulated by CPCB ensuring the following:
  - a. The waste (intended for utilization) belongs to same source of generation as specified in SoP.
  - b. The utilization shall be same to as described in SoP.
  - c. End-use/ product produced from the waste shall be same as specified in SoP.
  - d. Authorisation shall be granted only after verification of details and minimum requisite facilities as given in SoP.
  - e. Issuance of passbooks (similar to passbooks issued for recycling of used oil, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of ETP Sludge for utilization.
- 2) After issuance of authorization, SPCB shall verify the compliance of checklist and SoP on quarterly basis for initial 2 years; followed by random checks in the subsequent period for atleast once a year. The compliance reports shall be submitted to CPCB by July every year.
- 3) In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3<sup>rd</sup> party institutions or laboratories having EPA/NABL/ISO17025 accreditation / recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.
- 4) SPCBs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) to CPCB and also upload the same on SPCB website, periodically. Such updated list shall be sent to CPCB on a half yearly basis i.e., by July and January respectively.
- 5) Authorisation for utilisation shall not be given to the units located in the State/UT where there is no Common TSDF, unless the unit ensures authorised captive disposal of the hazardous waste (generated during utilisation) or its complete utilisation or arrangement of sharing with any other authorised disposal facility.
- 6) In case of the utilization proposal is not similar with respect to source of generation or utilization process or end-use as outlined in this SoP, the same may be referred to CPCB for clarification / conducting trial utilization studies and developing SoPs thereof.
- 7) The source and work zone standards suggested in the SoP are based on the E(P)A notified and OSHA standard respectively, however, SPCB/PCC may impose more stringent standards based on the location or process specific conditions.



**Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

**43.0 Utilization of Spent Aluminium Chloride:**

S.no.	Type of HW	Source of generation	Recovery & Utilization
1.	Spent Aluminium Chloride- Category 26.3/29.6 of Schedule I and/or Class B-10 - Halogen containing compound & Class C-2 of Schedule II of HOWM Rules, 2016.	During the production process of:  i. CPC Green ii. 2, 4, 6-Trimethyl Benzoyl Chloride iii. meta bromo benzaldehyde iv. chloro-bromination of Benzaldehyde v. meta phenoxy benzaldehyde  Industry type:  i. dyes & dyes intermediate ii. pesticides iii. pharmaceuticals industries	Recovery: Liquid Aluminium Hydroxide Chloride/Poly Aluminium Chloride  Utilization: The liquid Aluminium Hydroxide Chloride/Poly Aluminium Chloride produced can be utilized only as coagulant in the ETP and as sizing material in Pulp and Paper industry and in no case shall be used in Water Treatment Plant.  The Aluminium Hydroxide Chloride (AHC) manufactured by utilizing spent Aluminium Chloride (generated from manufacturing of CPC Green and 2,4,6 Trimethyl Benzoyl chloride) only shall be used as a coagulant in Sewage Treatment Plants (STPs)

**43.1 Source of Waste**

The Spent Aluminium Chloride is generated during manufacturing process of dyes & dyes intermediate, pharmaceuticals & pesticides industries. This Spent Aluminium Chloride is categorized as 26.3/29.6 of Schedule I and/or Class B-10 – Halogen containing compounds & Class C-2 of Schedule II of HOWM Rules, 2016, respectively. The typical characteristics of the wastes generated from different sources are given below.

**Table 1:- Characteristics of Spent Aluminium Chloride Solution Generated from CPC Green manufacturing Industries**

S.No.	Parameters	Unit	Result
1.	Moisture	%	78.09
2.	Aluminium Chloride as AlCl <sub>3</sub>	%	18.8
3.	HCL	%	0.13
4.	V-salt (as Sodium Chloride)	%	1.38
5.	Calcium Chloride	%	<0.1
6.	Cuppers Chloride as CuCl <sub>2</sub>	%	1.40
7.	TOC	mg/kg	16.75
<b>Heavy Metals</b>			
8.	Mercury as Hg	mg/kg	<0.1
9.	Arsenic as As	mg/kg	<0.1
10.	Cadmium as Cd	mg/kg	0.48
11.	Lead as Pb	mg/kg	0.62
12.	Iron as Fe	mg/kg	7.2
13.	Zinc as Zn	mg/kg	0.84
14.	Copper as Cu	mg/kg	923
15.	Chromium as Cr	mg/kg	0.56
16.	Manganese as Mn	mg/kg	2.14
<b>Organic Compound</b>			
17.	CPC-Blue	mg/kg	6.6
18.	CPC-Green	mg/kg	9.8
19.	Ferric Chloride	mg/kg	0.08

**Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

**Table 2:- Characteristics of Spent Aluminium Chloride Solution Generated from 2, 4, 6-Trimethyl Benzoyl Chloride Manufacturing Industries**

Sl. No.	Parameters	Unit	Result
1.	Moisture	%	72.30
2.	Aluminium Chloride as AlCl <sub>3</sub>	%	25.20
3.	HCL	%	1.294
4.	V-salt (as Sodium Chloride)	%	1.1
5.	Calcium Chloride	%	<0.1
6.	TOC	mg/kg	66.50
<b>Heavy Metals</b>			
7.	Mercury as Hg	mg/kg	<0.1
8.	Arsenic as As	mg/kg	<0.1
9.	Cadmium as Cd	mg/kg	0.13

Sl. No.	Parameters	Unit	Result
10.	Lead as Pb	mg/kg	0.44
11.	Iron as Fe	mg/kg	5.16
12.	Zinc as Zn	mg/kg	0.78
13.	Copper as Cu	mg/kg	1.92
14.	Chromium as Cr	mg/kg	0.46
15.	Manganese as Mn	mg/kg	0.94
<b>Organic Compound</b>			
16.	Acetyl Chloride	mg/kg	<0.1
17.	Mesitylene	mg/kg	8.0
18.	2, 4, 6-Trimethyl Benzoyl Chloride	mg/kg	10.90

**Table 3:- Characteristics of Spent Aluminium Chloride Solution generated from meta bromo benzaldehyde manufacturing Industries and during chloro-bromination of benzaldehyde**

S. no.	Parameters	Results (in ppm)	
		Meta bromo benzaldehyde	Chloro-bromination of benzaldehyde
1.	pH	-ve	0.84
2.	Sulphate	596	210
3.	Chloride	342305	337484
4.	Copper	189.50	155
5.	Total Chromium	0.81	1.15
6.	Hexavalent Chromium	0.75	0.92
7.	Phenolic Compounds	ND	ND
8.	Mercury	ND	ND
9.	TOC	ND	ND
10.	Heavy metals	ND	ND

### 43.2 Utilization Processes

Utilization process involves two steps, that is recovery of liquid Aluminium Hydroxide Chloride or Poly Aluminium Chloride as resource followed by utilization in Pulp and paper industry, ETP or STP as specified at Table given at Section 43.0 above.

#### a. The resource recovery:

- i. In case of utilization of Spent Aluminium Chloride generated from 2, 4, 6-Trimethyl Benzoyl Chloride, spent solution is transferred into the pre-treatment unit where the Spent Aluminium Chloride is treated with activated carbon to remove colour and organic impurities. The treated Spent Aluminium Chloride is then charged into the

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reaction vessel and the other raw materials i.e. alumina/aluminium hydroxide, sodium hydroxide /sodium bi-carbonate/ sodium carbonate and calcium hydroxide (all in solid form) are added into reaction. The reaction process is completed in 04-05 hours. After completion of process, the reaction mass is filtered through filter press. The product i.e. Aluminium hydroxide is obtained as liquid. The solid cake obtained from filter press is sent to the TSDF for final disposal.

The fumes from the reaction vessel are treated through venturi scrubber and the scrubbed bleed generated from venturi scrubber is further utilized in process for maintaining pH.

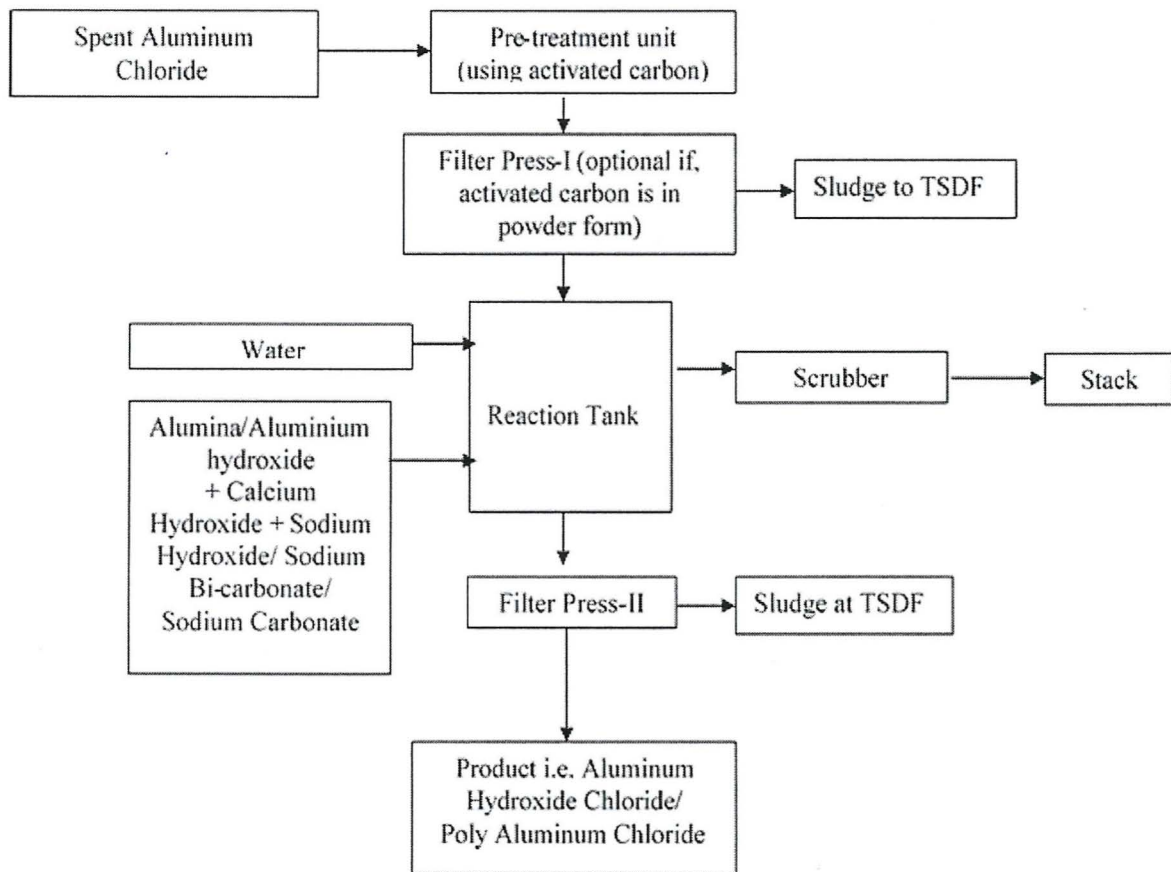


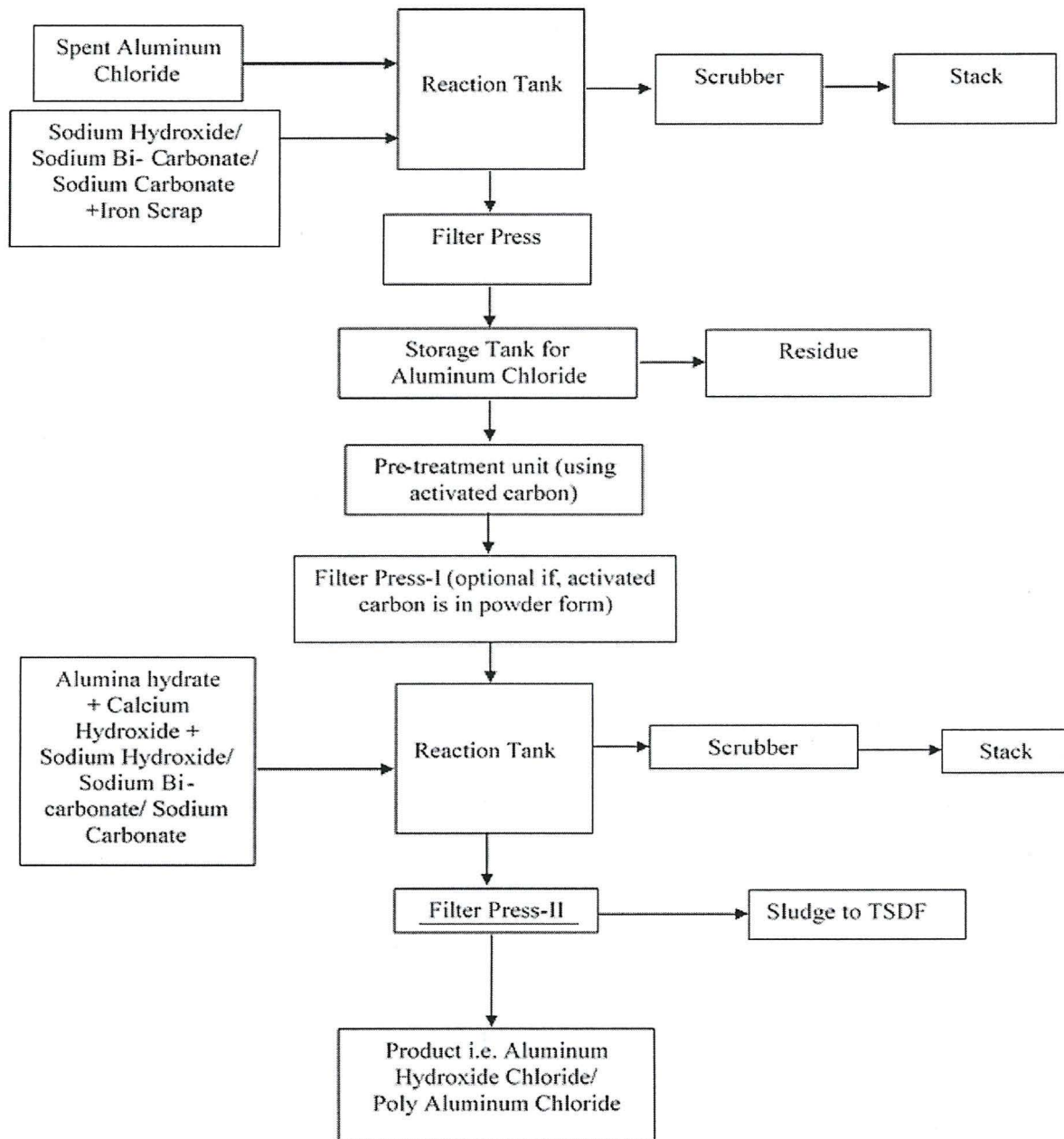
Figure: 1-Process flow diagram for utilization of Spent Aluminium Chloride generated from 2, 4, 6-Trimethyl Benzoyl Chloride.

- ii. In case of utilization of Spent Aluminium Chloride generated from CPC green, the spent solution is firstly charged into the reaction vessel and the other raw materials i.e. iron scrap and sodium hydroxide /sodium bi-carbonate/ sodium carbonate are added into reaction vessel. The solution is kept in agitation to complete the reaction and the reacted mass is filtered through filter press. The filtered precipitate is dried and taken out. The filtrate solution from the filter press is further treated with activated carbon and transferred to the reaction vessel and the other raw material i.e. alumina/aluminium hydroxide, sodium hydroxide /sodium bi-carbonate /sodium carbonate and calcium hydroxide (all in solid form) are added into reaction vessel in stage wise manner. The solution is kept in agitation to completion of process, the reaction mass is filtered

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through filter press. The product i.e. Aluminium hydroxide is obtained as liquid. The solid cake obtained from filter press is sent to the TSDF for final disposal.

The fumes from the reaction vessel(s) are treated through venturi scrubber and the scrubbed bleed generated from venturi scrubber is further utilized in process for maintain pH.



**Figure: 2-Process flow diagram for utilization of Spent Aluminium Chloride generated from CPC green.**

- iii. In case of utilization of Spent Aluminium Chloride generated during manufacturing of meta bromo benzaldehyde, chloro-bromination of benzaldehyde and meta phenoxy benzaldehyde (pharmaceutical & pesticide industries), initially the Spent Aluminium Chloride is allowed to settle for one hour in a tank for separation of organic layer.

## Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries

Separated organic layer (if any) is collected and stored separately & disposed at CHWTSDF or as per authorization.

During first stage purification (Pre-treatment), the Spent Aluminium Chloride is transferred into the pre-treatment unit where the activated carbon remove the colour and remaining organic impurities. The solution should be kept in agitation to complete the process and reaction mass shall be filtered through Filter Press-I.

During second stage purification, the treated Spent Aluminium Chloride is charged into the reaction vessel (e.g. glass lined reactor) and pre-activated carbon along with other raw materials i.e. alumina/aluminium hydroxide, sodium hydroxide/sodium bi-carbonate/ sodium carbonate and calcium hydroxide (all in solid form) are added into reaction vessel. The mixture is heated up to 150°C under pressure at 4 to 5 kg/cm<sup>2</sup> for about 4 hrs followed by cooling up to 40-45°C.

The reacted mass is passed through Filter Press-II and final product (filtrate) Poly Aluminium Chloride (PAC)/Aluminium Hydroxide Chloride (AHC) is stored in storage tank. Sludge generated from the filter press is stored in separate hazardous waste storage area and disposed at CHWTSDF or as per authorization.

The fumes from the reaction vessel are treated through venturi scrubber and the scrubbed bleed generated from venturi scrubber is further utilized in process for maintaining pH.

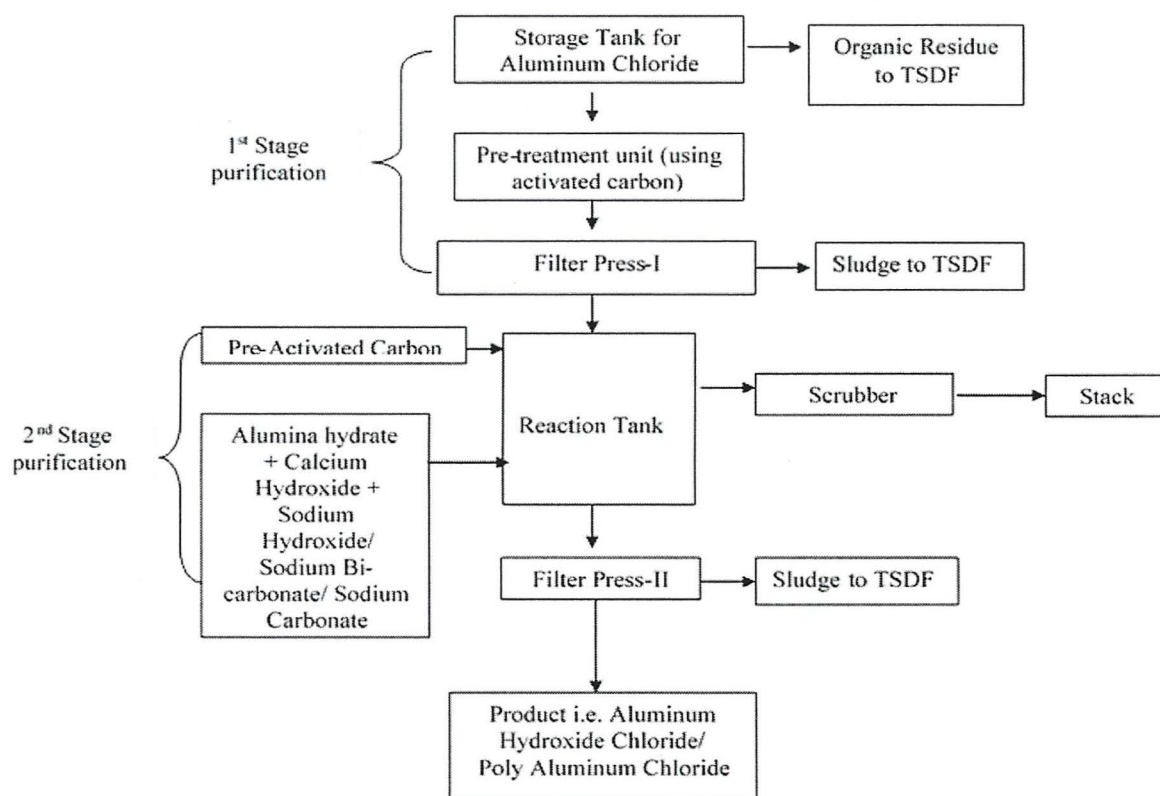


Figure: 3-Process flow diagram for utilization of Spent Aluminium Chloride generated from meta bromo benzaldehyde, chloro-bromination of benzaldehyde & meta phenoxy benzaldehyde

**Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

**b. Product Usage / Utilization**

The liquid Aluminium Hydroxide Chloride/Poly Aluminium Chloride produced can be utilized only in the Effluent Treatment Plant as coagulant and Pulp and paper industry as sizing material and in no case shall be used in Water Treatment Plant.

The Aluminium Hydroxide Chloride (AHC) manufactured by utilizing spent Aluminium Chloride (generated from manufacturing of CPC Green and 2,4,6 Trimethyl Benzoyl chloride) only shall be used as a coagulant in Sewage Treatment Plants (STPs) as per Para 43.3. In no case, Aluminium Hydroxide Chloride (AHC) shall be utilized for drinking water purification or water treatment plants. In no case, this treated sewage water shall be used in agricultural fields.

The product i.e. Aluminium Hydroxide Chloride /Poly Aluminium Chloride shall comply with the Bureau of Indian Standards: IS 15573:2018 for TOC i.e. 80 ppm (in liquid form)

The unit shall label its product (Aluminium Hydroxide Chloride/Poly Aluminium Chloride) manufactured by utilizing aforesaid hazardous waste) as “This Aluminium hydroxide/Poly Aluminium Chloride has been manufactured by utilizing Spent Aluminium Chloride and not to be used in Water Treatment Plant”.

**43.3 Utilization Process and Standard Operating Procedure for utilization of Aluminium Hydroxide Chloride as a coagulant in STPs:**

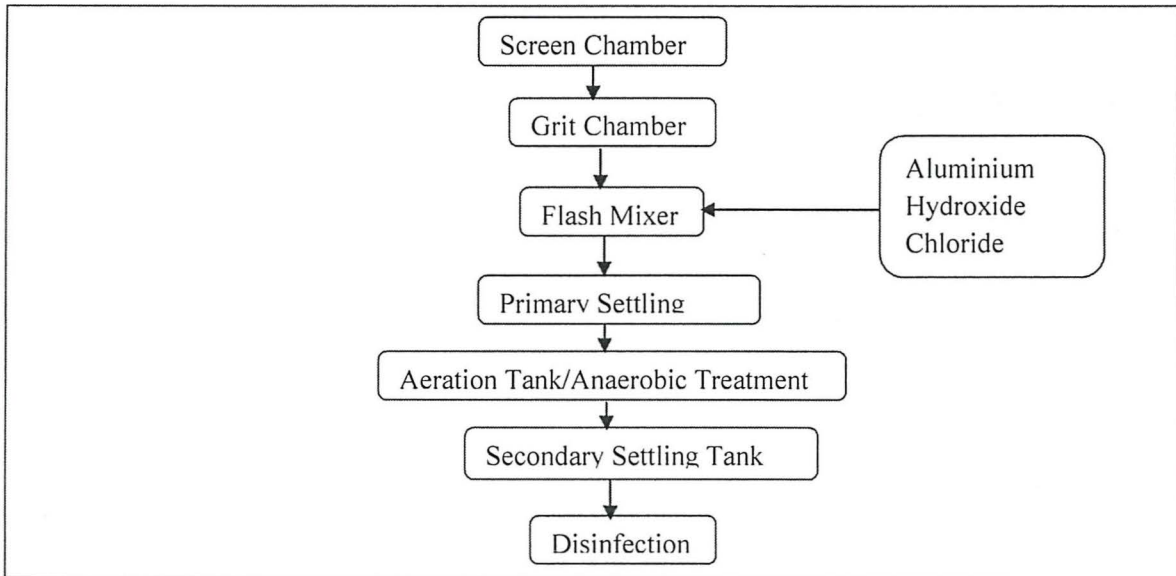
Characteristics of Aluminium Hydroxide Chloride (AHC) generated from CPC green and 2, 4, 6 Trimethyl Benzoyl Chloride:

Sr No	Parameters	Unit	Results of AHC from CPC Green	Results of AHC generated 2,4, 6 Trimethyl Benzoyl Chloride
1	Moisture	%	73.71	67.80
2	Aluminium Hydroxide Chloride	%	15	20.88
3	HCl	%	< 0.01	< 0.01
4	V-Salt (as sodium chloride)	%	6.30	6.2
5	Calcium Chloride	%	4.90	5.1
6	Coppers Chloride as CuCl <sub>2</sub>	%	0.0087	-
7	TOC	mg/Kg	8.75	58
8	Mercury as Hg	mg/Kg	<0.1	< 0.1
9	Arsenic as As	mg/Kg	< 0.1	< 0.1
10	Cadmium as Cd	mg/Kg	0.16	0.05
11	Lead as Pb	mg/Kg	0.28	0.16
12	Iron as Fe	mg/Kg	5.8	0.54
13	Zinc as Zn	mg/Kg	0.36	0.20
14	Copper as Cu	mg/Kg	15	0.32
15	Chromium as Cr	mg/Kg	0.12	0.11
16	Manganese as Mn	mg/Kg	0.56	0.28
17	Organic Compounds	mg/Kg	CPC Blue: <5	Acetyl Chloride: < 0.1
			CPC Green: <5	Mestilylene: 2.0
			Ferric Chloride: 0.020	2,4, 6 Trimethyl Benzoyl Chloride: 2.8



## Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries

**Utilization Process of AHC as a coagulant in STP:** The Aluminium Hydroxide Chloride (AHC) manufactured by utilizing spent Aluminium Chloride (generated from manufacturing of CPC Green and 2,4,6 Trimethyl Benzoyl chloride) as a coagulant in Sewage Treatment Plants (STPs). In coagulation and flocculation process, by using coagulant dissolved solids is transformed into insoluble solids. The dosing of coagulant is done in Flash Mixer/Equalisation tank. The effluent goes to screen chamber, grit chamber, Flash Mixer, primary clarifier/settling tank, secondary treatment (aeration tank/ anaerobic treatment), secondary clarifier/settling tank and treated effluent storage tank.



**Figure: 4-Process flow diagram for utilization of Aluminium Hydroxide Chloride as a coagulant in STP.**

### Standard Operating Procedure for utilization of AHC as a coagulant in STP:

- 1) The AHC shall be transported in SPCB/PCC authorized tankers mounted on vehicles fitted with requisite safeguards ensuring no spillage of the same.
- 2) There shall be a designed space for unloading of AHC into the storage tank. The receiving storage tank shall be placed above the ground and contained with low raise parapet/bund wall with slope to collect spillages, if any, into collection pit. Alternatively, storage tanks for AHC may be kept below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner. In the event of leachate detection in the leachate collection system, corrective measures shall be taken immediately.
- 3) The unit shall install storage tank under cool, dry, well ventilated covered storage shed(s) within premises, as authorized by the concerned SPCB/ PCC under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

Further, the storage area shall have leak-proof floor tiles with adequate slope to collect spillage, if any, into a collection pit. The spillage from collection pit shall be transferred to reaction tanker or ETP, as the cases may be, through chemical process pump.

- 4) There shall be no manual handling of the AHC. Acid Proof pump shall be used for transfer of AHC through pipelines to equalization tank/flash mixer.

## **Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

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- 5) The vent of AHC storage tanks shall be connected to scrubber for treatment using alkaline medium.
- 6) The unit shall provide separate storage tanks for storage of chemicals and the storage tanks should be at designated place with proper cover and with acid brick lining floors.
- 7) The unit shall ensure that the said utilization process and its associated activities shall be demarcated separately within the unit.

### **43.4 Standard Operating Procedure for utilization of hazardous wastes**

The SoP is applicable only for the utilization of Spent Aluminium Chloride generated during manufacturing of CPC Green, 2, 4, 6-Trimethyl Benzoyl Chloride, meta bromo benzaldehyde, chloro-bromination of benzaldehyde and meta phenoxy benzaldehyde (dye & dye-intermediate, pharmaceutical and pesticide industries) to produce Aluminium Hydroxide Chloride/Poly Aluminium Chloride.

- 1) The Spent Aluminium Chloride shall be transported in acid proof tankers mounted on vehicles fitted with requisite safeguards ensuring no spillage, as authorized by SPCB/PCC.
- 2) There should be a designated space for unloading of Spent Aluminium Chloride into an acid proof storage tank. The receiving storage tank shall be placed above the ground and contained with low raise parapet/bund wall & concrete/acid proof floor with slope to collect spillages, if any into collection pit.
- 3) The storage tank shall be kept under cool, dry, well-ventilated covered storage shed(s) within the premises, as authorized by the concerned SPCB/PCC under HOWM Rules, 2016, so as to eliminate rain water intrusion.
- 4) There shall be no manual handling of the Spent Aluminium Chloride and Poly Aluminium Chloride. Acid proof pump shall be used for transfer of Spent Aluminium Chloride through pipelines.
- 5) The Spent Aluminium Chloride shall be transfer through mechanized system into the pre-treatment unit to remove colour and organic impurities by treating the Spent Aluminium Chloride with Activated carbon.

In case of the Spent Aluminium Chloride generated from CPC Green manufacturing process, the pre-treatment with Activated Carbon shall be carried after removal of Copper from the Spent Aluminium Chloride by treating the same with iron scrap and sodium hydroxide in the mechanized agitated reaction vessel. The same should added through closed conveyor system. The reacted mass shall be transferred to the filter press and precipitated solid mass from the filter press is dried and packed and kept in Storage area.

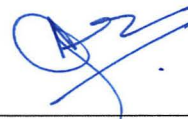
- 6) The activated carbon treated Aluminium Chloride solution shall be transferred to the closed reaction vessel where alumina/aluminium hydroxide, sodium hydroxide /sodium bi-carbonate / sodium carbonate and calcium hydroxide are also added step by step in powder form into the reactor through closed conveyor system. The reactor shall be of acid proof material.
- 7) Depending upon utilization process of Spent Aluminium Chloride generated from meta bromo benzaldehyde, chloro-bromination of benzaldehyde and meta phenoxy

## **Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

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- benzaldehyde, separate vessel for mixing of activated carbon & spent aluminium chloride followed by filter press may also be provided before mixing process in Glass lined reactor.
- 8) The solution in the reactor shall be agitated with the help of mechanized agitated for 4-4.5 hours and then transferred to filter press through pump for filtration. The solid mass from the filter press shall be removed mechanically and packed and kept in storage area.
  - 9) The filtrate i.e. Liquid Aluminium Chloride is received as final product from filter press.
  - 10) Poly Aluminium Chloride solution shall be spray dried in spray dryer to produce Poly Aluminium Chloride in powder form (if required).
  - 11) Acid fume/vapour is expected to be liberated from the reaction tanks where iron alumina/aluminium hydroxide, sodium hydroxide /sodium bi-carbonate / sodium carbonate and calcium hydroxide is added to Spent Aluminium Chloride. Thus, the said reaction tanks shall be connected with hood over it to suck acid fume/vapour. The hood shall be maintained under suction followed by treatment in scrubber using alkaline medium and attached to stack of minimum height of 30m or as prescribed by the concerned SPCB/PCC, whichever is higher.
  - 12) The entire process area shall have leak-proof and acid proof floor tiles with adequate slope to collect spillages, if any, into a collection pit. The spillages from collection pit shall be transferred to reaction tank, as the cases may be, through acid proof pump.
  - 13) The product i.e. Aluminium Hydroxide Chloride/ Poly Aluminium Chloride shall comply with the Bureau of Indian Standards: IS 15573:2018 for TOC i.e. 80 ppm (liquid form).
  - 14) The product (i.e. Aluminium Hydroxide Chloride/ Poly Aluminium Chloride) manufactured by utilizing aforesaid hazardous waste shall only be used in ETP as coagulant and Pulp & Paper industry as sizing agent.
  - 15) The unit shall label its product (i.e. Aluminium Hydroxide Chloride/ Poly Aluminium Chloride) manufactured by utilizing aforesaid hazardous waste) as "This Aluminium Hydroxide Chloride/ Poly Aluminium Chloride has been manufactured by utilizing spent Aluminium Chloride and not to be used in Water Treatment Plant".
  - 16) Treatment and disposal of wastewater:

The pollution potentials are emissions from reactors and residues from filter press and there is no generation of wastewater and thereof on discharge of wastewater.
  - 17) It shall be ensured that Spent Aluminium Chloride is produced from the industries that have valid authorization for the same from the concerned SPCB/PCC as required under HOWM Rules, 2016.
  - 18) The residues generated from (filter press), product spillages etc. shall be collected and temporarily stored at designated place and proper cover and concrete/acid proof brick lining floor and be sent to authorized common TSDF or other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.



## **Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

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- 19) Prior to utilization of Spent Aluminium Chloride, the unit shall obtain authorization for generation, storage and utilization from the concerned SPCB/PCC under HOWM Rules, 2016.
- 20) The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment (PPE) such as Chemical goggles, full-face shield, or a full face respirator, Impervious gloves of chemically resistant material (rubber or neoprene), Body suits, aprons, and/or coveralls of chemical resistant material and impervious boots of chemically resistant material.
- 21) Transportation of Spent Aluminium Chloride and residues generated during utilization shall be carried out by the sender or receiver (utilizer/TSDF operator) as per the authorization issued by concerned SPCB/PCC under HOWM Rules, 2016 and in compliance with other provision of said rules.
- 22) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit shall be liable to implement response measures, environmental site assessment and remediation of contaminated soil/ground water/sediment etc. as per the "Guidelines on Implementing Liabilities for Environment Damages due to Handling & Disposal of Hazardous Wastes and Penalty" published by CPCB.
- 23) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
- 24) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

### **43.5 Record>Returns Filing**

- 1) The unit shall maintain a passbook issued by the concern SPCB/PCC and maintain details of each procurement of ETP sludge as mentioned below:
  - Address of the sender
  - Date of dispatch
  - Quantity procured
  - Seal and signature of the sender
  - Date of receipt in the premises
- 2) A log book with information on source and date of generation/procurement of spent Aluminium Chloride, quantity, date wise utilization of spent Aluminium Chloride, quantity of Aluminium Hydroxide Chloride / Poly Aluminium Chloride manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.
- 3) The unit shall maintain record of hazardous waste generated, utilized and disposed as per Form 3 & also file annual returns in Form 4 as per Rule 20 (1) and (2) of HOWM Rules, 2016.



## **Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

- 4) The unit shall submit quarterly and annual information on hazardous wastes consumed, its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB/PCC.

### **43.6 Standards**

- 1) Source Emission in Stack attached to the reaction tanks shall comply with the following emission standards or as prescribed by the concerned SPCB/PCC, whichever is stringent:

PM <sub>10</sub>	-	50 mg/Nm <sup>3</sup>
HCL Vapour & Mist	-	35 mg/Nm <sup>3</sup>
TOC	-	20 mg/Nm <sup>3</sup>

- 2) Fugitive emissions in the work zone shall comply with the following standards:

PM <sub>10</sub>	-	5 mg/m <sup>3</sup> TWA*
HCl	-	7 mg/m <sup>3</sup> Ceiling <sup>#</sup>

*TWA\* - Time-weighted average The Permissible Exposure Limit is 8-hour TWA*

*# A Ceiling limit is one that may not be exceeded for any period of time, and is applied to irritants and other material that have immediate effects*

- 3) Monitoring of the specified parameters for source emission shall be carried out quarterly for the first year followed by at least annually in the subsequent year of utilization. Fugitive emission for specified parameters shall be carried out quarterly. The monitoring shall be carried out by ISO 17025 accredited or EPA, 1986 approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.
- 4) The treated effluent as well as sewage shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by respective SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.

### **43.7 Siting of Industry**

- (1) Facilities for processing of Spent Aluminium Chloride shall preferably be located in a notified industries area or industrial Park/estate/cluster.
- (2) Facilities for utilization of AHC shall be located in a STP and in accordance with Consent to Establish issued by the concerned SPCB/PCC.

### **43.8 Efficiency of utilization**

25.14 MT of Aluminium Hydroxide Chloride may be produced by utilizing about 23.03 MT of Spent Aluminium Chloride (generated from 2, 4, 6-Trimethyl Benzoyl Chloride) along-with other materials.

18.8 MT of Aluminium Chloride may be produced by utilizing 18.26 MT of Spent Aluminium Chloride (generated from CPC Green) along-with other material.

10 MT of Poly Aluminium Chloride may be produced by utilizing 8.6 MT of Spent Aluminium Chloride generated from meta bromo benzaldehyde, chloro-bromination of benzaldehyde and meta phenoxy benzaldehyde (dye & dye-intermediate, pharmaceutical and pesticide industries).

Therefore, requisite facilities of adequate size shall be installed accordingly as mentioned under para 43.10 below.

**Utilization of Spent Aluminium Chloride generated during manufacturing process of dye & dye intermediates, pharmaceuticals & pesticide industries**

**43.9 On-line detectors / Alarms / Analysers**

In case of continuous process operation, online analyzers shall be installed for PM and TOC in the stack emission and the on-line data be connected to the concerned SPCB/PCC server.

**43.10 Checklist of Minimal Requisite Facilities**

S.No.	Requisite Facilities
1.	Storage shed(s) for storage of Spent Aluminium Chloride in acid proof container only under cool, dry, well-ventilated covered storage shed(s) within premises.
2.	Separate storage area for storage of liquid Aluminium Hydroxide Chloride/ Poly Aluminium Chloride
3.	Storage tanks should be of such size/capacity that it can store two weeks requirements
4.	Collection pit for collection of the spillage from storage area, process area and uploading area.
5.	Closed Mechanized system for – <ul style="list-style-type: none"> <li>- Mixing of Spent Aluminium Chloride with alumina/aluminium hydroxide, sodium hydroxide /sodium bi-carbonate / sodium carbonate and calcium hydroxide.</li> <li>- Transfer of alumina/aluminium hydroxide, sodium hydroxide /sodium bi-carbonate / sodium carbonate and calcium hydroxide into process reactor</li> </ul>
6.	Chemical process pumps (acid proof) for transfer of Spent Aluminium Chloride and Poly Aluminium Chloride from tanker to storage tank and subsequently to process area
7.	Activated Carbon Pre-treatment unit Filter press (optional in case activated carbon used in powder form)
8.	Closed Process reactor [reaction vessel(s)] attached to scrubbing system followed by stack of minimum height of 30m or as prescribed by concerned SPCB/PCC, whichever is higher
9.	Filter Press
10.	Dedicated separate covered hazardous waste (filter press residue, activated carbon, etc.) storage area to store hazardous generated during utilization process.
11.	Spray dryer, in case Poly Aluminium Chloride required in powder form.
12.	Stacks to have sampling port, platform, access to the platform etc. as per the Guidelines on Methodologies for Source Emission Monitoring published by CPCB under Laboratory Analysis Techniques LATS/80/2013-14.
13.	Product shall be stored in cool, dry, well-ventilated covered storage shed within premises.
14.	Online analyzers shall be installed for PM and TOC in the stack emission and be connected to the concerned SPCB/PCC server.

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