

**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 Aluminium dross residues generated from separation
of metal from Aluminium dross or Aluminium dross reprocessing
units for manufacturing of Alum**



July, 2019

Central Pollution Control Board
(Ministry of Environment, Forest & Climate Change, Government of India)
Parivesh Bhawan, East Arjun Nagar,
Shahdara, Delhi – 110032

Utilization of Aluminium Dross residues generated from separation of metal for manufacturing of Alum

Procedure for grant of authorization by SPCBs/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 similar source of generation as specified in SoP.
 - b. The utilization shall be similar 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 for maintaining records of receipt of dross residues 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.

In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3rd party institutions or laboratories having EPA/NABL/ISO17025 accreditation / recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.
- 3) 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.
- 4) 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.
- 5) 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.
- 6) 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.

54.0 Utilization of aluminium dross residues:

Type of HW	Source of generation	Recovery/Product
Aluminium dross residues (Schedule II Category A12/A72 of HOWM Rules, 2016)	Generated from separation of metal from Aluminium dross / aluminium dross reprocessing units.	As a supplementary resource for manufacturing of Alum

54.1 Source of Waste

The dross residues is generated from separation of metal or dross reprocessing is categorized as Hazardous waste at S. No. 12 and 72 of Schedule II of HOWM Rules, 2016, due to the presence of nitrogen as nitrate and fluoride, which are required to be disposed in authorized

Waste Management Division, CPCB, Delhi

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disposal facility in accordance with authorization condition, when not utilized as resource recovery.

Typical characteristics of the aluminium dross residues are given below:

Parameters	Results (%)
Alumina as Al ₂ O ₃	83.5
Heavy metals (As, Mn, Cu, Zn)	0.026
Calcium Oxide as CaO	0.62
Silicon Dioxide SiO ₂	1.40
Titanium Dioxide as TiO ₂	0.12
Magnesium Oxide (as MgO)	0.81
Ferric Oxide as Fe ₂ O ₃	1.12
Disodium Oxide as Na ₂ O	0.21
Sulphur Trioxide as SO ₃	0.30
Manganese Oxide as MnO	0.07
Chromium Trioxide (Cr ₂ O ₃)	0.02
Fluoride as F	ND
Nitrogen as N	3.0

54.2 Utilization Process

The dross residues generated from separation of metal or dross reprocessing can be processed to produce alum. The production of alum by hydrometallurgical processing mainly includes unit operations like leaching, solid liquid separation, crystallization and centrifugation. The solid waste generated from the process may be washed with water prior to sending to TSDF and washed water may be re-used in the process in case of further recovery of resources in the waste.

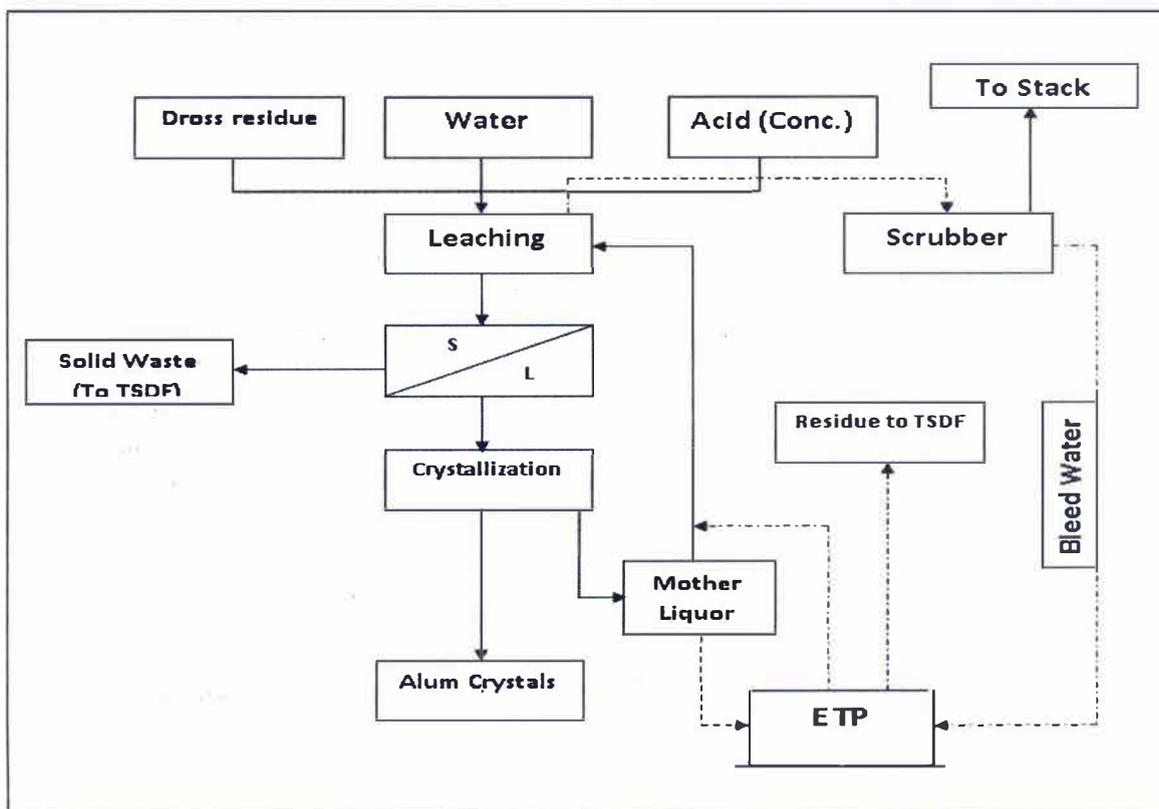


Figure no.: 1-Process flow diagram for utilization of hazardous waste i.e., Aluminium dross residues.

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54.3 Product Usage / Utilization

The Aluminium dross residues will be utilized in the production of alum. Product (Alum) to be used only for treatment of industrial effluent or for industrial applications and shall not be used for treating in case for drinking water use or in food/beverages applications, etc.

The unit shall label its product (i.e. alum) manufactured by utilizing aforesaid hazardous waste as "This Alum has been manufactured by utilizing aluminium dross residues generated from separation of metal from Aluminium dross originated from primary Aluminium production".

54.4 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of aluminium dross residues generated from material separation or dross reprocessing.

- 1) The aluminium dross residues shall be transported in SPCB/PCC authorized covered vehicles with requisite safeguards.
- 2) There shall be a closed system of operations such as leaching. The reaction vessel shall be connected with suction hood above the feeding point (of dross residue) to control acid fumes/vapours liberated from the reaction vessel. The suction hood shall be connected with alkali scrubber and stack of adequate height.
- 3) The fugitive emission of dust anywhere near the work zone shall be extracted through APCD i.e., Pulsejet Bag Filter and stack of adequate height.
- 4) The storage and handling of material shall be done under a shed of proper vertical height and over imperviously lined flooring.
- 5) The handling of hazardous waste shall be carried out using mechanical means with minimal manual intervention.
- 6) The solid residues generated from the process shall be reused in the said utilization process or shall be packed and temporarily stored in dedicated hazardous waste storage pit (imperviously lined) with cover and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.
- 7) 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 of sulphuric acid 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.

- 8) There shall be no manual handling of the sulphuric acid. Acid Proof pump shall be used for transfer of sulphuric acid through pipelines to the Leaching reactor. Spill containment arrangement shall be provided around the Sulphuric acid storage tanks.
- 9) 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.



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- 10) The treated gases shall comply with emission norms and prior to dispersion into atmosphere through stack. The height of stack shall be a minimum of 6 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.
- 11) The reactors, filters, thermic fluid heaters and centrifuges have to be a closed system and shall have vent ducts connected to common scrubbing system followed by dispersion through stack.
- 12) 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) specific to the process operations involved and type of chemicals handled as per Material Safety Data Sheet (MSDS). The safety precautions of the worker shall be in accordance with the Factory Act, 1948, as amended from time to time.
- 13) The quality of the product alum shall match with the BIS commercial grade specifications.
- 14) Treatment and disposal of wastewater:

Wastewater generated from floor-washings, spillages, reactor washing, scrubber bleed including the wastewater from filtration shall be treated Physico-Chemically in an ETP and may be sent to CETP for final disposal or be treated further in a captive facility to comply with surface water discharge standards.

In case of zero discharge condition by SPCB/PCC, the treated waste water from ETP may be reused in process or cooling inside the factory or evaporated in forced evaporators like MEE. The concentrated liquid from the evaporator shall be sent to spray dryer for conversion into dry powder which may be disposed as given in the para 15 below.

- 15) The treated effluent 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.
- 16) The hazardous wastes generated (namely the filter residue, ETP sludge, scrubber, effluent powder generated from spray dryer/forced evaporator, product spillages, damaged filter liners, etc.) shall be collected and temporarily stored in non-reactive drums/ bags under a dedicated hazardous waste storage area 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.

It shall be ensured that the highly soluble dry-powdered effluent from MEE-Spray Dryer should be stabilized or immobilized with suitable cementing material prior to secured landfilling in TSDF.

- 17) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes, etc.
- 18) The unit shall install storage tank under cool, dry, well ventilated covered storage shed(s) surrounded by garland drain and settling pit within premises, as authorized by the concerned SPCB/ PCC under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 so as to eliminate rain water intrusion.



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- 19) It shall be ensured that the aforesaid hazardous waste is procured from the industries, which have valid authorization for the same from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- 20) Transportation of aluminium dross residues shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorisation from the concerned SPCB under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
- 21) Prior to utilization of aluminium dross residues, the unit shall obtain authorisation for generation, storage and utilization of aluminium dross residues from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- 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 occupier (sender or receiver, as the case may be) shall be liable to implement immediate response measures, environmental site assessment and remediation of contaminated soil/ groundwater/ sediment etc. as per the "*Guidelines on Implementing Liabilities for Environmental 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 requirement in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

54.5 Record>Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB wherein the following details of each procurement of dross residues shall be entered:
 - Address of the sender
 - Date of dispatch
 - Quantity procured
 - Seal and signature of the sender
 - Date of Receipt in the premises
 - Quantity of alum produced and quality certificate from a NABL accredited Laboratory of few samples in a month randomly.
- 2) A log book with information on source and date of procurement of dross residues, quantity, date wise utilisation of the same, hazardous waste generation and its disposal, etc. shall be maintained including analysis report of fugitive emission monitoring & effluent discharged, as applicable.
- 3) The unit shall maintain record of hazardous waste utilised, hazardous waste generated and disposed as per Form 3 & shall file annual returns in Form 4 as per Rule 20 (1) and (2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, to concerned SPCB/PCC.

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- 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.

54.6 Standards

- 1) Source emissions from the stack connected to reactors/process stack shall comply with the following standards or as prescribed by the concerned SPCB/PCC, whichever is stringent;

PM	: 50 mg/Nm ³
SO ₂	: 200 mg/ Nm ³
Acid Mist (H ₂ SO ₄)	: 50 mg/Nm ³
NH ₃	: 30 mg/Nm ³

- 2) Fugitive emission in the storage area shall comply with the following standards:

PM ₁₀	: 5 mg/m ³ TWA* (PEL)
Ammonia	: 35 mg/m ³ TWA* (PEL)

*PEL: Permissible Exposure Limit

*time-weighted average (TWA): measured over a period of 8 hours of operation of process.

*short term exposure limit (STEL): measured for 15 minutes duration of exposure

- 3) Monitoring of the above specified parameters for source emission shall be carried out quarterly for 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 ISO17025 accredited or EPA approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.
- 4) Standard for wastewater discharge: Treated effluent shall be discharged in accordance with the conditions stipulated in Consent to Operate issued by respective SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974. In case of zero discharge or no discharge condition stipulated in the said consent or non-availability of the common Effluent Treatment Plant (CETP), zero discharge shall be met.

54.7 Siting of Industry

Facilities for utilization of dross residues shall be located in a notified industrial area or industrial park/estate/cluster and in accordance with Consent to Establish issued by the concerned SPCB/PCC.

54.8 On-line detectors / Alarms / Analysers

In case of continuous process operations, online emission analysers for PM in the stack shall be installed and the online data be connected to the server of the concerned SPCB/PCC.

54.9 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1	Covered storage shed of adequate capacity to store Aluminium dross residues of at least two weeks requirement but preferably for 90 days.
2	Cool, dry well-ventilated covered storage shed(s) for Aluminium dross residues storage, product storage and process activities within premises.
3	Mechanized system for transfer of Aluminium dross residues from storage area to reactor vessels.
4	The process units shall have proper ventilation (preferably with ventilation ducts above the process units connected to ID fan with exhaust above roof level)
5	Dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process.
6	Dumpers, loaders, feeders and other equipment for mechanical handling of aluminium dross and its residues.
7	Stack 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.
8	Mechanical Filter Press
9	Crystallizer unit (open tanks, jacketed crystallizers, crystallizers with evaporators, etc.)
10	Centrifuges
11	Zero Liquid Discharge (ZLD) to be maintained.

