# 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 Magnesium Chloride Salts Generated from DEMP (Diethyl Methyl Phosphonite reaction) in the MAP (Magnesium Ammonium Phosphate) Process in CETP

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**Central Pollution Control Board**

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

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## Utilization of Magnesium Chloride Salts Generated from DEMP (Diethyl Methyl Phosphonite reaction) in MAP (Magnesium Ammonium Phosphate) Process in CETP

**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 (similar to the passbooks issued for recycling of used oils, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous waste 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 thereof.

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.

**60.0 Utilization of Magnesium Chloride Salts Generated from Diethyl Methyl Phosphonite reaction (DEMP):**

| Type of HW | Source of generation | Recovery/Product |
|---|---|---|
| Spent Magnesium Chloride Salt | Generated from the Diethyl methyl phosphonite (DEMP) preparation process. | Spent Magnesium Chloride utilise in the MAP process of CETP as a raw material for waste water treatment |

# Utilization of Magnesium Chloride Salts Generated from DEMP (Diethyl Methyl Phosphonite reaction) in MAP (Magnesium Ammonium Phosphate) Process in CETP

## 60.1 Source of Waste

The Spent Magnesium Chloride salt is generated during the Diethyl methyl phosphonite (DEMP) reaction process. DEMP is an intermediate product manufactured for production of certain pesticides or chemicals. Magnesium Chloride solution is generated during the DEMP process which is converted into flakes before it is bagged.

*Table 1: Typical characteristics of Spent Magnesium Chloride salt generated in the DEMP reaction process.*

| Sr. No. | Parameter | Unit | Result |
|---|---|---|---|
| 1 | Appearance | -- | Off white flakes |
| 2 | $MgCl_2.6H_2O$ | % w/w | 89 |
| 3 | pH (10% solution) | -- | 5.26 |
| 4 | Water Content | % w/w | 48.5 |
| 5 | Chloride | % w/w | 31.1 |
| 6 | MgO | % w/w | 1.5 |
| 7 | TOC (Total Organic Carbon) | % | 6.96 |

## 60.2 Utilization Process

The Magnesium Ammonium Phosphate (MAP) process has been developed mainly for the removal of Ammonical Nitrogen in the effluent. The high Ammonical Nitrogen containing effluent are segregated and treated with Sodium salt, Magnesium Chloride and Di Sodium Hydrogen Phosphate or mixture of Caustic Soda and Phosphoric Acid to precipitate Magnesium Ammonium Phosphate (Struvite). MAP is insoluble compound and can be separated.

MAP (Struvite): Struvite or magnesium ammonium phosphate (MAP) is a fertiliser, precipitates in the presence of Mg+2 (M), NH4+ (N) and PO4-3 (P) according to following reaction:

$$Mg^{2+} + NH_4^+ + PO4^{3-} + 6H_2O \rightarrow MgNH_4PO_4.\ 6H_2O$$

The MAP crystals are separated out and the clear effluent is sent to the primary clarifier of the CETP and subject to further treatment in the secondary and tertiary treatment units of the CETP.

The high ammonical nitrogen stream from equalization tanks are pumped to MAP treatment unit where suitable dose of spent magnesium chloride and Sodium di-ammonium phosphate is added. The pH adjustment will be done by NaOH solution. The MAP crystal is separated out using tube settler and further dewatered in filter press. The clear effluent from Tube settler is sent to the primary clarifier of the CETP and subject to further treatment in the secondary and tertiary treatment units of the main CETP.

For removal of 1 Kg Ammonical Nitrogen from effluent, the requirement of Magnesium salt of 94.2 % purity will be approximately 14.8 kg. The proportional MAP (Struvite) production will be 48 Kg.

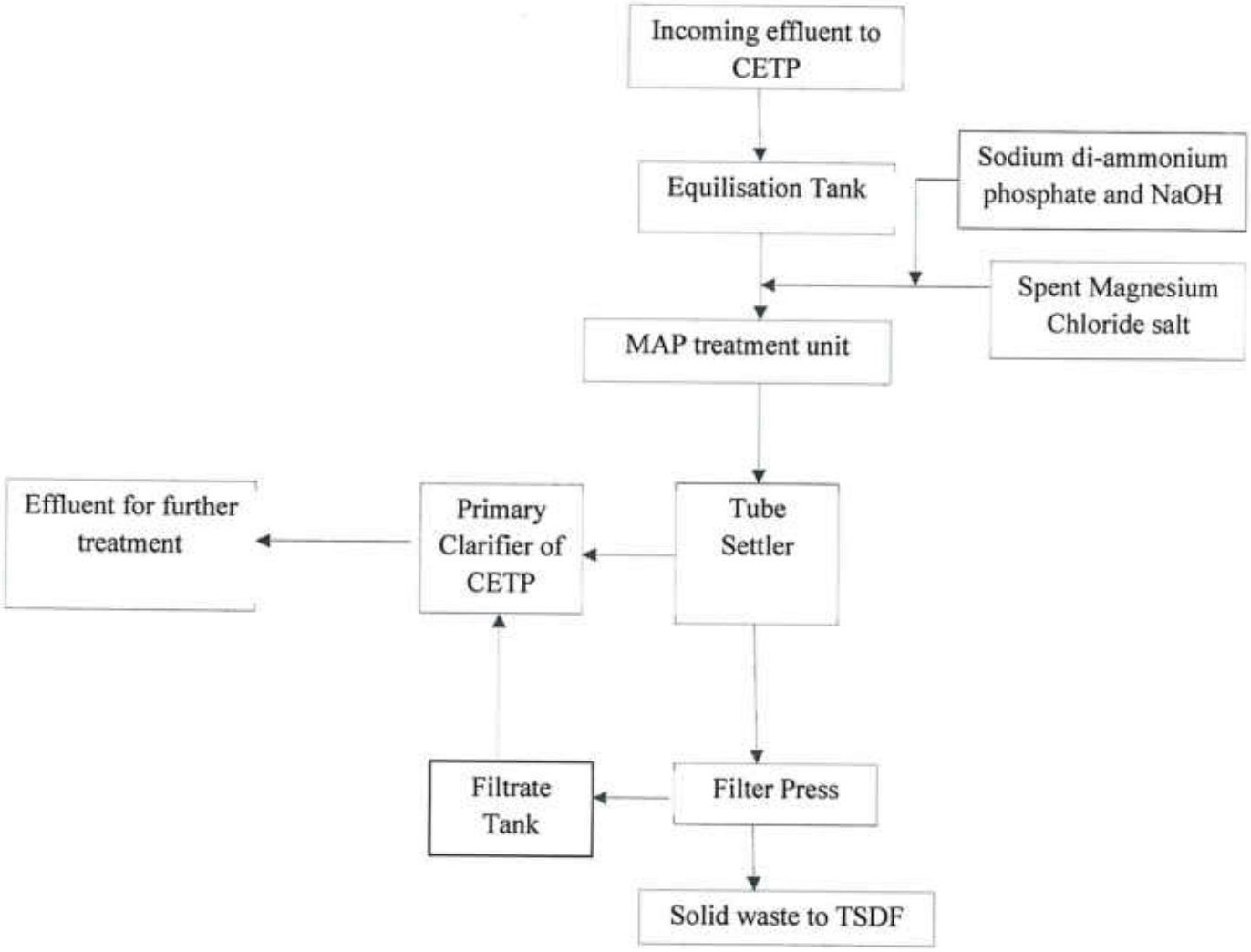


*Figure-1: Process flow diagram for utilization of hazardous waste i.e., Spent Magnesium Chloride salt*

### 60.3 Product Usage / Utilization

The spent magnesium chloride is used for removal of High Ammonical nitrogen from wastewater during Primary treatment of Common Effluent Treatment Plant.

### 60.4 Standard Operating Procedure for utilization

This SoP is applicable only for the utilization of the Spent Magnesium Chloride salt generated during the DEMP reaction process, for removal of high Ammonical Nitrogen from wastewater in primary treatment of common effluent treatment plant.

1. The handling and transportation of Magnesium Chloride salt from the source of generation to the utilization area shall be done in environmentally safe manner.
2. The unit shall provide separate storage area at designated place with proper cover for storage of Spent Magnesium Chloride.

3. The unit shall ensure that spent Magnesium Chloride is procured from the industries that have valid authorization for the same from the concerned SPCBs/PCCs as required under Hazardous and Other Wastes (Management & Trans-boundary Movement) (HOWM) Rules,2016.
4. The Spent Magnesium Chloride shall be transported in SPCB/PCC authorized vehicles with requisite safeguards.
5. Transportation of spent Magnesium Chloride shall be carried out by sender or receiver (utilizer) only after obtaining authorization from the concerned SPCBs/PCCs under (HOWM) Rules, 2016.
6. 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. The unit shall provide personal protective equipment like aprons, safety hand gloves and safety shoes, helmets to the person involved in production activities and in handling hazardous wastes. The safety precautions of the worker shall be in accordance with the Factory Act, 1948, as amended from time to time.
7. Prior to utilization of spent Magnesium Chloride, the unit shall obtain authorization for generation, storage, and utilization of spent Magnesium Chloride from the concerned SPCB/PCC under (HOWM) Rules, 2016.
8. Treatment and disposal of wastewater:

   Following are the sources of wastewater from utilization process (MAP).

   a. Wastewater (generated from floor washing/ spillages, etc.)
   b. Filtrate from filter press

   Wastewater generated from above mentioned shall be treated Physico-Chemically in an ETP or may be sent to CETP for final disposal (as per the prescribed standards) or be treated further in a captive facility to comply with surface water discharge standards or sent to CETP/ETP as stipulated in the Consent issued by the SPCBs/PCCs.

   In case of zero discharge condition by SPCB/PCC, the treated wastewater from ETP may be managed as per conditions stipulated by the SPCBs/PCCs.
9. The hazardous waste generated (Sludge from filter press after the tube settler), if any, shall be collected and stored in dedicated hazardous waste storage area and dispose of the sludge in accordance with HOWM, Rules, 2016. Such storage area shall have proper ventilation.
10. 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 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.
11. The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
12. 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.

### 60.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB wherein the following details of each procurement of Spent Magnesium Chloride shall be entered:
   - 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 procurement of Spent Magnesium Chloride 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 (HOWM) Rules, 2016, to concerned SPCB/PCC.

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.

### 60.6 Standards

1) Fugitive emission in the work zone area shall comply with the following standards:

| | |
|---|---|
| $PM_{10}$ | : 5 mg/$m^3$ TWA* (PEL) |
| $SO_2$ | : 13 mg/ $m^3$ TWA* (PEL) |
| $NO_X$ | : 1.8 mg/$m^3$ TWA* (PEL) |
| $NH_3$ | : 35 mg/$m^3$ TWA* (PEL) |

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

2) Fugitive emission and effluent monitoring 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.

3) Treated effluent shall comply with comply with prescribed CETP standards notified under the Environmental (Protection) Act. 1986, vide notification no. S.O. 4(E) dated 01/01/2016 or standard prescribed in Consent to Operate issued under the Water (Prevention and Control of Pollution) Act, 1974 by the respective SPCB/ PCC, whichever is stringent.

### 60.7 Siting of the industry

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

### 60.8 Size of plant & Efficiency of utilization

Requisite facilities of adequate size of storage shed and other plant & machineries as given in para 60.9 shall be installed accordingly.

### 60.9 Checklist of Minimal Requisite Facilities

| Sl. No | Particulars |
|---|---|
| 1 | Cool, dry well-ventilated covered storage shed for spent Magnesium Chloride |
| 2 | The process units shall have proper ventilation. |
| 3 | Pumps, pipes, feeders and other equipment for mechanical handling of Spent Magnesium Chloride & its solution. |
| 4 | Adequate system like preparation tank, mixing tank, holding tank, etc. to prepare dosing solution and feeding. |
| 5 | Sludge separation system like tube settler, clarifiers or as permitted by SPCB/PCC. |

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