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 Calcium Chloride (generated during manufacturing of Pesticide Compounds) as brine solution for Chilling Plant



September, 2023

Central Pollution Control Board (Ministry of Environment, Forest & Climate Change, Government of India) Parivesh Bhawan, East Arjun Nagar, Shahdara, Delhi – 110032 Utilization of Spent Calcium Chloride (generated during manufacturing of Pesticide Compounds) as Brine Solution for Chilling Plant

<u>Procedure for grant of authorization by State Pollution Control Board (SPCBs)/Pollution</u> <u>Control Committee (PCCs) for utilization of Hazardous waste</u>

- 1) While granting authorization for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorization is given only to those wastes for which Standard Operating Procedures (SoPs) for 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 as described in SoP.
 - c. End-use/ product produced from the waste shall be same as specified in SoP.
 - d. Authorization 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 hazardous waste for utilization.
 - f. Monitor closely the quantity of spent calcium chloride, being sent by generators and the quantity being utilized by the authorized industries.
- 2) After issuance of authorization, SPCBs/PCCs shall verify the compliance of checklist and SoP on quarterly basis for initial 1 year; followed by random checks during subsequent period for atleast once a year. The compliance reports may be submitted to CPCB.
- 3) In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3rd party institutions or laboratories having EPA, 1986/NABL/ISO17025 accreditation/recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.
- 4) SPCBs/PCCs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous & Other Wastes (Management & Transboundary Movement) [HOWM] Rules, 2016 to CPCB and also upload the same on SPCB/PCC website, periodically. Such updated list shall be sent to CPCB.
- 5) Authorization for utilisation shall not be given to the units located in the State/Union Territory where there is no Common TSDF, unless the unit ensures authorised captive disposal of the hazardous waste (if any generated during utilisation) or its complete utilisation or arrangement for transfer to authorised disposal facility.
- 6) In case of the utilization proposal is not same 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 studies and developing SoPs thereof.
- 7) The source and work zone standards suggested in the SoP are based on E(P)A notified and OSHA/NAAQ standard, respectively. However, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.
- 8) This SOP shall not be applicable for spent calcium chloride generated from production of banned pesticide compounds.
- 9) SPCBs/PCCs shall ensure that the utiliser of spent calcium chloride shall maintain daily records ion National Hazardous Waste Tracking System (NHWTS) once operationalised by CPCB.

Waste Management-II Division, CPCB, Delhi

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Type of HW			Source of generation		Recovery/ Product			
Spent	Calcium	chloride	Generated	during	То	be	utilized	as
(Category: 29.1 of Schedule Lof HOWM Rules, 2016)			manufacturing of Pesticides compounds		supplementary brine			
	wivi itules,	2010)			in cl	osed l strial u	oop systen ises	n for

94.0 Utilization of hazardous waste (H.W.):

94.1 Source of Waste:

Spent calcium chloride is generated from pesticides industries is categorized as hazardous waste under Category: 29.1 of Schedule I of HOWM Rules-2016 which is required to be disposed in an authorized disposal facility in accordance with condition, when not utilized as resource recovery.

Sr. No.	TestParameter	Unit (SI)	Results
1.	pH		6.86
2.	Water content	%	68.354
3.	Calcium Chloride	%	28.67
4.	Alkalinity	mg/l	295
5.	Total Suspended Solid	mg/l	3563
6.	Total Dissolved Solid	mg/l	360540
7.	Chlorides (as Cl)	mg/l	335002
8.	Specific Gravity	gm/cc	1.29
9.	COD	mg/l	620
10.	TOC	mg/l	128
11.	Trimethyl Phosphite	ppm	Absent
12.	Phosphate	mg/l	2.38
13.	Insecticide/Pesticide	mg/l	Absent

Table 1. Typical Characteristics of Spent Calcium Chloride

94.2 Utilization Process of hazardous waste (Spent Calcium Chloride):

Depending on the concentration, industries intending to utilize spent calcium chloride may dilute spent solution with water to prepare brine solution, and cooled down in the chiller. Chilled brine (below 0° C) is supplied and circulated to reaction vessels in external coil/ jacket of the reaction vessels/condensers as a cooling media where it does not take part in any of the manufacturing reaction. Addition of Calcium Chloride to water increases the specific gravity and also results in lowering of the freezing point of water.

Further to make up, water and spent calcium chloride are periodically added in a gradual manner into the brine solution tank to maintain the cooling media level in the tank.



Figure: 1-Process flow diagram for utilization of spent calcium chloride.

94.3 Product Usage / Utilization

Brine solution prepared by utilizing spent calcium chloride (generated during manufacturing of Pesticides compounds) shall be utilized by industries in chilling plant in closed loop system for industrial uses and not to be used in the chilling plants of food and pharma industry.

94.4 Standard Operating Procedure for utilization of Spent Calcium Chloride:

This SoP is applicable only for utilization of spent calcium chloride (generated during manufacturing of Pesticides compounds) as brine solution in chilling plant in closed loop system for industrial uses.

- Spent calcium chloride shall be allowed to procure by the utilizer industries only if (i) the concentration of the calcium chloride is within the ranges of 14-30% for the liquid form (or) 85-90% for the solid form of spent calcium chloride, and (ii) Concentration of TOC in spent brine solution shall not exceed 150mg/l.
- 2) Spent calcium chloride shall be procured only in SPCB/PCC authorized barrels/closed tanks mounted over vehicles fitted with requisite safeguards.
- 3) Spent calcium chloride shall be stored in dedicated storage tanks under covered storage shed within the premises. Further, storage sheds shall have proper slope and seepage collection pit to collect seepage / floor washing. The collected seepage / floor washing shall be channelized to Effluent Treatment Plant for further treatment.
- 4) The unloading, storage, transfer and other handling of spent calcium chloride during entire utilization process shall be carried out through dedicated mechanical transfer pump with fixed pipeline in closed system. Manual handling shall be strictly prevented.

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- 5) The unit shall ensure for measurement of specific gravity of brine solution at regular intervals for determination of saturation level and maintaining the temperature to lower down the freezing point of water.
- 6) The unit shall ensure that the circulation of brine solution should be in close loop system and accordingly the arrangement of machineries, resources and utilities are to be made.
- 7) 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.
- 8) Treatment and disposal of wastewater:

Waste water generated from floor-washings, spillages, leaked brine solution, shall be treated Physico-Chemically in an ETP or 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 managed as per conditions stipulated by the SPCB / PCC. The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by concerned SPCB / PCC under the Water (Prevention and Control of Pollution) Act, 1974.

- 9) The hazardous wastes generated (i.e., un-utilizable spent brine solution or brine sludge from the closed loop, if any) shall be collected and temporarily stored in nonreactive 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.
- 10) The unit shall ensure that the spent calcium chloride is procured from authorized industries as required under HOWM Rules, 2016.
- Transportation of spent calcium chloride shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization 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.
- 12) Prior to utilization of spent calcium chloride, the unit shall obtain authorization for collection, storage and utilization of Spent Calcium Chloride from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- 13) 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

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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.

- 14) If the TOC of spent calcium chloride is more than 150mg/l, the industry shall install purification plant to bring down the organic content. The treatment plant shall be based on adsorption or chemical-oxidation of organic pollutants, such as passing the solution through a column of activated carbon or treatment with ozone/ hydrogen peroxide.
- 15) 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. The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.

94.5 Record/Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of spent calcium chloride 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 procurement of spent calcium chloride, date wise utilization 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 generated, utilized and disposed as per Form-3 & also file an annual return in Form-4 as per Rule 20 (1) and (2) of 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/PCC.
- 5) The unit shall use NHWTS to manage the manifest, enter daily records of quantity generated, disposed, etc. once the portal is operational.

94.6 Standards

1) Industry shall comply with the following work zone area standards

Parameters	Standards		
PM10	5 mg/m ³ *(PEL)		
Ammonia	35 mg/m ³ *(PEL)		
Cl ₂	3 mg/m ³ *(PEL)		

*PEL - Permissible Exposure Limit.

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

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- 2) Monitoring of the above specified parameters for Work zone emission shall be carried out quarterly for first year followed by at least annually in the subsequent year of utilization. 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.
- 3) Standard for wastewater discharge: Treated effluent shall be discharged in accordance with the conditions stipulated in Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974. In case of (i) zero discharge as per consent or (ii) non-availability of the common Effluent Treatment Plant (CETP), the unit shall achieve zero discharge by setting up adequate captive treatment facility.

94.7 Siting of Industry

Since setting up a new facility for utilization is not applicable, the siting criteria shall not apply to industry who intend to utilize spent calcium chloride in their existing brine chilling plants.

94.8 Size of Plant and Efficiency of Utilisation

Spent calcium chloride is used to prepare brine for chilling plant in closed loop and further added periodically to makeup. Therefore, requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

Sl. No Particulars Dedicated storage tank for storage of spent calcium chloride with acid proof brick 1. lining and proper slope & seepage collection pit in the storage tank area and tanker unloading area Mechanical transfer pumps with fixed pipeline for transportation and handling of 2. spent calcium chloride. Material transfer / handling in entire utilization process shall be done in closed 3. system. Manual handling shall be strictly avoided. Close loop system for circulation of chilled brine solution 4. Activated carbon filtration system or chemical oxidation unit for reduction of 5. organic matter (TOC) in spent calcium chloride if required or as may be decided by SPCB/PCCS.

94.9 Checklist of Minimal Requisite Facilities:

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