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 Sodium Hypo Chlorite along with Fresh/ Spent Caustic Solution for manufacturing of Sodium Hypo Chlorite

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Central Pollution Control Board

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

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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.

56.0 Utilization of spent sodium hypochlorite and spent caustic solution:

Part	Type of HW	Source of generation	Recovery/Product
Part- A	a) Spent Sodium Hypo Chlorite (A4100 Part A Schedule III of HOWM Rules, 2016)	Generated from caustic scrubbing of vent chlorine gas from chlorination process at various industries.	Sodium Hypo Chlorite to be used in ETP for waste water treatment and as oxidising agent in textile industry, paper industry etc.,

Part- B	b) Spent Sodium Hypo Chlorite and Spent Caustic Solution.	Generated during manufacturing of Meta Di Chloro Benzene and, 1, 4 Dioxane & 2-Methyl-1,3-Dioxane respectively.	Sodium Hypo Chlorite to be used in ETP for waste water treatment and as oxidising agent in textile industry, paper industry etc.,

56.1 Source of Waste(s)

PART-A: The Spent Sodium Hypo Chlorite (6-8%) generated from caustic scrubbing of vent chlorine gas from chlorination process at various industries are categorized as Hazardous waste listed at A4100 Part A Schedule III of HOWM Rules, 2016.

PART-B: The Spent Sodium Hypo Chlorite (6-8%) and Spent Caustic Solution (30-40%) generated during manufacturing of Meta Di Chloro Benzene (MDCB) and, 1,4 Dioxane & 2-Methyl-1,3- Dioxane, respectively.

Typical characteristics of Spent Sodium Hypo Chlorite are presented at Table 1 and Spent Caustic Solution at Table 2 below:

Table - 1: Spent Sodium Hypo Chlorite

Sl. No.	Parameter	Unit	Range
1	Relative density (at 25° C)	-	1.11-1.14
2	Available Chlorine as Cl	%	7.26-7.81
3	Total Chlorine as Cl	%	7.62-8.30
4	Free alkali as NaOH	gm/L	1.611-1.867
5	Free Sodium Carbonate as Na_2CO_3	gm/L	0.369-0.446
6	Iron as Fe	mg/Kg	3.17-3.76
7	TOC	%	<0.1

Table - 2: Spent Caustic Solution

Sl. No.	Parameter	Unit	Range
1	Sodium Carbonate as Na_2CO_3	%	0.91-1.01
2	Sodium Hydroxide as NaOH	%	30.88-31.11
3	Chloride as NaCl	%	1.38-1.98
4	Sulphate as Na_2SO_4	%	1.77-2.10
5	Silicates as SiO_2	%	0.04
6	Iron as Fe	mg/Kg	0.012-0.018
7	Copper as Cu	mg/Kg	0.411-0.506
8	Chlorates & per chlorates	mg/Kg	0.078-6.46
9	TOC	%	<0.1
10	Matter insoluble in water	%	0.036-0.041
11	Purity as NaOH	%	30.88-31.11

56.2 Utilization Process

The Spent Sodium Hypo Chlorite (6-8%) and Fresh/ Spent Caustic Solution (30-40%) are mixed in the reaction vessel with addition of ice and chlorine gas. pH of the solution is maintained by adding alkaline solution from the scrubber, to produce the final product Sodium Hypo Chlorite, which is then passed through candle filter before packing.

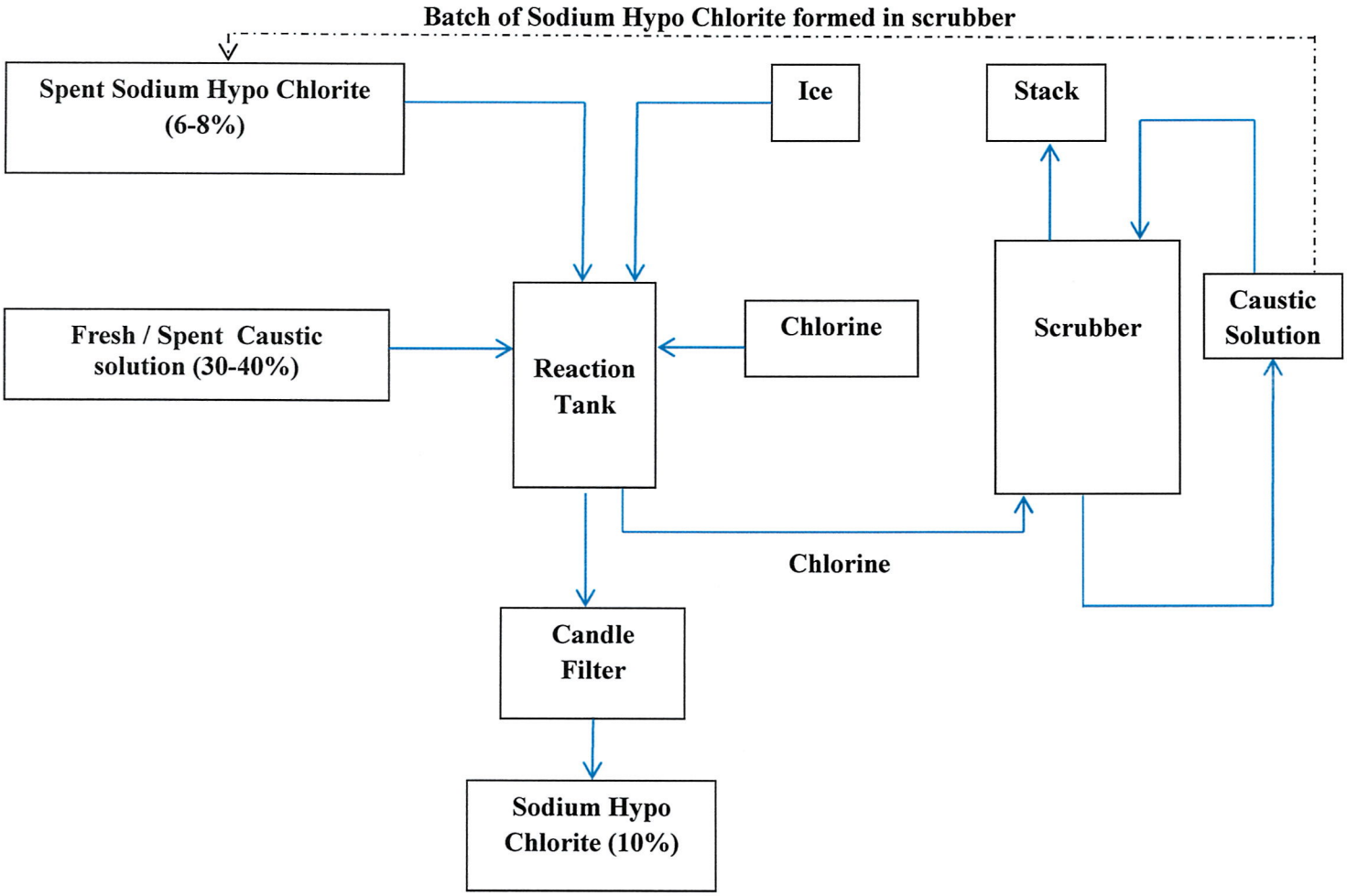

Figure: *Process flow diagram for utilization of hazardous waste(s) i.e., a) Spent Sodium Hypo Chlorite and (b) Fresh/ spent Caustic Solution*

56.3 Product Usage / Utilization

The product Sodium Hypo Chlorite is a good oxidising agent and shall be utilized in effluent treatment plant for waste water treatment and as bleaching agent in pulp, paper, textile industries etc. once it meet the IS 11673 : 1992 standards.

56.4 Methodology for finalization of quality of (Part A) Spent Sodium Hypo Chlorite generated from caustic scrubbing of vent chlorine gas from chlorination process at various industries for manufacturing Sodium Hypo Chlorite.

1) MoEF&CC vide Office Memorandum No: SO 3518(E) dated 23/11/2016 notified the procedure to issue permission for the "Change in product mix without increase in pollution load". As per this notification, all SPCBs have framed Technical Committee to comply the said notification.

2) It is envisaged that implementation of this SoP is done through this committee or other committee constituted for implementation of HOWM Rules, 2016, wherever scrutiny and assessment are required in this SoP for Part A of source of waste. Accordingly, following shall be the responsibilities of Technical Committee while reviewing the application;

   a) The technical committee shall decide the characteristics of Spent Sodium Hypo Chlorite generated from various industries for utilization in manufacturing of Sodium Hypo Chlorite.

   b) The committee shall permit the quantity for utilization of Spent Sodium Hypo Chlorite generated from various industries products based on characteristics of Spent Sodium Hypo Chlorite, material balance and mass balance.

   c) The committee shall verify the utility of Sodium Hypo Chlorite manufactured by utilization of Spent Sodium Hypo Chlorite and thus shall restrain the characteristics of Spent Sodium Hypo Chlorite.

   d) The source emissions from the stack connected to reactors/ process stack and fugitive emissions in the process/ storage area shall comply with the standards prescribed in section 56.7 (i) and (ii) of this SoP respectively. Standards prescribed in aforesaid section is not exhaustive these may vary depending upon characteristics of Spent Sodium Hypo Chlorite and utilization process; however committee may take final decisions on these.

   e) Hazardous waste generated during utilization of Spent Sodium Hypo Chlorite in production of Sodium Hypo Chlorite shall be listed in the authorization issued by SPCBs/PCCs along with its disposal mechanism, if any.

   f) The general conditions shall be complied as mentioned in the SoP.

   g) Based on the recommendation of the Technical Committee, SPCB/PCC shall grant authorization to unit under Rule 9 for permission to utilize Spent Sodium Hypo Chlorite generated from various industries for utilization in manufacturing of Sodium Hypo Chlorite.

56.5 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of the a) Spent Sodium Hypo Chlorite (6-8%) generated from caustic scrubbing of vent chlorine gas from chlorination process at various industries along with Fresh caustic solution (or) b) Spent Sodium Hypo Chlorite (6-8%) generated from manufacturing of Meta Di Chloro Benzene (MDCB) and Spent caustic solution (30-40%) generated during manufacturing process of 1, 4 Dioxane & 2-Methyl-1,3- Dioxane, for manufacturing of Sodium Hypo Chlorite.

1) The Spent Sodium Hypo Chlorite and Spent Caustic Solution shall be procured only in SPCB/PCC authorised barrels/tanks mounted over vehicles fitted with requisite safeguards ensuring no spillage of the same.

2) Spent Sodium Hypo Chlorite and Spent Caustic Solution shall be stored in either HDPE or rubber lined steel tank and also keep away from metals especially aluminium.

3) There shall be no manual handling of the Spent Sodium Hypo Chlorite and Spent Caustic Solution. Transfer of Spent Sodium Hypo Chlorite and Spent Caustic Solution should be done through pipelines to the reactor vessel. Spill containment arrangement shall be provided around the Spent Sodium Hypo Chlorite and Spent Caustic Solution storage tanks.

4) The reaction vessel shall be connected with suction hood above the feeding point to control acid fumes/vapours liberated form the reaction vessel. The suction hood shall be connected with alkali scrubber and stack of adequate height.

5) The storage and handling of Spent Sodium Hypo Chlorite and Spent Caustic Solution shall be done under a shed of proper vertical height and over imperviously lined flooring.

6) The unit shall install storage tanks 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, .

   Further, the storage area of Spent Sodium Hypo Chlorite and Spent Caustic Solution 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.

7) Caustic lye pit shall be provided to neutralize the chlorine gas, if, any, to roll the chlorine gas cylinders in to the pit in case of leakages from cylinder.

8) Fibre-reinforced plastic (FRP) hoods shall be provided to cover the chlorine cylinders and the hood is connected to common scrubber.

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.

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 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.

12) 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 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.

13) 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.

14) The hazardous wastes generated (namely the filter residue, scrubber, product spillages,, 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.

15) It shall be ensured that the Spent Sodium Hypo Chlorite and Spent Caustic Solution are procured from the industries, which have valid authorization from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

16) Transportation of Spent Sodium Hypo Chlorite and Spent Caustic Solution 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.

17) Prior to utilization of Spent Sodium Hypo Chlorite and Spent Caustic Solution, the unit shall obtain authorisation for generation, storage and utilization of Spent Sodium Hypo Chlorite and Spent Caustic Solution from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

18) 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.

19) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.

20) 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.

56.6 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB wherein the following details of each procurement of Spent Sodium Hypo Chlorite and Spent Caustic Solution 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 Sodium Hypo Chlorite and Spent Caustic Solution 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.
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.

56.7 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
HCL Mist	: 20 mg/Nm^3
Cl_2	: 15 mg/Nm^3
TOC	: 20 mg/Nm^3

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

PM_{10}	: 5 mg/m^3 TWA* (PEL)
Cl_2	: 3 mg/ m^3 TWA* (PEL)
HCl	: 7 mg/m^3 TWA* (PEL)
NaOH	: 2 mg/m^3 TWA* (PEL)
Chloro Benzene	: 350 mg/m^3 TWA* (PEL)

**PEL: Permissible Exposure Limit*

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

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 ISO 17025 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 concerned 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.

56.8 Siting of the industry

Facilities for utilization of Spent Sodium Hypo Chlorite & Spent Caustic Solution 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.

56.9 Size of plant & Efficiency of utilization

40.8 MT of Sodium Hypo Chlorite is produced from 38 MT Spent Sodium Hypo Chlorite (7.5%) and 1.6 MT of Spent Caustic Solution (35%). Therefore requisite facilities of adequate size of storage shed and other plant & machineries as given in para 56.11 below–shall be installed accordingly.

56.10 On-line detectors / Alarms / Analysers

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

56.11 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1.	Storage tanks of adequate capacity to store Spent Sodium Hypo Chlorite and Spent Caustic Solution. Such storage tanks shall be placed above the ground and contained with low rise parapet/bund wall and acid proof floor with slope to collect spillages , if any, in to collection pit. Alternately, the storage tanks may be below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner.
2.	Cool, dry well-ventilated covered sheds for Spent Sodium Hypo Chlorite and Spent Caustic Solution storage tanks, product storage tanks and process activities within premises and dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process.
3.	Mechanized system for transfer of Spent Sodium Hypo Chlorite, Spent Caustic Solution and Chlorine from storage tanks to reactor vessels.
4.	The process units shall have suction hood. (The suction hood shall be connected with alkali scrubber and stack of adequate height)
5.	Spare vessel to transfer the reaction mass, if any, in case of leakage or damage to the reaction vessel.
6.	Caustic lye pit to neutralize the chlorine gas, if, any, to roll the chlorine gas cylinders in to the pit in case of leakages from cylinder.
7.	FRP hoods to cover the chlorine cylinders and the hood is connected to common scrubber.
8.	Pumps, pipes, feeders and other equipment for mechanical handling of Spent Sodium Hypo Chlorite and Spent Caustic Solution.
9.	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.
10.	Candle filter
11.	Scrubber

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