

**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 Potassium Chloride  
[generated during recovery of bromine from spent KBr solution from pesticide industry (meta phenoxy benzaldehyde)]  
for recovery of Potassium Chloride salt suitable in production of dye & dye intermediates and in the electroplating industry**



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

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

- 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 utilization have been circulated by Central Pollution Control Board (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) 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 hazardous waste (spent KCl) being sent by generators and the quantity being utilized by authorized facilities in recovery of KCl and further use in dye & dye intermediates and electroplating industries including the adequacy of the facilities to receive the same.
- 2) After issuance of authorization, SPCBs/PCCs shall verify the compliance of checklist and SoP on quarterly basis for initial 1 years; followed by random checks during subsequent period for at least 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 3<sup>rd</sup> 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) Rules, 2016 (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 utilization 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 utilization) or its complete utilization or arrangement for transfer to 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 E(P)A notified and OSHA standard respectively, however, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.
- 8) SPCBs/PCCs shall ensure that the utilizer of spent KCl shall maintain daily records in National Hazardous Waste Tracking System (NHWTS). The manifest system should also be generated on hazardous waste tracking system.

### 111.0 Utilization of Spent KCl:

Type of HW	Source of generation	Recovery/Product
Spent Potassium Chloride (KCl) solution, Category 29.1 of Schedule I of HOWM Rules, 2016	Generated during recovery of bromine from spent KBr solution from pesticide industry (meta phenoxy benzaldehyde)	For recovery of KCl salt suitable in production of dye & dye intermediates and in the electroplating industry

#### 111.1 Source of Waste:

Spent KCl, generated during recovery of bromine from spent KBr solution from pesticide industry (meta phenoxy benzaldehyde) is categorized as hazardous waste at Category 29.1 of Schedule I, HOWM Rules – 2016.

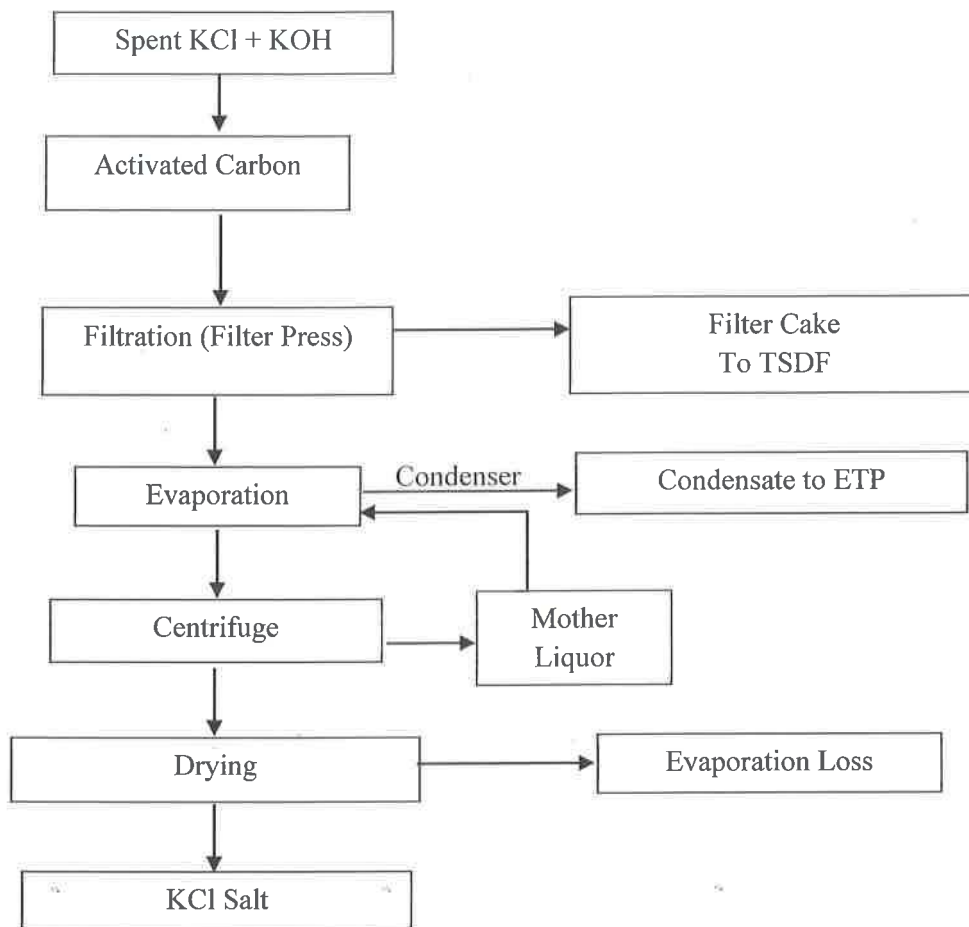
*Table 1. Typical Characteristics of Spent KCl are given below:*

Sr. No.	Parameter	Unit	Value
1.	Purity of KCl	%	>18
2.	pH	-	9
3.	TOC	ppm	< 60
4.	COD	ppm	< 110
5.	Copper	ppm	0.005
6.	Zinc	ppm	0.008
7.	As, Cd, Cr, Ni, Pb, Co, Hg	mg/l TCLP	Less than Schedule II values

Note: SPCBs/PCCs to check the characteristics of spent KCl prior to issuance of authorization, any significant deviation with respect to typical values mentioned in the table above may be examined with respect to the source or may be referred to CPCB.

#### 111.2 Utilization Process

Spent KCl (neutralized with KOH) solution is treated with activated carbon for removal of organic / suspended impurities. The mass is then passed through the filter press to separate the sludge (carbon and other suspended impurities) and filtrate is transferred to evaporator. After removal of about 80% condensate, concentrated mass is crystalized and fed to the centrifuge. The centrifuged material is dried (in hot air oven/ rotary dryer) to get the final product (KCl salt) and mother liquor from centrifuge is reused in the evaporator for recovery of the residual product.



**Figure: 2-Process flow diagram for utilization of spent KCl for recovery of KCl salt.**

### 111.3 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of Spent KCl [generated during recovery of bromine from spent KBr solution from pesticide industry (meta phenoxy benzaldehyde)] for recovery of KCl salt suitable in production of dye & dye intermediates and in the electroplating industry.

- 1) The Spent KCl shall be procured only in SPCB/PCC authorized vehicles with (acid proof lined) takers or closed HDPE drums fitted with requisite safeguards ensuring no spillage of the waste.
- 2) Spent KCl shall be stored in dedicated storage tank under shed and above the ground. 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 HOWM Rules, 2016.

Further, the storage area of Spent KCl 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 ETP, as the cases may be, through chemical process pump.

- 3) The unit shall ensure that neutralized Spent KCl with KOH is procured for utilization process.
- 4) There shall be no manual handling of the Spent KCl. The feeding of Spent KCl shall be done through closed loop pipelines using dedicated transfer pump.

- 5) The entire utilization process of Spent KCl shall be carried out in a closed and mechanized system.
- 6) The unit shall ensure control of fugitive emissions at material transfer points, mixing units and drying units by adopting closed & mechanized system,
- 7) The condensate shall be treated in the ETP and subsequently be disposed of through CETP after meeting the inlet norms.

- 8) Treatment and disposal of wastewater:

Wastewater generated from floor-washings, spillages, reactor washing, condensate from evaporator shall be treated Physico-Chemically in an ETP to comply with surface water discharge standards or may be sent to CETP for final disposal.

In case of zero discharge, the treated waste water from ETP / MEE condensate may be managed as per conditions stipulated by the SPCB/PCC.

Mother Liquor generated from centrifuge may be re-used in the process.

- 9) 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. The condensate water shall not be used in cooling water.
- 10) The hazardous wastes generated (namely the filter cake, 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 its generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.
- 11) It shall be ensured that the Spent KCl is procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.
- 12) Transportation of Spent KCl shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization from the concerned SPCB/PCC under HOWM Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
- 13) Prior to utilization of Spent KCl, the unit shall obtain authorization for storage, utilization and disposal of Spent KCl from the concerned SPCB/PCC under HOWM Rules, 2016.
- 14) 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.
- 15) 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.



- 16) The unit shall provide suitable fire safety arrangements, flame proof electrical fittings and on site emergency plan approved by concerned agency. 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.

#### 111.4 Product Usage / Utilization

1. Recovered KCl salt from Spent KCl shall not be used in food & beverages, pharma, healthcare and fertilizer industries.
2. The recovered KCl salt from Spent KCl shall be permitted in dyes & dye intermediates and in electroplating industry.
3. The unit shall label its product i.e. KCl manufactured by utilizing afore said Spent KCl as "This KCl salt has been manufactured by utilizing Spent KCl (generated during recovery of bromine from spent KBr solution from pesticide industry)".

#### 111.5 Record>Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of spent KCl 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 logbook with information on source and date of procurement of Spent KCl, 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. The unit shall also use the manifest system on hazardous waste tracking system.

#### 111.6 Standards

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

PM <sub>10</sub>	5 mg/m <sup>3</sup> TWA
Benzene	10 ppm TWA*
Toluene	200 ppm TWA*
Bromine	3 mg/m <sup>3</sup> #Ceiling limit
Chlorine	3 mg/m <sup>3</sup>

\*PEL - Permissible Exposure Limit

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

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

- 2) 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, 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.

### 111.7 Siting of Industry

New facilities for utilization of Spent KCl shall be preferably located in a notified industrial area or industrial park/estate/cluster and in accordance with Consent to Establish issued by the concerned SPCB/PCC. This may not apply to the facilities already engaged in production of KCl and have obtained CTE/CTO.

### 111.8 Size of Plant and Efficiency of Utilization

Considering a recovery 600 Kgs of KCl salt was recovered by utilizing 7 MT of spent KCl solution as observed, during trial study. The, requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

### 111.9 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1.	Spent KCl solution shall be transported in lined (acid proof) tankers or HDPE drums. Storage tanks of adequate capacity to store Spent KCl. Storage tanks shall be placed under shed and 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.
2.	Cool, drywell-ventilated covered sheds for Spent KCl storage tanks, product storage tanks and process activities within premises.
3.	Mechanized system for transfer of Spent KCl from storage tanks to reactor.
4.	SS reactor for activated carbon treatment unit with filter press.
5.	SS make evaporation with steam jacket and crystallization unit and condenser
6.	Centrifuge unit
7.	Effluent Treatment Plant (ETP) of adequate capacity with physio-chemical treatment or send to CETP after primary treatment.
8.	Pumps, pipes and equipment for mechanical handling of Spent KCl.
9.	Dust extraction system for the dryer unit connected to APCDs and stack of adequate height as prescribed by SPCBs/PCCs.
10.	Dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process.

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