

**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 Ammonium Carbonate (generated during
manufacturing of Copper Pthalocyanin blue (CPC Blue)) in
Manufacturing of Zinc Carbonate, Copper Carbonate, Manganese
Carbonate, Magnesium Carbonate and Ferrous Carbonate**



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**Central Pollution Control Board
(Ministry of Environment, Forest & Climate Change, Government of
India)
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83

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

Procedure for grant of authorisation by SPCBs/PCCs for utilization of Hazardous Waste

- (i) While granting authorisation for utilization of hazardous wastes, SPCBs/PCCs shall ensure the following:
 - a. The waste (intended for utilization) belongs to similar source of generation as specified in SoPs.
 - b. The utilization process is similar to the process of utilization described in SoPs.
 - c. End-use / product produced from the waste shall be same as specified in SoPs.
 - d. Authorisation be granted only after verification of utilization process and minimum requisite facilities as given in SoPs.
 - e. Issuance of passbooks (similar to the passbooks issued for recycling of used oil, waste oil, non-ferrous scrap, etc.) for maintaining records of receipt of hazardous wastes for utilization.
- (ii) After issuance of authorization, SPCB shall verify the utilization process, checklist and SOPs on quarterly basis for initial 2 years; followed by random checks in the subsequent period for at least once a year.
 In case of lack of requisite infrastructures with the SPCB/PCC, 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.
- (iii) SPCBs/PCCs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous and Other Wastes (Management & Transboundary Movement) 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.
- (iv) 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.
- (v) In case 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.
- (vi) The source and work zone standards suggested in the SoPs 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.

50.0 Utilization of Spent Ammonium carbonate:

Type of HW	Source of generation	Recovery/Product
Spent Ammonium Carbonate - Category 26.1 of schedule-I of HOWM Rules, 2016	during manufacturing of copper pthalocyanin blue (dye & dye-intermediate)	Metallic carbonates (i.e. Zinc, Copper, Manganese, Magnesium and Ferrous)

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Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

50.1 Source of Waste

Spent Ammonium carbonate (hazardous waste) is generated during manufacturing of dye & dye-intermediate i.e. Copper Pthalocyanin blue (CPC Blue). During the production of CPC blue, ammonia gas liberated from the reaction vessel is passed through water scrubber, which generates Ammonium carbonate.

The aforesaid Spent Ammonium Carbonate is categorized as hazardous waste at S.No. 26.1 of Schedule-I of HOWM Rules, 2016 which are required to be disposed in authorized disposal facility in accordance with authorization condition, when not utilized as resource recovery.

A typical characteristic of the hazardous waste is given below:

Parameters	UNIT	Spent Ammonium carbonate (Hazardous Waste) used for production
Moisture	%	55.02
pH		9.39
Thylo cyanine	mg/kg	<1.0
Nitro benzene	mg/kg	8.2
Chloride as Cl	%	0.076
TOC	%	0.022
Copper	mg/kg	9.03
Zinc	mg/kg	371
Lead	mg/kg	13.88
Chromium	mg/kg	<0.05
Nickel	mg/kg	0.81
Cadmium	mg/kg	1.43

50.2 Utilization Process

The production of metallic carbonates (i.e. zinc carbonate, copper carbonate, Manganese Carbonate, Magnesium Carbonate and Ferrous Carbonate) includes precipitation of ammonium carbonate with metallic sulphates (i.e. Zinc/Copper/Manganese/Magnesium/Ferrous Sulphate) to form metallic carbonates followed by filtration and drying.

Manufacturing of metallic carbonates involve addition of spent ammonium carbonate to metallic sulphate (Zinc/Copper/Manganese/Magnesium/Ferrous) solution in the reaction vessel and allowing to precipitate by maintaining pH 7 (by adding lime/H₂SO₄ accordingly).

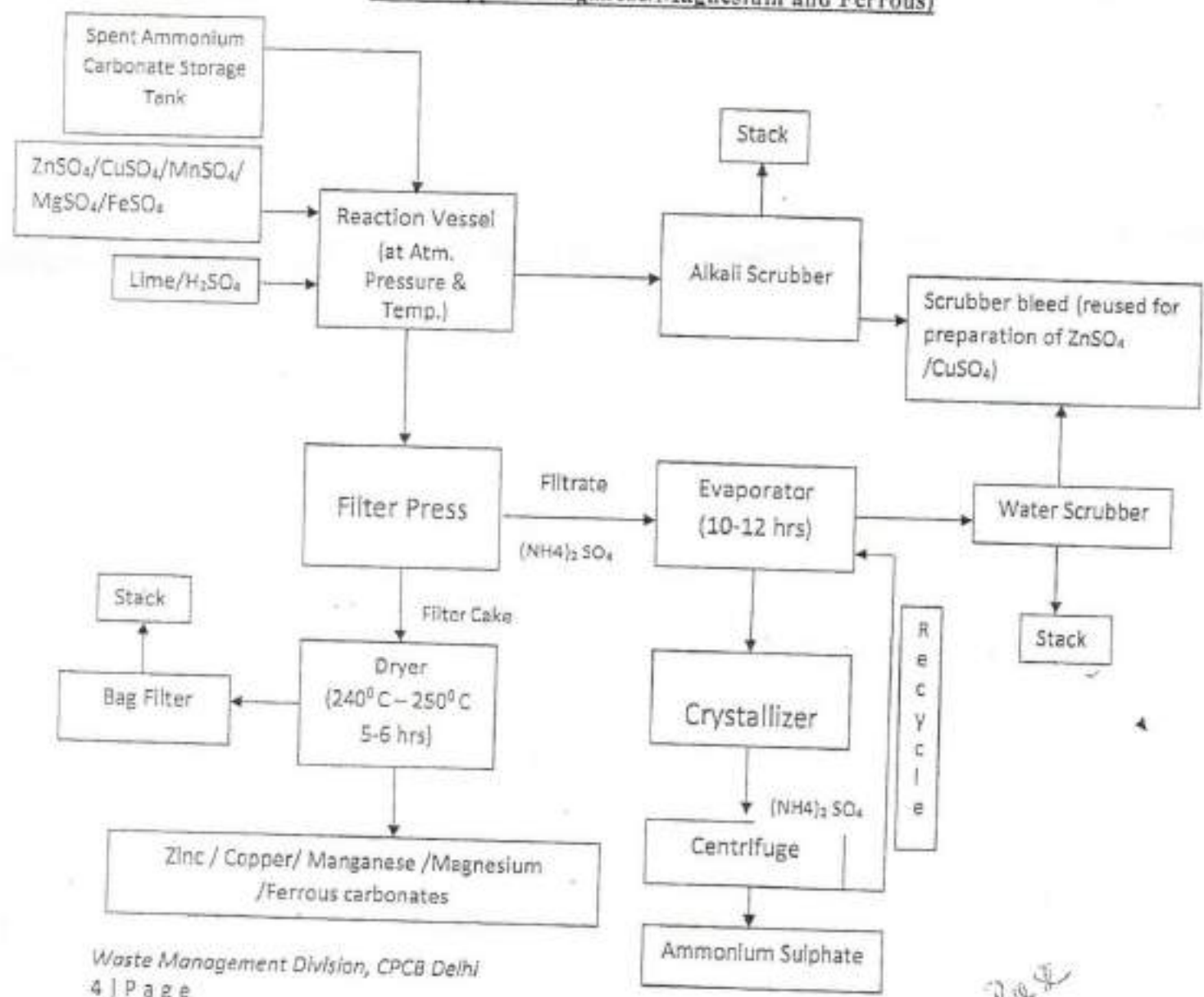
85

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

After precipitation, metallic carbonate slurry is transferred through filter press to separate metallic carbonate and ammonium sulphate. The filter cake containing metallic carbonate (Zinc/Copper/Manganese/Magnesium/Ferrous) is sent to drier and dried product is collected and packed.

The ammonium sulphate solution collected from the filter press is sent to evaporator followed by crystallizer and centrifuge. The ammonium sulphate crystal collected may be used for alum manufacturing. The mother liquor generated from centrifuge may be recycled in the evaporator. The reject or Waste water generated from the process is to be managed as per the conditions stipulated in the Consent to Operate granted by concerned SPCB/PCC. The flow diagram of the utilization process is provided as below;

Figure 1. Process Flow Diagram of manufacturing of Metallic Carbonates (Zinc/Copper/Manganese/Magnesium and Ferrous)



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50.3 Product Usage / Utilization

Metallic Carbonates (Zinc carbonate / copper carbonate /Manganese Carbonate/ Magnesium Carbonate/ Ferrous Carbonate) will be utilized in industrial use i.e. textile, rubber industry. The unit shall label its product (i.e. Zinc Carbonate / Copper Carbonate / Manganese Carbonate/ Magnesium Carbonate/ Ferrous Carbonate) manufactured by utilizing aforesaid Hazardous waste as "This zinc carbonate / copper carbonate / manganese Carbonate/ magnesium Carbonate/ ferrous Carbonate has been manufactured by utilizing spent ammonium carbonate, generated from Copper PhthaloCyanin Blue manufacturing process."

The ammonium sulphate so produced during the said utilization process be used for manufacturing alum. The application of alum, shall only be allowed in Dye & Dye intermediate manufacturing, Leather tanning process or other industrial process application etc. and shall not be permitted for use in manufacture of fertilizer or in water treatment. In case, the said end use of ammonium sulphate is not possible, the same may be disposed in TSDF.

50.4 Standard Operating Procedure (SoP) for utilization

This SoP is applicable only for the utilization of Spent Ammonium carbonate generated from CPC Blue manufacturing process.

- (1) Spent Ammonium carbonate shall be transported in SPCB/PCC authorised dedicated tankers mounted on vehicles fitted with requisite safeguards ensuring no spillage of the same.
- (2) There should be a designated space for unloading of Spent Ammonium carbonate into a rubber lined storage tank. The receiving storage tank shall be placed above the ground and contained with low raise parapet/bund wall & dedicated leak proof floor with slope to collect spillages, if any, into collection pit. Alternatively, storage tanks for spent ammonium carbonate may be below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner. In the event of leachate detection in the leachate collection system, corrective measures shall be taken immediately.
- (3) The unit shall install storage tank under cool, dry, well-ventilated covered storage shed(s) within premises, as authorized by the concerned State Pollution Control Board/Pollution Control Committee under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 so as to eliminate rain water intrusion.
- (4) There shall be no manual handling of the hazardous wastes (Spent ammonium carbonate). Chemical process pump shall be used for transfer of Spent ammonium carbonate through pipelines to the reaction vessel.

87

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Phthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

- (5) The entire process area shall have dedicated leak-proof floor tiles with adequate slope to collect spillages, if any, into a collection pit. The spillages from collection pit shall be transferred to ETP or reaction tanks, as the cases may be, through chemical process pump.
- (6) The unit shall provide separate storage tanks for the storage of chemicals and the storage tanks should be at designated place with proper cover and with acid proof brick lining floors.
- (7) The unit shall ensure that the said utilization process and its associated activities shall be demarcated separately within the unit.
- (8) Spent ammonium carbonate shall be mixed with metallic sulphates (Zinc/Copper/Manganese/Magnesium/Ferrous) only in closed vessel reactors (isolation vessel) having mechanised stirring system for proper mixing and maintaining the pH up to 7. The mixer shall be kept under covered shed with adequate safety gadgets provided to workers, as well as ensuring proper ventilation in the process area.
- (9) NH_3 , heavy metals and TOC are expected to be liberated from the said reactors (isolation vessel) where the spent ammonium carbonate is added. Thus, the said reactors (isolation vessel) shall be connected with hood over it to suck acid fume/vapor. The hood shall be maintained under suction followed by treatment in scrubber using alkaline medium.
- (10) The dryer shall be attached with bag filter followed by Stack of height as prescribed by the concerned SPCB/PCC.
- (11) The evaporator shall be attached with scrubbing system to contain the fumes/vapors released from the evaporator followed by stack of height as prescribed by the concerned SPCB/PCC.
- (12) The evaporator followed by centrifuge and crystallizer shall be operated electrically or by fuel permitted by the concerned SPCB/PCC. Depending upon type of fuel, suitable air pollution control device(s) shall be installed at the evaporator followed by stack of height as prescribed by the concerned SPCB/PCC.
- (13) 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) such as Chemical goggles, full-face shield, or a full-face respirator, Impervious gloves of chemically resistant material (rubber or neoprene), Body suits, aprons, and/or coveralls of chemical resistant material and impervious boots of chemically resistant material.

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Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

(14) The treated acid fume/vapour shall comply with emission norms and shall be dispersed into atmosphere through stack of minimum height of 6 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.

(15) Treatment and disposal of wastewater:

Following are the sources of wastewater from utilization process;

- a) Waste water (generated from Floor washing/reactor wash/vehicle wash/spillages, etc.)
- b) Scrubber bleed

Waste water and scrubber bleed may be reused in the said utilization process for the production of zinc carbonate/copper carbonate / manganese carbonate/ magnesium carbonate/ ferrous carbonate.

In case of Waste water generation, the same shall be treated Physico-Chemically in an ETP so as to comply with the prescribed inlet standards in case of CETP or be treated in captive ETP having adequate treatment facilities to comply with surface water discharge standards as stipulated in the Consent issued by the SPCBs/PCCs.

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

- (16) It shall be ensured that Spent ammonium carbonate is procured from the industries that have valid authorization for the same from the concerned SPCB/PCC as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- (17) SPCBs/PCCs shall ensure synchronization of generation and utilization of Spent ammonium carbonate and the same shall be reflected in respective authorization specifying name and quantity.
- (18) Prior to utilization of Spent ammonium carbonate, the unit shall obtain authorization for generation, storage, and utilization of spent ammonium carbonate solution from the concerned State Pollution Control Board under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- (19) 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.
- (20) a) The residue generated (from bag filter attached to dryer, scrubber, product spillages, etc.) in case of copper carbonate production, 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

89

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.

b) The residue generated (from bag filter attached to dryer, scrubber, product spillages, etc) in case of zinc carbonate/ manganese Carbonate/ magnesium Carbonate/ ferrous Carbonate production may be reused in the said utilization process. If the residue is not reused, the same 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.

- (21) Transportation of Spent Ammonium Carbonate and residues generated during utilisation shall be carried out by the sender or receiver (utilizer/TSDF operator) as per the authorization issued by concerned SPCB/PCC under the Hazardous and Other Wastes (Management & 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 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.
- (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 the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

50.5 Records/return filing

- (1) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent Ammonium Carbonate shall be entered:
 - Address of the sender
 - Date of dispatch
 - Quantity procured
 - Seal and signature of the sender
 - Date of receipt in the premises

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90

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

- (2) A log book with information on source and date of procurement of each type of the said hazardous wastes, quantity, date wise utilization of the same, quantity of zinc carbonate, copper carbonate, manganese Carbonate, magnesium Carbonate and ferrous Carbonate manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of 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.
- (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.

50.6 Standards

- (1) Fugitive emissions in the work zone:

Ammonia	-	35.0 mg/m ³ TWA*
Zinc Oxides	-	5.0 mg/m ³ TWA*
Copper Fumes	-	0.1 mg/m ³ TWA*
Sulphur dioxide	-	13.0 mg/m ³ TWA*

(Reference: Occupational Safety and Health Standards 1910:1000)
TWA - Time-weighted average*
The Permissible Exposure Limit is 8-hour TWA.

- (2) Monitoring of specified parameters for fugitive emission shall be carried out quarterly for the first year followed by at least annually in the subsequent year of utilization. Fugitive emission for specified parameters shall be carried out by NABL accredited or ISO17025/EPA recognized laboratories and the results shall be submitted quarterly to the concerned SPCB/PCC.

- (3) Stack Emissions:

- a) Stack attached to evaporator and reaction vessel

PM	-	50 mg/Nm ³
Ammonia	-	30 mg/Nm ³
Heavy Metals	-	0.5 mg/Nm ³
TOC	-	20 mg/Nm ³

- b) Stack attached to dryer

91

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

PM	-	50 mg/Nm ³
Ammonia	-	30 mg/Nm ³

50.7 Siting of Industry

Facilities for processing of Spent Ammonium Carbonate shall preferably 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.

50.8 Size of Plant & Efficiency of utilisation

1. Maximum 3.08 Kgs of Spent ammonium carbonate yields 1 Kg of product i.e. Zinc carbonate.
2. Maximum 3.11 Kgs of Spent ammonium carbonate yields 1 Kg of product i.e. Copper carbonate.

Quantity of spent ammonium carbonate ranging from 2.85 to 5.0 kg may be required to yield 1 kg of Manganese carbonate/ Magnesium carbonate/ Ferrous carbonate. However, concerned SPCB/PCC shall permit the final quantity for utilization of spent ammonium carbonate for production of the above products (Manganese carbonate/ Magnesium carbonate/ Ferrous carbonate) upon verifying the actual material balance.

Therefore, requisite facilities of adequate size of storage shed and other plant & machineries as given in para 50.10 below shall be installed accordingly.

50.9 On-line detectors / Alarms / Analysers

Online emission monitoring systems shall be installed in case of continuous process operations for parameters as prescribed by the SPCBs/PCCs.

50.10 Checklist of Minimal Requisite Facilities

S. No.	Requisite Facilities
1.	Storage tank(s) of adequate capacity to store Spent Ammonium Carbonate of at least two weeks requirement. Such storage tank(s) shall be placed above the ground and contained with low raise parapet/bund wall & dedicated leak proof floor with slope to collect spillages, if any, into collection pit. Alternatively, the storage tank(s) 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 storage shed(s) for Spent Ammonium Carbonate

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92

Standard Operating Procedure and Checklist of Minimal Requisite Facilities - Utilization of Spent Ammonium Carbonate (generated during manufacturing of Copper Pthalocyanin Blue) in manufacturing of metallic carbonates (Zinc, Copper, Manganese, Magnesium and Ferrous)

	storage tanks within premises
3.	Mechanized system for transfer of Spent Ammonium Carbonate from tankers to storage tanks and storage tanks 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.	Covered hazardous waste storage space to store hazardous generated during utilization process
6.	Reactors (isolation vessel) with suction hood connected via duct to scrubber and stack
7.	Filter press
8.	Evaporator for filtrate (i.e. ammonium sulphate).
9.	Crystallizer with chilling unit (for ammonium sulphate).
10.	Centrifuge (for ammonium sulphate)
11.	Dryer (of adequate size operated electrically or by fuel as permitted by the concerned SPCB/PCC)
12.	Bag filter shall be installed in case of dryer followed by stack of height as prescribed by the concerned SPCB/PCC
13.	Suction arrangement to channelize emissions from reaction vessel, dryer and evaporator to the APCD. Appropriate Scrubber system shall be installed to reaction vessel and evaporator followed by stack of height as prescribed by the SPCBs/PCCs
14.	Adequate Effluent treatment plant so as to comply with standards/conditions prescribed by the concerned SPCB/PCC
15.	Forced Evaporator in case of zero discharge condition
16.	Boiler (attached with the dryer/forced evaporator) operated electrically or by fuel as permitted by the concerned SPCB/PCC. Depending upon type of fuel, suitable air pollution control device(s) shall be installed with the boiler followed by stack of height as prescribed by the concerned SPCB/PCC
17.	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
18.	Dedicated hazardous waste storage area for temporary storage of hazardous waste generated during utilization process

List of SOPs under Rule 9 of HOWM Rules, 2016

SOP Number	Details of SOP	CPCB Letters No.
1.	Recovery of solvents from spent solvents containing - Toluene, Xylene, Cyclohexane, Acetone, Methyl isobutyl ketone, Methanol, Isopropyl alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Iso Propyl Ether, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Benzene, Ethanol and Methyl Ethyl Ketone	CPCB letter no. B-29016 (SC)/1 (55-IV)/16/HWMD/2879-2913 dated 30/06/2016
2.	Utilization of APCD Dust/Residue generated from LD Furnace/Electric Arc Furnace (EAF)/Blast Furnace of Steel Plant/captive Blast Furnace and Ferro-Alloy Plant for producing cold briquettes for use in Blast Furnace for production of Pig Iron	
3.	Utilization of Spent Catalyst containing precious metals to recover - Platinum, Iridium, Osmium, Palladium, Rhodium, Ruthium, Rhenium, Gold & Silver	
4.	Utilization of Spent H2SO4 generated from Pickling operations for manufacturing Ferrous Sulphate	
5.	Utilization of Spent Acid containing Molybdenum generated from filament industries for producing Molybdenum Trioxide by heating process	
6.	Utilization of Spent HCl generated from steel rolling mills for producing Ferric Chloride	
7.	Utilization of Used Anode Butt generated from Aluminium smelters to produce Carbon Pellets and High Energy (HE) Coke for use in Steel furnaces/foundries.	
8.	Utilization of Used Anode Butt generated from Aluminium smelters to produce Carbon Blended Coke/ Electrode carbon Paste /Carburiser for use in Steel or ferroalloy furnaces	
9.	Utilization of pre-processed Used Anode Butt generated from Aluminium smelters to produce Green Anodes through Anode-Baking Process for use in Aluminium Smelters	
10.	Utilization of pre-processed used Anode Butt generated from Aluminium smelters to produce Carbon Electrode Paste.	
11.	Utilization of Coal Tar/Tarry Residue generated from coal gasifier for energy recovery in sodium silicate industry.	
12.	De-contamination of contaminated drums/containers/ barrels generated from pharmaceuticals, food processing, cosmetic, textile, paint formulation and beverages industries for industrial re-use and/or production of plastic granules.	
13.	Utilization of process sludge and primary ETP sludge generated from Pulp & Paper Industries for producing Paper Board/ Mill Board/ Card Board	
14.	Captive Utilization of Aluminium Dross generated from refining and casting house of Aluminium smelter units to recover Aluminium Metal	
15.	Utilization of Aluminium Dross generated from refining and casting house of Aluminium smelter units to recover Aluminium Metal	
16.	Utilization of Oil based Iron sludge generated from grinding mill section of Ball & Roller bearings for producing Ferrous Sulphate	
17.	Utilization of Spent catalyst containing Mercury & Mercury Waste generated from various industry for recovering Mercury	
18.	Utilization of Spent H2SO4 containing organic compounds generated from Dye and Dye Intermediates to produce gypsum suitable for use in cement plants	

94

19.	Utilization of Spent fixer (Hypo) solution generated from Photography/X-rays films	CPCB letter no. B-29016 (SC)/1 (55-IV)/16/HWMD/18997-19031 dated 28/10/2016
20.	Utilization of Hydro Fluoro Silicic Acid generated from Single Super Phosphate Fertilizer Industries	CPCB letter no. B-29016 (SC)/1 (55-IV)/16/HWMD/19734-19768 dated 25/11/2016
21.	Utilization of Spent Sulphuric Acid generated during manufacturing of Col 313 dye using Anthraquinone	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/15277-15311 dated 23/03/2017
22.	Utilization of Vanadium Sludge generated from Alumina Refineries	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/20691-20725 dated 23/12/2016
23.	Utilization of Phenolic Waste Water generated from Coal Gasifier Condensate Water	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/9794-9827 dated 20/01/2017
24.	Utilization of ETP Sludge generated from Pulp & Paper Industry	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/23140-23174 dated 13/02/2017
25.	Utilization of Spent Carbon (Carbon Residue) generated from Urea Fertilizer Industry	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/272-306 dated 05/04/2017
26.	Utilization of Spent Acid Containing Molybdenum generated during manufacturing of Filaments in Bulb/Lamp Industry	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/15277-15311 dated 23/03/2017
27.	Utilization of Resin Waste generated during Resin Impregnation of Electrical Coils	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/24438-24472 dated 16/03/2017
28.	Utilization of Spent Alumina generated from Polymerization in Swing Unit of Petrochemical Plant	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/24214-24248 dated 09/03/2017
29.	Utilization of Spent Ion Exchange Resin generated from Demineralization (DM) Plant	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/272-306 dated 05/04/2017
30.	Captive utilization of Spent Ion Exchange Resin generated from Demineralization (DM) plant in DRI Kiln of Sponge Iron	
31.	Utilization of Tungsten Scrap (Tungsten Carbide Insert Tips) generated from Metal Cutting Operation	
32.	Utilization of Spent Pot Lining (SPL) generated from Primary Aluminium Smelting Industries	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/462-496 dated 10/04/2017
33.	Utilization of Spent Sulphuric Acid generated during manufacturing of 4,4'-Diamino Benzene Sulphanilide	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/15277-15311 dated 23/03/2017
34.	Utilization of Coal Tar/Tarry Residue generated from Coal Gasifier Units	
35.	Utilization of Gasifier Slag Containing Nickel & Spent Catalyst Containing Molybdenum generated during production of Ammonia in Nitrogenous Fertilizer Industry	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/5315-5349 dated 07/07/2017
36.	Utilization of Synthetic Oil Based Mud/Oil based Drill Cutting Waste in Road Construction	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/7947-7981 dated 20/07/2017
37.	Utilization of Flue Gas Cleaning Residue generated from Steel Scrap Melting Induction Furnace, for Zinc Extraction	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/8305-8339 dated 24/07/2017

48

38.	Utilization of Spent Sulphuric Acid (generated during manufacturing of 3, 5-Dichloro Nitro Benzene) and Spent Sodium Thiosulphate (generated during manufacturing of 3, 5-Dichloro Aniline) for manufacturing of Nitrosyl Sulphuric Acid (NSA)	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/11732-11766 dated 04/10/2017
39.	Utilization of Spent Phosphoric Acid generated during manufacturing of Quinacridone pigment, for	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/11272-11306 dated 04/10/2017
40.	Utilization of Spent Sulphuric Acid generated during manufacturing of Vinyl Sulphone, for production of H-Acid	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/HWMD/13081-13115 dated 30/10/2017
41.	Utilisation of Waste Dichromate Solution generated during manufacturing of Ibuprofen for production of Basic Chromium Sulphate	CPCB letter no. B-29016 (SC)/1 (55-IV)/17/WM-11/15518-15552 dated 11/12/2017
42.	Utilization of Used/Waste Thinner for manufacturing of Industrial Primer to be used as Automotive Paints	CPCB letter no. B-29016 (SC)/1 (55-IV)/18/WM-11/16677-16711 dated 31/01/2018
43.	Utilization of Spent Aluminum Chloride generated during manufacturing of CPC Green and 2,4,6-Trimethyl Benzoyl Chloride	CPCB letter no. B-29016 (SC)/1 (55-IV)/18/WM-11/1228 - 1262 dated 24/04/2018
44.	Utilization of Spent Sulphuric Acid generated during manufacturing of G-Salt, for production of R-Complex and Gamma-acid	CPCB letter no. B-29016/(SC)/1(55-IV)/18/WM-II/3068 - 3102 dated 25/06/2018
45.	Utilization of Spent Ammonium Chloride generated during manufacturing of Hexamethyl Disilazane for production of Ammonium Chloride	CPCB letter no. B-29016/(SC)/1(55-IV)/18/WM-II/6997-7030 dated 04/07/2018
46.	Utilization of Spent Sulphuric Acid (generated during manufacturing of 4, 4-Diaminobenzesulfanilide (DABSA) in manufacturing of Para Amino Benzene Sulphonic Acid (PABSA)	CPCB letter no. B-29016/(SC)/1(55-IV)/18/WM-II/13312 - 13346 dated 30/11/2018
47.	Utilization of Spent Liquid Glauber Salt generated from ethoxylation step of Para Base Vinyl Sulphone manufacturing process as supplementary resource for manufacture of Reactive Dye (Reactive Orange 2R)	CPCB letter no. B-29016/(SC)/1(55-IV)/18/WM-II/13841 - 13875 dated 12/12/2018
48.	Utilization of Spent Alkali Bromine and Spent Acidic Bromide generated during manufacturing of various pesticides, pharmaceuticals and organic chemicals for recovery of liquid Bromide	CPCB letter no. B-29016/(SC)/1(55-IV)/18/WM-II/14188-14222 dated 20/12/2018
49.	Utilization of spent sulphuric acid (generated from dye & dye intermediates industries and chemical manufacturing industries) as neutralizing agent in Effluent Treatment Plant (ETP)	CPCB letter no. B-29016/(SC)/1(55-IV)/18/WM-II/15407-15441 dated 17/01/2019
50.	Utilization of spent ammonium carbonate (generated during manufacturing of copper pthalocyanin blue (CPCB blue) in manufacturing of zinc carbonate, Copper carbonate Manganese Carbonate, Magnesium Carbonate and Ferrous Carbonate	CPCB letter no. B-29016/(SC)/1(55-IV)/19/WM-II/863-879 dated 25/04/2019
51.	Utilization of residue/rejects generated from processing of Aluminium Dross of Aluminium smelting process for production	CPCB letter no. B-

96

	of Synthetic Slag	29016/(SC)/1(55-IV)/19/WM-II/16587-16621 dated 20/02/2019
52.	Utilization of Terry Residue generated from Coal Gasifier units for production of Creosote Oils and Coal Tar Pitch.	CPCB letter no. B-29016/(SC)/1(55-IV)/19/WM-II/16552-16585 dated 20/02/2019

10/2/19