

**INVENTORISATION OF  
HAZARDOUS WASTE AS PER HAZARDOUS AND OTHER  
WASTES (MANAGEMENT AND TRANSBOUNDARY  
MOVEMENT) RULES, 2016  
IN  
KANNUR, KASARGODE, KOZHIKODE, MALAPPURAM, PALAKKAD &  
WAYANAD.**



**KERALA STATE POLLUTION CONTROL BOARD  
REGIONAL OFFICE, KOZHIKODE  
2017**

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# CHAPTER 1

## INTRODUCTION

### 1.1 General

Hazardous wastes are wastes with properties that make them dangerous or potentially harmful to human health or the environment. Hazardous wastes can be liquids, solids, contained gases, or sludges. They can be by-products of manufacturing processes or simply discarded commercial products, like cleaning fluids or pesticides. A hazardous waste is a special type of waste because it cannot be disposed of by common means like other by-products of our everyday lives. Depending on the physical state of the waste, treatment and solidification processes might be required.

The pertinent characteristic of hazardous wastes is that they exhibit measurable properties posing sufficient threats to warrant regulation. For a waste to be deemed a characteristic hazardous waste, it must cause, or significantly contribute to, an increased mortality or an increase in serious irreversible or incapacitating reversible illness, or pose a substantial hazard or threat of a hazard to human health or the environment, when it is improperly treated, stored, transported, disposed of, or otherwise mismanaged.

There are many tragic events occurring around the world due to the improper disposal of hazardous waste. The toxic contamination of a middle class community called love canal in New York was due to the improper dumping of many hazardous wastes and substances in a half dug canal and the land was reclaimed and used for community living. However there were many sort of health hazards for the people living in the reclaimed land due to the leaching of the hazardous substance in to the environment. The Minamata disease, a neurological disorder caused by mercury poisoning affected the population of the Minamata town in Japan, was caused due to the discharge of hazardous Methyl Mercury in to the sea by a local chemical plant. Methyl mercury contaminated the Minamata Bay and accumulated in fish, which were then consumed by the local population. The Union Carbide Industrial disaster in Bhopal in India on the night of 2<sup>nd</sup> December 1984, which occurred due to the leak of hazardous Methylisocyanate (MIC) claimed lives of thousands residing around the industry. Among many other reasons, lax regulations and inadequate supervision of operations of the industry resulted in the disaster.

Rapid industrialization in last few decades have led to the depletion of natural resources and increase in pollution. These industrialization has also led to the generation of huge quantities of hazardous waste which causes severe environmental problems. With the tightening of environmental laws in the 1970s, disposal costs for hazardous waste rose dramatically. At the same time, globalization of shipping made transboundary movement of waste more accessible, and consequently, the trade in hazardous waste, particularly to developing countries, grew rapidly and many of the developing countries became dumping ground for these hazardous waste. Soon the world arose to the threaten of these hazardous waste and the

also the need for a frame work for the management of the same. The three conventions which laid down the frame work for the regulation and management of these wastes were the The Basel, The Rotterdam and The Stockholm Conventions. Together they cover the Key Elements of “ cradle – to- grave” management of hazardous waste.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland. Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between Nations and specifically to prevent transfer of hazardous waste from developed to less developed countries and to have a regulatory system applying to cases where transboundary movements are permissible. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist less developed countries in environmentally sound management of the hazardous and other wastes they generate.

The Rotterdam Convention was adopted on 10 September 1998 by a Conference of Plenipotentiaries in Rotterdam, the Netherlands. The Convention entered into force on 24 February 2004. The objective of the convention are to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to the environmentally sound use of those hazardous chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.

The Stockholm Convention on Persistent Organic Pollutants was adopted by the Conference of Plenipotentiaries on 22 May 2001 in Stockholm, Sweden. The Convention entered into force on 17 May 2004. The Stockholm Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment. Exposure to Persistent Organic Pollutants (POPs) can lead to serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and damages to the central and peripheral nervous systems. Given their long range transport, no one government acting alone can protect its citizens or its environment from POPs.

Thus it is clear that hazardous waste management is essential since

- a. Exposure to hazardous materials can result in long term and short term health problems
- b. Long term damage is likely to the environment and resources like water, sediment , soil and air

- c. Bio-concentration of some hazardous or toxic compounds can lead to damage to biota and human health
- d. Closure and reclamation of old and defunct contaminated industrial sites is required

## **1.2 Hazardous Waste Inventory**

In India, the hazardous waste management regulations are constituted under the Environment (Protection), Act 1986. The Ministry of Forest, Environment and Climate Change is responsible for framing regulations with regard to the environment protection. The Government has constituted the Central Pollution Control Board (CPCB) as the apex body for the implementation and regulation of the environment protection acts namely The Water (Prevention and Control of Pollution), Act, 1974, The Air (Prevention and Control of Pollution), 1981 and Environment (Protection), Act and rules there under. The State pollution Control Boards (SPCB) and Pollution Control Committees are formed in each state and union territories of the country respectively.

Kerala State Pollution Control Board was formed in 1979 and is the statutory body for the implementation of Water Act, Air Act and Environment (Protection), Act in the state of Kerala. The preparation of inventory of hazardous waste which is done to obtain information regarding type, quantity of waste generated, requirements of infrastructure for the environmentally sound management of these wastes are the responsibility of SPCB. Hence this project aims to the preparation of inventory of hazardous waste in the northern region of Kerala which is under the jurisdiction of Kerala State Pollution Control Board, Regional Office, and Kozhikode. The region comprises of six district namely Palakkad, Malappuram, Kozhikode, Kannur, Wayanad, Kasaragode.





Figure 1.1 The map of Kerala showing the 14 districts.

## CHAPTER 2

### LEGISLATIVE FRAMEWORK IN INDIA

The objectives of environmental legislation are the effective management of hazardous waste, so as to avoid environmental pollution and adverse health effects due to its improper handling & disposal, to have an appropriate strategy for the regulatory bodies, generators of hazardous waste, its recyclers and operators of facilities to minimize, recycle, treat and dispose of left over hazardous waste in an environmentally sound manner and to facilitate implementation of the action plan brought out in “National Environment Policy 2006” on management aspects of hazardous waste, and to fulfill obligations under the Basel Convention on Transboundary movement of hazardous wastes including their minimization environmentally sound management and active promotion of transfer and use of cleaner technologies.

Ministry of Environment and Forest (MoEF) promulgated hazardous waste (Management and Handling) Rules on 1989 under the provision of the Environment Protection Act, 1986 and classified the hazardous waste into 18 categories based on constituents present in it and quantum of generation. These Rules were amended in the year 2000 primarily to bring them in line with the Basel convention. The 2000 amendment classified the waste by process of waste generation and as per their characteristics. Thus in all 44 categories were identified comprising of 148 waste streams in Schedule 1 and 79 types of wastes in Schedule 2. The 2003 amendment rationalized the list of processes/ waste streams, thus number of industrial processes generating hazardous waste was reduced from 44 to 36 and number of waste streams from 148 to 123.

In September 2008 the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 was notified in supersession of former notification. The Rules lay down corresponding duties of various authorities such as MoEF, CPCB, State/UT Govts., SPCBs/PCCs, Directorate General of Foreign Trade (DGFT), Port Authority and Custom Authority while State Pollution Control Boards/ Pollution Control Committees have been designated with wider responsibilities touching across almost every aspect of Hazardous wastes generation, handling and their disposal.

## 2.1 Hazardous and Other Wastes (Management and Transboundary Movement)

### Rules, 2016

To be in line with this Government's priority for Ease of Doing Business but with responsible concerns for sustainable development, Ministry of Environment and Forest (MoEF) has notified Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 in suppression of the 2008 Rules. The 2016 Hazardous Waste Rules focus more on resource recovery and disposal of hazardous waste in environmentally sound manner. The major changes in the Hazardous Waste Management Rules 2008 and 2016 are given in the table 2.1 below

2016 Rule	2008 Rule
Hazardous and Other Wastes (Management and Transboundary Movement) Rules	Hazardous Waste (Management, Handling and Transboundary Movement) Rules
24 Paras, 8 Schedules, 12 Forms	26 Paras, 7 Schedules, 16 Forms
Actual user	Recycler
Only authorisation	Registration
Sender or receiver liability	Transporter liability
7 colour manifest	6 colour manifest
Other waste means wastes specified in Part B and Part D of Schedule III and includes all such wastes generated indigenously within the country	Other wastes are the wastes specified in Part D of Schedule III shall not be hazardous unless they possess any of the hazardous characteristics specified in Part C of the Schedule

Table 2.1- Major differences between the Rules of 2008 and 2016.

The main features of Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 include the following:-

- i. The ambit of the Rules has been expanded by including 'Other Waste'.
- ii. Waste Management hierarchy in the sequence of priority of prevention, minimization, reuse, recycling, recovery, co-processing; and safe disposal has been incorporated.
- iii. All the forms under the rules for permission, import/export, filing of annual returns, transportation, etc. have been revised significantly, indicating the stringent approach for management of such hazardous and other wastes with simultaneous simplification of procedure.
- iv. The basic necessity of infrastructure to safeguard the health and environment from waste processing

industry has been prescribed as Standard Operating Procedure (SOPs), specific to waste type, which has to be complied by the stakeholders and ensured by SPCB/PCC while granting such authorization.

v. Procedure has been simplified to merge all the approvals as a single window clearance for setting up of hazardous waste disposal facility and import of other wastes.

vi. Co-processing as preferential mechanism over disposal for use of waste as supplementary resource, or for recovery of energy has been provided.

vii. The approval process for co-processing of hazardous waste to recover energy has been streamlined and put on emission norms basis rather than on trial basis.

viii. The process of import/export of waste under the Rules has been streamlined by simplifying the document-based procedure and by revising the list of waste regulated for import/export.

ix. The import of metal scrap, paper waste and various categories of electrical and electronic equipments for re-use purpose has been exempted from the need of obtaining Ministry's permission.

x. The basic necessity of infrastructure to safeguard the health and environment from waste processing industry has been prescribed as Standard Operating Procedure (SOPs) specific to waste type.

xi. Responsibilities of State Government for environmentally sound management of hazardous and other wastes have been introduced as follows:

→ To set up/ allot industrial space or sheds for recycling, pre-processing and other utilization of hazardous or other waste

→ To register the workers involved in recycling, pre-processing and other utilization activities.

→ To form groups of workers to facilitate setting up such facilities;

→ To undertake industrial skill development activities and ensure safety and health of workers.

xii. List of processes generating hazardous wastes has been reviewed taking into account technological evolution in the industries.

xiii. List of Waste Constituents with Concentration Limits has been revised as per international standard and drinking water standard.

The following items have been prohibited for import:

a. Waste edible fats and oil of animals, or vegetable origin;

b. Household waste;

c. Critical Care Medical equipment;

d. Tyres for direct re-use purpose;

e. Solid Plastic wastes including Pet bottles;

f. Waste electrical and electronic assemblies scrap;

g. Other chemical wastes especially in solvent form.

xiv. State Government is authorized to prepare integrated plan for effective implementation of these provisions, and have to submit annual report to Ministry of Environment, Forest and Climate Change.

xv. State Pollution Control Board is mandated to prepare an annual inventory of the waste generated; waste recycled, recovered, utilized including co-processed; waste re-exported and waste disposed and submit to the Central Pollution Control Board by the 30th day of September every year.

## CHAPTER 3

# HAZARDOUS WASTE MANAGEMENT

The hazardous waste that is improperly managed poses a serious threat to human health and environment. The provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 deals with the cradle to grave management of the hazardous waste generated. The principles of waste management hierarchy are very vital in the management of hazardous waste, for that case the management of any solid waste. The 2016 rules also focus on this hierarchy.

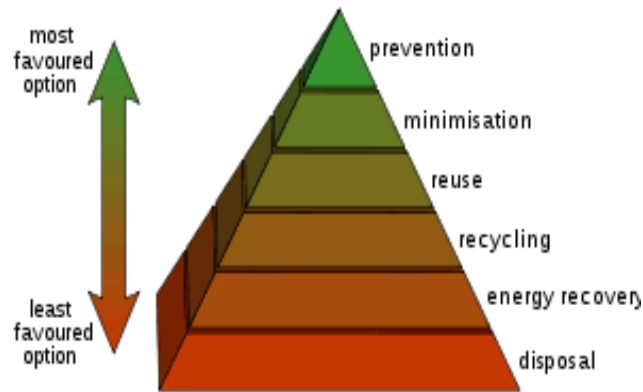


Figure 3.1 The Waste Management Hierarchy

In this hierarchy prevention is given the highest priority. This policy intends to encourage the generators to reduce the hazardous waste at its source rather than use the end of pipe treatment or disposal. Since it is often impractical to completely eliminate the production of hazardous waste from an industrial process, reducing the volume generated lessens the environmental impact while at the same time lowering the operating costs, decreasing the complexity of waste management and reducing the potential liability. Volume reduction can be achieved through such strategies as inventory control, improved house keeping, production/ process modification, substitution, waste segregation and new use for wastes. Minimisation of waste results in reducing the weight, volume or toxicity to the extent feasible of a waste prior to site treatment, storage or disposal. Minimisation of waste can be broken down in to three basic activities. Reuse ensures that the waste is used to the maximum extent in its original form thus eliminating the need for processing the material. Recycling is the reclamation of a waste stream to be used as an ingredient in the process. Energy recovery from waste is the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolyzation, anaerobic digestion, and landfill gas (LFG) recovery. This process is often called waste-to-energy (WTE). Converting non-recyclable waste materials into electricity and heat generates a renewable energy source and reduces carbon emissions by offsetting the need for energy from fossil sources and reduces methane generation from landfills. After energy is recovered, approximately

ten percent of the volume remains as ash, which can be generally disposed in a landfill. The last step in the hierarchy is that of the disposal. Land fill and incineration are the preferred method of disposal. Co-processing of waste is also practiced widely for its final disposal. Co-processing means the use of waste materials in manufacturing processes for the purpose of energy or resource recovery or both and resultant reduction in the use of conventional fuels or raw materials or both through substitutions

Waste management functions cover waste collection and transport, treatment, disposal, recycling, re-use and recovery, minimization as well as the production of energy from waste. Waste management decisions are often taken locally and need to be sustainable and affordable. There is a great variation of costs across cities worldwide, due to variations in available land area, waste quantity, waste characteristics, regulatory constraints, local preferences, collection/transport, and policy/planning guidance.

### 3.1 Generation

The industrial process is the main source of hazardous waste. Process such as mining , extraction, fertilizer and pesticide manufacturing , iron and steel etc contribute much to the generation of the waste. As per the 2016 Rules, the following waste has been excluded from the purview of hazardous waste management

- Waste water
- exhaust gases,
- wastes arising out of the operation from ships beyond five kilometres of the relevant baseline as covered under the provisions of the Merchant Shipping Act, 1958 (44 of 1958) ,
- radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) ,
- bio-medical wastes,
- Municipal Solid Waste

When it comes to **hazardous waste** disposal and management, understanding the characteristics of waste is imperative. The four main characteristics of hazardous waste are explained below

(1)**Ignitability** – If the waste material is likely to catch fire in the process of transport, storage, treatment or disposal then it is identified as hazardous waste. Examples include oils, solvents, flammable gases like methane, flammable compressed gas and strong oxidizing agents. This definition also includes liquids with flash point < 60°C. If the material is not liquid under standard temperature and pressure but can cause fire due to friction, absorption of moisture or spontaneous chemical reaction, it is also defined as ignitable substance.

(2)**Corrosivity**- waste materials with very low pH (< 2) or very high pH (> 12.5) are considered corrosive and therefore hazardous. Corrosive substances, such as hydrochloric acid, nitric acid, and sulfuric acid, have the ability to eat through containers, causing the leakage of harmful materials. Everyday example of corrosives includes battery acid and rust removers.

(3)**Reactivity** – Chemically unstable waste materials are defined as reactive and therefore hazardous. This includes materials that have extremely fast reaction rates which can result in explosive conditions at any stage in the management cycle ; if it can undergo violent change with or without detonation; if it reacts violently with water and forms a potentially dangerous mixture with water; if it is explosive or toxic. Cyanide or sulfide bearing waste that can release toxic gases , vapours, fumes within a pH range of 2-12.5 are all included in this definition.

(4)**Toxicity** - Any material that is poisonous at some concentration is defined as toxic. For hazardous waste, many toxic substances may be present in a mixture. These contaminants are identified solely through a test method called Toxicity Characteristic Leaching Procedure or TCLP.

The United States Environmental Protection Agency (USEPA) has categorized hazardous materials or wastes based on the chemical constituents, some examples of which are shown in the table 3.1 below

Hazardous Waste Category	Possible sites	Examples
Non halogenated Volatile Organic Compound	Chemical manufacturing plants or disposal area, electroplating /metal finishing shops, hangars / aircraft maintenance area, landfills and burial pits, leaking storage tanks, radioactive/mixed waste disposal areas, oxidation ponds/ lagoons, paint stripping and spray booth areas, pesticide / herbicide mixing areas, solvent degreasing areas, surface impoundments and vehicle maintenance areas	Ethanol, methanol, carbon disulphide, acetone etc
Halogenated Volatile Organic Compounds	As above	Trichloroethylene (TCE), chloroform and dichloromethane
Non halogenated SVOCs	As above	Non halogenated pesticides like parathion, malathion,



		PAHs like naphthalene and anthracene etc
Halogenated Semi Volatile Organic Compounds	As above and wood preserving sites	Pesticides like DDT, Endrin, Endosulfan and their degradation intermediates
Fuels	Aircraft area, burn pits, chemical disposal areas, contaminated marine sediments, disposal wells and leach field, firefighting training areas, hangars, aircraft maintenance areas, landfills and burial pits, leaking storage tanks, solvent degreasing areas, surface impoundments and vehicle maintenance areas	Petroleum compounds like benzene, toluene, ethyl benzene, xylene etc
Inorganics	Artillery and small arm impact areas, battery disposal areas, burn pits, chemical disposal areas, contaminated marine sediments, , disposal wells and leach field, electroplating /metal finishing shops, firefighting training areas, landfills and burial pits, leaking collection and system sanitary lines, leaking storage tanks, radioactive and mixed waste disposal areas, oxidation ponds/ lagoons, , paint stripping and spray booth areas, sand blasting areas, surface impoundments and vehicle maintenance areas	All metals and their compounds, cyanide, fluorine, asbestos etc.
Radionuclides	Radioactive and mixed waste disposal areas	Uranium, thorium, cesium, radon, radium, carbon – 14 etc
Explosives	Artillery impact areas, contaminated marine sediments, disposal wells and leach field, landfills and burial pits and TNT washout lagoons	

Table 3.1 USEPA categorization of hazardous waste

In the 2016 Rules the process which causes the generation of hazardous waste and the concentration of the constituents which render the waste hazardous are detailed in Schedule I, Schedule II and Schedule III. The Schedules I, II, III are given in Annexure 1,2,3 respectively.

In addition to the sources listed, the spillage of containerized hazardous waste must also be considered an important source. The quantities of hazardous wastes that are involved in spillage are usually not known. The effects of spillage are often spectacular and visible to the community. Because the occurrence of spillage cannot be predicted, the potential threat to human health and environment is greater than that from routinely generated hazardous wastes.



Figure 3.1 Empty containers of chemicals and paints



Figure 3.2 Waste from lathe industries



Figure 3.3 Flue gas residues

## 3.2 Segregation and storage

Segregation is important in order to prevent the mixing up of wastes of different characteristics. At many times improper segregation has caused mixing of incompatible wastes leading to explosions and accidents. The type of storage to be adopted depends upon the nature of hazardous waste. Onsite storage practices are a function of the types and amounts of hazardous wastes generated. Separate area should be earmarked for storing the waste and storage area may consist of different cells for storing different kinds of hazardous wastes. Ignitable, reactive and non-compatible wastes shall be stored separately. The improper storage of waste might cause spills, leaks, fires, and contamination of soil and drinking water. As per the Hazardous Waste Rules , 2016 the occupiers of facilities may store the hazardous and other wastes for a period not exceeding ninety days and shall maintain a record of the same, provided that the State Pollution Control Board may extend the said period of ninety days in following cases, namely:-

- (i) Small generators (up to ten tones per annum) up to one hundred and eighty days of their annual capacity;
  - (ii) Actual users and disposal facility operators up to one hundred and eighty days of their annual capacity,
  - (iii) Occupiers who do not have access to any treatment, storage, disposal facility in the concerned State;
- or
- (iv) the waste which needs to be specifically stored for development of a process for its recycling, recovery, pre-processing, co-processing or utilization;



(v) in any other case, on justifiable grounds up to one hundred and eighty days.

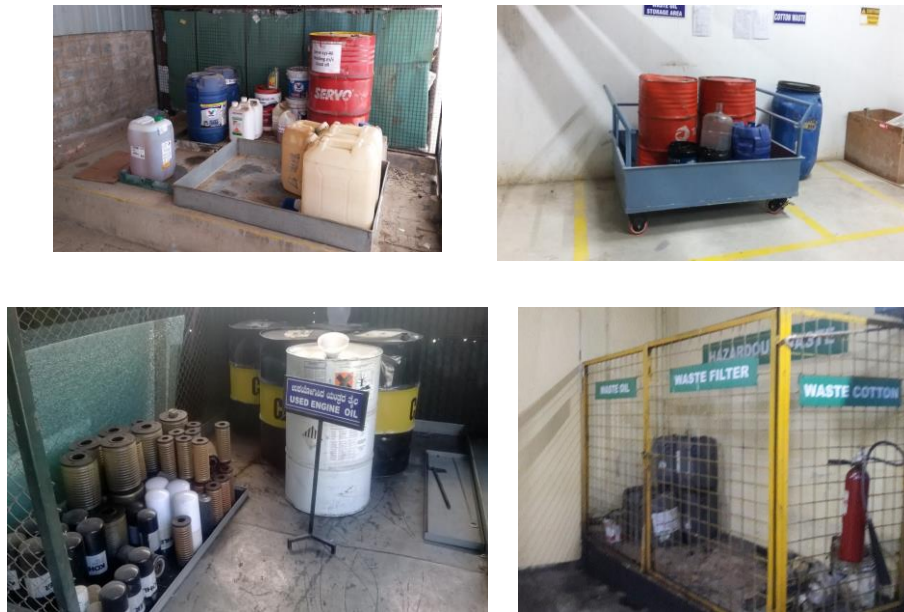


Figure 3.4 Segregated storage of hazardous waste

### 3.3 Collection and transport

In view of its toxic, flammable or corrosive characteristic, the transportation of hazardous waste has to be planned not to cause / likely to cause danger to health or environment, whether alone or when in contact with other waste or substances during transportation. As per the 2016 rules, collection and transportation of hazardous waste can only be done by authorized persons. The transport of the hazardous and other waste shall be in accordance with the provisions of these rules and the rules made Motor Vehicle Act, 1988.

The regulations to be exercised during the safe transportation of the hazardous waste according to the various provisions of the 2016, Rules are given below

- (1) The transport of the shall be in accordance with the provisions of these rules and the rules made MV Act, 1988 and the guidelines issued by the CPCB in this regard.
- (2) The occupier shall provide the transporter with the relevant information in **Form 9**, regarding the hazardous nature of the wastes and measures to be taken in case of an emergency and shall label the Hazardous and other waste containers as per **Form 8**.
- (3) In case of transportation of H and OW for final disposal to a facility existing in a State other than the State where the waste is generated, the sender shall obtain “No Objection Certificate” from the SPCB of both the States.

(4) In case of transportation of Hazardous and other waste for recycling or utilization including co-processing, the sender shall intimate both the SPCBs before handing over the waste to the transporter.

(5) In case of transit of Hazardous and other waste for recycling, utilization including co-processing or disposal through a State other than the States of origin and destination, the sender shall give prior intimation to the concerned SPCB of the States of transit before handing over the wastes to the transporter.

(6) In case of transportation of Hazardous and other waste, the responsibility of safe transport shall be either of the sender or the receiver whosoever arranges the transport and has the necessary authorisation for transport from the concerned SPCB. This responsibility should be clearly indicated in the manifest.

(7) The authorisation for transport shall be obtained either by the sender or the receiver on whose behalf the transport is being arranged.

### **3.4 Processing**

Processing of hazardous waste is done for purposes of recovering useful materials and preparing the wastes for disposal. Processing can be accomplished on-site or off-site. The variables affecting the selection of processing site include the characteristics of wastes, the quantity of wastes, the technical, economical and environmental aspects of available on-site treatment processes and the availability of the nearest off-site treatment facility (e.g., haul distance, fees, and exclusions). The treatment of hazardous waste can be accomplished by physical, chemical, thermal or biological means. In practice, the physical, chemical and thermal treatment operations are the most commonly used. (Biological treatment processes are used less often because of their sensitivity.) Depending on the type of wastes being treated, one or more of these methods may be used.

As per the 2016 rules, the utilization of Hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use, including within the premises of the generator (if it is not part of process), shall be carried out only after obtaining authorization from the State pollution Control Board. The Central Pollution Control Board has issued guide lines for Environmentally Sound Recycling of Recyclable Hazardous Wastes listed in Schedule IV. Schedule IV is attached as Annexure 4.

### **3.5 Disposal**

(1) **Landfills** - It is important to take care both in the selection of a hazardous waste disposal site and its design. In general, disposal sites for hazardous wastes should be separate from those for municipal solid wastes. As hazardous wastes can exist in the form of liquids, sledges, solids and dusts, a correct approach for co-disposal for each of the hazardous wastes should be determined. To avoid the co-disposal of incompatible wastes, separate storage areas within the total landfill site should be designated for various classes of compatible wastes.

Liquid wastes are usually stored in a tank near the site and can be introduced into the landfill by means of trenches or lagoons, injection or irrigation. Sludges are also placed in trenches. During disposal of lightweight wastes, the disposal area must be kept wet to prevent dust emissions. Hazardous solid waste characterised by a high degree of impermeability as such must not be disposed of over large areas. When containerised wastes are to be disposed of, precautions must be taken to avoid the rupturing of containers during the unloading operation and the placement of incompatible waste in the same location. To avoid rupturing, the containers are unloaded and placed in position individually. The covering of the containers with earth should be monitored and controlled carefully to ensure that a soil layer exists between each container and the equipment placing the soil does not crush or deform the container.

While designing a landfill site for hazardous waste, provision should be made to prevent any leachate escaping from landfill site. This requires a clay liner, and in some cases, both clay and impermeable membrane liners are used. A layer of limestone is placed at the bottom of the landfill to neutralise the pH of leachate. A final soil cover of 25 cm or more should be placed over the liner. The completed site should be monitored continuously, both visually and with sample wells.

**(2) Incineration** - Thermal oxidation through incinerator is one of the proven technologies for destruction of hazardous waste in all the forms i.e. solid / semi solid / liquid and gaseous, based on the feeding system, so as to render them innocuous in the form of non-toxic and non-hazardous residues. Though it is a solution for destruction of complex hazardous waste, requires knowledge to judge the compatibility of various wastes for the purpose of homogenization of feeding waste, to operate and maintain thermal processes, pollution control devices, which demands skill & experience, in order to comply with the environmental regulations for common hazardous waste incineration facilities.

**(3) Co processing in cement kilns-** Co processing is a form of waste management that recovers the energy and mineral content from waste for beneficial re-use as fuel for energy generation and product additives for manufacturing. Co processing in cement kilns are widely preferred for the disposal of hazardous waste. In these the waste can be used as substitution for the raw material or the fuel. Advantages of Co processing in cement kiln is usually preferred due to the following reasons

- High temperatures (1400°C) and residence time of 4 – 5 seconds in an oxygen-rich atmosphere ensure the destruction of organic compounds.
- Any acid gases formed during combustion are neutralized by the alkaline raw material and are incorporated into the cement clinker.

- Interaction of the flue gases and the raw material present in the kiln ensures that the non – combustible part of the residue is held back in the process and is incorporated into the clinker in a practically irreversible manner.
- No waste is generated that requires subsequent processing

As per the 2016 rules, trial runs are not required for co-processing of waste in cement plants for which guidelines by the Central Pollution Control Board are already available; however, the actual users shall ensure compliance to the standards notified under the Environment Protection Act,1986 for cement plant with respect to co-processing of waste

## CHAPTER 4

### HAZARDOUS WASTE INVENTORY

For the preparation of this inventory, the waste generated as per the Schedule 1 and Schedule 2 of Hazardous and Other Waste (Management and Transboundary Movement), Rules, 2016 were considered. The format for the preparation of inventory was developed by Central Pollution Control Board and the same was used to collect the details of waste generated in the six districts Palakkad, Malappuram, Wayand, Kasaragode, Kozhikode, Kannur. The details were then verified and shown in the Annexure 5.

The total quantity of hazardous waste generated is 2768 t/year. The quantity of landfillable, recyclable, incinerable type waste were separately collected and the details are shown in the table 4.1

Districts	Landfillable (t/year)	Incinerable (t/year)	Recyclable (t/year)	Total
Kannur	227.91	5.00	238.06	470.97
Kasargode	0.78	0	76.33	77.11
Kozhikode	41.985	1.10	439.56	482.65
Malappuram	31.00	0.38	109.17	140.52
Palakkad	778.11	102.15	654.30	1534.56
Wayanad	1.00	0	60.825	61.825
Total	1080.79	108.63	1578.245	2767.67

Table 4.1 Split up details of hazardous waste of six districts

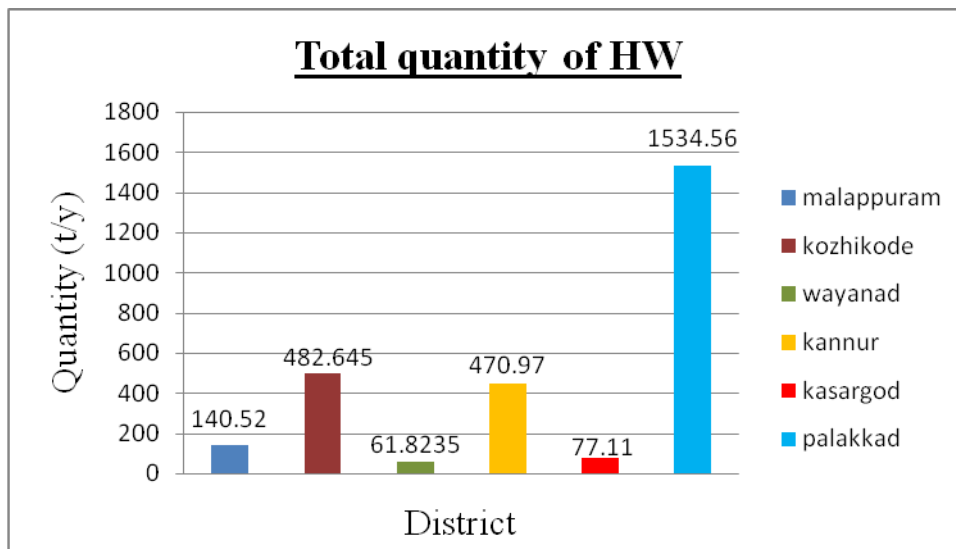


Figure 4.1 – Total quantity (t/y) of hazardous waste generated in six districts



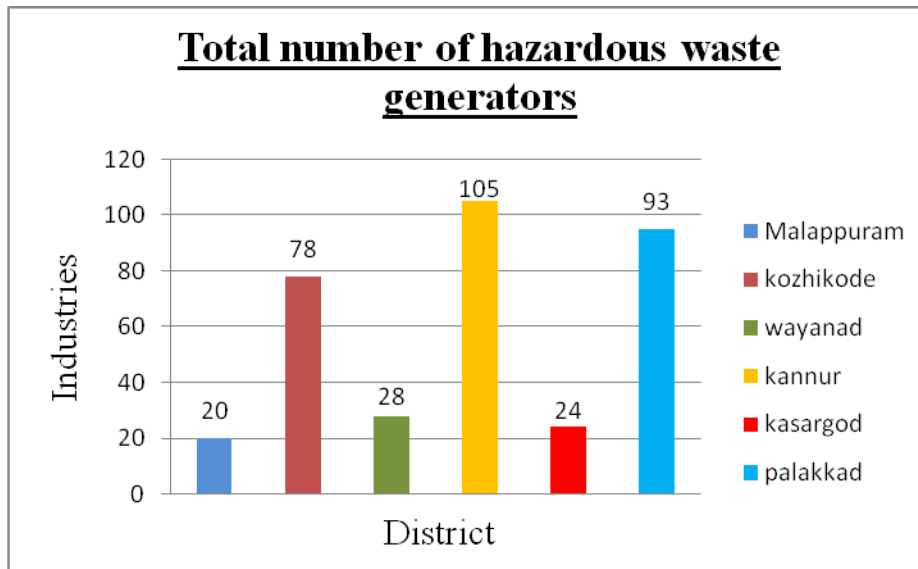


Figure 4.2 –Number of industries identified in the inventory as hazardous waste generating in six districts.

#### 4.1 Hazardous waste inventory of Kannur district

Kannur, one of the districts of Kerala, was formed in 1957. The geographical area of the district is 2,996 sq. km. The total population of Kannur is 2,412,365 as per the census report of 2011, with a population density of 813 persons per sq km.

The district has many medium and small scale industries and the main ones are the dyeing units of cotton and handloom and the ply wood manufacturing. 105 industries were indentified in the inventory. Total of 470.97 t/y of hazardous wastes are produced yearly in the district. In this 227.91 t are landfillable, 238.06 t are recyclable and 5.00 t are incinerable type wastes.

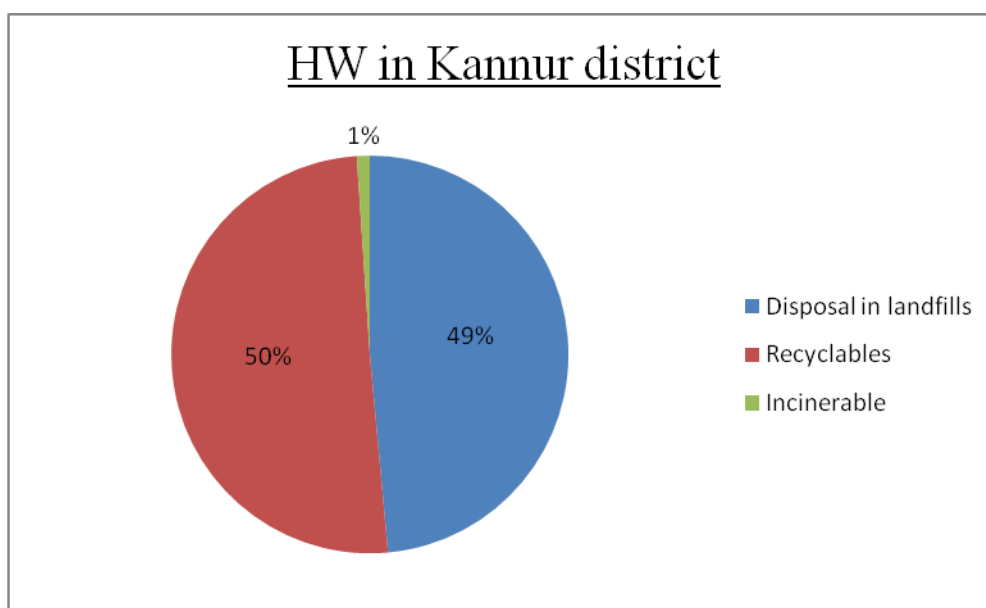


Figure 4.3 – Percentage proportion of landfillable, recyclable and incinerable hazardous waste generated in Kannur district.

## 4.2. Hazardous waste inventory of Kasargode district

Kasargode, one of the districts of Kerala, was formed in 1984 and the last district to be formed in the state. The geographical area of the district is 1,992 sq. km. The total population of Kasargode is 1.307 million as per the census report of 2011, with a population density of 654 inhabitants per square kilometre.

The predominant types of industries are the small scale ones. 24 industries were indentified in the inventory. Total 77.11 t/y of hazardous wastes are produced yearly in the district. In this 0.78 are landfillable, remaining 76.33 t are recyclable.

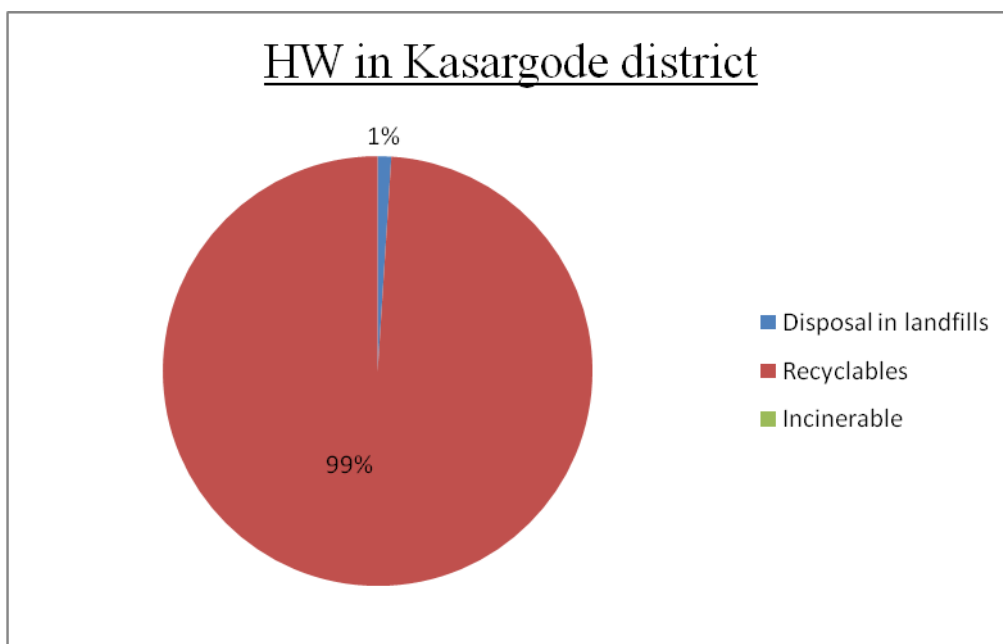


Figure 4.4 – Percentage proportion of landfillable, recyclable hazardous waste generated in Kasargode district.

## 4.3 Hazardous waste inventory of Kozhikode district

Kozhikode, one of the districts of Kerala, was formed in 1957. The geographical area of the district is 2344 sq. km. The total population of Kozhikode is 550,440 as per the census report of 2011 with a population density of 3,410/sq mi.

The industries of Kozhikode district are predominantly small scale. 78 industries were indentified in the inventory. Total 482.643 t/y of hazardous wastes are produced yearly in the district. In this 41.985 t are landfillable, 439.56 t are recyclable and 1.1 t are incinerable wastes.

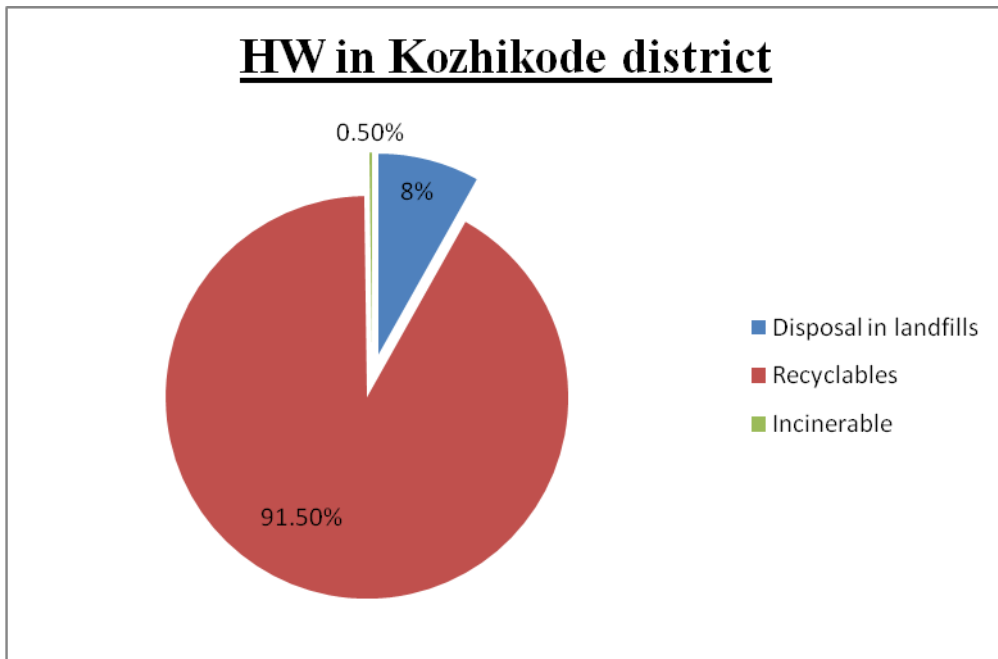


Figure 4.5 – Percentage proportion of landfillable, recyclable and incinerable hazardous waste generated in Kozhikode district.

#### 4.4 Hazardous waste inventory of Malappuram district

Malappuram, one of the districts of Kerala, was formed in 1969. The geographical area of the district is 3,550 sq. km. It is the third largest district of Kerala, as it occupies 9.13 per cent of the total area of the state. The total population of Malappuram is 36,29,640 as per the census report of 2001. and an area of 3550 km<sup>2</sup>, with a population density of 1,022 persons per km<sup>2</sup>.

In Malappuram district main source of hazardous wastes are vehicle services centers. There are 19 such industries already identified. The total hazardous waste generating industries are 20 nos. Total 140.52 tons of hazardous wastes are produced yearly in the district. In this 31 t are landfillable, 109.17 t are recyclable and remaining 0.38 t are incinerable wastes.

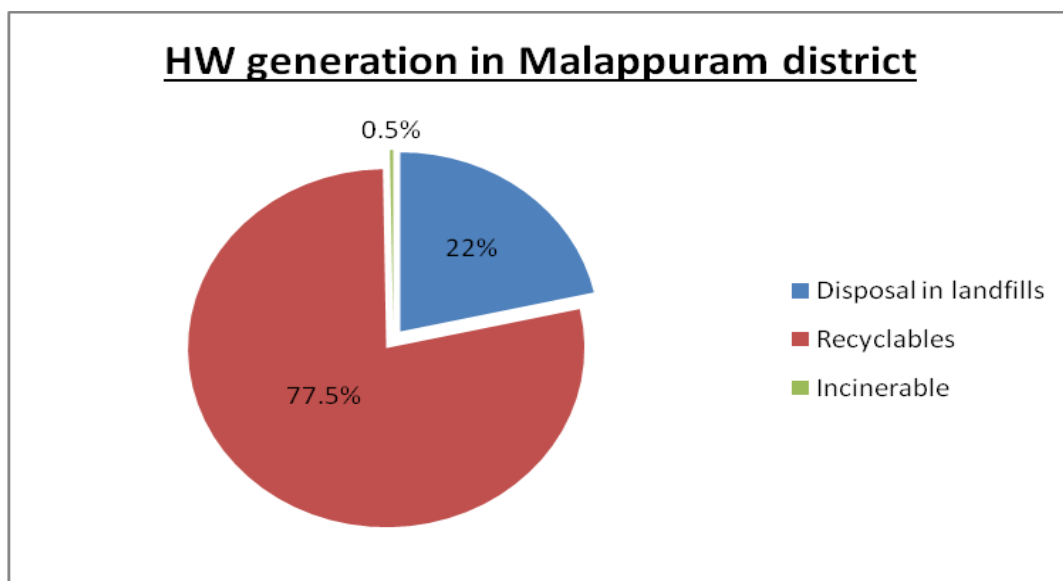


Figure 4.6 – Percentage proportion of landfillable, recyclable and incinerable hazardous waste generated in Malappuram district

#### 4.5 Hazardous waste inventory of Palakkad district

Palakkad, one of the districts of Kerala, was formed in 1957. The geographical area of the district is 4,480 sq. km. It is the largest district of Kerala, as it occupies 11.5 per cent of the total area of the state. The total population of Palakkad is 2,810,892 as per the census report of 2011. , with a population density of 1620 persons per sqmi.

Palakkad district has the second largest industrial belt in the state of Kerala. The dominant industries are the secondary steel manufacturing units recycling the mild steel scrap. The only cement manufacturing plant of the state a public undertaking Malabar Cements Ltd is also situated in the district. There are also some large and medium scale industries involved in dyeing, soft drinks and beverage manufacturing, engineering units which contribute much to the hazardous waste generation. 93 industries were indentified in the inventory. Total of 1534.56 tons of hazardous wastes are produced yearly in the district. In this 778.11 are landfillable, 654.30 t are recyclable and remaining 102.15t are incinerable wastes.

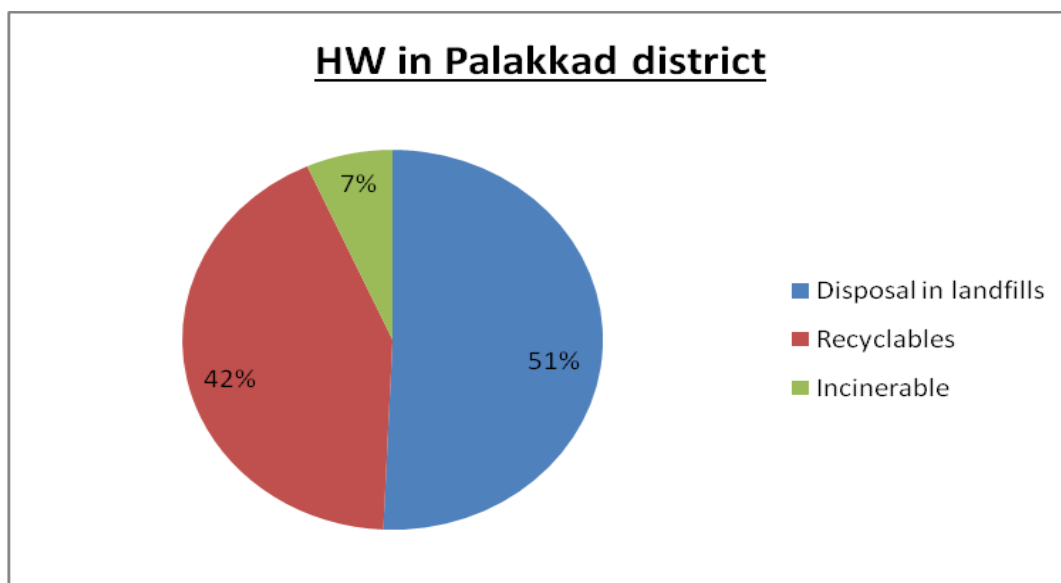


Figure 4.7 – Percentage proportion of landfillable, recyclable and incinerable hazardous waste generated in Palakkad district

#### 4.6 Hazardous waste inventory of Wayand

Wayanad, one of the districts of Kerala, was formed in 1980. The geographical area of the district is 2131 sq. km. The total population of Wayanad is 816558 as per the census report of 2011, with a population density of 380persons per sq km.

The predominant type of industries is the small scale ones. 28 industries were identified in the inventory. Total 61.83 t/y of hazardous wastes are produced yearly in the district. In this 1 t are landfillable, remaining 60.83 t are recyclable

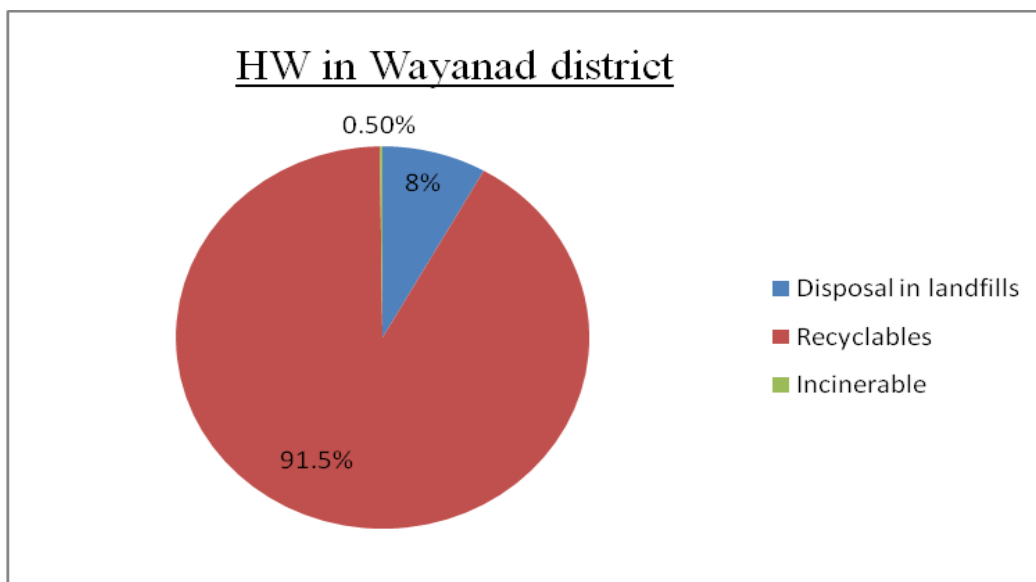


Figure 4.8 – Percentage proportion of landfillable and recyclable hazardous waste generated in Wayanad district

#### 4.7 Conclusion

The data collected from the 4 districts ie Kasargode, Kozhikode, Malappuram and Wayanad shows that recyclable type waste are the most generated ones. The process stream which contributes mainly to this generation is the used oil/waste oil designated as 5.1 in Schedule 1 of Hazardous and Other Waste (Management and Transboundary Movement), Rules, 2016. In the case of Kannur district landfillable waste are also generated in more or less equal proportions as that of recyclable wastes. However in Palakkad district it is the landfillable waste which is generated more than that of recyclables. The quantity of incinerable type of waste generated in the district seems to be very less. The data collected pertains to the production of industries in the year 2015 -2016 and the data from the informal sector are also not included.

**Annexure 1****SCHEDULE I****List of processes generating hazardous wastes**

<b>S.No.</b>	<b>Processes</b>	<b>Hazardous Waste</b>
1	Petrochemical processes and pyrolytic operations	1.1 Furnace or reactor residue and debris 1.2 Tarry residues and still bottoms from distillation 1.3 Oily sludge emulsion 1.4 Organic residues 1.5 Residues from alkali wash of fuels 1.6 Spent catalyst and molecular sieves 1.7 Oil from wastewater treatment
2.	Crude oil and natural gas production	2.1 Drill cuttings excluding those from water based mud 2.2 Sludge containing oil 2.3 Drilling mud containing oil
3.	Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1 cargo residue, washing water and sludge containing oil 3.2 cargo residue and sludge containing chemicals 3.3 Sludge and filters contaminated with oil 3.4 Ballast water containing oil from ships
4	Petroleum refining or reprocessing	

	of used oil or recycling of waste oil	4.1 Oil sludge or emulsion 4.2 Spent catalyst 4.3 Slop oil 4.4 Organic residue from processes 4.5 Spent clay containing oil
<b>5</b>	Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1 Used or spent oil 5.2 Wastes or residues containing oil 5.3 Waste cutting oils
<b>6</b>	Secondary production and / or industrial use of zinc	6.1 Sludge and filter press cake arising out of production of Zinc Sulphate and other Zinc Compounds. 6.2 Zinc fines or dust or ash or skimmings in dispersible form 6.3 Other residues from processing of zinc ash or skimmings 6.4 Flue gas dust and other particulates
<b>7</b>	Primary production of zinc or lead or copper and other non-ferrous metals except aluminium	7.1 Flue gas dust from roasting 7.2 Process residues 7.3 Arsenic-bearing sludge 7.4 Non-ferrous metal bearing sludge and residue. 7.5 Sludge from scrubbers
<b>8</b>	Secondary production of copper	8.1 Spent electrolytic solutions

		<p>8.2 Sludge and filter cakes</p> <p>8.3 Flue gas dust and other particulates</p>
<b>9</b>	Secondary production of lead	<p>9.1 Lead bearing residues</p> <p>9.2 Lead ash or particulate from flue gas</p> <p>9.3 Acid from used batteries</p>
<b>10</b>	Production and/or industrial use of cadmium and arsenic and their compounds	<p>10.1 Residues containing cadmium and arsenic</p>
<b>11</b>	Production of primary and secondary aluminum	<p>11.1 Sludges from off-gas treatment</p> <p>11.2 Cathode residues including pot lining wastes</p> <p>11.3 Tar containing wastes</p> <p>11.4 Flue gas dust and other particulates</p> <p>11.5 Drosses and waste from treatment of salt sludge</p> <p>11.6 Used anode butts</p> <p>11.7 Vanadium sludge from alumina refineries</p>



<p><b>12</b></p>	<p>Metal surface treatment, such as etching, staining, polishing, galvanizing, cleaning, degreasing, plating, etc.</p>	<p>12.1 Acidic and alkaline residues</p> <p>12.2 Spent acid and alkali</p> <p>12.3 Spent bath and sludge containing sulphide, cyanide and toxic metals</p> <p>12.4 Sludge from bath containing organic solvents</p> <p>12.5 Phosphate sludge</p> <p>12.6 Sludge from staining bath</p> <p>12.7 Copper etching residues</p> <p>12.8 Plating metal sludge</p>
<p><b>13</b></p>	<p>Production of iron and steel including other ferrous alloys (electric furnace; steel rolling and finishing mills; Coke oven and by products plant)</p>	<p>13.1 Spent pickling liquor</p> <p>13.2 Sludge from acid recovery unit</p> <p>13.3 Benzol acid sludge</p> <p>13.4 Decanter tank tar sludge</p> <p>13.5 Tar storage tank residue</p> <p>13.6 Residues from coke oven by product plant.</p>
<p><b>14</b></p>	<p>Hardening of steel</p>	<p>14.1 Cyanide-, nitrate-, or nitrite -containing sludge</p> <p>14.2 Spent hardening salt</p>
<p><b>15</b></p>	<p>Production of asbestos or</p>	

	asbestos-containing materials	<p>15.1 Asbestos-containing residues</p> <p>15.2 Discarded asbestos</p> <p>15.3 Dust or particulates from exhaust gas treatment.</p>
<b>16</b>	Production of caustic soda and chlorine	<p>16.1 Mercury bearing sludge generated from mercury cell process</p> <p>16.2 Residue or sludges and filter cakes</p> <p>16.3 Brine sludge</p>
<b>17</b>	Production of mineral acids	<p>17.1 Process acidic residue, filter cake, dust</p> <p>17.2 Spent catalyst</p>
<b>18</b>	Production of nitrogenous and complex fertilizers	<p>18.1 Spent catalyst</p> <p>18.2 Carbon residue</p> <p>18.3 Sludge or residue containing arsenic</p> <p>18.4 Chromium sludge from water cooling tower</p>
<b>19</b>	Production of phenol	<p>19.1 Residue or sludge containing phenol</p> <p>19.2 Spent catalyst</p>
<b>20</b>	Production and/or industrial use of	

	solvents	<p>20.1 Contaminated aromatic, aliphatic or naphthenic solvents may or may not be fit for reuse.</p> <p>20.2 Spent solvents</p> <p>20.3 Distillation residues</p> <p>20.4 Process Sludge</p>
21	Production and/or industrial use of paints, pigments, lacquers, varnishes and inks	<p>21.1 Process wastes, residues and sludges</p> <p>21.2 Spent solvent</p>
22.	Production of plastics	<p>22.1 Spent catalysts</p> <p>22.2 Process residues</p>
23	Production and /or industrial use of glues, organic cements,	<p>23.1 Wastes or residues (not made with vegetable or animal materials) adhesive and resins</p> <p>23.2 Spent solvents</p>
24.	Production of canvas and textiles	24.1 Chemical residues
25	Industrial production and	<p>25.1 Chemical residues</p> <p>25.2 Residues from wood alkali bath</p>

	formulation of wood preservatives	
26.	Production or industrial use of synthetic dyes, dye-intermediates and pigments	<p>26.1 Process waste sludge/residues containing acid, toxic metals, organic compounds</p> <p>26.2 Dust from air filtration system</p> <p>26.3 Spent acid</p> <p>26.4 Spent solvent</p> <p>26.5 Spent catalyst</p>
27.	Production of organic-silicone compound	27.1 Process residues
28.	Production/formulation of drugs/pharmaceutical and health care product	<p>28.1 Process Residue and wastes</p> <p>28.2 Spent catalyst</p> <p>28.3 Spent carbon</p> <p>28.4 Off specification products</p> <p>28.5 Date-expired products</p> <p>28.6 Spent solvents</p>
29	Production, and formulation of pesticides including stock-piles	<p>29.1 Process wastes or residues</p> <p>29.2 Sludge containing residual pesticides</p>

		<p>29.3 Date-expired and off-specification pesticides</p> <p>29.4 Spent solvents</p> <p>29.5 Spent catalysts</p> <p>29.6 Spent acids</p>
30.	Leather tanneries	30.1 Chromium bearing residue and sludge
31.	Electronic Industry	<p>31.1 Process residue and wastes</p> <p>31.2 Spent etching chemicals and solvents</p>
32.	Pulp and Paper Industry	<p>32.1 Spent chemicals</p> <p>32.2 Corrosive wastes arising from use of strong acid and bases</p> <p>32.3 Process sludge containing adsorbable organic halides(AOx)</p>
33.	Handling of hazardous chemicals and wastes	<p>33.1 Empty barrels/containers/liners contaminated with hazardous chemicals /wastes</p> <p>33.2 Contaminated cotton rags or other cleaning materials</p>

34	De -contamination of barrels / containers used for handling of hazardous wastes/chemicals	<p>34.1 Chemical-containing residue arising from decontamination.</p> <p>34.2 Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers</p>
35.	Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	<p>35.1 Exhaust Air or Gas cleaning residue</p> <p>35.2 Spent ion exchange resin containing toxic metals</p> <p>35.3 Chemical sludge from waste water treatment</p> <p>35.4 Oil and grease skimming</p> <p>35.5 Chromium sludge from cooling water</p>
36.	Purification process for organic	<p>36.1 Any process or distillation residue compounds/solvents</p> <p>36.2 Spent carbon or filter medium</p>
37.	Hazardous waste treatment processes, e.g. pre-processing, incineration and concentration	<p>37.1 Sludge from wet scrubbers</p> <p>37.2 Ash from incinerator and flue gas cleaning residue</p> <p>37.3 Concentration or evaporation residues</p>

38.	Chemical processing of Ores containing heavy metals such as Chromium, Manganese, Nickel, Cadmium etc.	38.1 Process residues 38.2 Spent acid

**\*The inclusion of wastes contained in this Schedule does not preclude the use of Schedule II to demonstrate that the waste is not hazardous. In case of dispute, the matter would be referred to the Technical Review Committee constituted by Ministry of Environment, Forest and Climate Change.**

**Note:** The high volume low effect wastes such as fly ash, Phosphogypsum, red mud, jarosite, Slags from pyrometallurgical operations, mine tailings and ore beneficiation rejects are excluded from the category of hazardous wastes. Separate guidelines on the management of these wastes shall be issued by Central Pollution Control Board.

**Annexure 2**  
**SCHEDULE 2**

**List of processes generating hazardous wastes**

**List of waste constituents with concentration limits**

**Class A:** Based on leachable concentration limits [Toxicity Characteristic Leaching Procedure (TCLP) or Soluble Threshold Limit Concentration (STLC)]

Class	Constituents	Concentration in mg/l
(1)	(2)	(3)
A1	Arsenic	5.0
A2	Barium	100.0
A3	Cadmium	1.0
A4	Chromium and/or Chromium (III) compounds	5.0
A5	Lead	5.0
A6	Manganese	10.0
A7	Mercury	0.2
A8	Selenium	1.0
A9	Silver	5.0
A10	Ammonia	50*
A11	Cyanide	20*
A12	Nitrate (as nitrate-nitrogen)	1000.0
A13	Sulphide (as H <sub>2</sub> S)	5.0
A14	1,1-Dichloroethylene	0.7
A15	1,2-Dichloroethane	0.5
A16	1,4-Dichlorobenzene	7.5
A17	2,4,5-Trichlorophenol	400.0
A18	2,4,6-Trichlorophenol	2.0
A19	2,4-Dinitrotoluene	0.13
A20	Benzene	0.5
A21	Benzo (a) Pyrene	0.001
A22	Bromodichloromethane	6.0
A23	Bromoform	10.0
A24	Carbon tetrachloride	0.5
A25	Chlorobenzene	100.0
A26	Chloroform	6.0
A27	Cresol (ortho+ meta+ para)	200.0
A28	Dibromochloromethane	10.0
A29	Hexachlorobenzene	0.13
A30	Hexachlorobutadiene	0.5
A31	Hexachloroethane	3.0
A32	Methyl ethyl ketone	200.0
A33	Naphthalene	5.0
A34	Nitrobenzene	2.0
A35	Pentachlorophenol	100.0
A36	Pyridine	5.0
A37	Tetrachloroethylene	0.7
A38	Trichloroethylene	0.5



(1)	(2)	(3)
A39	Vinyl chloride	0.2
A40	2,4,5-TP (Silvex)	1.0
A41	2,4-Dichlorophenoxyacetic acid	10.0
A42	Alachlor	2.0
A43	Alpha HCH	0.001
A44	Atrazine	0.2
A45	Beta HCH	0.004
A46	Butachlor	12.5
A47	Chlordane	0.03
A48	Chlorpyrifos	9.0
A49	Delta HCH	0.004
A50	Endosulfan (alpha+ beta+ sulphate)	0.04
A51	Endrin	0.02
A52	Ethion	0.3
A53	Heptachlor (& its Epoxide)	0.008
A54	Isoproturon	0.9
A55	Lindane	0.4
A56	Malathion	19
A57	Methoxychlor	10
A58	Methyl parathion	0.7
A59	Monocrotophos	0.1
A60	Phorate	0.2
A61	Toxaphene	0.5
A62	Antimony	15
A63	Beryllium	0.75
A64	Chromium (VI)	5.0
A65	Cobalt	80.0
A66	Copper	25.0
A67	Molybdenum	350
A68	Nickel	20.0
A69	Thallium	7.0
A70	Vanadium	24.0
A71	Zinc	250
A72	Fluoride	180.0
A73	Aldrin	0.14
A74	Dichlorodiphenyltrichloroethane (DDT), Dichlorodiphenyldichloroethylene (DDE), Dichlorodiphenyldichloroethane (DDD)	0.1
A75	Dieldrin	0.8
A76	Kepone	2.1
A77	Mirex	2.1
A78	Polychlorinated biphenyls	5.0
A79	Dioxin (2,3,7,8-TCDD)	0.001

Class B: Based on Total Threshold Limit Concentration (TLC)

Class	Constituent	Concentration in mg/kg
(1)	(2)	(3)
B1	Asbestos	10000
B2	Total Petroleum Hydrocarbons (TPH) (C5 - C36)	5,000

**Annexure 3**  
**SCHEDULE 3**

Part A

List of hazardous wastes applicable for import and export with Prior Informed Consent  
[Annexure VIII of the Basel Convention\*]

Basel No.	Description of Hazardous Wastes
(1)	(2)
A1	<b>Metal and Metal bearing wastes</b>
A1010	Metal wastes and waste consisting of alloys of any of the following but excluding such wastes specifically listed in Part B and Part D
	- Antimony
	- Cadmium
	- Lead
	- Tellurium
A1020	Waste having as constituents or contaminants, excluding metal wastes in massive form, any of the following:
	- Antimony, antimony compounds
	- Cadmium, cadmium compounds
	- Lead, lead compounds
	- Tellurium, tellurium compounds
A1040	Waste having metal carbonyls as constituents
A1050	Galvanic sludges
A1070	Leaching residues from zinc processing, dust and sludges such as jarosite, hematite, etc.
A1080	Waste zinc residues not included in Part B, containing lead and cadmium in concentrations sufficient to exhibit hazard characteristics indicated in Part C
A1090	Ashes from the incineration of insulated copper wire
A1100	Dusts and residues from gas cleaning systems of copper smelters
A1120	Waste sludges, excluding anode slimes, from electrolyte purification systems in copper electrorefining and electrowinning operations
A1140	Waste cupric chloride and copper cyanide catalysts not in liquid form note the related entry in Schedule VI
A1150	Precious metal ash from incineration of printed circuit boards not included in Part B
A1160	Waste lead acid batteries, whole or crushed
A1170	Unsorted waste batteries excluding mixtures of only Part B batteries. Waste batteries not specified in Part B containing constituents mentioned in Schedule II to an extent to render them hazardous
A2	<b>Wastes containing principally inorganic constituents, which may contain metals and organic materials</b>
A2010	Glass waste from cathode-ray tubes and other activated glasses
A2030	Waste catalysts but excluding such wastes specified in Part B
A3	<b>Wastes containing principally organic constituents, which may contain metals and inorganic materials</b>
A3010	Waste from the production or processing of petroleum coke and bitumen
A3020	Waste mineral oils unfit for their originally intended use
A3050	Wastes from production, formulation and use of resins, latex, plasticizers, glues or adhesives excluding such wastes specified in Part B (B4020)
A3120	Fluff-light fraction from shredding

(1)	(2)
A3130	Waste organic phosphorus compounds
<b>A4</b>	<b>Wastes which may contain either inorganic or organic constituents</b>
A4010	Wastes from the production, preparation and use of pharmaceutical products but excluding such waste specified in Part B
A4040	Wastes from the manufacture, formulation and use of wood-preserving chemicals (does not include wood treated with wood preserving chemicals)
A4070	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish excluding those specified in Part B (B4010)
A4100	Wastes from industrial pollution control devices for cleaning of industrial off-gases but excluding such wastes specified in Part B
A4120	Wastes that contain, consist of or are contaminated with peroxides.
A4130	Waste packages and containers containing Schedule II constituents in concentration sufficient to exhibit Part C of Schedule III hazard characteristics.
A4140	Waste consisting of or containing off specification or outdated chemicals (unused within the period recommended by the manufacturer) corresponding to constituents mentioned in Schedule II and exhibiting Part C of Schedule III hazard characteristics.
A4160	Spent activated carbon not included in Part B, B2060

\*This List is based on Annexure VIII of the Basel Convention on Transboundary Movement of Hazardous Wastes and comprises of wastes characterized as hazardous under Article I, paragraph 1(a) of the Convention. Inclusion of wastes on this list does not preclude the use of hazard.

Characteristics given in Annexure VIII of the Basel Convention (Part C of this Schedule) to demonstrate that the wastes are not hazardous. Hazardous wastes in Part-A are restricted and cannot be allowed to be imported without permission from the Ministry of Environment, Forest and Climate Change and the Directorate General of Foreign Trade license, if applicable.

#### Part B

List of other wastes applicable for import and export and not requiring Prior Informed Consent [Annex IX of the Basel Convention\*]

Basel No.	Description of wastes
(1)	(2)
<b>B1</b>	<b>Metal and metal-bearing wastes</b>
B1010	Metal and metal-alloy wastes in metallic, non-dispersible form: <ul style="list-style-type: none"> <li>- Thorium scrap</li> <li>- Rare earths scrap</li> </ul>
B1020	Clean, uncontaminated metal scrap, including alloys, in bulk finished form (sheet, plates, beams, rods, etc.), of: <ul style="list-style-type: none"> <li>- Antimony scrap</li> <li>- Beryllium scrap</li> <li>- Cadmium scrap</li> <li>- Lead scrap (excluding lead acid batteries)</li> <li>- Selenium scrap</li> <li>- Tellurium scrap</li> </ul>
B1030	Refractory metals containing residues

(1)	(2)
B1031	Molybdenum, tungsten, titanium, tantalum, niobium and rhenium metal and metal alloy wastes in metallic dispersible form (metal powder), excluding such wastes as specified in Part A under entry A1050, Galvanic sludges
B1040	Scrap assemblies from electrical power generation not contaminated with lubricating oil, PCB or PCT to an extent to render them hazardous
B1050	Mixed non-ferrous metal, heavy fraction scrap, containing cadmium, antimony, lead & tellurium mentioned in Schedule II in concentrations sufficient to exhibit Part C characteristics
B1060	Waste selenium and tellurium in metallic elemental form including powder
B1070	Waste of copper and copper alloys in dispersible form, unless they contain any of the constituents mentioned in Schedule II to an extent that they exhibit Part C characteristics
B1080	Zinc ash and residues including zinc alloys residues in dispersible form unless they contain any of the constituents mentioned in Schedule II in concentration such as to exhibit Part C characteristics
B1090	Waste batteries conforming to a standard battery specification, excluding those made with lead, cadmium or mercury
B1100	<p>Metal bearing wastes arising from melting, smelting and refining of metals:</p> <ul style="list-style-type: none"> <li>- Slags from copper processing for further processing or refining containing arsenic, lead or cadmium</li> <li>- Slags from precious metals processing for further refining</li> <li>- Wastes of refractory linings, including crucibles, originating from copper smelting</li> <li>- Tantalum-bearing tin slags with less than 0.5% tin</li> </ul>
B1110	<p>Used Electrical and electronic assemblies other than those listed in Part D of Schedule III</p> <p>Electronic assemblies consisting only of metals or alloys</p> <p>Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing components such as accumulators and other batteries included in Part A of Schedule III, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or not contaminated with Schedule II constituents such as cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Part C of Schedule III (note the related entry in Schedule VI, A1180)</p>
B1120	<p>Spent catalysts excluding liquids used as catalysts, containing any of:</p> <p>Transition metals, excluding waste catalysts (spent catalysts, liquid used catalysts or other catalysts) in Part A and Schedule VI:</p> <ul style="list-style-type: none"> <li>- Scandium</li> <li>- Vanadium</li> <li>- Manganese</li> <li>- Cobalt</li> <li>- Copper</li> <li>- Yttrium</li> <li>- Niobium</li> <li>- Hafnium</li> <li>- Titanium</li> <li>- Chromium</li> <li>- Iron</li> <li>- Nickel</li> <li>- Zinc</li> <li>- Zirconium</li> <li>- Molybdenum</li> <li>- Tantalum</li> </ul>

(1)	(2)
	<ul style="list-style-type: none"> <li>- Tungsten - Rhenium</li> </ul> Lanthanides (rare earth metals): <ul style="list-style-type: none"> <li>- Lanthanum - Cerium</li> </ul>
	<ul style="list-style-type: none"> <li>- Praseodymium - Neodymium</li> <li>- Samarium - Europium</li> <li>- Gadolinium - Terbium</li> <li>- Dysprosium - Holmium</li> <li>- Erbium - Thulium</li> <li>- Ytterbium - Lutetium</li> </ul>
B1130	Cleaned spent precious metal bearing catalysts
B1140	Precious metal bearing residues in solid form which contain traces of inorganic cyanides
B1150	Precious metals and alloy wastes (gold, silver, the platinum group but not mercury) in a dispersible form, non-liquid form with appropriate packaging and labelling
B1160	Precious metal ash from the incineration of printed circuit boards (note the related entry in Part A A1150)
B1170	Precious metal ash from the incineration of photographic film
B1180	Waste photographic film containing silver halides and metallic silver
B1190	Waste photographic paper containing silver halides and metallic silver
B1200	Granulated slag arising from the manufacture of iron and steel
B1210	Slag arising from the manufacture of iron and steel including slags as a source of titanium dioxide and vanadium
B1220	Slag from zinc production, chemically stabilised, having a high iron content (above 20%) and processed according to industrial specifications mainly for construction
B1230	Mill scale arising from the manufacture of iron and steel
B1240	Copper oxide mill-scale
B2	Wastes containing principally inorganic constituents, which may contain metals and organic materials
B2010	Wastes from mining operations in non-dispersible form: <ul style="list-style-type: none"> <li>- Natural graphite waste</li> <li>- Slate wastes</li> <li>- Mica wastes</li> <li>- Leucite, nepheline and nepheline syenite waste</li> <li>- Feldspar waste</li> <li>- Fluorspar waste</li> <li>- Silica wastes in solid form excluding those used in foundry operations</li> </ul>
B2020	Glass wastes in non-dispersible form: <ul style="list-style-type: none"> <li>- Cullet and other waste and scrap of glass except for glass from cathode-ray tubes and other activated glasses</li> </ul>
B2030	Ceramic wastes in non-dispersible form: <ul style="list-style-type: none"> <li>- Cement wastes and scrap (metal ceramic composites)</li> <li>- Ceramic based fibres</li> </ul>
B2040	Other wastes containing principally inorganic constituents: <ul style="list-style-type: none"> <li>- Partially refined calcium sulphate produced from flue gas desulphurization (FGD)</li> <li>- Waste gypsum wallboard or plasterboard arising from the demolition of buildings</li> </ul>



(1)	(2)
	<ul style="list-style-type: none"> <li>- Slag from copper production, chemically stabilized, having a high iron content (above 20%) and processed according to industrial specifications mainly for construction and abrasive applications</li> <li>- Sulphur in solid form</li> <li>- Limestone from production of calcium cyanamide (pH&lt;9)</li> <li>- Sodium, potassium, calcium chlorides</li> <li>- Carborundum (silicon carbide)</li> <li>- Broken concrete</li> <li>- Lithium-tantalum and lithium-niobium containing glass scraps</li> </ul>
B2060	Spent activated carbon not containing any of Schedule II constituents to the extent they exhibit Part C characteristics, for example, carbon resulting from the treatment of potable water and processes of the food industry and vitamin production (note the related entry in Part A. A4160)
B2070	Calcium fluoride sludge
B2080	Waste gypsum arising from chemical industry processes not included in Schedule VI (note the related entry in A2040)
B2090	Waste anode butts from steel or aluminium production made of petroleum coke or bitumen and cleaned to normal industry specifications (excluding anode butts from chlor alkali electrolyses and from metallurgical industry)
B2100	Waste hydrates of aluminium and waste alumina and residues from alumina production, excluding such materials used for gas cleaning, flocculation or filtration processes
B2130	Bituminous material (asphalt waste) from road construction and maintenance, not containing tar (note the related entry in Schedule VI, A3200)
B3	<b>Wastes containing principally organic constituents, which may contain metals and inorganic materials</b>
B3027	Self-adhesive label laminate waste containing raw materials used in label material production
B3030	<p>Textile wastes</p> <p>The following materials, provided they are not mixed with other wastes and are prepared to a specification:</p> <ul style="list-style-type: none"> <li>- Silk waste (including cocoons unsuitable for reeling, yarn waste and garmetted stock) <ul style="list-style-type: none"> <li>• not carded or combed</li> <li>• other</li> </ul> </li> <li>- Waste of wool or of fine or coarse animal hair, including yarn waste but excluding garmetted stock <ul style="list-style-type: none"> <li>• rolls of wool or of fine animal hair</li> <li>• other waste of wool or of fine animal hair</li> <li>• waste of coarse animal hair</li> </ul> </li> <li>- Cotton waste (including yarn waste and garmetted stock) <ul style="list-style-type: none"> <li>• yarn waste (including thread waste)</li> <li>• garmetted stock</li> <li>• other</li> </ul> </li> <li>- Flax tow and waste</li> <li>- Tow and waste (including yarn waste and garmetted stock) of true hemp (<i>Cannabis sativa</i> L.)</li> <li>- Tow and waste (including yarn waste and garmetted stock) of jute and other textile bast fibres (excluding flax, true hemp and ramie)</li> <li>- Tow and waste (including yarn waste and garmetted stock) of sisal</li> </ul>

(1)	(2)
	<p>and other textile fibres of the genus Agave</p> <ul style="list-style-type: none"> <li>- Tow, noils and waste (Including yarn waste and garneted stock) of coconut</li> <li>- Tow, noils and waste (Including yarn waste and garneted stock) of abaca (Manila hemp or Musa textilis Nee)</li> <li>- Tow, noils and waste (Including yarn waste and garneted stock) of ramie and other vegetable textile fibres, not elsewhere specified or included</li> <li>- Waste (Including noils, yarn waste and garneted stock) of man-made fibres <ul style="list-style-type: none"> <li>• of synthetic fibres</li> <li>• of artificial fibres</li> </ul> </li> <li>- Worn clothing and other worn textile articles</li> <li>- Used rags, scrap twine, cordage, rope and cables and worn out articles of twine, cordage, rope or cables of textile materials <ul style="list-style-type: none"> <li>• sorted</li> <li>• other</li> </ul> </li> </ul>
B3035	Waste textile floor coverings, carpets
B3040	<p>Rubber Wastes</p> <p>The following materials, provided they are not mixed with other wastes:</p> <ul style="list-style-type: none"> <li>- Waste and scrap of hard rubber (e.g., ebonite)</li> <li>- Other rubber wastes (excluding such wastes specified elsewhere)</li> </ul>
B3050	<p>Untreated cork and wood waste:</p> <ul style="list-style-type: none"> <li>- Wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms</li> <li>- Cork waste: crushed, granulated or ground cork</li> </ul>
B3060	<p>Wastes arising from agro-food industries provided it is not infectious:</p> <ul style="list-style-type: none"> <li>- Wine lees</li> <li>- Dried and sterilized vegetable waste, residues and by-products, whether or not in the form of pellets, of a kind used in animal feeding, not elsewhere specified or included</li> <li>- Degras: residues resulting from the treatment of fatty substances or animal or vegetable waxes</li> <li>- Waste of bones and horn-cores, unworked, defatted, simply prepared (but not cut to shape), treated with acid or degelatinised</li> <li>- Fish waste</li> <li>- Cocoa shells, husks, skins and other cocoa waste</li> <li>- Other wastes from the agro-food industry excluding by-products which meet national and international requirements and standards for human or animal consumption</li> </ul>
B3070	<p>The following wastes:</p> <ul style="list-style-type: none"> <li>- Waste of human hair</li> <li>- Waste straw</li> <li>- Deactivated fungus mycellum from penicillin production to be used as animal feed</li> </ul>
B3080	Waste parings and scrap of rubber
B3090	<p>Paring and other wastes of leather or of composition leather not suitable for the manufacture of leather articles, excluding leather sludges, not containing hexavalent chromium compounds and biocides (note the related entry in Schedule VI, A3100)</p>

(1)	(2)
B3100	Leather dust, ash, sludges or flours not containing hexavalent chromium compounds or biocides (note the related entry in Schedule VI, A3090)
B3110	Fellmongery wastes not containing hexavalent chromium compounds or biocides or infectious substances (note the related entry in Schedule VI, A3110)
B3120	Wastes consisting of food dyes
B3130	Waste polymer ethers and waste non-hazardous monomer ethers incapable of forming peroxides
B3140	Waste pneumatic and other tyres, excluding those which do not lead to resource recovery, recycling, reclamation but not for direct reuse
B4	Wastes which may contain either inorganic or organic constituents
B4010	Wastes consisting mainly of water-based or latex paints, inks and hardened varnishes not containing organic solvents, heavy metals or biocides to an extent to render them hazardous (note the related entry in Part A, A4070)
B4020	Wastes from production, formulation and use of resins, latex, plasticizers, glues or adhesives, not listed in Part A, free of solvents and other contaminants to an extent that they do not exhibit Part C characteristics (note the related entry in Part A, A3050)
B4030	Used single-use cameras, with batteries not included in Part A

\* This list is based on Annexure IX of the Basel Convention on Transboundary Movement of Hazardous Wastes and comprises of wastes not characterized as hazardous under Article-I of the Basel Convention. The wastes in Part- B are restricted and cannot be allowed to be imported without permission from the Ministry of Environment, Forest and Climate Change and the Directorate General of Foreign Trade license, if applicable.

**Note:**

- (1) Copper dross containing copper greater than 65% and lead and Cadmium equal to or less than 1.25% and 0.1% respectively; spent cleaned metal catalyst containing copper; and copper reverts, cake and residues containing lead and cadmium equal to or less than 1.25% and 0.1% respectively are allowed for import without Director General of Foreign Trade license to units (actual users) authorized by State Pollution Control Board and with the Ministry of Environment, Forest and Climate Change's permission. Copper reverts, cake and residues containing lead and cadmium greater than 1.25% and 0.1% respectively are under restricted category for which import is permitted only against Director General of Foreign Trade license for the purpose of processing or reuse by units permitted with the Ministry of Environment, Forest and Climate Change (actual users).
- (2) Zinc ash or skimmings in dispersible form containing zinc more than 65% and lead and cadmium equal to or less than 1.25% and 0.1% respectively and spent cleaned metal catalyst containing zinc are allowed for import without Director General of Foreign Trade license to units authorized by State Pollution control Board, Ministry of Environment, Forest and Climate Change's permission (actual users) upto an annual quantity limit indicated in registration letter. Zinc ash and skimmings containing less than 65% zinc and lead and cadmium equal to or more than 1.25% and 0.1% respectively and hard zinc spelter and brass dross containing lead greater than 1.25% are under restricted category for which import is permitted against Director General of Foreign Trade license and only for purpose of processing or reuse by units registered with the Ministry of Environment Forest and Climate Change (actual users).



**Annexure 4**  
**SCHEDULE IV**  
**List of commonly recyclable hazardous wastes**

S.No.	Wastes
1.	Brass Dross
2.	Copper Dross
3.	Copper Oxide mill scale
4.	Copper reverts, cake and residue
5.	Waste Copper and copper alloys in dispersible form
6.	Slags from copper processing for further processing or refining
7.	Insulated Copper Wire Scrap or copper with PVC sheathing including ISRI-code material namely "Druid"
8.	Jelly filled Copper cables
9.	Spent cleared metal catalyst containing copper
10.	Spent catalyst containing nickel, cadmium, Zinc, copper, arsenic, vanadium and cobalt
11.	Zinc Dross-Hot dip Galvanizers SLAB
12.	Zinc Dross-Bottom Dross
13.	Zinc ash/Skimmings arising from galvanizing and die casting operations
14.	Zinc ash/Skimming/other zinc bearing wastes arising from smelting and refining
15.	Zinc ash and residues including zinc alloy residues in dispersible form
16.	Spent cleared metal catalyst containing zinc
17.	Used Lead acid battery including grid plates and other lead scrap/ashes/residues not covered under Batteries (Management and Handling) Rules, 2001. [Battery scrap, namely: Lead battery plates covered by ISRI, Code word "Rails" Battery lugs covered by ISRI, Code word "Rakes". Scrap drained/dry while intact, lead batteries covered by ISRI, Code word "rains".
18.	Components of waste electrical and electronic assemblies comprising

	accumulators and other batteries included in Part A of Schedule III, mercury switches, activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors, or any other component contaminated with Schedule II constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part C of Schedule III.
19.	Paint and ink Sludge/residues
20.	Used oil and waste oil

**Annexure 5 - Details of Hazardous Waste of Six Districts**

Sl. No.	District	Name and Address	Products (tonnes/day) or Activity	HW Generating Process as per Schedule 1	HW Generating stream as per schedule 1	HW Generating stream as per schedule 2	HW Generation in t/y as per Schedule 1	HW Generation in t/y as per Schedule 2	Total Quantity of HW in t/y	Disposal in landfills	Recyclables	Incinerable
1	Malappuram	A.M.Motors,Thurakkal, Bypass,Manjeri	Servicing & repairing of vehicles	5	5.1	0	3.84	0	3.84	0	3.84	0
2	Malappuram	A.M.Workshop,Tirur	Servicing & repairing of vehicles	5	5.1	0	14.4	0	14.4	0	14.4	0
3	Wayanad	APCO Automobiles, Variyad, Kalpeta	Servicing & repairing of vehicles	5	5.1	0	1.47	0	1.47	0	1.47	0
4	Wayanad	Autowill,Variyad, Near Quarter Bakery,Muttill	Servicing & repairing of vehicles	5	5.1	0	1.095	0	1.095	0	1.095	0
5	Wayanad	Apco Automobiles,Variyad,Kakkavayal,Vythiri	Servicing & repairing of vehicles	5	5.1	0	5.11	0	5.11	0	5.11	0
6	Malappuram	A.M.Honda,Angadippuram,Perinthalmanna	Servicing & repairing of vehicles	5	5.1	0	5	0	5	0	5	0
7	Kozhikode	Amanan Toyota,VPK Motors(P) Ltd.Kolathara,Cheruvannur Classic	servicing of vehicles	5	5.1	0	35.1	0	35.1	0	35.1	0
8	Wayanad	Hyundai,Variyad,Muttill,Vythiri	servicing of vehicles	5	5.1	0	1.095	0	1.095	0	1.095	0
9	Kannur	Dipin Fabrics, Azhikode, Kottarathumpara	Dyed Yarn	35	35.3	0	0.3	0	0.3	0.3	0	0
10	Kozhikode	Evolution High Tech,Opp.Bank of India,Thiruvannur	Repair,servicing and painting of vehicles	5	5.1	0	0.702	0	0.702	0	0.702	0
11	Wayanad	Falcon Motors,Vadochal,Karimbume I,Panamaram	Servicing & repairing of vehicles	5	5.1	0	0.1825	0	0.1825	0	0.1825	0
12	Wayanad	Friends Autogarrage,Pulppally	Servicing & repairing of vehicles	5	5.1	0	0.636	0	0.636	0	0.636	0
13	Wayanad	Friends Automobiles,Tharuvana,Mananthavady	Servicing & repairing of vehicles	5	5.1	0	0.365	0	0.365	0	0.365	0
14	Kozhikode	Flora Car Service, Industrial Estate, vadakar,Kozhikode	Servicing of Cars	5	5.1	0	0.34	0	0.34	0	0.34	0
15	Kozhikode	Focus Motors,Kolathara ,Kozhikode	Servicing and repairing of automobiles	5	5.1	0	0.522	0	0.522	0	0.522	0

16	Malappuram	German Motors, Angadippuram, Malappuram	Servicing of vehicles	5	5.1	0	0.12	0	0.12	0	0.12	0
17	Kannur	German Motors, Valapattanam, Kannur	Servicing of vehicles	5	5.1	0	3.65	0	3.65	0	3.65	0
18	Kozhikode	Hindustan Petroleum Corporation Ltd, Elathur, Kozhikode	Storage of petroleum products namely Motor spirit, HSD, Superior oil	3	3.3	0	4.5	0	4.5	0	4.5	0

19	Kannur	Hindustan Textiles, Alavil,Kannur	Dyed Yarn	35	35.3	0	19	0	19	19	0	0		
20	Wayanad	Hi-tech Maruthi Service Station,Mananthavady,Wayan ad	Servicing of Vehicles	5	5.1	0	3	0	3	0	3	0		
21	Kozhikode	Indian Oil Corporation Ltd,Mannarpadam,Feroke,Ko zhikode	Storage and distribution of petroleum products	3	3.3	0	2.7	0	2.7	0	2.7	0		
22	Malappuram	Indian Oil Corporation Ltd,Indane Bottling Plant,Chelari,Malappuram	Gas Bottling Plant	5	5.1	0	2.58	0	2.58	0	2.58	0		
23	Kannur	Bharath Petroleum Corporation Ltd.Kannur Depot.Thavakkara Road,Kannur	Storage of petroleum products	3	3.3	0	2.33	0	2.33	0	2.33	0		
24	Kozhikode	Indus Motors Co Pvt.Ltd, Vatakara,Karimpanappadam, Kozhikode	Servicing and repairing of vehicles	5	5.1	5.2	0	3.2	0.1	0	3.3	0	3.3	0
25	Wayanad	Index Maruthi Services, Pallimukku,Kaniyambetta,Wa yanad	Servicing and repairing of vehicles	5	5.1	0	1.095	0	1.095	0	1.095	0		
26	Kozhikode	Indus Motors Co Pvt.Ltd, Panikker Road Workshop, Vellayil,Kozhikode	Servicing and repair of vehicles	5	5.1	5.2	0	0.5	0.06	0	0.56	0	0.56	0
27	Kozhikode	Indus Motors Co.(P) Ltd,Kolathara,Nallalalm,Kozh ikode	Servicing of Automobiles	5	5.1	0	2.25	0	2.25	0	2.25	0		
28	Kozhikode	Indus Motors Co.(P) Ltd,Highway workshop, Koya road, Westhill,Kozhikode	Servicing of vehicles	5	5.1	0	1.62	0	1.62	0	1.62	0		
29	Malappuram	Indus Motors Company (P) Ltd, Kottakkal,Malappuram	Servicing of vehicles	5	5.1	0	2.4	0	2.4	0	2.4	0		
30	Wayanad	Indus Motors, Kakkavayal,Wayanad	Servicing of vehicles	5	5.1	0	4	0	4	0	4	0		
31	Kannur	J S textiles, Venganaparamba,Kannur	Handloom Cloth	35	35.3	0	0.6	0	0.6	0.6	0	0		
32	Wayanad	Jyothi Laboratories (P) Ltd, Kolagappara, Wayanad	Detergents	5	5.1	0	0.02	0	0.02	0	0.02	0		
33	Malappuram	K.S.R.T.C.Sub Depot, Ponnani	Servicing and Repairing of vehicles	5	5.1	0	34.8	0	34.8	0	34.8	0		
34	Malappuram	K.S.R.T.C.Depot, Nilambur,Malappuram	Servicing and Repairing of vehicles	5	5.1	0	0.36	0	0.36	0	0.36	0		
35	Malappuram	K.S.R.T.C.Depot, Perinthalmanna, Malappuram	Servicing and Repairing of vehicles	5	5.1	0	1.05	0	1.05	0	1.05	0		
36	Kozhikode	K T C Automobiles, Hyundai,YMCA Road, Kozhikode	Servicing of vehicles	5	5.1	0	9.9	0	9.9	0	9.9	0		

37	Kozhikode	K T C Motors,Y M C A Road,Kozhikode	Maintenance of vehicles including oil changing	5	5.1	0	4.8	0	4.8	0	4.8	0		
38	Kannur	Kalliasseri Weavers Industrial Co-Operative Society Ltd, Kalliassery,Kannur	Dyed Yarn	35	35.3	0	0.04	0	0.04	0.04	0	0		
39	Kannur	Kanhirode Weavers Co operative P & S Society Ltd, Kanhirode, Koodali,Kannur	Hand Woven cloth	35	35.3	0	0.2	0	0.2	0.2	0	0		
40	Kannur	Karivellur Weavers Co Operative P & S Society Ltd,Karivellur,Kannur	Handloom Cloth	35	35.3	0	0.02	0	0.02	0.02	0	0		
41	Kozhikode	Kerala Co operative Milk Marketing Federation Ltd. Peringalam, Kozhikode	pasteurised milk 336000, skimmed milk-2880	5	5.1	0	0.18	0	0.18	0	0.18	0		
42	Kannur	Kerala State Handloom Development Corporation Ltd,Handveev processing House,Chirakkal, Kannur	Yarn	35	35.3	0	24	0	24	24	0	0		
43	Kozhikode	KSRTC,District Transport officer,Mavoor Road, Kozhikode	Servicing of Vehicles	5	5.1	5.2	0	9 0.6	0	9.6	0	9.6	0	
44	Kozhikode	KSRTC,Regional workshop,Kozhikode	Servicing of Vehicles	5	5.1	5.3	0	2.2	0.2	0	2.4	0	2.4	0
45	Kozhikode	Kerala Transport Company,KTC Nagar,Meenchantha,Kozhikode	Servicing & repairing of vehicles	5	5.1	5.2	0	3.2 0.1	0	3.3	0	3	0	
46	Malappuram	KINS Automobile Engineering Works & Service Station,Muthukurissi,Elad, Malappuram	Servicing of Vehicles	5	5.1	0	0.2	0	0.2	0	0.2	0		
47	Kannur	Kishore Kumar Textiles, Azhikode,Kannur	Dyed Yarn-48	35	35.3	0	1.56	0	1.56	1.56	0	0		
48	Kannur	Koyenko Auto (Pvt) Ltd, HQ Hospital Road, Kannur	Vehicle servicing	5	5.1	0	6.48	0	6.48	0	6.48	0		
49	Kozhikode	Koyenko Expellers (Kerala) P.Ltd, Koyenko House, Westhill, Kozhikode	De-oiled cakes-60 T/d, coconut oil-6 T/d	5	5.1	0	2.835	0	2.835	0	2.835	0		
50	Wayanad	Keyyex Automobiles, Kambalakkad,Wayanad	Servicing of Vehicles	5	5.1	0	0.4	0	0.4	0	0.4	0		
51	Kozhikode	Kozhikode Diesel Power Project, Nallalam,Kozhikode	Electrical Energy-387.080 MU	3	5	3.1 5.1	0	239.526	47.097	0	286.623	0	286.623	0
52	Wayanad	KSRTC, Sulthan Bathery, Wayanad	Servicing of Vehicles	5	5.1	0	6	0	6	0	6	0		
53	Malappuram	KSRTC Bus Depot, Malappuram	Servicing of Vehicles	5	5.1	0	2.52	0	2.52	0	2.52	0		
54	Wayanad	KSRTC , Kalpetta,Wayanad	Servicing & repairing of vehicles	5	5.1	0	6	0	6	0	6	0		

55	Wayanad	KSRTC,Mananthavady, Wayanad	Servicing & repairing of vehicles	5	5.1	0	6	0	6	0	6	0
56	Malappuram	KVR Auto Cars Pvt.Ltd,Perinthalmanna, Malappuram	Servicing & repairing of vehicles	5	5.2	0	3.28	0	3.28	0	3.28	0
57	Kannur	Lakshmi Fabrics, Venkenparamba,Koodali,Kannur	Dyed yarn-129.6	35	35.3	0	90	0	90	90	0	0
58	Wayanad	Madeena Autogarrage, B Street,Mananthavady	Servicing of Vehicles	5	5.1	0	0.9	0	0.9	0	0.9	0
59	Kozhikode	Malabar Regional Co-op.Milk Producers Union Ltd, Naduvattom, Kozhikode	Peda and Ghee making	5	5.1	0	2.7	0	2.7	0	2.7	0
60	Kozhikode	Mannath Petroleum, Kumaraswami road, Narikkuni,Kozhikode	Servicing of Vehicles	5	5.1	0	0.3	0	0.3	0	0.3	0
61	Malappuram	Mardek R.K. Latex,Tanah,Vadappuram, Malappuram	Centrifuged latex	5	5.1 35.3	0	0.6 6	0	6.6	6	0.6	0
62	Kozhikode	Marikar Industries Automobiles Workshop,Mooriyad, Mankavu,Kozhikode	Servicing of Automobiles	5	5.1	0	1.45	0	1.45	0	1.45	0
63	Kozhikode	Marina Motors (India ) Pvt Ltd,Kodel,Nadakkavu, Pantheerankavu,Kozhikode	Servicing of Automobiles	5	5.1	0	0.78	0	0.78	0	0.78	0
64	Malappuram	Mark Motors,Angadippuram,Malappuram	Servicing of vehicles	5	5.1	0	2.52	0	2.52	0	2.52	0
65	Kannur	Mascot Industries,Kulapuram P.O,Vilayancode,Payyannur, Kannur	Handloom Cloth-4.25	35	35.3	0	0.3	0	0.3	0.3	0	0
66	Kannur	Mascot Industries, Azhikode,Kannur	Handloom Cloth-4.26	35	35.3	0	0.6	0	0.6	0.6	0	0
67	Kannur	Minaxi Weaving Mills (P)Ltd, Muttannur,Pattannur, Kannur	Handloom cloth	35	35.3	0	0.75	0	0.75	0.75	0	0
68	Wayanad	Motor Tech,Krishnagiri, Meenangadi, Wayanad	Servicing of Vehicles	5	5.1	0	2.4	0	2.4	0	2.4	0
69	Wayanad	Omega Auto House, Variad ,Muttil, Wayanad	Servicing and repairing of vehicles	5	5.1	0	3	0	3	0	3	0
70	Kannur	P.K.Handlooms ,N.H.road, Valapattanam,Kannur	Dyed yarn-15	35	35.3	0	0.15	0	0.15	0.15	0	0
71	Wayanad	PSN Automotive Marketing Ltd,calicut Road,Dhottappankulam,s.bathery,Wayanad	Servicing and repairing of vehicles	5	5.1	0	8.395	0	8.395	0	8.395	0
72	Wayanad	Promise Autogarrage,B street,Mananthavady	Servicing and repairing of vehicles	5	5.1	0	1.095	0	1.095	0	1.095	0

73	Kozhikode	Parrison Agortech Pvt Ltd, West hill,Kozhikode	Refined oil/vanaspathi-18250 Fatty Acid-18250 Acid oil- 912.5	35	35.3	0	2.7	0	2.7	2.7	0	0		
74	Kannur	Pioneer Auto & Engineering Works,Kannothumchal Road,Kannur	Vehicle servicing	5	5.1	0	2	0	2	0	2	0		
75	Kozhikode	Popular Vehicles & Services Ltd, Eswaravilasam Road, Govindapuram P.O, Kozhikode	Servicing of vehicles	5	5.1	5.2	0	4.32	1.05	0	5.37	0	5.37	0
76	Kannur	Popular Vehicles & Services Ltd, Mundayad Road,Chovva, Kannur	Vehicle servicing	5	5.1	0	7.2	0	7.2	0	7.2	0		
77	Malappuram	Popular Vehicles, Randathani,Kottakkal	Servicing & repairing of vehicles	5	5.1	0	7.3	0	7.3	0	7.3	0		
78	Kozhikode	Prabha Service station,Manassery,Mukkam, Kozhikode	Servicing & repairing of vehicles	5	5.1	0	0.3	0	0.3	0	0.3	0		
79	Kozhikode	PVS Automobiles,YMCA Cross road,Kozhikode	Servicing & repairing of vehicles	5	5.1	0	0.3	0	0.3	0	0.3	0		
80	Wayanad	RS Automobiles, Edappetty, N.Kalpetta,Vythy	Servicing & repairing of vehicles	5	5.1	0	0.42	0	0.42	0	0.42	0		
81	Kozhikode	R K Industries,Westhill, Industrial Estate, Kozhikode	manufacturing of distempers,enamels,primer,varn ish etc	21	21.1	0	0.1	0	0.1	0	0	0.1		
82	Kozhikode	Rajasree Ford, Golf Link Road, Chevarambalam, Kozhikode	Vehicle servicing	5	5.1	0	0.3	0	0.3	0	0.3	0		
83	Kannur	Ranjini Textiles, Azhikode, Kannur	Dyed Yarn-60	35	35.3	0	0.9	0	0.9	0.9	0	0		
84	Kannur	Safe Hands Automobiles, Eranholy,Thalassery, Kannur	Vehicle servicing	5	5.1	0	1.2	0	1.2	0	1.2	0		
85	Malappuram	Sakthi Automobiles,Moodal,Kuttipur am,Malappuram	servicing and repairing of vehicles	5	5.1	5.2	0	2	0.38	0	2.38	0	2	0.38
86	Kozhikode	Sakthi Automobiles, Meenchanda,Kozhikode	Servicing of Automobiles	5	5.1	0	8.1	0	8.1	0	8.1	0		
87	Wayanad	Sakthi Automobiles, Kakkavayal,Wayanad	servicing and repairing of vehicles	5	5.1	0	2.4	0	2.4	0	2.4	0		
88	Kannur	Sakthi Automobiles, Thottada,Kannur	Vehicle servicing	5	5.1	0	3	0	3	0	3	0		
89	Malappuram	Sakthi Automobiles, Thurakkal Jn, Manjery,Malappuram	servicing and repairing of vehicles	5	5.1	0	8.2	0	8.2	0	8.2	0		
90	Wayanad	Sheeja Auto Engineering Works, B Street, Mananthavady,Wayanad	servicing and repairing of vehicles	5	5.1	0	1.095	0	1.095	0	1.095	0		
91	Kannur	Saraswathy Weaving Factory, Azhikode,Kannur	Handloom cloth-54	35	35.3	0	1	0	1	1	0	0		



92	Kozhikode	Savo Polymers & Petro products (P)Ltd, Kallai,Peruvayal, Kozhikode	paraffin wax-1.27 t/d residue wax-0.73 t/d Industrial & Automobile lubricants/grease-4.5 t/d	5	5.1	0	1	0	1	0	1	0
93	Kannur	Siavadas textiles, Azhikode,Kannur	Dyed yarn-43.2	35	35.3	0	0.73	0	0.73	0.73	0	0
94	Kozhikode	Soorya Autogarage, Puramery, Nadapuram, Vatakara,Kozhikode	Servicing and repairing of vehicles	5	5.1	0	0.6	0	0.6	0	0.6	0
95	Kozhikode	Soorya Service station, Kunnummel,Kakkattil, Vadakra,Kozhikode	Servicing of Automobiles	5	5.1	0	0.016	0	0.016	0	0.016	0
96	Kannur	Sreekanda Weaving Works, Alavil P.O, Kannur	Handloom cloth	35	35.3	0	0.6	0	0.6	0.6	0	0
97	Wayanad	S S Autogarrage, B Street, Mananthavady	Servicing of Automobiles	5	5.1	0	0.25	0	0.25	0	0.25	0
98	Kannur	Swadeshi Cottage Industries, Azhikode,Aknnur	yarn-98 finished fabric-88	35	35.3	0	1.8	0	1.8	1.8	0	0
99	Kozhikode	SwarajPaint Industries Development Plot, Westhill,Kozhikode	Paints and varnishes	21	21.1	0	0.3	0	0.3	0	0	0.3
100	Kozhikode	Swastik Paints Industrial Estate, Westhill,Kozhikode	Distempers, enamels, primer, varnish etc	21	21.1	0	0.1	0	0.1	0	0	0.1
101	Malappuram	Synthite Industries, Kakkanchery, Malappuram	Oleoresin Ginger	35	35.3	0	24	0	24	24	0	0
102	Kozhikode	T.V.Sundaram Iyengar & Sons Ltd, Mavoora Road, Kozhikode	Vehicle servicing	5	5.1 5.2	0	5.4 0.6	0	6	0	5.4	0.6
103	Kozhikode	T.V.Sundaram Iyengar & Sons Ltd,Near Chungam,Feroke ,Kozhikode	Servicing of Automobiles	5	5.1	0	1.17	0	1.17	0	1.17	0
104	Kozhikode	T.V.Sundaram Iyengar & Sons Ltd, Golf Link Road, Chevayoor, Kozhikode	Servicing of Automobiles	5	5.1	0	14.4	0	14.4	0	14.4	0
105	Kannur	T.V.Sundaram Iyengar & Sons Ltd, Thottada, Kannur	Servicing repairing and maintenance of vehicles	5	5.1	0	205.2	0	205.2	0	205.2	0
106	Malappuram	T.V.Sundaram Iyengar & Sons Ltd, Manjeri Road, Valluvambaram, Malappuram	Servicing & repairing of vehicles	5	5.1	0	18	0	18	0	18	0
107	Wayanad	Tee Pee Motors, Sulthan Bathery, Wayanad	Servicing & Repairing of vehicles	5	5.1	0	1.5	0	1.5	0	1.5	0
108	Kozhikode	Thamarapally Rubber Co.Ltd, calicut Estate, Mukkom, Kozhikode	Cenex-117 skim crepe-15 E.B.C-46	35	35.3	0	18.25	0	18.25	18.25	0	0
109	Kozhikode	Thiruvambadi Rubber Co.Ltd, Thiruvambadi Estate, Mukkam, Kozhikode	cenex-350 crumb-100 skim crepe-60	35	35.3	0	19.3	0	19.3	19.3	0	0
110	Wayanad	Thomson Paper Pvt Ltd, Echom, Panamaram, Wayanad	Kraft Paper-1680	32	32.3	0	1	0	1	1	0	0

111	Kannur	Thrilokya Weaving Works, Azhikode, Kannur	Handloom cloth	35	35.3	0	0.05	0	0.05	0.05	0	0
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112	Kozhikode	T V Automobiles,Kannur road,Kozhikode	Maintenance of vehicles including oil changing	5	5.1	0	8.1	0	8.1	0	8.1	0
113	Wayanad	T.V.Sundaram Iyengar & Sons Ltd, Kakkavayal, Wayanad	Servicing of vehicles	5	5.1	0	2.4	0	2.4	0	2.4	0
114	Kannur	V.P.K.Motors Pvt Ltd, Near Edakkad Gramapanchayath, Thottada, Kannur	Servicing of vehicles	5	5.1	0	5	0	5	0	5	0
115	Wayanad	Victory Soaps and Cosmetics Pvt Ltd, KINFRA, Kalpeta, Wayanad	Soaps and detergents	5	5.1	0	0.5	0	0.5	0	0.5	0
116	Kannur	Vikas Textiles, Valapattanam, Kannur	Textile	35	35.3	0	0.364	0	0.364	0.364	0	0
117	Kannur	AFRA PLYWOODS, 1 D PLOT, ANDOOR, P.O. PARASSINIKADAVU, KANNUR 670563	Plywood	23	23.1	0	1	0	0	1	0	0
118	Kannur	C.R Textiles ,Kannur	Textile	35	35.3	0	3.88	0	0	3.88	0	0
119	Kannur	Cannanore Handlooms Exports , Kannur	Textile	35	35.3	0	5.51	0	0	5.51	0	0
120	Kannur	Great Indian Textiles (KHA:8)	Textile	35	35.3	0	0.086	0	0	0.086	0	0
121	Kannur	Green Gold Panels , Kannur	Industry	23	23.1	0	1.102	0	0	1.102	0	0
122	Kannur	Mina Wood Industries , Kannur	Wood industry	23	23.1	0	1.101	0	1.101	1.101	0	0
123	Kannur	Rabee- Wood Industries , Kannur	Wood industry	23	23.1	0	1.101	0	1.101	1.101	0	0
125	Kozhikode	Steel Industrials Kerala Limited	steel industry	12	12.6	0	0.335	0	0	0.335	0	0
126	Kannur	Steel Industrials, Azheekkal P.O,	Breaking of ship	3,5,15	3.3,5.1,15.1	0	5,2,,15	0	0	0.15	2	5
127	Kannur	Swadeshi Cottage Industries , Kannur	Industry	35	35.3	0	4.513	0	0	4.513	0	0
128	Kannur	Vasulal Textiles , Kannur	Textile	35	35.3	0	0.5	0	0	0.5	0	0
129	Kozhikode	ABT Maruthi, TP 8/669, Old Vini Theatre Building, Wayanad Road, Thamarassery, Kozhikode	Servicing of vehicles	5	5.1	0	0.18	0	0.18	0	0.18	0
130	Kozhikode	ABT Maruthi (A Division of ABT Ltd), Kalluthankadavu, Puthiyapalam Road, Puthiyara.P.O, Kozhikode	Servicing of vehicles	5	5.1	0	0.18	0	0.18	0	0.18	0
131	Kozhikode	A.K.Auto garage Nanminda (PO) Kozhikode-673612	Servicing of vehicles	5	5.1	0	0.24	0	0.24	0	0.24	0