

HAZARDOUS WASTE:-

Hazardous waste is defined as any substance (or) material that can have harmful effects on the health of people and the environment.

A waste may be considered as hazardous if it exhibits certain hazardous characteristics / properties (or) if it is included on a specific list of wastes EPA has determined.

List of hazardous characteristics

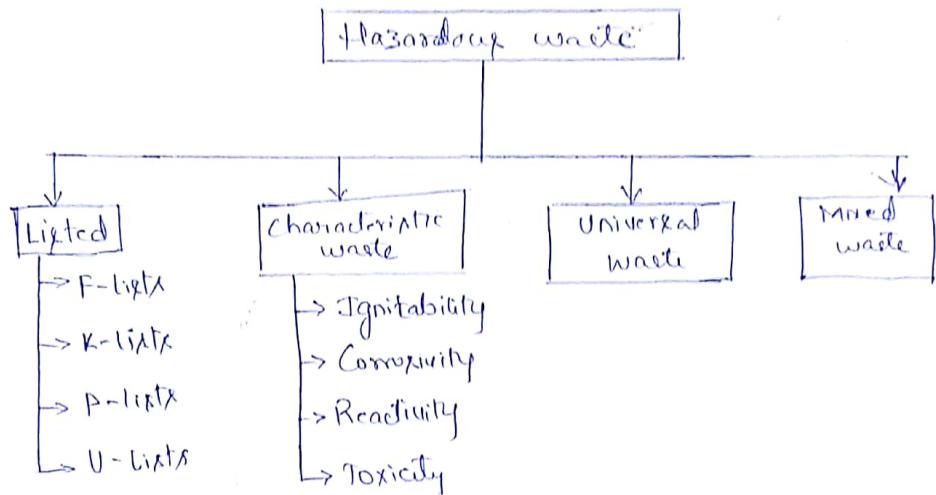
- * Explosive
- * flammable liquids / solids
- * Substances (or) wastes liable to spontaneous combustion
- * Substances (or) wastes which in contact with water emit flammable gases
- * oxidizing
- * Organic peroxides
- * poisons (acute)
- * Infectious substances
- * Corrosives
- * Liberation of toxic gases in contact with air (or) water etc.,

Classification of hazardous waste)

* Hazardous wastes often vary from one another. The EPA has identified four main categories in which hazardous wastes can be classified.

* With each categorization comes different risks and disposal methods. When left inappropriately treated (or) managed, these wastes can have very harmful effects on the environment.

The four identifiable classification are as follows



⇒ LISTED WASTE:-

When it comes to listed wastes, there are four ~~more~~ subtypes of ~~the~~ listed wastes.

a) F-list waste:-

→ This includes any waste that have a non-specific source, but are produced from manufacturing and industrial processes. Because they can be generated in various sectors of industry and manufacturing, their ultimate source becomes non-specific.

Ex: spent solvent wastes, wood preservative waste etc.,

b) K-list waste

→ This includes any waste that have specific industry source.

→ particular production and treatment processes generate certain types of wastewater and sludge that become distinguishable as hazardous waste.

Ex: pesticide manufacturing, petroleum refining etc.,

P-list and U-list waste

(*) P-list and U-list wastes are specific commercial chemical products that are disposed of but unused.

(*) To be considered as one of these wastes, they must meet certain criteria and be commercial grade formulations of specific unused chemicals.

The main difference between P and U-listed wastes is their level of risk. P listed waste ~~are~~ more toxic i.e., → P-list waste Even in small quantity can ~~cause~~ be harmful

Ex: Cyanides

→ U-list waste are less hazardous as compared to P-list

Ex: Acetone

2) characteristic waste:-

unlike listed wastes, these characteristic waste follow the identification process depending on the characteristics they display. Below are the four characteristics that are identified with wastes.

a) Ignitability (or) something flammable

A waste ~~is~~ is said to be Ignitable if it exhibits following ~~charact~~ properties

* liquids ~~or~~ solid which gives off a flammable vapour at Temperature less than 60°C

* If it is an oxidizer that yields oxygen readily to stimulate the combustion of organic matter.

b) Corrosivity (or) something that can rust (or) decompose

* If it is aqueous and pH less & and greater than 12.5

* liquid which corrodes steel at a greater than 6.35 mm per year at a test temperature of 55°C

If not aqueous, but when mixed with water produces aqueous solution of ~~not~~ above property

c) Reactivity (or) something Explosive

A material is said to be reactive if

- ↳ normally unstable and readily undergoes violent change
- ↳ If reacts violently with water & behaves like explosive
- ↳ When mixed with water produce toxic gases
- ↳ It is a forbidden explosive etc.)

d) Toxicity (or) Something Poisonous

Any waste that is fatally poisonous when ingested (or) absorbed.

A waste exhibits the characteristic of toxicity if

- ↳ It has acute oral LD₅₀ < 2,500 mg/kg
- ↳ It has acute dermal LD₅₀ < 4,300 mg/kg
- ↳ It has an acute inhalation LC₅₀ < 10,000 ppm q
- ↳ It has acute toxicity with 50% mortality within 96 hours for Zebra fish at a concentration of 500 mg/l.

3) Universal wastes:-

Also known as commonly generated, universal wastes are another classification for hazardous wastes. These type of wastes typically include bulbs, mercury-containing equipment, pesticides and batteries. There are a classification with these wastes listed below.

Class 1: Explosive

Class 2: @ Toxic gases

Class 3: Flammable Liquids

Class 4: Flammable Solids (or) Substances

Class 5: Oxidizing Substances and organic peroxide

Class 6: Toxic and infectious substances.

Class 7: Radioactive

Class 8: Corrosive Substances

Class 9: Miscellaneous Dangerous Substances.

4) Mixed wastes:-

Last mixed wastes are wastes that contain both hazardous as well as radioactive components. Because mixed wastes involve hazardous and radioactive materials, their treatment and disposal vary.

Guidelines for handling Hazardous waste management :-

- 1) The state Govt, occupier, operators of facility (or) any association of occupiers shall individually (or) jointly (or) severally be responsible for identification of sites for establishing the facility for treatment, storage and disposal of the hazardous and other waste in the state.
- 2) The operator of common facility (or) occupier of a captive facility, shall design and set up the treatment, storage and disposal facility as per Technical guidelines issued by CPCB in this regard from time to time and shall obtain approval from the SPCB for design and layout in this regard.
- 3) The SPCB shall monitor the setting up of and operation of common (or) captive treatment, storage and disposal facility regularly.
- 4) The operators of common facility (or) occupier captive facility shall be responsible for safe and environmentally sound operation of the facility and its closure and post closure phase, as per guidelines (or) standard operating procedures issued by CPCB from time to time.

- 5) The operator of common facility (a) occupier of a captive facility shall maintain records of hazardous and other waste handled by him in Form 3.
- 6) The operator of common facility (m) occupier of captive facility shall file an annual return in Form 4 to the SPCB on (or) before the 30th day of June following the financial year to which that return relates.

TREATMENT AND DISPOSAL of HAZARDOUS WASTE

Hazardous waste can be treated by

- * chemical method
- * Thermal method
- * Biological method
- * physical method

* chemical methods which can be adopted for hazardous treatment are

- a) ion Exchange
- b) Precipitation
- c) Oxidation
- d) Reduction and
- e) Neutralization

* Thermal methods is high temperature incineration which not only can detoxify certain organic wastes but also can destroy them. Some types of thermal equipment are used for burning in either solid, liquid (or) sludge form. These

- a) fluidized - bed incinerator

- b) multiple - batch furnace
- c) rotary kiln and
- d) liquid injection incinerator etc,

* Biological treatment of certain organic wastes, such as those from the petroleum industry, is also an option. One method used to treat hazardous waste biologically is called landfarming. In this technique the waste is carefully mixed with surface soil on a suitable tract of land. Microbes can metabolize the waste may be added, along with nutrients.

* Physical treatment means concentrating, solidifying (or) reducing the volume of the waste. physical process include

- a) Evaporation
- b) sedimentation
- c) flotation
- d) filtration and
- e) Encapsulation [concreting waste in concrete, asphalt (or) plastic etc)

* Encapsulation produces a solid mass of material that is resistant to leaching.

NOTE: The chemical, thermal and biological treatment methods outlined above change the molecular form of waste material, On the other hand physical treatment Concentrates, solidifies (or) reduces the volume of the waste.

~~Haz~~ Hazardous waste can disposed by

- a) incineration
- b) Land disposal
 - i) landfilling
 - ii) underground injection

a) Incineration:

* The use of incineration by burning the material in high furnace is a great way to destroy toxic waste. Incineration actually destroys and terminates most hazardous waste.

* All the flammable waste can be burned and used as energy source.

* The method of incineration released toxic gases which can affect the environment, but current technology has developed more effective incinerator units that limit the amount of emissions released in the sky.

b) Land disposal

Hazardous waste ~~is~~ that ~~cannot~~ be destroyed by incineration or other chemical process need to be disposed of properly. For most such wastes, land disposal is ultimate destination, although it ~~is~~ is not an

Two basic methods of land disposal include

- i) landfilling
- ii) underground injection.

(P.T.O)

Land filling

* Land filling of hazardous waste is regulated more strictly than land filling of municipal solid waste.
+ hazardous waste must be deposited in called secured landfill, which provide atleast 3m of separation between the bottom of the landfill and the underlying bedrock (or) groundwater table.

* A secured hazardous-waste landfill ~~must~~ must have two impermeable liners and leachate collection systems.

* The double leachate collection system consists of a network of perforated pipes placed above each liner. The upper system prevents the accumulation of leachate trapped in the fill, and the lower serves as a backup. Collected leachate is pumped to a treatment plant.

* A ground water monitoring system ~~to~~ includes a series of deep wells drilled in and around the site is also required. The wells allow a routine program of sampling and testing to detect ~~any~~ any leaks (or) groundwater contamination. If a leak does occur, the wells can be pumped to intercept polluted water and bring it to the surface for treatment.

* An impermeable cap (or) cover is placed over a finished landfill in order to reduce the potential environmental damage.

underground injection (or) deep well injection

* The method involves pumping liquid waste through a steel casing into the pores and fissures of rock, where it is to be ~~permanently~~ stored. (limestone, sandstone)

* The injection zone must lie below a layer of impervious rock (or) clay, and it may extend more than 0.8 km below the surface.

Disposal Technology / Treatment

As Deep well injection is relatively inexpensive and requires little (or) no pretreatment of the waste, but it poses a danger of leaking hazardous waste and eventually polluting subsurface water supplies.

TRANSBOUNDARY MOVEMENT OF HAZARDOUS

WASTE 1-

"Transboundary Movement" means any movement of hazardous wastes from an area under the national jurisdiction of one country to an area under the national jurisdiction of another country.

* The ministry of Environment, Forest and Climate Change (MoEFCC) shall be nodal ministry to deal with the transboundary movement of the hazardous and other wastes in accordance with the provisions of these rules.

- a) No import of the hazardous and other wastes from any country to India for disposal shall be permitted.
- b) The import of hazardous and other wastes from any country shall be permitted only for recycling, recovery, reuse and utilization ~~including co-processing~~.
- c) The import of hazardous waste in part A, part B and part D of schedule III may be allowed to actual users with prior informed consent of the exporting country and shall require the permission of ~~the~~ MoEFCC.

d) No import of the hazardous and other waste specified in Schedule VII shall be permitted.

e) The ~~prior~~ Export of hazardous and other waste from India listed in part A and part B of Schedule III and Schedule VII shall be with the permission of MoEFC ~~etc~~ and prior informed Consent of the ~~respective~~ importing country.

* Actual user intending to import (or) Transboundary movement of hazardous and other wastes specified in part A & part B of Schedule III they should take Consent from MoEFC.

The process of taking Consent includes following steps

a) shall apply in form 5 ~~etc~~ with prior consent from Exporting country and send a copy of application to a concerned State pollution control board (SPCB)

b) The informed and acknowledgement in this respect from the concerned SPCB shall be submitted to the MoEFC along with the application.

c) Application Examined by MoEFC considering the comments and ~~etc~~ observations if any received from the SPCB and may grant the permission for import ~~etc~~ with a period of 60 days subject to the condition that the importer has

i) ~~etc~~ the Environmentally sound facilities

ii) ~~etc~~ Adequate arrangements for treatment and disposal of waste generated

iii) ~~etc~~ a valid authorisation and Consents from SPCB

iv) prior informed Consent from the Exporting country in case of part A ~~etc~~ of Schedule III wastes.

d) The MoRPF shall forward copy of permission to

- i) Concerned port and ~~Customs~~ customs authority
- ii) CPCB
- iii) Concerned SpCB

e) The importer of hazardous and other waste shall maintain records of the hazardous and other waste imported by him in Form 3 and the record so maintained shall be made available for inspection and the same should be audited.

ILLEGAL TRAFFIC :-

The Export and import of hazardous or other wastes ~~and~~ from and into India respectively shall be deemed illegal, if

- a) It is without permission of central Government in accordance with rules
- b) The permission has been obtained through falsification, ~~mis~~ misrepresentation (or) fraud
- c) It does not conform to the shipping details provided in the movement of documents
- d) It resulted in ~~the~~ deliberate disposal (i.e., dumping) of hazardous or other waste without any use of waste.

In case of illegal import

- a) If a importer is known, it is responsibility of importer to re-export the waste in question of his lost within a period of 90 days from the date of its arrival into India and its implementation will be ensured by the concerned port and customs authority
- b) Where the importer is not traceable then the waste either can be sold by the customs authority to any ~~or~~ other having authorization under these ~~or~~ rules from the concerned SpCB (or) can be sent to authorized treatment, storage and disposal facility.

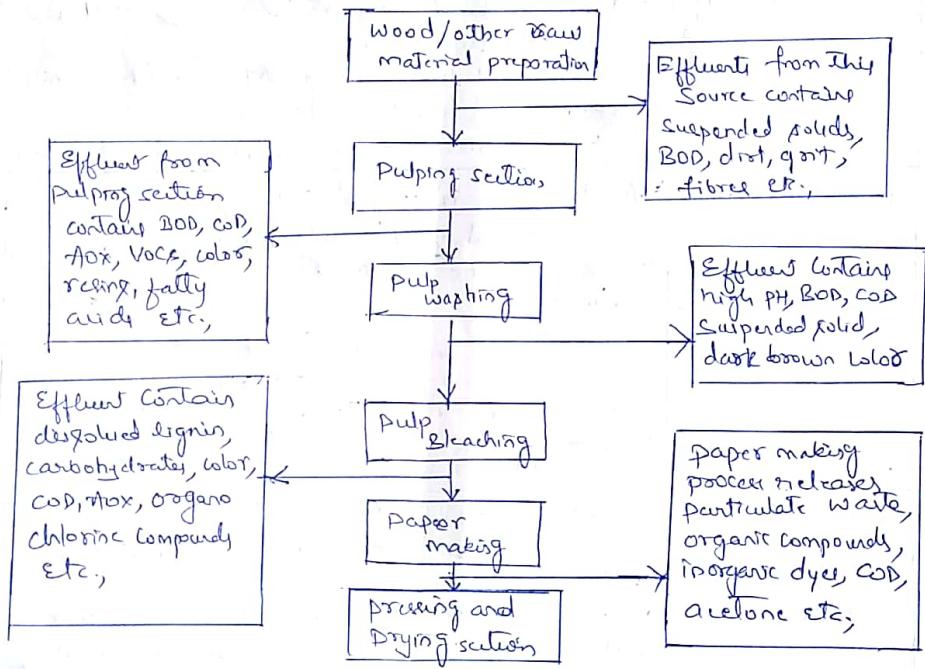
MODULE - 5 :- APPLICATIONS 1

Pulp and Paper Industry

The pulp and paper industry comprises companies that used wood as raw material and produce, pulp, paper and other cellulose-based products. The pulp and paper industry are categorised into 3 sectors.

- a) waste paper based units without bleaching process to manufacture craft paper. This industry mainly generates water and air pollution.
- b) waste paper based units with bleaching process to manufacture writing and printing paper. This industry generates all sorts of pollution.
- c) Large and small scale agro and wood-based units. This industry generates all sorts of pollution and its one among 17 highly polluting industry.

Process flow chart and source of Effluents



Application of EMS in pulp and paper industry

EMS Elements	Components
Policy Commitment	<ul style="list-style-type: none"> * pressure to comply with regulatory requirements as specified by pollution control board & MOEF * operations to promote environmental protection, an efficient utilization of resources, energy and sustainable development.
Objectives and Targets	<ul style="list-style-type: none"> * Reduction and treatment of effluents * Treatment of gas emissions * Sustainable use of wood as a raw material
Planning	<ul style="list-style-type: none"> * Environmental aspects of are such as deforestation, use of water surrounding water bodies and etc., their impacts were studied. * Suitable processes are adopted to identify significant environmental aspects. * Environmental management ^{programme} were established in order to achieve compliance <ul style="list-style-type: none"> a) Effluents from different units meet as with state control board regulations b) Air emissions are within standard values
Implementation	<ul style="list-style-type: none"> * A structure is designed and responsibility of each personnel is communicated and competence of of employee were achieved with proper training * Documentation of each environmental program, operation were maintained and any changed procedure will incorporated. * operational control is achieved through proper documentation process
Corrective action and management review	<ul style="list-style-type: none"> * Organization efforts towards pollution prevention were checked and corrective actions are suggested * Audit reports and other documents of environmental were reported to top management for review.

Application of waste Audit and pollution prevention in Paper and Pulp industry

Waste Audit will help to understand what type of waste will be generated from after different processes. Some waste generated in paper and pulp industry is as follows

[Refer process flow chart]

- a) after raw material production → wastewater containing high suspended solids, BOD, nitrate etc, will be generated
- b) after pulping section of wastewater containing high BOD & COD, VOC's etc, will be generated
- c) after pulp washing section
- d) after pulp bleaching - wastewater containing organic chlorocompounds, dissolved lignin, high COD will be generated
- e) after paper making and during processing, drying - gaseous waste containing high particulate matter, organic compounds will be released

Modern waste minimization approach is by two means.

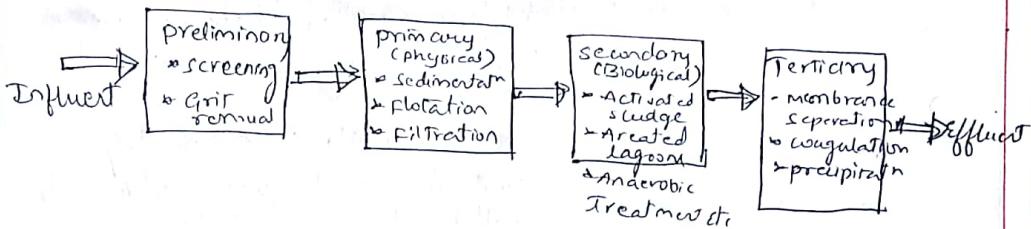
- i) The first way is chemical recovery and recycling. This system especially in chemical pulping process significantly reduces pollutants and additionally economic return is another important aspect.
- ii) The second way to minimize waste production from pulp and paper mills i.e., by applying best available techniques (BAT)

APPLICATION OF WASTE MINIMISATION

→ An effective waste minimization method reduces cost, liability, regulatory burdens of hazardous waste management. Furthermore, hazardous waste generation can be reduced by waste management methods including:

- * production, planning and sequencing
- * process adjustment and/or modification.
- * Raw material replacement
- ↳ housekeeping, Waste Segregation and separation
- ↳ Recycling

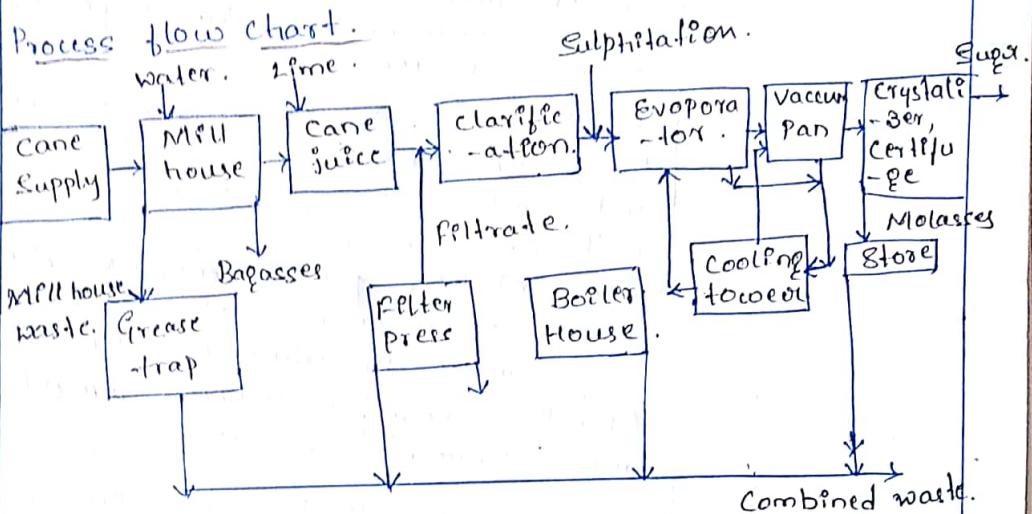
→ waste water generated in pulp and paper industry can be treated End of the Pipe pollution treatment strategies. The general flow chart of a typical wastewater treatment plant is given by



→ Air pollution control @ pulp and paper mill has been important concern. Especially VOCs produced from pulp and bleaching steps and steam are conventionally treated by physicochemical methods such as adsorption to activated coal filters, absorption, thermal oxidation, catalytic oxidation, and condensation.

Another sources of air pollution in pulp and paper industry are boilers, furnaces and D.C. sets. Adequate measures such as increasing stack height and infrastructure facilities should be provided.

- ③ Sugar Industry.
- Sugar is one of the significant agricultural products and industries processing sugar are vital for Indian economy.
 - Sugar industry is one of important agro-based industries in India.
 - The industry has created significant socio-economic impact on rural agro-based economy.



Application of EMS in Sugar Industry:

EMS Elements.	Components.
<ul style="list-style-type: none"> - Policy commitment 	<ul style="list-style-type: none"> - Pressure to comply with regulatory requirements as specified by Pollution control board & MoEF - Operation to promote Environmental Protection, an efficient utilisation of resources, energy & equitable development.

Objectives & Targets.	<ul style="list-style-type: none"> → Reduce the impact caused by wastewater produced in sugar mills. → Treatment of gas emulsion. → Increase the recycling because of treated effluent.
Planning.	<ul style="list-style-type: none"> → To ensure consistency & quality environmental aspect & technical environmental aspects require to document potential environmental impact. → To identify each key issues & determine objectives for each issue. → Determine performance targets for each environmental aspects. → Develop the procedure for tracking progress by updating the EMP.
Implementation.	<ul style="list-style-type: none"> → A structure is designed and responsibility of each personnel is communicated and competence of employee is activated with proper training. → Documentation of each environmental program operation were maintained & any changed procedure well incorporated. → Operation control is activated through proper documentation process.
Corrective action and Management review.	<ul style="list-style-type: none"> → Organization efforts towards pollution prevention checked & corrective action are suggested. → Audit reports and other documents of environmental were reported to top management for review.
Application of waste audit, & pollution prevention in Sugar Industry.	<p>Waste audit will helps to understand what type of waste will be generated after different process. Some waste generated in sugar industry is as follows.</p>

Process Input waste

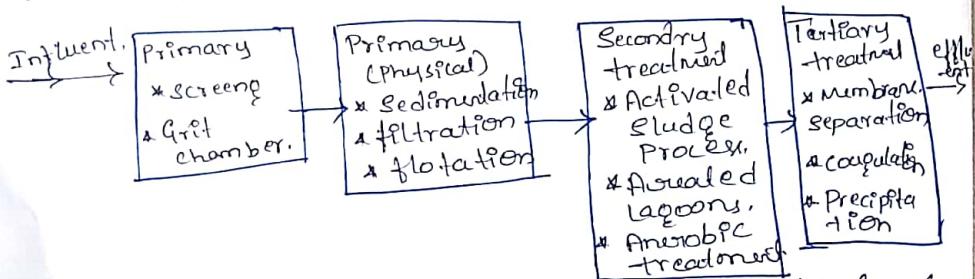
Mill House → Sugar cane. → waste water from bearing house of mills. suspended solids, and oil contents. It also includes water used for floor cleaning which contains sugar contents. Bagasse.

Process → Sugar house. → Sugar juice → Filter cake, washing of different components of mill generates Aggressive effluents, have high BOD & COD, Molasses.

Boiler house → Bagasse furnace → Flyash, smoke gases waste water cooling water of wet scrubber. Pond. chemicals → waste water contains very high Molasses → waste water contains very high BOD.

Treatment technologies.

- * Pre-treatment of effluents consist of screening & creation normally followed by biological treatment.
- * Biological treatment system includes sludge & anaerobic system which can reduce a reduction in the BOD level of over 95%.
- * Odour controlled by ventilation & Sanitation may be required. for fermentation & juice-processing areas.



above fig shows the typical wastewater treatment plant.

Particulate matter and sugar dioxide emission should be less than 100 mg /Nm³. Odour quality, for major odour controls should be implemented where necessary to achieve acceptable odour quality for nearby residents.

Pollution Prevention and control.

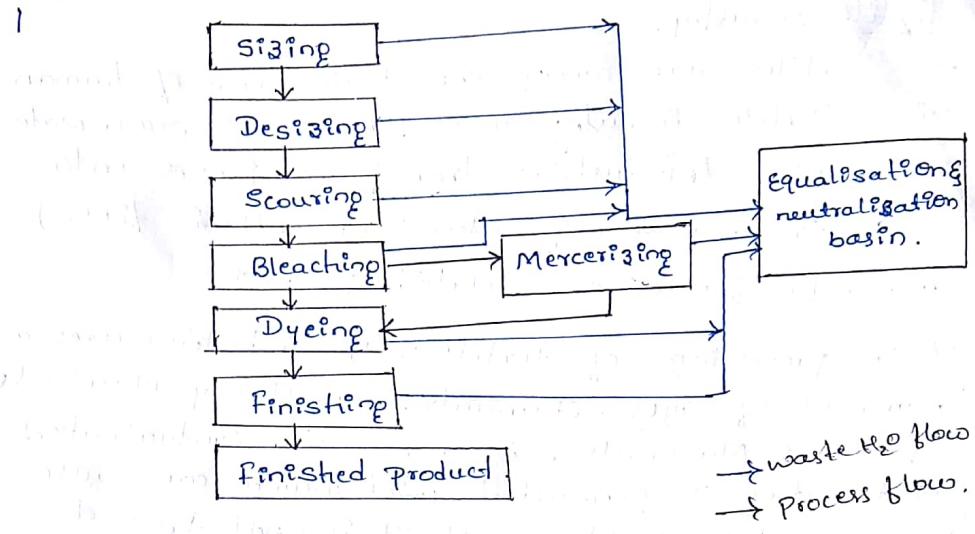
Good pollution prevention practices in sugar manufacturing focus on the following main areas.

- * Reduce product losses to less than 10% by better production control. Perform sugar auditing.
- * Minimisation storage time for juice & other intermediate product produce. Product losses.
- * Give preference to less polluting classification process such as using bentonite instead of sulfite.
- * for manufacture of white sugar for use in other industries
- * collect waste product for use in paper mills. for example, bagasse for use in cleaning chemicals.
- * Optimise the use of water & cleaning chemicals. Produce cane washed in the field. Prefer the use of dry cleaning method.
- * Recirculate cooling waters.

Textile Industry.

- Textiles are among the basic needs of human being. Textile industry uses fibers as raw material. these industries transform fibers into yarn (thread makeup of natural or synthetic fiber) and into fabric or related product.
- In processing of textiles, the industries uses a number of dyes, chemicals, auxiliaries, sizing materials. As a result, contaminated wastewater is generated which can cause environmental problems. if it is not treated properly.
- Textile industries generate 3 kinds of waste i.e liquid effluents, air emissions & solid waste.
- The main source of air pollution are boilers, thermo pack & diesel generators. which generate gaseous pollutants such as suspended particulate matter (SPM), SO_2 , & nitrogen gas etc.
- Textile industry is also major source of hazardous waste generation. Main source are treated fluid treatment plant sludge, used oil, etc.

Process flow chart



Application of EMS in Textile industry.

EMS Elements	components
→ Policy commitment.	<ul style="list-style-type: none"> → Pressure to comply with regulatory requirements as specified by pollution control board & MOEF → Operations to promote environmental protection, an efficient utilization of resources; Energy & Sustainable development.
→ Objectives & Targets.	<ul style="list-style-type: none"> → To treat the generated waste water before disposal. → Treatment of gas emissions. → To dispose the waste water adequately to reduce environmental problems. → The reduction of environmental impacts.
→ Planning.	<ul style="list-style-type: none"> → The focus of EMS is to conserve input resources & to protect the environment. → To use recycling, use eco-materials so less & harmless waste can minimize adverse impacts. → Suitable process are adopted to identify significant environmental aspects.

	<ul style="list-style-type: none"> Effluents from different units with control board regulation. Tariff Emissions are within standard values.
Implementation.	<ul style="list-style-type: none"> A structure is designed & responsibility of each personnel is communicated & competence of employee were achieved with proper training. Documentation of each environmental program operation were maintained and any changed procedure will incorporated. Operational control is achieved through proper documentation process.
Corrective action & Management review	<ul style="list-style-type: none"> Organization effort towards pollution prevention checked and corrective actions are suggested. Audit reports and other documents of environmental were reported to top management for review.

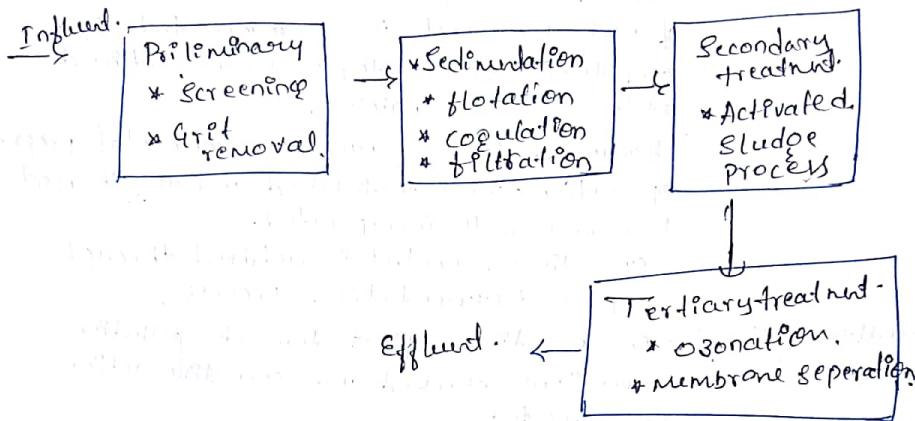
Application of waste Audit and pollution prevention in Textile industry

Some waste generated in textile industry is given below.

- Washing → Yarn waste, unsized starch based sizes.
Produces high BOD, medium COD.
- Pressing → BOD (30-50 l.) high COD, temperature (70-80°C)
- Scouring → oil fats, BOD (30 l.): dark color waste generated.
- Bleaching. { → high pH, total dissolved solid, ^{low} high BOD
Mercerizing } → high toxicity, BOD, high pH.
- Dyeing → high toxicity, BOD, high pH.
- Frosting → low BOD, high toxicity, low alkalinity.

(4)

The wastewater generated in textile industry can be treated & the flow chart of typical wastewater treatment plant is given below.



- * Main source of air pollution in textile industry are boilers, furnaces & D.G sets on which adequate air pollution measures have taken like stack heights, & infrastructure facilities for air pollution monitoring are required to be provided.

The best practice for waste reduction at source include:

- * Administrative prevention
- * Better process control
- * Material substitution
- * equipment modification
- * New process technology
- * Reuse / Recycling
- * Product modification

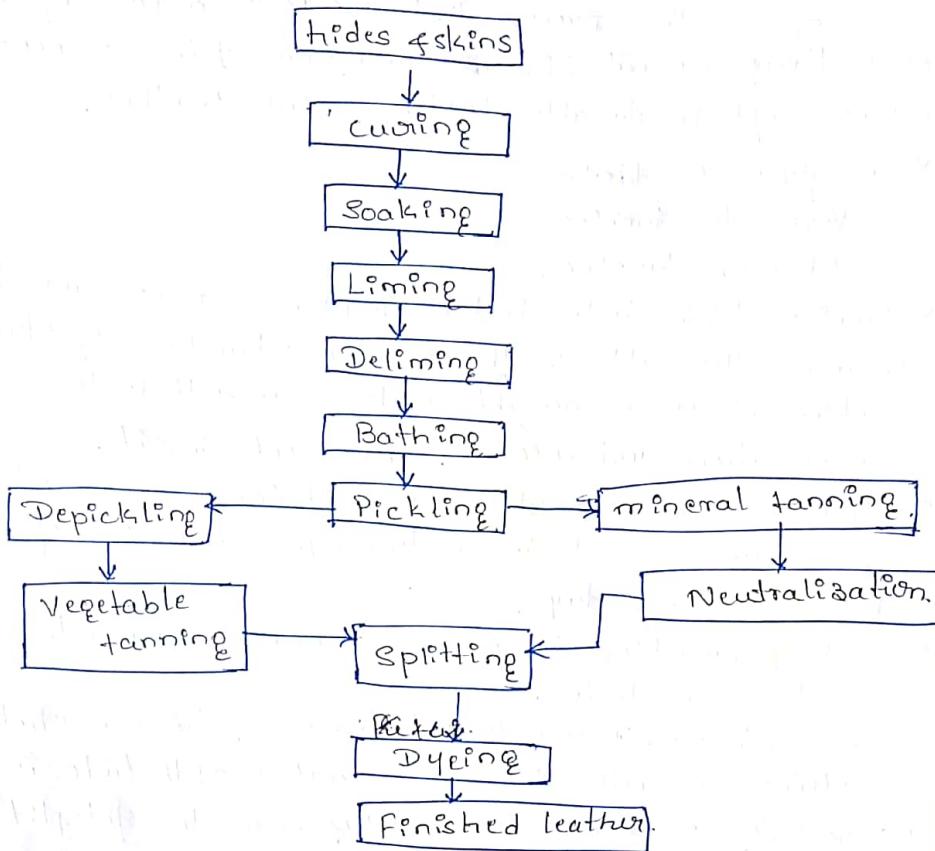
Tools of methods

Tanning Industry.

Tanning is the process that converts a part of a once living animal (i.e hide and skins) into a non-rotting, soft & durable textile called leather.

- * Two types of tanning
 - ↳ Vegetable tanning
 - ↳ Chrome tanning.
- * Tanning hide into leather involves a process which permanently alters the protein structure of skin, making it more durable & less susceptible to decomposition, and also possibly colouring of.
- * Before tanning, the skins are detained, degreased, desalinated and soaked in water over a period of 6 hours to two days.
- * Soaking : washing in water to remove impurities & bolds from the hide.
- * Pressing : Excess water is eliminated & hide is stretched.
- * Splitting : The grain - the outer surface of the hide is mechanically separated tangentially from the split.
- * Shaving : The entire surface of the hide acquires a uniform thickness.
- * Trimming : Cutting, selecting & dividing the hide.
- * Dyeing : The key point in the process, lending the hide softness, colour, & stability.
- * Drying : Removing the water.
- * Staking : Softening of leather.
- * Finishing : Treatment to give the desired shine, colour & appearance.

Process flow chart.



The process of Liming includes the addition of excess lime inside the hide or skin. The main purpose of liming is to separate the hair from tides. Deliming to eliminate alkalinity as well as lowering pH. The main purpose of Deliming to reduce the ammonia, nitrogen from tannery waste water.

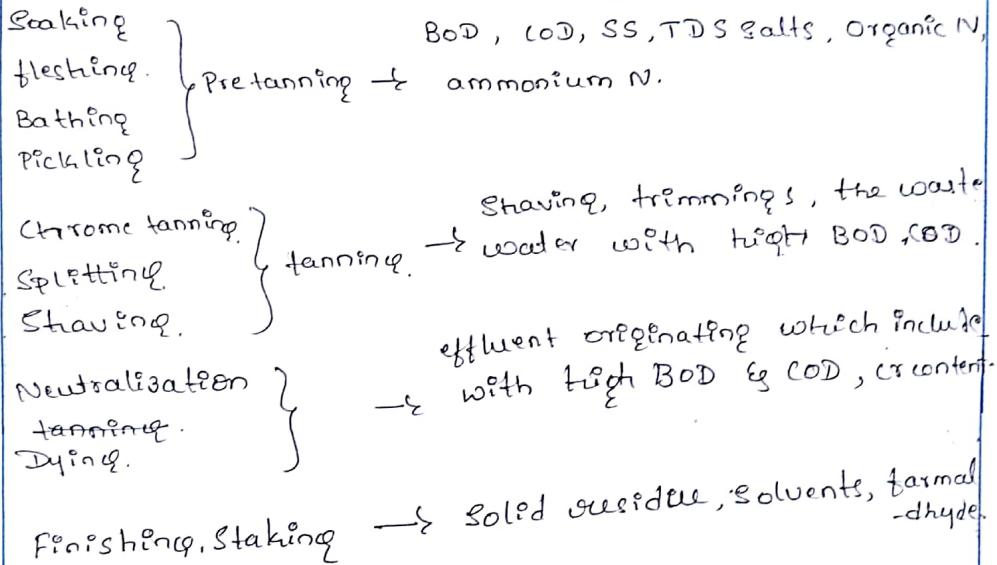
Pickling makes the fibers of tides more receptive to tanning. Pickling increase the acidity of the tide to a pH of 3

Application of EMS in Tanning Industry.

EMS Elements	Components.
Policy components	<ul style="list-style-type: none"> - Pressure to comply with regulatory requirements as specified by pollution control board Eg MOEF - Operation to promote environmental protection, an efficient utilization of resources, energy & sustainable development.
Objectives & Targets	<ul style="list-style-type: none"> - To determine removal efficiency & effectiveness of Cr, COD, turbidity, & colour of different alkalis as precipitating agent - To recover chromium from sludge - Produced by the chemical precipitation - To conduct Eco-Audit in a different companies to understand current status of awareness regarding Environmental protection in industries.
Planning.	<ul style="list-style-type: none"> * Focus will be given to understand chemical management system & create awareness about harmful effects on humans.
Implementation	<ul style="list-style-type: none"> * Encourage industries to adopt environmental policy, conduct environmental review. * Introduce environmental program, carry out internal audit. * Set the objectives aimed at continuous improvement of environmental performance; Prepare an environmental statement.
Corrective actions	<ul style="list-style-type: none"> * organization effort towards pollution prevention checked & corrective actions are suggested.
Management review	<ul style="list-style-type: none"> * Audit reports and other documents of environmental were reported to top management for review.

Application of waste Audit and pollution prevention in tanning industry.

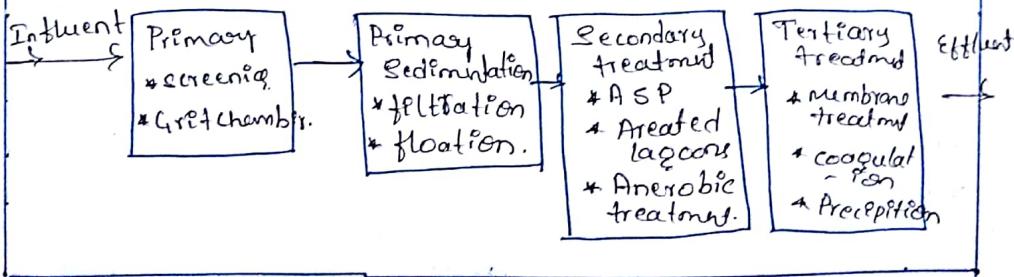
Tannery wastewater is highly complex & characterized by high contents of organic, inorganic & nitrogenous compounds, chromium sulphides, suspended solids etc.



Treatment technologies.

Pretreatment of effluents consist of screening & aeration normally followed by biological treatment.

* Biological treatment systems includes sludge & anaerobic system which can active a reduction in the BOD level.

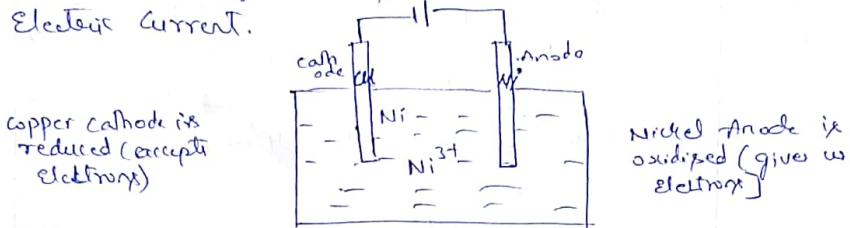


Pollution prevention and control of tanning industry.

- 1) Tannery effluents if disposed off without any treatment either on land or in inland surface waters may cause severe problems leading to damage of the environment. Tanning trivalent chromium, proteinous matter Sulphides & high BOD/COD of waste water call for proper treatment
- 2) Removal of causative impurities from the tannery
- 3) Removal of odour bearing dusts by cyclone separator.

Electroplating Industry

Electroplating is a general name for processes that produce a metal coating on a solid substrate through the reduction of cations of the metal by means of direct electric current.



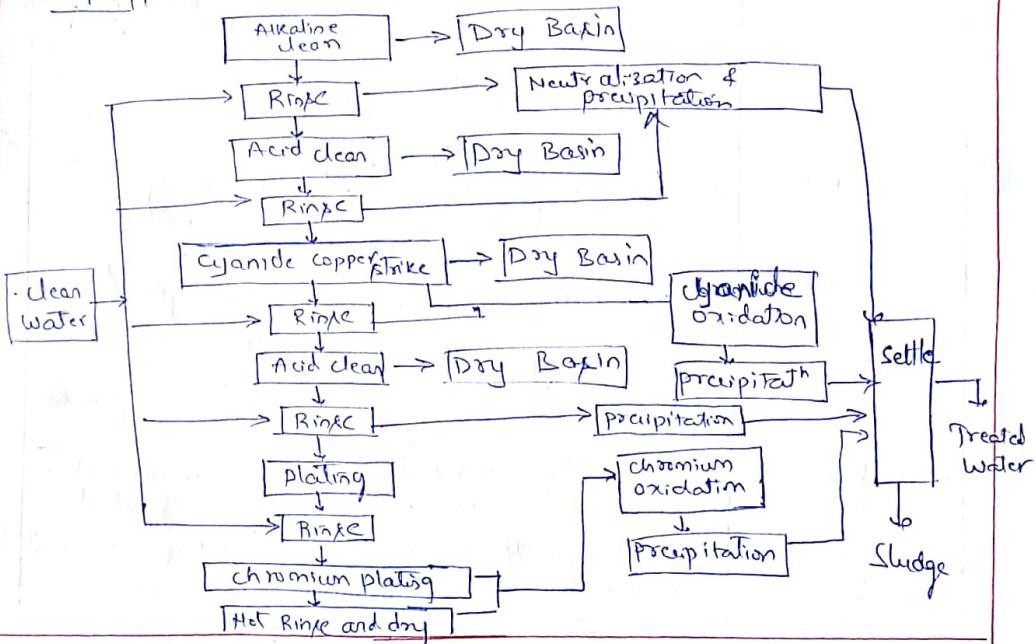
Ni^{3+} ions within solution become attracted to copper cathode

* The part to be coated acts as cathode

* The electrolyte is a solution of a salt of the metal to be coated

* The anode is usually either a block of that metal or some inert conductive material.

Process flow diagram and source of effluent in electroplating industry



Application of EMS in Electroplating Industry

EMS Elements	Components
Policy commitment	<ul style="list-style-type: none"> * pressure to comply with regulatory requirements as specified by pollution control board & MOPF * operations to promote Environmental protection, an efficient utilization of resources, Energy and Sustainable development.
Objectives and Targets	<ul style="list-style-type: none"> * Reduction and Treatment of effluents * Treatment of gas emissions * Treatment of effluents containing heavy metals * Reduce use of organic cleaning solvents
Planning	<ul style="list-style-type: none"> * Environmental aspects such as use of water from surrounding water bodies for drinking, heavy metal contamination etc, & their impacts were studied * Suitable processes were adopted to identify significant environmental aspect. * Environmental management programs were established to ensure compliance * Effluents from different unit with standards * air Emissions are within standard values * Reduce water use & high heavy metal contamination
Implementation	<ul style="list-style-type: none"> * A structure is designed and responsibility of each personnel is communicated and competence of employee were achieved with proper training * Documentation of each environmental program, operation were maintained and any changed procedure will be incorporated * Operational control is achieved through proper documentation process
Corrective action and Management Review	<ul style="list-style-type: none"> * Organization efforts towards pollution prevention checked and corrective actions are suggested * Audit reports and other documents of environmental were reported to top management for review.

Application of waste Audit and pollution prevention in Electroplating industry:

Waste Audit will help to understand what type of waste will be generated after different processes. ~~more~~ ~~waste generated~~ Wastewater, spent solvent, spent process solutions and sludge are the major waste forms generated in large volumes in electroplating industries.

The waste containing such as ~~Ni~~ chromium, zinc, lead, silver, mercury, cyanide etc., are more hazardous.

Some waste generated in electroplating industry are

- a) alkaline clean }
- b) Acid clean } wastewater containing spent solvent,
spent process solutions.
- c) cyanide copper } a waste water containing cyanide
strike will be generated
- d) plating f } a waste water containing ~~chromium~~ (chromium)
chromium electro plating and chromium (Cr) will be generated.
(chromium)

Pollution prevention and waste minimization plan in Electroplating industry can be done by ~~by~~ by

- a) ~~by~~ changes in process
 - use trivalent chromium instead of hexavalent chromium
 - Regenerate acids and other ingredients
 - Give water based surface cleaning agents instead of organic cleaning agents

b) Minimizing water consumption in rinsing systems

It is possible to design rinsing systems to achieve 50-90% reduction in traditional water usage. It can be achieved by

- » Agitation of rinse water on work pieces to increase rinsing efficiency
- » Spray rinses

c) Management of process solutions

It includes

- » Recycle process baths after concentration & filtration
- » Recycle Rinse waters
- » Clean racks between baths to minimize contamination etc.,

Waste treatment in Electroplating industry

~~If treated by conventional wastewater treatment with~~

In general, contaminants contained in the electroplating wastewater are toxic in nature and require treatment are cyanide, hexavalent chromium & heavy metals. Several types of treatment methods have been developed for specific contaminant. Here biological Treatment (Secondary Treatment) are not adopted but waste is toxic.

Some ~~and~~ methods of Treatment in Electroplating industry are:

i) Treatment of cyanide - chlorination

ozoneation

Electrolysis

Ion exchange

ii) Treatment of hexavalent chromium

~~Reduction to Trivalent chromium + precipitation~~

» Concentration

» precipitation as barium salt

» Ion Exchange

3) Treatment of metals

- Neutralization and precipitation as hydroxides
- precipitation as metal sulphide.
- Ion Exchange etc.,

Air pollutants (or) solvent emmissions to air must be removed by the use of an air pollution control system such as ~~as~~ carbon filter.