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Environmental Management System In Textile Industry

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April 2023

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P.O. Limda – 391 760, GUJARAT, INDIA

Environmental Management System in Textile Industry

M Tech Dissertation Work

Submitted in

partial fulfillment of the requirements for the degree of

MASTERS OF TECHNOLOGY

in **Environmental Engineering**

by

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Abstract

Chapter 1: Introduction

Textile industry is one of the oldest industries ; it started very early in the ancient ages ; several thousands of years in a very primitive and simple way It is essential industry sinc e it is role is to provide one clothes for human being , covering one of the basic needs of mankind. Textile industry grows and improves gradually at the first and then rapidly to s atisfy other different need of the mankind, even for luxury purposes. Textile industry bega n to fit for different purposes such as fire fighting cloth, space Researches, gcotextile and other different applications.

Textile wet processes used significant quantities of water and various kind of chemicals m arketed under the name textile auxiliaries, to enhance the appearance of the fabric, service ability, and durability.

The chemical contamination of the textile wet processes can be a health risk for the mill workers, consumers and for the environment as well. A number of schemes have been pr oposed in different countries to control the textile wet processes to create better environm ent and protect the ecosystem from further degradation, the developing countries need to a pply their designed policies from the beginning.

The protection of the environment has become an important issue throughout the world an d the concern with the environmental issues and associated matters such as occupational h ealth and consumer product safety have attracted the attention of the international commu nity. The seriousness of environmental issues is very evident on global warming. The text ile wet processing give raise to many different pollutants, organic and inorganic compoun ds, which may require different methods to reduce or eliminate.

All organizational activities, products and services will interact with and have an effect on the environment, and an effective environmental management system (EMS) is needed to deal with this complexity. It must therefore be interwoven with the overall management of the company. An EMS is important because i, manages measures and improves env,ro,, raen,al performance, and leads ,o efficient compliance with environmental requirements.

It is hoped that amongst other things in the years to come, the implementation of EMS in Sudanese companies will result in industry competitiveness and their access to internation al markets, especially during the time that the need for environmental comphance will bec ome a prerequisite to export especially into the European and Amencan markets. It is also true that in the long term, companies that implement the EMS properly will save money, reduce costs and increase product quality.

A theoretical study for probability of application of environmental management system in textile industry, to prevent or eliminate textile industry pollution that considered as one of the largest polluters in Sudanese environment, especially after the government (industrial ministry) support and facilitate to textile industry development.

Chapter 2: Aims and Objectives

2.1 Aim :

- To study and Implementation of environmental Management System in Dye Indust ry.

2.2 Objectives:

The broad objectives are:

- Reduction of water consumption.
- Air pollution control.
- Reduction of Energy Consumption.
- Water pollution control

Chapter 3: Process

Textile Wet processes:

These will be looked at under the following broad categories:

1. Sizing
2. Pretreatment or/preparation department.
3. Dyeing.
4. Printing.
5. Finishing.

3.1.Sizing

This would involve size selection, where the need to replace starch based sizes with synthetic sizes. This results in reduced pollution load as synthetic sizes have lower BOD levels and they can be recycled for reuse. Further strategies would include testing incoming raw materials for toxic compounds, purchasing size in bulk in drums rather than bags etc as this produces less solid waste and reduces the chances of spills due to breakages. Finally, there is need to ensure that only the minimum required sizes are added to the yarn as this reduces chemical consumption as well as the pollution load to drain during desizing

3.2.Pretreatment or/preparation department

The process of preparation includes desizing, scouring, bleaching and mercerizing. Desizing accounts for over 50% of the pollution load of preparation while scouring contributes between 10 and 25%. Good preparation is essential for subsequent processing, as any impurities remaining on the fabric will interfere with the dyeing and finishing processes.

The pretreatment aims to prepare the fabric for the subsequent processes, which demand a

high degree of absorbency. However, at aims pretreatment is all that is required. The ulti mate goal of any preparatory treatment is to produce fabric that is clean and rid of all im purities that interfere with dyeing and finishing. The pretreatment can be carried out as eit her batch or continuous processes

3.2.1 Dyeing.

Desizing is done to remove size from sized fabric." Size "is an adhesive substance applie d to facilitate weaving. Common sizing material is starch {natural organic and synthetic) or gum and some times gelatin. Size has in general a high biological oxygen demand (BO D) and will contribute significantly to the waste of the effluents. Three methods frequentl y used in desizing are acid desizing, enzyme desizing and oxidative desizing. The goal of these different methods is to hydrolyze the starch. Unlike natural starch, synthetic starche s stay intact during desizing, that is can be recovered and reused. All these methods depe nd on breaking down, by chemical means, the sizing preparation until it is soluble in wat er. Enzyme desizing is probably the most popular and safest method. Using alpha (a) and beta (P) amylases. Wetting agents and soaps are used in deszing to speed up the action. Washing follows the process.

3.2.2 Scouring

Natural fibers contain oils, fats, waxes, minerals, leafy matter and motes as impurities that interfere with dyeing and finishing. Synthetic fibers contain producer spin finishes. Mill grease used to lubricate processing equipment mill dirt; temporary fabric marking s and th e like may contaminate fabrics as they are being produced. Even though these impurities are not soluble in water, they can be removed by extraction, dissolving the impurities in o rganic solvents, emulsification, forming stable suspensions of the impurities in water and s aponification, converting the contamination into water soluble components [5]. Scouring pr ocess removes oils and grease spots, dirt, and etc. from the fabric. Neutralization is done after scouring, followed by hot and cold washing. The removal of natural impurities is ba sed upon soapification at high pH. The use of sequestering and reducing agent can be avo

ided when softened water is used. The common scouring agent to day is caustic soda (sod ium hydroxide) and it is used in amounts corresponding to 2 to 5 percent on weight of fa bric (owf). It is important that the detergent solution should hold the impurities in suspens ion as well as remove them from the fiber, other wise they would be deposited again. Th e rising of the dirty liquors after scouring is there fore a process, which requires some car e .

3.2.3 Bleaching

Avery large proportion of the fabrics made, either as such or in the form of garments, co uld not be sold directly .they usually contain sizing and lubricating ingredients which hav e been added to assist their production by weaving and knitting and they are also frequent ly stained with oil or are other wise dirty .so much materials have to be purified and then processed so as. to be white or coloured. For the production of a good white some form of bleaching treatment has to be applied while for colouring use has to be made of dyes either in dying or printing .It is not intended to describe these wet processes but to indica te one or two features which influence subsequent finishing operations. [4] The primary o bjective of bleaching process is to remove natural colouring matter and undesired impurities from fabric. This can be done in two ways; continuous, o r batch wise. For continuous bleaching process open width or Babcock bleaching machine is used. Batch bleaching process is performed in jet or winch machine. However, it shoul d be noted that the latter case exists with low frequency.

3.2.4 Mercerization

Mercerization is the treatment of pure cotton fabrics or yarn with a strong caustic soda so lution to improve strength, dye substantively and smoothness. Sufficient washing is requir ed after this step to remove any traces of caustic soda . It is usually applied for high qual ity products.

3.3. Dyeing

The dying properties of the different fibres have resulted in the dye manufacturers produci ng ranges of dyes which, although of widely differing chemical constitution, possess simil ar dyeing properties within each range. For example, the disperse dyes suitable for the mo re hydrophobic materials, the acid dyes for wool and nylon, the direct and vat dyes for ce llulose.

Dyeing is a process or combination of processes, which is performed to give a reasonably permanent colouration to the textile fabric. The dyeing should offer a reasonable fastness to:

i. Household washing and laundering.
ii. Light.
iii. Rubbing.
iv. Oxidation and sublimation.
v. Perspiration.

The fastness depends upon various factors such as the used type of dyestuff, the applicati on method, after treatment of the dyed goods, etc. The uniformity of dyeing is equally im portant, which is in turn dependent on preparatory processes, equipment, and dye liquor p reparation and dyeing conditions .

Dyeing can be accomplished in one of either batch or continuous approaches. The selectio n of dyes is quite important. General waste minimization options for dyeing include the f ollowing:

- Operate at lowest possible bath ratio. This leads to a reduction in operating costs, w ater consumption, chemical use, energy use and less effluent discharge.
- Minimize stripping and do re dyeing procedures
- Avoid shading additions
- Avoid the use of detergents to wash fabric after reactive dyeing; high temperatures are just as effective

- Minimize auxiliary use. Some auxiliaries interfere with dye fixation and should be r eplaced with alternatives or removed, as this will reduce the colour load of the effluent

Batch processing

There are a number of waste minimization options for batch processing. These include:

- Cascading multiple rinsing operations
- Reusing softening baths with reconstitution
- Segregating coloured effluent streams from clean streams to ensure that only concentrat ed effluent is treated. This clean effluent may be used elsewhere in the factory
- Installing automatic shut down of water in overflow cooling when the required temperat ure has been reached
- Replacing outdated machines with high liquor ratios with more modern equipment
- Carrying out softening on a pad mangle
- Replacing batch wise rinsing with continuous rinsing with counter current flow
- General water, chemical and energy conservation measures

3.4. Printing

Printing is a process which has much in common with dyeing. In essence, the dye, after c ompounding with a thickening agent in order to ensure a sharp out line, is applied to the cloth from engraved rollers or through screens which carry the design. After transfer, thec loth is dried and passed through a steam chamber where the paste reabsorbs moisture to s ome extent, there by enabling the water. Soluble dye to diffuse into the substrate. The var iations in such a technique are many. For example, the dye may be directly printed onto t he cloth or, the cloth previously dyed and printed with an agent which on steaming is cap able of reducing the dyed background. This will form a white pattern on a coloured groun d or, if dye be applied simultaneously with the reducing agent, a coloured pattern will res ult.

3.5. Finishing

Finishing encompasses any of several processes performed on fiber, yam, or fabric to imp rove its appearance, texture, or performance.

Many chemical finishes are applied using padding machines, which pass the fabric throug h the finishing solution, under a guide roller, and between two padding rolls. The rolls re move excess liquid before the fabric is transported to a steaming or washing and drying machine. The backfilling machine is a variant of the padding machine that applies the fini shing solution to only one side of the fabric.

In this process, the fabric is treated with some chemicals or other useful agents to make i t qualitatively better, for example cotton is made sun protected by treating it with UV pro tecting agent.

Table 3.1: Over all look to the types of chemicals used in wet processes

Wet proces s	Chemicals employed	Auxiliaries
Desizing	Amylase or 2% Sodium Hydroxid e or (0.5- 1)%H2S04 or HCL	Wetting agent
Scouring	2%sodium hydroxide	Wetting agent
Bleaching	Reducing agents(S02) Oxidizing agents (hypochlorite or hydrogen peroxide)	Buffer pH 9-11.5 Sodium Silicate, pH 7
Mercerizin g	17.5% sodium hydroxide	Wetting agents
Dyeing & printing	Direct dyes	NaCl or Na2 So4 Fixation agents
	Vat dyes	Reduction agents (NaOH), Oxidation agents (Na2Cr207/H20)
	Sulphur dyes	NaOH+H20& NaCl
	Reactive dyes	NaCl or Na2S04

	Insoluble Azo dyes	NaOH & HC1 + Diazotization
	Pigments	Binders

Chapter 4: Overview of Pollutants and Waste Streams

4. Overview of Pollutants and Waste Streams

Textile processing generates many waste streams, including water-based effluent as well as air emissions, water pollution, and hazardous wastes. The nature of the waste generated depends on the type of textile facility, the processes and technologies being operated, and the types of fibers and chemicals used.

4.1 Air Pollutants

Most processes performed in textile mills produce atmospheric emissions. Gaseous emissions have been identified as the second greatest pollution problem (after effluent quality) for the textile industry.

Speculation concerning the amounts and types of air pollutants emitted from textile operations has been widespread, but, generally, air emissions data for textile manufacturing operations are not readily available. Most published data are based on mass-balance calculations, not direct measurements.

Air pollution is the most difficult type of pollution to sample, test, and quantify in an audit. Measurement techniques such as direct reading tubes and gas chromatography (GC)/mass spectrometry have been used recently to collect more reliable data. Continued collection of air emissions data from textile operations will result in better definitions of industry norms. Efforts are now underway to establish a reliable set of emissions factors for textiles; however, no set is currently available that can be recommended for audit purposes.

Air emissions can be classified according to the nature of their sources:

Point sources: Specific discharge points, such as stacks or vents, that are intended to be t he point of atmospheric release for emissions. (Boilers are one of the major point source s of air emissions in the textile industry. Primarily because of emissions of nitrogen and s ulfur oxides from boilers).

Fugitive sources: Sources for more general atmospheric emissions such as those that occu r through evaporation, leaks, and spills .

4.2 Indoor Air Pollution

In recent years, textile materials have been linked to indoor air quality (IAQ) problems. T extile materials that emit pollutants (primary emitters) as well as those that sorb and reem it air pollutants indoors (secondary emitters) are a concern for the textile industry. At this time, researchers are studying primary emissions from the types of textile process residue s listed below:

- Chemical finishes
- Dyeing process residues
- Assembly and fabrication residues

4.3 Water pollution:

Textile manufacturing is one of the largest industrial producers of waste water. On averag e, approximately 160 pounds of water (20 gallons) are required to produce 1 pound of tex tile product. Textile also is a chemically intensive industry, and therefore, the waste water from textile processing contains processing bath residues from preparation, dyeing, finishi ng, and other operations. These residues can cause damage if not properly treated before discharge to the environment.

4.4 Hazardous Waste:

Most textile operations produce little or no hazardous waste as part of their routine operations, but a small percentage of textile mills (perhaps 10 percent to 20 percent) are hazardous waste generators. Any facility that uses chemicals can produce hazardous waste if a chemical exhibiting the hazardous characteristics of ignitability, toxicity, corrosively, reactivity, or flammability is spilled on the ground. The contaminated soil from such a spill is often hazardous waste by the legal definition and must be handled accordingly. Generators must prepare both for routine handling of hazardous waste and for emergencies through proper training, equipment, and policies. For facilities that generate and handle hazardous waste, hazardous waste policies are essential. Policies must be realistic and must actually encourage proper practices. Policies designed mainly to protect the employer from liability and that do not actually promote safety and pollution prevention should be avoided.

Table 4.1: Typical Pollution Characteristic of the Textile Industry Effluent

Process	Composition	Nature
Scouring	Caustic soda, waxes, grease, soda ash, sodium silicate, fibers, surfactants, sodium phosphate.	Dark coloured, high pH, high COD, dissolved solids
Bleaching	Hypochlorite, chlorine, caustic soda, hydrogen peroxide, acids, surfactants, sodium silicate, sodium phosphate	Alkaline, suspended solids
Mercerizing	Caustic soda	High Ph, low COD, High dissolved solids
Dyeing	Various dyes, mordents, reducing agent, acetic acid, soap	Strongly coloured, high COD, dissolved solids and low suspended soli

		ds, heavy metals
Printing	Paste, starch gums, oil mordents, acids, soaps	Highly coloured, high COD, oily appearance suspended solids.
Finishing	Inorganic salts, toxic compounds	Slightly alkaline, low BOD

Although the majority of textile waste originates from household sources, waste textiles also arise during yarn and fabric manufacture, garment-making processes and from the retail industry. These are termed post-industrial waste, as opposed to the postconsumer waste which goes to jumble sales and charity shops. Together they provide a vast potential for recovery and recycling.

Recovery and recycling provide both environmental and economic benefits. Textile recovery:

- Reduces the need for landfill space. Textiles present particular problems in landfill as synthetic (man-made fibres) products will not decompose, while woolen garments do decompose and produce methane, which contributes to global warming.
- Reduces pressure on virgin resources.
- Aids the balance of payments as we import fewer materials for our needs.
- Results in less pollution and energy savings, as fibres do not have to be transported from abroad

Reclaiming fibre avoids many of the polluting and energy intensive processes needed to make textiles from virgin materials, including:

- Savings on energy consumption when processing, as items do not need to be redyed or scoured.
- Less effluent, as unlike raw wool, it does not have to be thoroughly washed using l arge volumes of water.
- Reduction of demand for dyes and fixing agents and the problems caused by their use and manufacture.

Chapter 5: Environmental Management System

5. The Environmental Management System Requirements:

An EMS is important because it manages, measures and improves environmental performa nce and leads to efficient compliance with environmental requirements. It should:

- Identify and assess environmental effects caused by company activities and incidents ,
- Identify relevant regulations,
- Identify priorities and objectives and set targets,
- Facilitate planning, monitoring, auditing and reviewing of the system, and
- Be capable of changing as circumstances change.

The organization shall establish and maintain an Environmental Management System (EM S) with the following requirements:

- Environmental policy defined by top management
- Planning
  - ➢ Environmental aspects
  - ➢ Legal and other requirements
  - ➢ Objectives and targets
  - ➢ Environmental management programmers

- Implementation and operation
  - Communication
  - Environmental Management system documentation
  - Document control
  - Emergency preparedness and response

- Checking and corrective action
  - Monitoring and measurement
  - Nbn compliance and corrective and preventive action
  - Records
  - EMS audit

- Management review

Chapter 6: Literature Review

Paper 1

Title - Environmental issues in chemical dyeing and printing industries, 2019

Author -

Ashok K. Rathoure, Hani Patel, Devyani Bagrecha, Unnati Patel and Jahanvi Modi

Name of Journal – Octa Journal of Environmental Research

Literature Content –

- This paper reviews the textile production process with the source of solid, liquid a nd gaseous pollution, their impact on environment and environmental issues in chemical d yeing and printing industries.

Paper 2

Title -

Environmental Protection and Waste Management in Textile and Apparel Sectors (2018)

Author - Mucella Guner and Onder Yucel

Name of Journal – Journal of Applied Science

Literature Content –

- This paper shows environmental-based production has become an economic activity that need to be taken into consideration through all processes from designing to packaging.
- In this study, where eco-textiles were dealt with in a comprehensive manner, it was emphasized that aiming at manufacturing a healthy final product would not be sufficient and that environmentally friendly practices would have to be used in the production process as well.

Paper 3

Title -

Effects of textile dyes on health and the environment and bioremediation potential of living organisms (2019)

Author - Bruno Lellis, Cíntia Zani Fávaro-Polonio, João Alencar Pamphile

Name of Journal – Elesevier

Literature Content –

- This paper shows that textile dyes significantly compromise the aesthetic quality of water bodies, increase biochemical and chemical oxygen demand (BOD and COD), impair

photosynthesis, inhibit plant growth, enter the food chain, provide recalcitrance and bioac cumulation, and may promote toxicity, mutagenicity and carcinogenicity.

- In spite of this, the bioremediation of textile dyes, that is, the transformation or min eralization of these contaminants by the enzymatic action of plant, bacteria, extremophiles and fungi biomasses is fully possible. Another option is the adsorption.

Paper 4

Title - Environmental Management Planning for a Textile Dyeing Industry (2017)

Author - Kashmira B Patil, Dr. V. D. Salkar

Name of Journal –

International Journal of Engineering Research in Mechanical and Civil Engineering

Literature Content –

- The study involves careful consideration of water usage in textile processes, charac teristics of waste and subsequently proposing suitable strategies for environmental protecti on. The significant observations and recommendations made are put forth in the present p aper.
- The effluent is provided with primary treatment by the industry.
- The secondary treatment is carried out at common effluent treatment plant (CETP).
- Primary treatment provided at industry is found to be rather inadequate to meet the expectations of CETP. So, there is a need to upgrade the primary treatment qualitatively. The stack height is also found inadequate, so needs revision as discussed in the paper

Paper 5

Title -

: Textile Organic Dyes: Polluting effects and Elimination Methods from Textile Waste W ater (2017)

Author - Rummi Devi Saini

Name of Journal – International Journal of Chemical Engineering Research.

Literature Content –

- This paper shows that harmful chemicals present in textile effluents react with man y disinfectants especially chlorine and form bi products that are often carcinogens.

- Colloidal matter presents along with color increases the turbidity, gives bad appeara nce, foul smell and prevents the penetration of sunlight into water bodies required for the photosynthesis which interfere with the oxygen transfer mechanism and hence marine life.

Paper 6

Title - Impact of Textile Dyes Waste on Aquatic Environments and its Treatment (2016)

Author - Samchetshabam Gita, Ajmal Hussan, T. G. Choudhury

Name of Journal – Central Institute of Freshwater Aquaculture

Literature Content –

- This paper shows quality problem of dye content and/or color in the dye house eff luent discharged in water courses can be solved by using of a range of advanced decolori

zation technologies investigated by the major dye suppliers, textile operators and customer s who are under pressure to reduce color and residual dye levels in their effluents.

- An alternative to minimize the problems related to the treatment of textile effluents would be the development of more effective dye that can be fixed fiber with higher effic iency decreasing losses on tailings waters and reducing the amount of dye required in the dycing process, reducing certainly improve the cost and quality of the effluent.

Paper 7

Title - Textile dyeing industry an environmental hazard (2013**)**

Author - Rita Kant

Name of Journal – Natural Science

Literature Content –

- This paper shows the art of applying color to fabric has been known to mankind si nce 3500 BC. WH Perkins in 1856 discovered the use of synthetic dyes.
- Synthetic dyes have provided a wide range of colorfast, bright hues.
- However their toxic nature has become a cause of grave concern to environmentalis ts. Use of synthetic dyes has an adverse effect on all forms of life.
- Presence of sulphur, naphthol, vat dyes, nitrates, acetic acid, soaps, enzymes chromi um compounds and heavy metals like copper, arsenic, lead, cadmium, mercury, nickel, an d cobalt and certain auxiliary chemicals all collectively make the textile effluent highly to xic

Chapter: 7 Methodology

7.Detailed Measures to address Common Aspects in EMS Implementation:

There are a number of aspects that are common to most of the EMS issues. These are:

- Reduction in Water Consumption • Reducing Chemical Consumption
- Energy Consumption
- Reducing Air Pollution
- Reducing toxicity
- Reducing Noise pollution

7.1 Reduction in Water Consumption:

Many industries have water consumption, which is generally much higher than what they require. The impact of high water consumption include high wastewater treatment costs, h igher water bills, and in some instances inefficient processes. This can in most cases be r educed by implementing various changes ranging from simple procedures such as fixing l eaks to more complex options such as optimizing water use and reducing the number of p rocess steps. Some suggestions are as follows:

- Repair leaks, faulty valves, etc
- Turn off running taps and hoses
- Turn off water when machines are not running
- Reduce the number of process steps
- Optimize process water use
- Recycle cooling water

- Re use process water
- Using water efficient process and equipment
- Seeping floors
- Reusing water from auxiliary processes

7.2 Reducing Chemical Consumption:

The majority of chemicals applied especially in the textiles industry and in particular to th e fabric are washed off and sent to the drains. Thus, the reduction of chemical consumpti on can lead to a reduction in effluent strength and therefore lower treatment costs, as well as overall saving sin chemical costs. Various options for the reduction of chemical usage arc as follows:

- Recipe optimization
- Dosing control
- Prescreen chemicals and raw materials
- Chemical substitution
- Correct storage and handling
- Chemical recovery and reuse
- Process changes
- Improve scheduling

7.3 Energy Consumption:

As with water consumption, reduction in energy use can result in substantial savings and l ower emissions from boilers or generating plants. Some energy efficient options include th e following:

- Good housekeeping
- Reduce cooling loads
- Install heat exchangers
- Optimize Plant Environmental Conditions
- Shutting off of lighting, air conditioning etc

7.4 Reducing Air pollution:

Air pollution is a menace to a number of industries. Some steps that can be taken to redu ce the emissions to air include the following:

- Decreasing emissions of organic solvents by changing to water-based products
- Using scrubbers to collect particulate matter
- Optimizing boiler operations to reduce the emissions of nitrous and Sulphur oxides
- Prescreening chemicals using the Material Safety Data Sheets to ensure that chemic als are not toxic
- Identifying sources of air pollution and quantifying emissions
- Designing and manufacturing products that do not produce toxic or hazardous air p ollutants
- Avoiding fugitive air emissions from chemical spills through improved work practic es

7.5 Reducing Toxicity:

The reduction of toxicity is a suitable approach to cleaner production. Especially, in the te xtile industry, compounds that contribute to the aquatic toxicity of textile effluent include salt metals, surfactants, toxic organic chemicals, biocides and toxic anions. Some methods of reducing the use of these compounds are to:

- Reduce metal content through careful prescreening of chemicals and dyes for metal content and using alternatives where possible
- Eliminate galvanized plumbing as reactions with brass fittings can take place in the presence of acids, alkalis or salt and lead to the release of zinc
- Reduce the amount of salt in the effluent by optimizing recipes, using low salt dyes , reusing dye baths and optimizing dyeing temperatures
- Use biodegradable surfactants such as linear alcohol ethoxylates
- Replace chlorinated solvents with unchlorinated alternatives
- Replace the use of biocides with ultraviolet light as a disinfectant for cooling tower s

7.6 Reducing noise pollution:

The following steps can be taken to reduce noise pollution

- Install screens and sound baffles on fans
- Regular maintenance of machinery
- Fit anti vibration mounts on machines, and
- Fit walls with sound absorbing materials

Chapter: 8 Results and Discussion

Various kinds of machinery and chemicals used for the processes of desizing, scouring, bl eaching, dyeing and finishing of textile materials have been well described. It has become possible in recent years to improve the efficiency of these processes by the use of specia l chemical assistants which are now marketed under the name textile auxiliaries. These as sistants have indeed now become essential and no dyer or finisher would think of process ing textile materials without first considering whether or not possible to make the process more effective or to carry out more expeditiously by the use of selected textile auxiliary. The water used in the process is almost entirely discharged as waste, the average begin 1 50 to 175 liters of waste water for every Kg of fabric processed. This poses a great dema nd for ground water. Untreated effluents from these processes contain high concentration of ionic substances, organic color and reactive dyestuffs. Heavy metals, which are used fo r fixing color in the dye, also present; that could endanger the aquatic life. Some of the d yes present in the waste water are carcinogenic and harmful not only to human beings als o to plants and animals

Waste water temperature is another major from of pollution. In dyeing processes, so much hot water is discharge that, in the absence of any counter-

measures, total waste water temperature may exceed40c, even though 35c is the maximum permissible temperature, in many cases this heat can be recovered in heat exchangers, an d then returned to the process.

A pH of between 6 and 9 is prescribed for waste water discharged from treatment plants. Because partially acidic alkaline waste water is produced in the mill, according to the tre atment stage and process, a balancing tank to hold around 50% of the daily waste water quantity is normally required by the approving authorities.

The usage of water and chemicals is very essential in textile processes, some chemicals a nd dyes arc recognized as hazardous to health; others are not. However it cannot be sure that all hazards are known and the impact of theses chemicals has not been sufficiently in

vestigated, so it is wise to take the right precautions when handling chemicals as stated b y HSE (Human Safety Equipment) information sheets. Untreated effluents from these proc esses contain high concentration of ionic substance, organic matter, heavy metals, which i n some cases not fully biodegradable and danger the aquatic life.

According to the current work made in the local mills it has been found that: there isn't a ny respect for the international standard regarding usage of chemicals in textile industry. Protective measure is neglected, most of the staff has poor knowledge about different che micals and hazardous related to it. Moreover no waste water treatment is applied within t he mills.

The environment and specification Administration didn't work in the textile mills because most of them were not working. They have no equipment to measure the chemicals residu es in the fabrics, since the official governmental unit who are responsible for rules and st andards formulations are not capable to do their role, so obviously the owner of the factor ies will not pay any attentions for the environment and workers health or the impact from misuse of hazardous chemicals.

Chapter: 9 Conclusion and Recommendation

9. Conclusion and Recommendation

9.1 Conclusion:

At the end of the present work and through the field work in textile mills, the followings are often predominate, typically they are:

- Low level of technology.
- Poor knowledge of textile chemicals and their hazards.
- Unspecialised workers.
- Protective measures are neglected.
- Lack of modernisation.

- Poor environmental performance.
- There are high risks from occupational and environmental exposure.
- No sufficient waste water treatment.

9.2 Recommendation:

Based on the gathered information and experience gained through out the course of this w ork here are some recommendations:

- Raise environmental awareness.
- Establishment of the cleaner production center for monitoring all industries.
- Apply the environmental management system.
- Improvement of the working conditions.
- Doing environmental impact assessment for the present mills and projects.
- Capacity building.

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