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Implementation & Performance analysis of Effluent treatment plant for waste water treatment in the dyeing textile industries

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Abstract: Effluent Treatment Plant (ETP) is one of the most important & prominent part of Textile dyeing sector. The discharged water is properly treated in the ETP plant to ensure that the discharged waste water is not harmful for nature. If the ETP is performed properly in the industry it ensures the smooth & ethical production operation of the manufacturing units. The ETP unit of some of Bangladeshi dyeing textile unit is taken into consideration for this research. After taking the raw water directly discharged from industry is taken for the parameter checking. Analyzing the acquired result it is clear that if the management of the dyeing unit becomes loyal to the environment with ethics & operate the ETP properly than most of the dyeing industry would perform best with ISO standard. The common measurement & procedures available in the dyeing factory is used to measure the characteristic of discharged waste water.

Keywords: Effluent treatment plant (ETP), Waste water, Dyeing Textile, water quality, BOD, COD, P^H.

1. Introduction

The effluent generated from different sections of a textile mill must be treated before they are discharged to environment. Various chemicals & physical means are introduced for this purpose. The effluent treatment plant in dyeing industry is chemical-biological combination process developed [1].

Water is basic necessity of life used for many purposes one of which is industrial use. Industries generally take water from rivers or lakes but they have to pay heavy taxes for that. So it's necessary for them to recycle that to reduce cost and also conserve it. Main function of this ETP is to clean GCP effluent and recycle it for further use [2], [3].

The basic thrust of the technology is to convert entire quantity of effluent to zero level by separating water and salt using evaporation and separation technology. The concept and the treatments are based on the removal of the entire COD/BOD and the condensate coming out to meet the fresh water quality requirement in the process [4].
Textile dyeing industries need huge quantity of water for textile dyeing, which they normally pump out repeatedly from the ground or natural water sources resulting in depletion of ground water level.

The untreated textile wastewater can cause rapid depletion of dissolved oxygen if it is directly discharged into the surface water sources due to its high BOD value. The effluents with high levels of BOD and COD values are highly toxic to biological life. The high alkalinity and traces of chromium which is employed in dyes adversely affect the aquatic life and also interfere with the biological treatment processes. The quality of such effluent can be analyzed by their physicochemical and biological analysis. Monitoring of the environmental parameters of the effluent would allow having, at any time, a precise idea on performance evaluation of ETP and if necessary, appropriate measures may be undertaken to prevent adverse impact on environment [5].

In the dyeing process textile industries generate huge quantity of toxic effluent containing colors, sodium Sulphate, sodium chloride, sodium hydroxide and traces of other salts. These are generated after dyeing and after washing of garments / fabrics. After dyeing the waste water produced is called Dye Bath water and after washing the waste water generated is called wash water. Dye Bath contains higher solids in the range 4-5% whereas wash water contains only 0.5-1% solids [6], [7].

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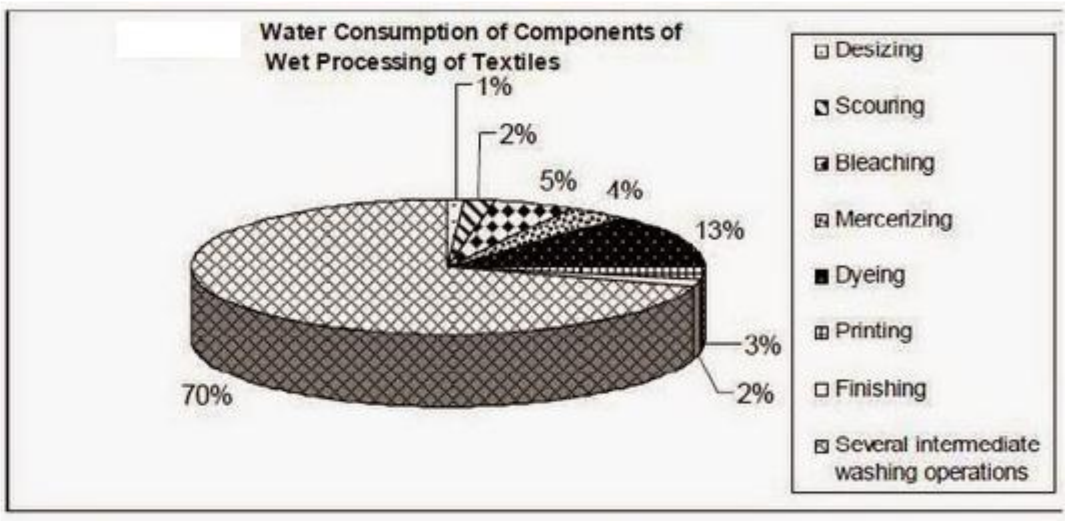

Figure 1: Water consumptions of dyeing Textiles

Based on the above mentioned fact "SSP" has developed a technology which can process such harmful toxic effluent water and transform it into reusable water. Thus the textile industries will have the advantage of using the same water in the dying process repeatedly; also the salt used for dyeing can be reused or sold in the market. The technology offered by SSP can overcome all problems pertaining to environmental pollution in respect to textile dying industries [8], [9], [10].

Other major uses of water in the textile industry

- Steam generation (boiler feed water)
- Water treatment plant (reject stream, periodic cleaning of reverse osmosis plant, regeneration and washing of demineralization, softener plant, back wash of media filters);
- Cooling (processing machines, cooling tower);
- Humidification (spinning process); and
- Domestic purposes (irrigation of lawn and garden, sanitation, cleaning, drinking and miscellaneous uses).

There are different types of ETP plant available in the dyeing companies. Effluent is the stream of excess chemical liquor extracted from the industry after using in original operation such as the excess dye liquor, effluent of pretreatment, after treatment etc. The effluent contains various chemicals that are harmful for the environment. Industrial effluent generated from different processes are treated with various chemicals to remove or neutralize the environmentally toxic materials present in it, before discharging it to surface or ground water. This is called effluent treatment [11], [12], [13].
There are generally three types of ETP found in our country –

1. Chemical ETP
2. Biological ETP
3. Bio-chemical ETP.

2. Effluent Generation and Characteristics

Wet processing of textiles involves, in addition to extensive amounts of water and dyes, a number of inorganic and organic chemicals, detergents, soaps and finishing chemicals to aid in the dyeing process to impart the desired properties to dyed textile products. Residual chemicals often remain in the effluent from these processes. In addition, natural impurities such as waxes, proteins and pigment, and other impurities used in processing such as spinning oils, sizing chemicals and oil stains present in cotton textiles, are removed during desizing, scouring and bleaching operations. This results in an effluent of poor quality, which is high in BOD and COD load. Table 1 lists typical value of various water quality parameters in untreated effluent from the processing of fabric using reactive, sulfur and vat dyes and compares these to the DOE effluent standards for discharge into an inland surface water body (e.g. river, lake, etc.). As demonstrated, the effluent from textile industries is heavily polluted [14], [15].

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Table 1: Textile Industry waste water Characteristic

Parameters	Standard Effluent	Cotton	Synthetic	Wool
P^H	5.5-9.0	8-12	7-9	3-10
BOD	30-50 PPM	150-750 PPM	150-200 PPM	5000-8000 PPM
COD	100-250 PPM	200-2400 PPM	400-650 PPM	10,000-20,000 PPM
TDS	1500-2100 PPM	2100-7700 PPM	1060-1120 PPM	10,000-15,000 PPM

2.1 Discharge Quality Standard for Classified dyeing Industries:

Table 2: Quality standard of classified dyeing industries

Serial No.	parameters	Units	Typical values	DOE standards for waste from textile dyeing house
1.	Appearance	-	Colloidal	-
2.	P^H	-	8-10	6-9
3.	Color	-	Intensive colored	-
4.	Heavy metals	mg/l	10-15	Varies depending on types of metal
5.	Suspended Solids	mg/l	200-300	150
6.	TDS	mg/l	5000-6000	2100
7.	COD	mg/l	1500-1750	200
8.	BOD	mg/l	500-600	50
9.	Oil & Grease	mg/l	40-60	10
10.	Surfactants	mg/l	10-40	-
11.	Sulphide as S	mg/l	50-60	1

3. Description of the ETP

Equalization Tank: The waste water are collected and treated in the equalization tank. This waste water is alkaline in nature. Solution of H_2SO_4 or HCL is dosed here to neutralize the waste water from alkaline condition.
P^H control tank: In this tank, ferrous sulphate is used to control the pH of the effluent. The pH of the effluent comes down to 6-7 from the value 10-11.
Flocculation tank: In this tank, polyelectrolyte & alum is used so that the smaller particle of the effluent agglomerated. Thus sludge is produced in this tank.
Primary Clarifier: In this tank, the sludge is separated also the measure the amount of sludge to monitor performance of the flocculation clarifier. The sludge is taken outside and buried down.
Aeration tank: In this tank, air is introduced in the effluent and cow dung present in this tank increase the production of bacteria. The air is passing from under the tank. This helps in reducing the amount of BOD & COD value and also high oxidation efficiency is got for diffused aeration system.
Secondary clarifier: Primary clarifier cannot separate sludge alone from the effluent. The remaining sludge is separated in this tank as well as the TDS value of the effluent is reduced.
Chlorination tank: In this tank, sodium hypochlorite is used. As a result, the color of the effluent is changed into color less or in pale yellow color. Also the disinfection of the effluent is done through chlorination in this tank [16], [17], [18].
Screening, Equalization and Skimming: Screens are very simple materials having iron bars in the form of square grids. Effluent is allowed to pass through the grid when large and coarse solid materials are arrested by it allowing smaller particles and effluent to pass through. In some several grids are use with diminishing grid sizes.

Equalization tank is a large chamber which is designed for retention time of 12 hours. This means if the rate effluent is 30 cubic meters then the capacity of the equalization tank has to be30 X 12 = 360 cubic meters. The equalization tank is specially built where air is blown by two blowers alternately round the clock on continuous basis. The purposes of equalization are (i) to supply oxygen so that DO level increases and (ii) to mix various types effluents and (iii) to reduce the temperature of the water. On the top surface of the equalization tank there is a scrapper used to skim the oily substances.

Biological Treatment: The objective of biological treatment of industrial wastewater is to remove, or reduce the concentration of organic and inorganic compounds. Biological treatment process can take many forms but all are based around microorganisms, mainly bacteria.

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These microorganisms use components of the effluent as their food and in doing so break them down to fewer complexes and less hazardous compounds. In the process the microorganisms increase in number. There are two main types of processes, these involve suspended microbial growth (e.g. activated sludge) and attached microbial growth (e.g. fixed film). With both approaches large populations of microorganisms are brought into contact with effluent in the presence of excess oxygen. In both systems the microbial population has to be retained in the reactor. With suspended growth systems microbes grow in small aggregates or flocks (this is known as activated sludge).Activated sludge (AS) leaves the reactor with the treated effluent but is settled out in a clarifier and returned to the aeration unit. If the amount of AS is excessive some may be disposed of rather than being recycled. In fixed film systems the microbial population grows as a thin layer on the surface of an inert support medium. The classical fixed film system is known as a percolating or biological filter and uses small stones as a medium to support microbial growth. In the more modern system microbes grow on plastic supports. In the traditional percolating filters effluent is sprayed over the medium and trickles through a packed bed with oxygen entering from the air. In more recent reactor designs, the medium (usually plastic) are submerged in effluent and air is blown into the base of the reactor. Traditional percolating filters require large areas of land and are unlikely to be of use in Bangladesh due to land costs. Submerged fixed film reactors using plastic media require much less land and are potentially of value in treating textile wastes. These plastic media are now widely used and known as Moving Bed Biological Reactor (MBBR).

MBBR systems require a final clarifier to remove particles of bio film that become detached from the medium. However, this material is not recycled to the reactor [19], [20].

The chemical reactions that took place in the MBBR reactor can be defined according to the following three processes;

A. Oxidation process

COHNS + O_2 + Bacteria + DAP and UREA CO_2 + NH_3 + Energy + Other end Products

DAP and Urea are used as food for the microorganism.

B. Synthesis Process

COHNS+O_2+ Bacteria $C_5H_7NO_2$ (New bacteria)

While most of the activated sludge is recycled some may be surplus to requirements and needs to be disposed of, as does detached bio film from film reactor. This material must be disposed appropriately so that the pollutants now present in this sludge do not enter the water cycle. The treated liquid is discharged to the environment or taken for further treatment depending on the desired standard of effluent quality or the required use of the wastewater. Biological treatment plants must be carefully managed as they use live microorganisms to digest the pollutants. For example some of the compounds in the wastewater may be toxic to the bacteria used and pre-treatment with physical operations or chemical processes may be necessary. It is also important to monitor and control pH as adverse pH may result in death of the microorganisms. The ETP must be properly aerated and must be operated 24 hours a day, 365 days a year to ensure that the bacteria are provided with sufficient food (i.e. wastewater) and oxygen to keep them alive. Like humans microorganisms need a balanced diet with sources of carbon, nitrogen, phosphorus and sulfur. While textile wastes have enough carbon and sulfur (sulfate) they are generally lacking in nitrogen and phosphorous containing compounds. If the microorganism is to grow and work effectively they are likely to need addition of nutrients. Normally materials such as urea and ammonium phosphate are added. It is possible to replace these nutrients by substituting the liquid portion of effluent from toilets, which is rich in nitrogen and phosphorus containing chemicals (the solid portion may cause problems). Both activated sludge and fixed film systems can produce high quality effluent but both in have advantages and disadvantages. In the AS process the settling and recycling of AS to the aerobic reactor is vital, and the settling process can be difficult to accomplish. Fixed film/MBBR systems do not require recycling of biomass and so do not present this problem.

Anaerobic digestion: Anaerobic digestion is the biodegradation of complex organic substances in the absence of oxygen to yield carbon dioxide, methane and water. It is an effective process for treating high COD wastes (e.g. size, desize washing and scouring) and the methane that is produced can be utilized as energy for heating etc. The reducing conditions in an anaerobic digester have been found to cause de

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colorization of azo dyes through cleavage of the azo bond and subsequent destruction of the dye chromospheres. Complete mine realization of these degradation products does not take place and aromatic amines may be present in the effluent from the digester [21], [22].

4. Effluent Treatment Plant Design

Textile industries (fabric dyeing and chemical treatment industries) are classified according to the Environmental Conservation Rules 1997 as Red category industries, and therefore an ETP must be designed and constructed to treat plant effluent. The effluent from the plant must meet the national effluent discharge quality standards, including the "Quality Standards for Classified Industries", before discharge to the environment. These quality standards must be ensured at the moment of beginning trial production. The waste discharge standards differ according to the final disposal place of the effluent. The effluent standards are presented in. It is the DOE's mandate to enforce this legislation, and this guide provides the tools required to assess the ETPs proposed by textile industries in the EMP/EIA.

There are various types of ETPs and their design will vary depending on the quantity and quality of the effluent, amount of money available for construction, operation and maintenance, and the amount of land available. There are three mechanisms for treatment which are: Physical, Chemical and Biological. These mechanisms will often be used together in a single ETP [23], [24].

There are generally four levels of treatment, as described below:

- **Preliminary:** Removal of large solids such as rags, sticks, grit and grease that may result in damage to equipment or operational problems (Physical);
- **Primary:** Removal of floating and settable materials, i.e. suspended solids and organic matter (Physical and Chemical);
- **Secondary:** Removal of biodegradable organic matter and suspended solids (Biological and Chemical);
- **Tertiary:** Removal of residual suspended solids / dissolved solids (Physical, Chemical and Biological)

There are many ways of combining the operations and processes in an ETP:

- A properly designed biological treatment plant, which typically includes screening, equalization, pH control, aeration, and settling, can efficiently satisfy BOD, pH, TSS, oil and grease requirements. However the compounds in industrial effluent may be toxic to the microorganisms so pretreatment may be necessary. Most dyes are complex chemicals and are difficult for microbes to degrade so there is usually very little color removal.
- Another option is a physico-chemical treatment plant, which typically includes screening, equalization, pH control, chemical storage tanks, mixing unit, flocculation unit, settling unit and sludge dewatering. This type of treatment will remove much of the color depending on the processes used. It can be difficult to reduce BOD and COD to meet effluent standards and it is not possible to remove TDS.
- Most often, physico-chemical treatment will be combined with biological treatment. The typical components of such a plant are screening, equalization, and pH control, chemical storage, mixing, flocculation, primary settling, aeration, and secondary settling. The physico-chemical treatment always comes before the biological treatment units. Using a combination of treatments will generally reduce pollutant levels to below the discharge standards. 4-8
- Another form of biological treatment is the reed bed, which can be used with a settling tank, or in combination with other treatment processes It presents a natural method of treating effluent which is often lower in capital, operation and maintenance costs. Reed beds can contribute to a reduction in color, a decrease in COD, an increase dissolved oxygen and a reduction in heavy metals, but function best with some form of pretreatment.

As discussed, there are many options for the design of an ETP. The type of plant and the various components of the plant will depend on the characteristics of the effluent. In evaluating an ETP design in an application for an ECC, it is necessary to determine whether the components of the ETP are sized correctly for the flow and to assess whether the effluent is likely to meet the requirements of the discharge standards [25], [26].

5. Procedure for ETP operation

The production of textile goods involves spinning (fiber to yarn), weaving / knitting (yarn to fabric), chemical (wet) processing, and garment manufacturing. The majority of the water consumption (72%) takes place in the chemical (wet) processing of textiles. The water is required for preparing the fabric for dyeing, printing and finishing operations, Intermediate washing / rinsing operations and machine cleaning.

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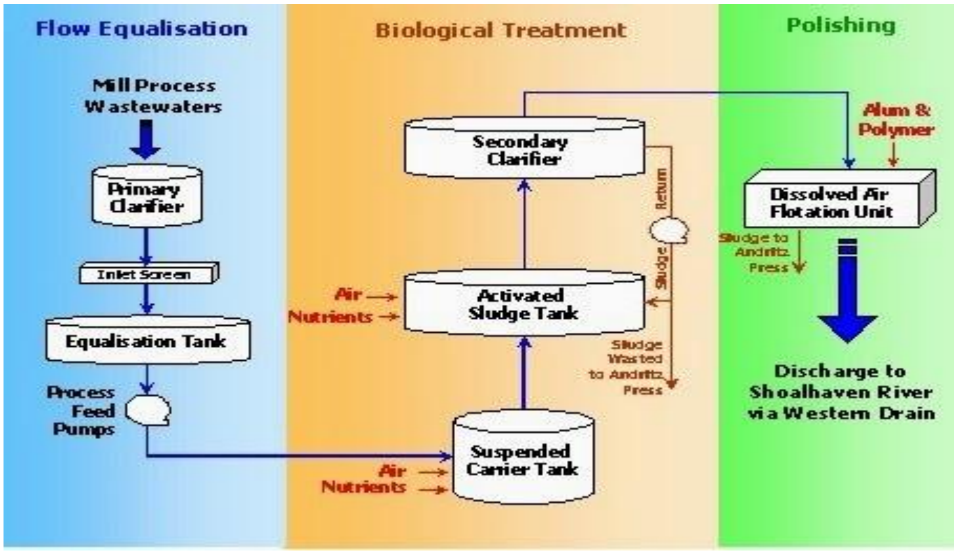

Figure 2: Typical Biological treatment plant

6.1 Process Description

I. Inlet Launder

The purpose of launder is to flow the effluent of gas scrubber to distribution chamber Inlet channel is designed for a surge flow of 1950m^3/hr @ slope of 2% so water flows at 1.5m/s(self cleaning velocity).Self cleaning velocity is that velocity at which if the sludge flows it will not get accumulated in the launder.

II. Distribution on chamber

Purpose of distribution chamber is to divide the flow (design flow of 1140m3/hr) into two equal flows. In case if one of the thickeners is closed then there would be no distribution so selection of pipes is done on these criteria. The size of gates is designed such that there is equal distribution always.

III. Flash Mixer

There are two flash mixers designed for a flow of 1140m3/hr with a retention time of 60 sec. So its volume must lie around 19m3. In flash mixer alum (coagulant) acts upon sludge so that suspended solids settle down. In addition pH of sludge is also raised by lime as it is required to have a pH of 7-9. Polyelectrolyte (flocculants) also acts upon to fasten the process of coagulation.

6.2 Chemicals used & their colors

Chemicals used	**Appearance**
Ferrous sulphate	Granular solid, greenish color
Lime	White bulk form
Polyacrylate	White granular solid
Sulphuric acid	Clear liquid
Alum	White bulk form
Na-hypochlorite	Clear liquid
Hydrochloric acid	Clear liquid

Multi Filter: In this filter, extra suspended impurities are separated through passing the effluent is sand bath. The water got from this tank is now reserved for using it in the toilet flash and the remaining water is discharged into the land.
Consumption of the chemical used: Approximately for the output of the ETP is about 1650 m^3/day.

Chemical Name	**Chemical Used**
H_2SO_4 & HCl	25 Kg/day
Lime	250Kg/shift
Alum	250 Kg/day
Polyelectrolyte	1 Kg/day
H_3PO_4	1 Kg/shift
Urea	1 Kg/shift

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6.3 Functions of different chemicals

H_2SO_4& HCL:

- Neutralize the water from alkaline state.

Ferrous Sulphate/Aluminum sulphate:

- To control the p^H.

Lime:

- To vanish the color of the effluent.

Alum & Polyelectrolyte:

- To agglomerate the smaller particles.
- For sedimentation of the smaller particle.

H_3PO_4/Urea:

- For increasing the production of the bacteria.

6.4 Flow chart of effluent treatment

Raw effluent
↓
Skin chamber
↓
Collection Sump
↓
Pump station
↓
Dissolved Air Floatation Tank
↓
Clarifier
↓
Aeration tank
↓
Setting tank
↓
Clear water, pH check
↓
Sand filter
↓
Carbon filter
↓
Drain

6.5 Sludge separation

Sludge of DAF
↓
Sludge thickening plant
↓
Sludge drying

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Figure 3: Effluent treatment plant

6.6 Description of Effluent Treatment Plant Process Sequence in Textile Industry

Cooling & Mixing

After primary filtration, the liquor passes to cooling and mixing tank in which uniform mixing of effluents from various process takes place. A paddle mixer is provided for mixing. Cooling of the effluent may be done with the help of cooling tower.

Neutralization

The effluent is pumped to a tank in which it is neutralized by acid or alkali dozing. The tank has an automatic dosing controller which at automatically control the dose of acid or alkali to maintain the required P^H.

Coagulation

Then the effluent is pumped to the coagulation tank. Chemical coagulation very effective for removal of color and suspended materials, aluminum, ferrous Sulphate, ferric chloride, chlorinate copper etc. to increase the efficiency of coagulation, coagulation gain may be added for example polyacrylate.

Setting & Separation of Sludge

Some of the soluble organic matter and light suspended solids will form a blanket of flocculent matter with the coagulants. The blanket is skimmed off to another tank and the remaining solution is moved to pressure filter.

Pressure Filter

For pressure filtration vacuum pumps may be used to force through the filter and suspended flocks are collected in the pressure fine filter.

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Discharging to Drain
After filtration the purified water sent to drain which eventually reach to the river or anywhere else.

6.7 GENERAL STRUCTURE OF CLARIFIER

The clarifier separates the treated slurry from clean water. The sludge settles down and cleans water at the top flows down to the cooling tower from where it is cooled and recycled. According to PG the SS content in this water must not be greater than 100 ppm. The clarifier has a racker arm which extracts the sludge out of clarifier. In case if sludge height goes higher than the racker arm then it will automatically lift up and then settle down taking sludge with it. From here sludge is pumped to sludge tank.

Suspended Carrier Tank

In the first tank, organisms are grown on the inside of special plastic rings. This tank performs most of the treatment. The organisms appear as a thin brown film on the rings.
Sludge tank

In the sludge tank the sludge is continuously agitated in order to prevent settlement of sludge. Each tank has capacity of 224m3 and can hold for 8 hrs. Main purpose of the tank is to hold sludge for transfer to filter press. From sludge tank the sludge is pumped to filter press by filter press feed pump. In the second tank organisms which are suspended in the tank perform the rest of the treatment. The organisms are very small and appear as a fine brown sludge (called Activated Sludge) in the tank.

Secondary Clarifier
The third tank is a clarifier in which the suspended organisms are separated from the treated effluent by settling. The settled organisms are pumped back to the second tank to keep them in the system.

Filter press
Sludge from the sludge tank will be pumped to the Filter Press equipment's for dewatering purpose. According to performance guarantee the cake moisture should not be more than 20%. For this purpose different types of filters are used namely- gravity setters, gravity belt filters, centrifuges, vacuum or pressure belt filters and filter press. But among these filter press is most efficient and economical. Other filtration systems offer high pressure filtration, but only the filter press has both high pressure capability and efficient filter cake removal. The filter elements are constructed of lightweight polypropylene. They are extremely corrosion resistant and virtually eliminate plate breakage.

Filter process Polishing
The treated effluent from the clarifier is further treated by flocculation with chemicals followed by Dissolved Air Flotation. This step polishes the effluent before discharge to the river.

Dewatering
Dewatering is accomplished by pumping a slurry or sludge into chambers surrounded by filter membranes. As pumping pressure is increased the filtrate is forced through the accumulated filter cake and membrane until the chamber is full of solid filter cake. The chambers are formed by two recessed plates held together under hydraulic pressure. The hydraulic ram moves the follower against the stack of filter plates closing the press. The ram continues to apply sealing pressure of sufficient force to counteract the high internal compaction pressures.

The head stock and tail stock are held in place by specially engineered side rail support bars. The filtrate passes through the membrane and is directed by channels in the plates and drain ports to the head stock for discharge. The filtrate typically contains less than 15 PPM suspended solids. The filter cake is easily removed by simply reversing the hydraulic ram, thus opening the press. The lightweight plates may then be moved apart, permitting the compacted cake to fall from the chambers. Higher the internal pressure, the greater the solids compaction. The standard press is constructed to withstand 100 PSI compaction pressure producing a hard dry cake. The special high pressure press can withstand 225 PSI for sludge more difficult to dewater.

6.8 Ozone Treatment for Textile Effluent Treatment Plant COD, Color Removal Ozone Wastewater

The use of ozone in textile effluent treatment appears to be a very attractive alternative with considerable application potential. Ozone is a powerful oxidizing agent when compared with other well knows oxidizing agents. Ozone is capable of causing the degradation of dyes.

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6.8.1 Advantages of Ozone Generator in Textile Industry Effluent Treatment Plants

- Ozone reduces COD.
- Ozone reduces BOD.
- Ozone removes Color.
- Ozone eliminates Odor.
- Ozonation increases the biodegradation effectiveness.
- Decomposes rapidly, leaving no harmful byproducts.
- Increase efficiency of Filter.

6.8.2 Benefits of Ozone Generator in Textile Industry Effluent Treatment Plants

- Due to its unstable physical property, it should be generated at the point of application for use in treatment purposes.
- After chemical oxidation residual ozone reverts to oxygen.
- Environment friendly gas.
- Can be retrofitted to existing and new treatment plant.
- Low operating cost.
- Easy to operate & handle.

7. Results & Discussions

This process is provided for treating the effluents of dyeing, printing, finishing, weaving & thus allow discharging it as per norms given by World Bank department of environment of Bangladesh. This process comprises of collecting, pumping, clarification, filtering, setting, aeration, pH correction, discharging, etc.

Characteristics of raw effluents

P^H	: 10-12.5
BOD	: 500-800 PPM
COD	: 1300-2000 PPM
TDS	: 2000-5000 PPM
TSS	: >250-300 mg/l
SS	: 100-400 PPM
Color	: Black/ Blue
Temperature	: About 80^oC

Requirement of dischargeable effluent as per World Bank

p^H	: 6-8
BOD	: <50
COD	: <250
SS	: <100
TDS	: Not stated
Color	: Clear

Product quality check

Following chemical tests are carried out to check the quality:

- BOD
- COD
- Total suspended solids
- Total dissolved solids
- Color
- pH

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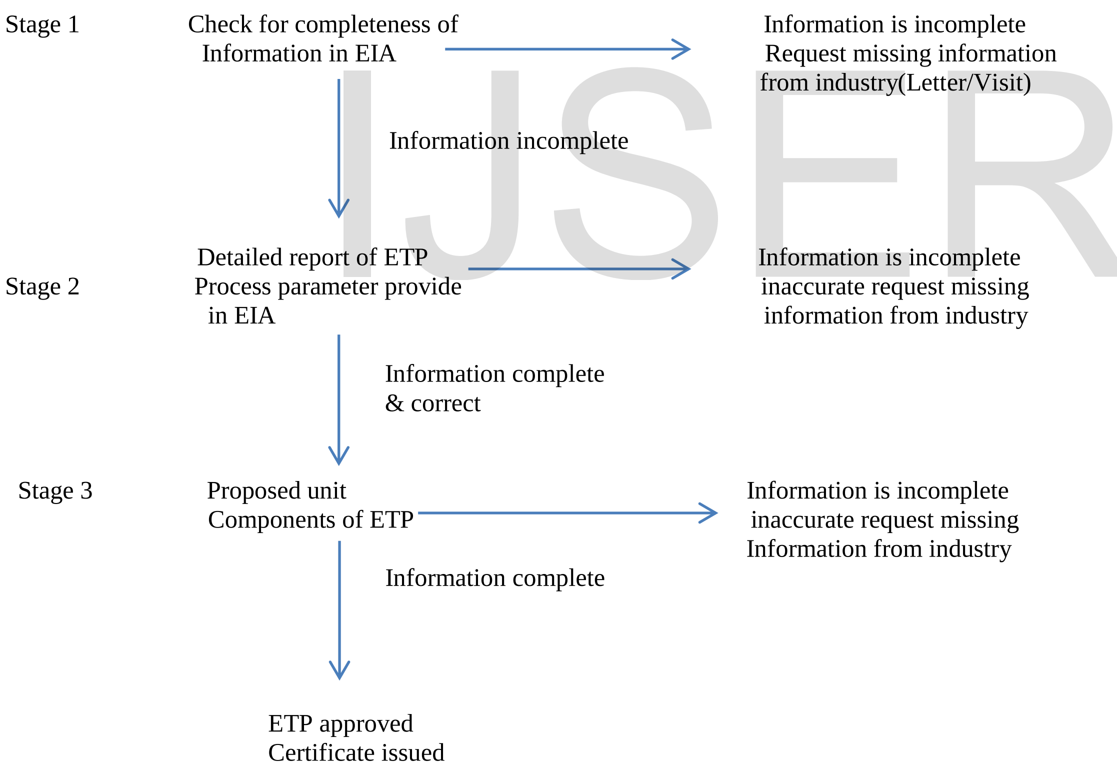
Table 3: ETP outlet water characteristic

TYPES OF WATER	pH	TDS (mg/lit)	TSS (mg/lit)	BOD (mg/lit)	COD (mg/lit)
ETP OUTLET(Before treatment)	**8.2**	**2096**	**62**	**47**	**134**
ETP OUTLET(After de colorant & sand filter)	**7.9**	**2115**	**5**	**14**	**62**

7.1 Overview of Stages in ETP Assessment Procedure

Figure Shows the ETP assessment procedure. There are 3 stages for reviewing an ETP design and checklists are provided for each. As indicated, in any stage if the information provided for the proposed ETP is found to be inadequate, incorrect or outside the guideline values, the industry must be consulted to provide or correct the information.



8. Conclusions

Recently the economy of Bangladesh is totally dependent on the exporting of Readymade garments (RMG). Dyeing is most prominent sector of RMG sector in Bangladesh. Everyday huge amount of waste water is discharged from the textile dyeing sector. It is essential to treat the waste water properly to ensure the purity of our environment. If the BOD, COD, Do, P^H level is not maintained properly the environment will be affected strongly. All most all the dyeing factories in Bangladesh exists the ETP section. If the Government as well as the responsible authority take necessary initiatives to implement the rules & regulations properly for ETP properly it would be extremely helpful for Bangladesh to save the environment.

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In Bangladesh and other countries in the region effluent treatment from textile dyeing factories and other industrial processes is usually required by law and often expected by international buyers. Despite this, treatment is regularly below standards and is rarely checked either by the factory, environment departments or buyers. There are a several reasons for this but the bottom line is usually a lack of funds and technical expertise. The main problems experienced by factories with ETPs are inadequate treatment due to incorrect dosing of chemicals required in the treatment process or inactivity and even death of necessary micro-organisms, due to the pH or lack of nutrients. All of these can be addressed through better management; usually by chemical dosing properly. By regularly monitoring and understanding their wastewater properly ETP managers can make effective decisions to achieve optimal ETP functioning.

Furthermore, factories supplying international buyers can use this data to demonstrate their 'green' credentials and thus generate more business or at the very least maintain their share in an increasingly competitive global market. The untreated textile wastewater can cause rapid depletion of dissolved oxygen if it is directly discharged into the surface water sources due to its high BOD value. The effluents with high levels of BOD and COD values are highly toxic to biological life.

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Industry:

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ii. FAKHRUDDIN TEXTILE MILLS LIMITED
iii. NAZ Bangladesh Ltd.
iv. Aswad composite mills limited
v. Experience Textiles Limited