COMPANY PROFILE

Chemical Engineering Construction Co.(BD)

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Scope of Work:

1. **ETP:**

- **Textile Industries**
- **Pharmaceuticals Industries**
- **Sugar Industries**
- **Paper Industries**
- **Leather Industries**
- **Food & Beverage Industries**
- **Milk Processing Industries**
- **Fish Processing Industries**
- **Hospital**
- **Hotel**
- **Battery Industries**
- **Power Plant**
- **Fertilizer Industries**
- **Fish Processing Industries**
- **Meat Processing Industries**

2. **STP**
3. **WTP**

Machinery Origin:

- **Germany;**
- **Italy;**
- **Spain;**
- **Sweden;**
- **Denmark;**
- **Hungary;**
- **USA;**
- **UK;**
- **India;**
- **China;**
- **Taiwan;**
- **Japan;**
- **Korea;**
- **Bangladesh.**

Treatment Procedure:

- Biological (Anaerobic – Aerobic Process)
- Biological (Aerobic Process)
- Biological Anaerobic-Anoxic-Aerobic Process (A2O)
- Chemical Treatment Process
- Bio-Chemical Treatment Process
- AoP (Advance Oxidation Process for water recycling)
- RO

Used Microorganisms:

- Anaerobic
- Aerobic

Used Chemical

- Sulphuric Acid
- Water De-colorant
- Polyelectrolyte
- Ferrous Sulphate
- Lime
- Alum
- Sodium Hypochlorite
- Antifoaming Agent
- Liquid Caustic Soda
- Oxygen Riser

Filter Media

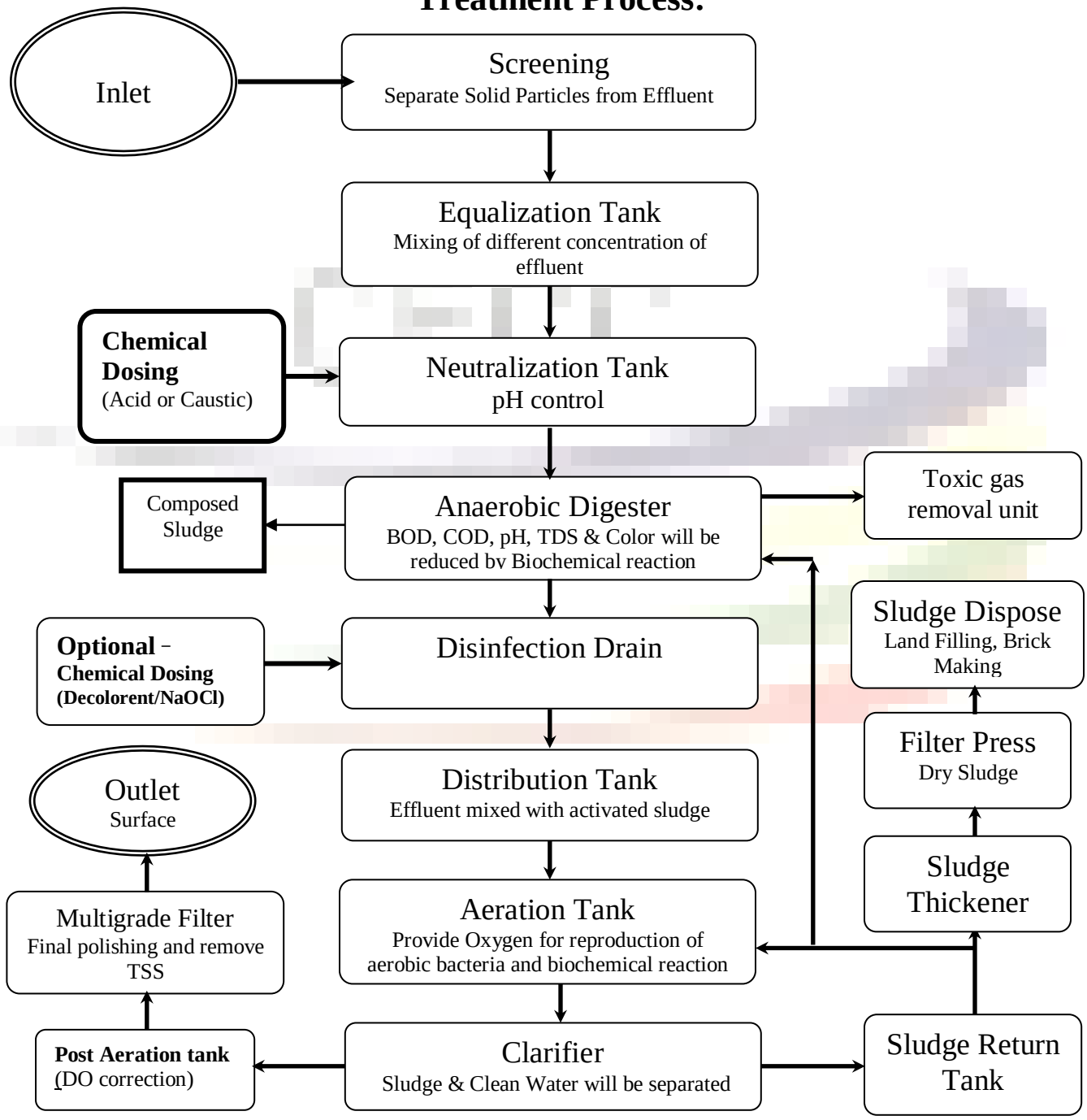
- Activated Carbon
- Sand
- Gravels
- Stone Chips

Maintain the following Parameters and Standard of treated Effluent:

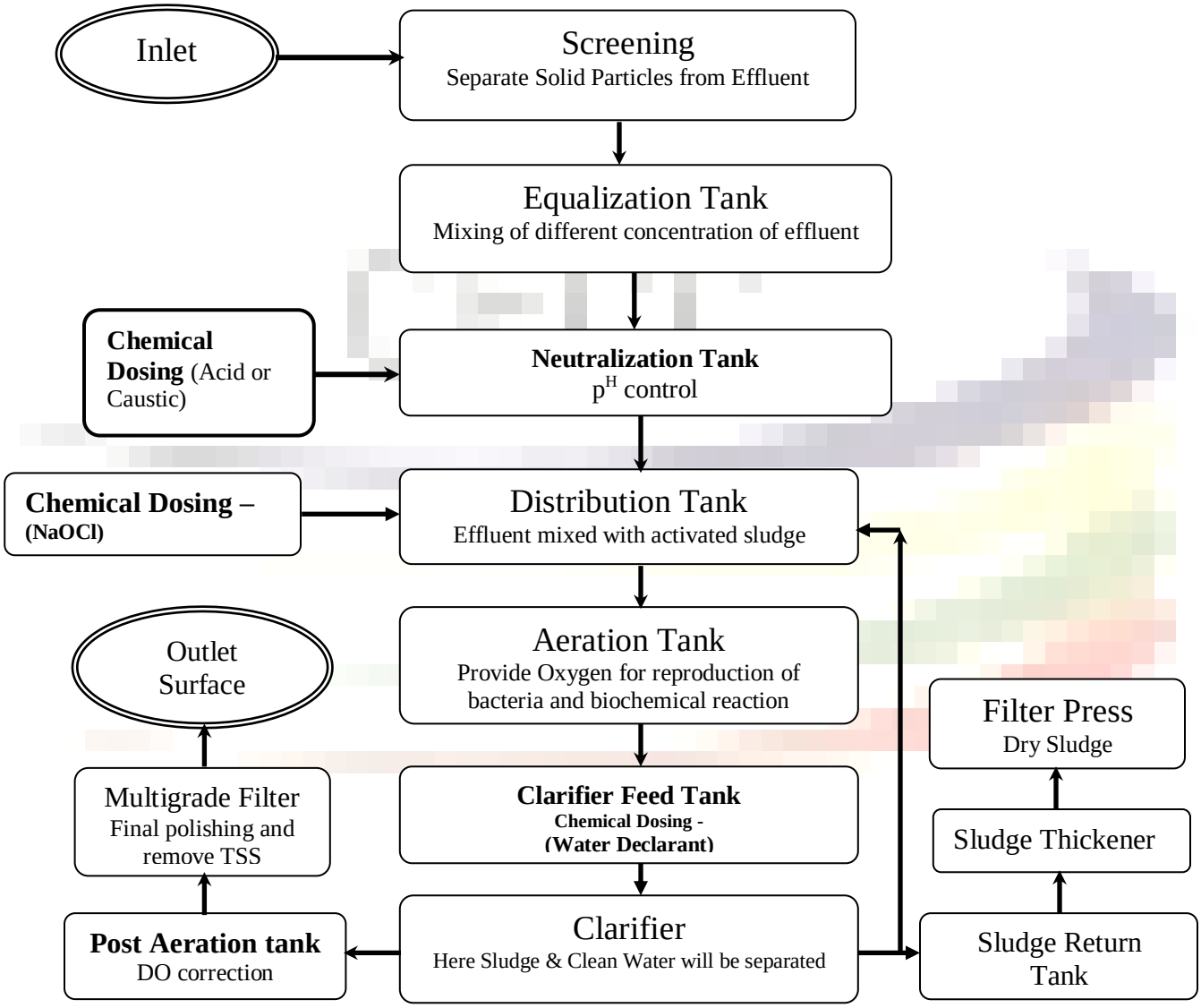
Parameter	World bank	Dept.of Environment (GoB)	Discharge Water quality
pH	6-8	6-9	7.3 - 7.5
BOD_5	29-60 ppm	30 ppm	< 30 ppm
COD	200 ppm	200 ppm	< 200 ppm
TSS	32-60 ppm	100 ppm	30 ppm
TDS	2100-2200 ppm	2100 ppm	2100 ppm

DO	-	4.5 – 8.0 ppm	4.5 – 6.0 ppm
Color	220 Pt.Co	-	200 Pt.Co

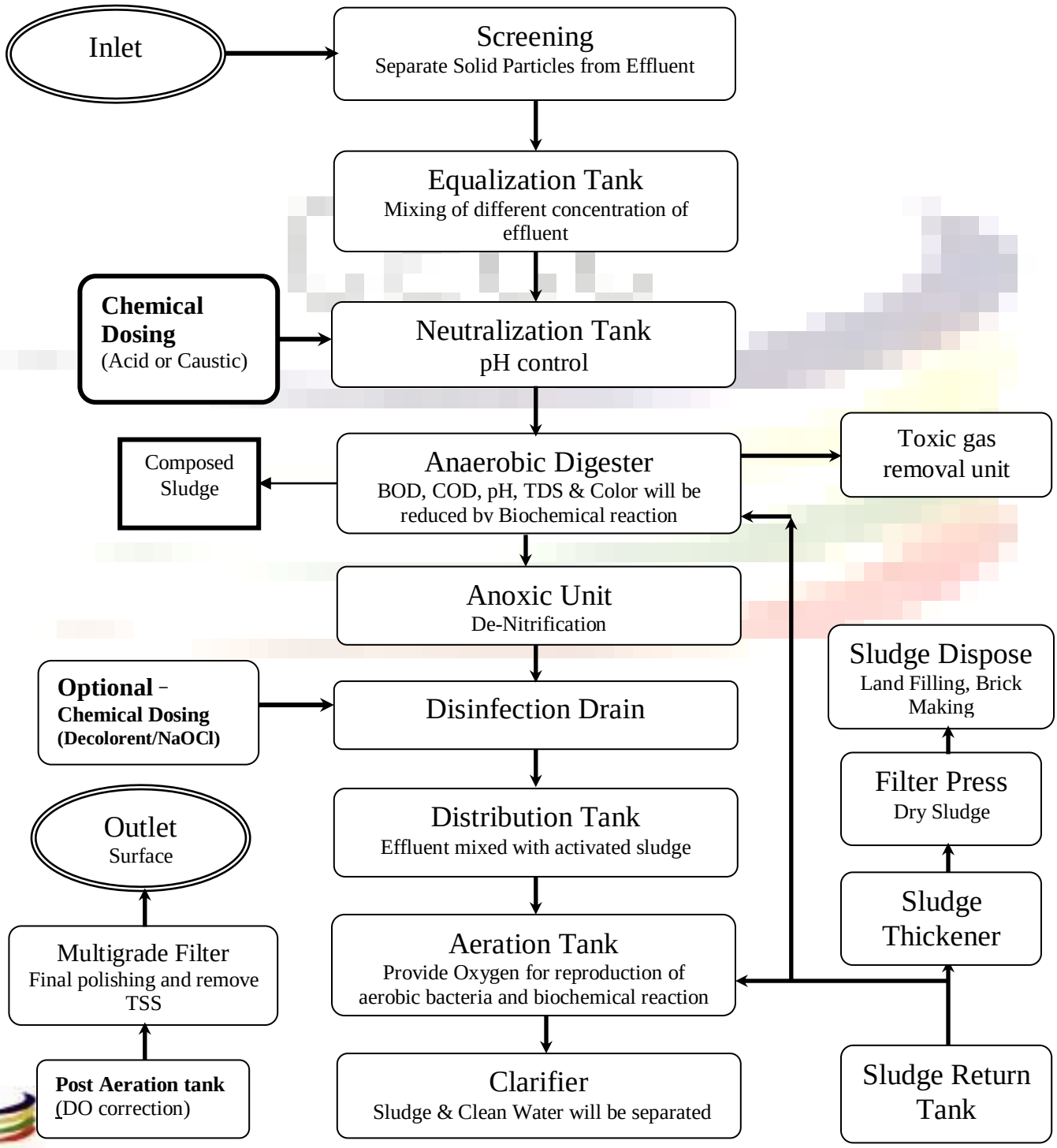
1. Flow Diagram of Biological (Anaerobic and Aerobic) Treatment Process:



2. Flow Diagram of Biological (Aerobic) Treatment Process:

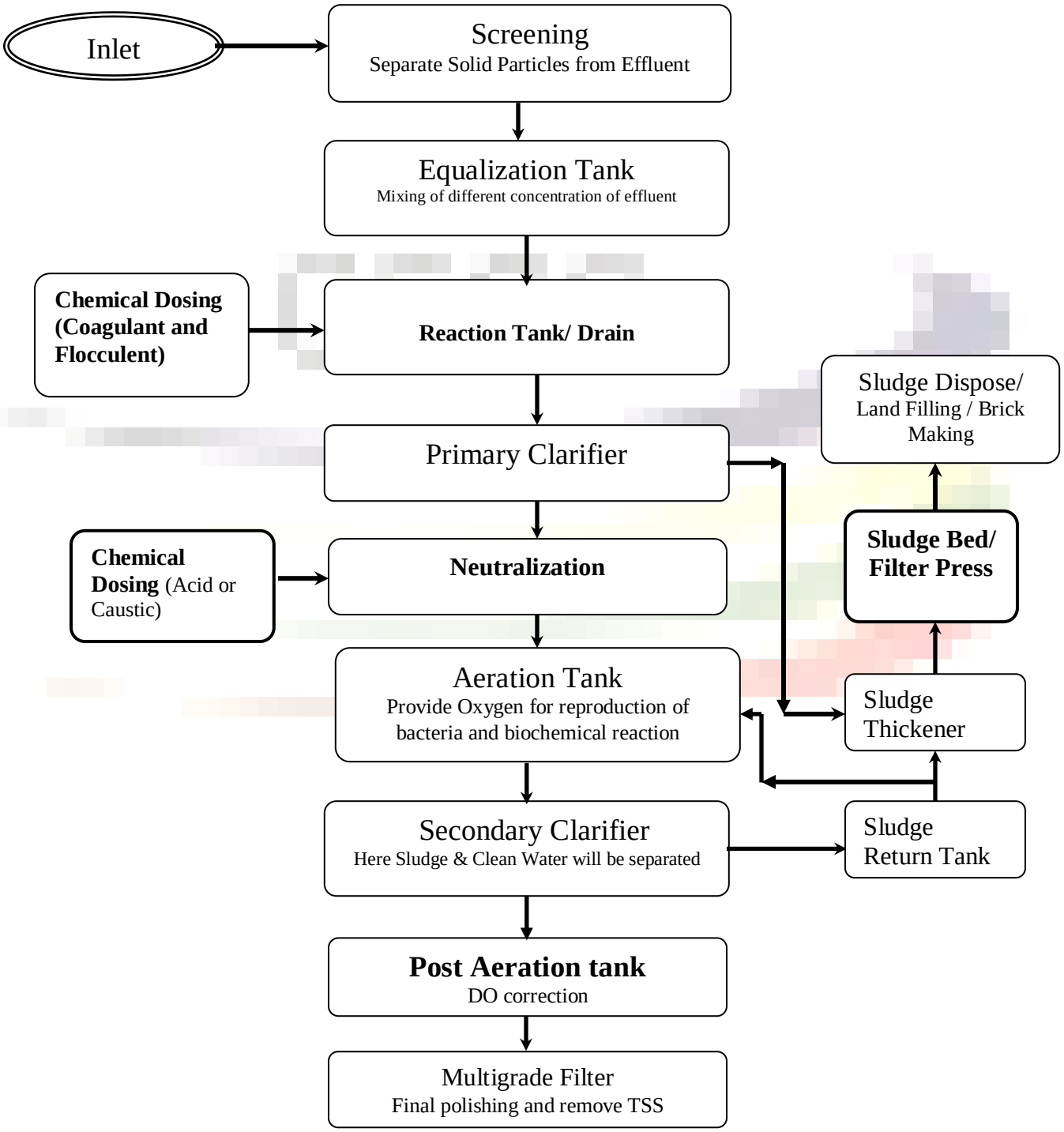


3. Flow Diagram of Biological Anaerobic-Anoxic-Aerobic Treatment Process:

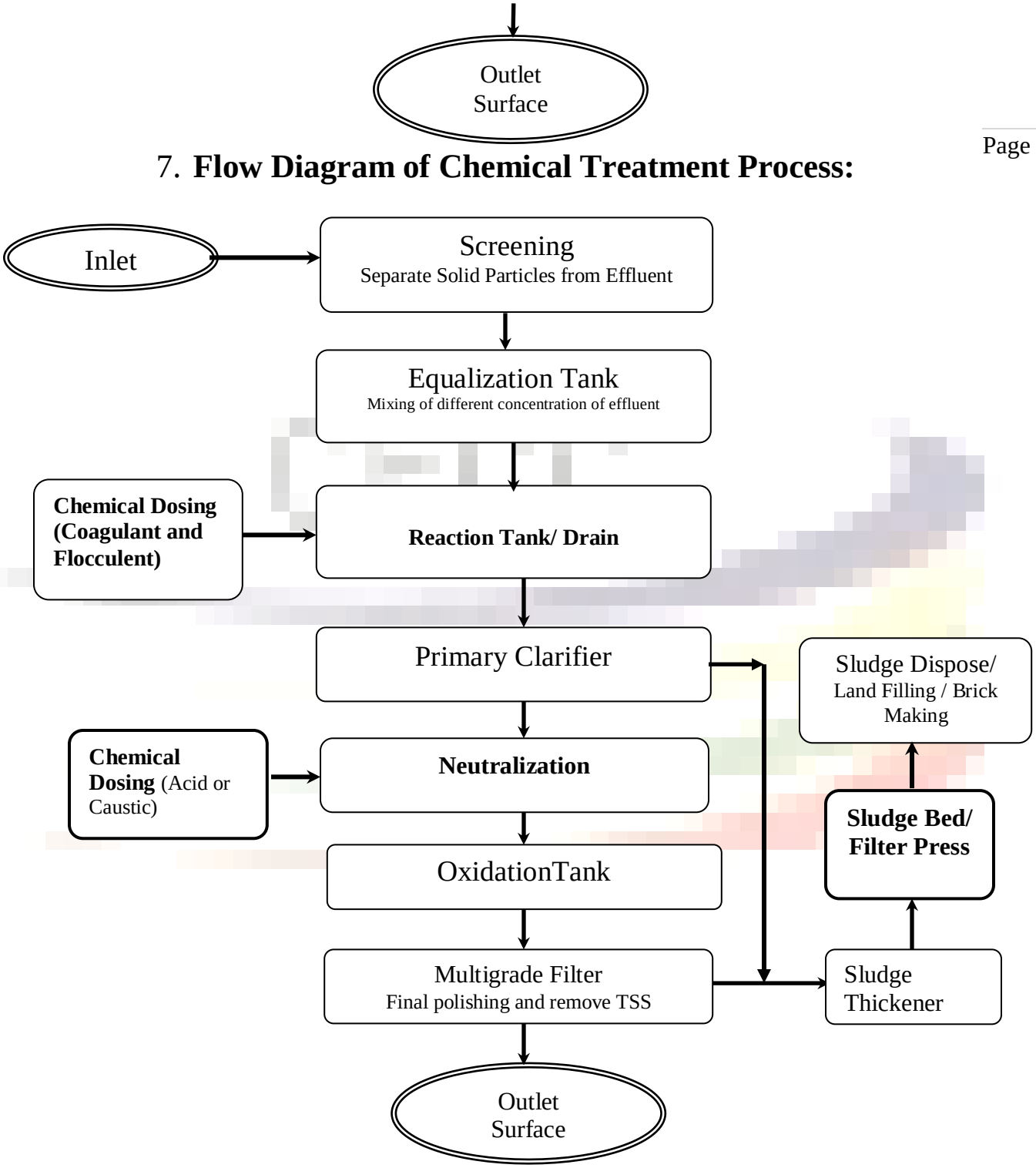


4.

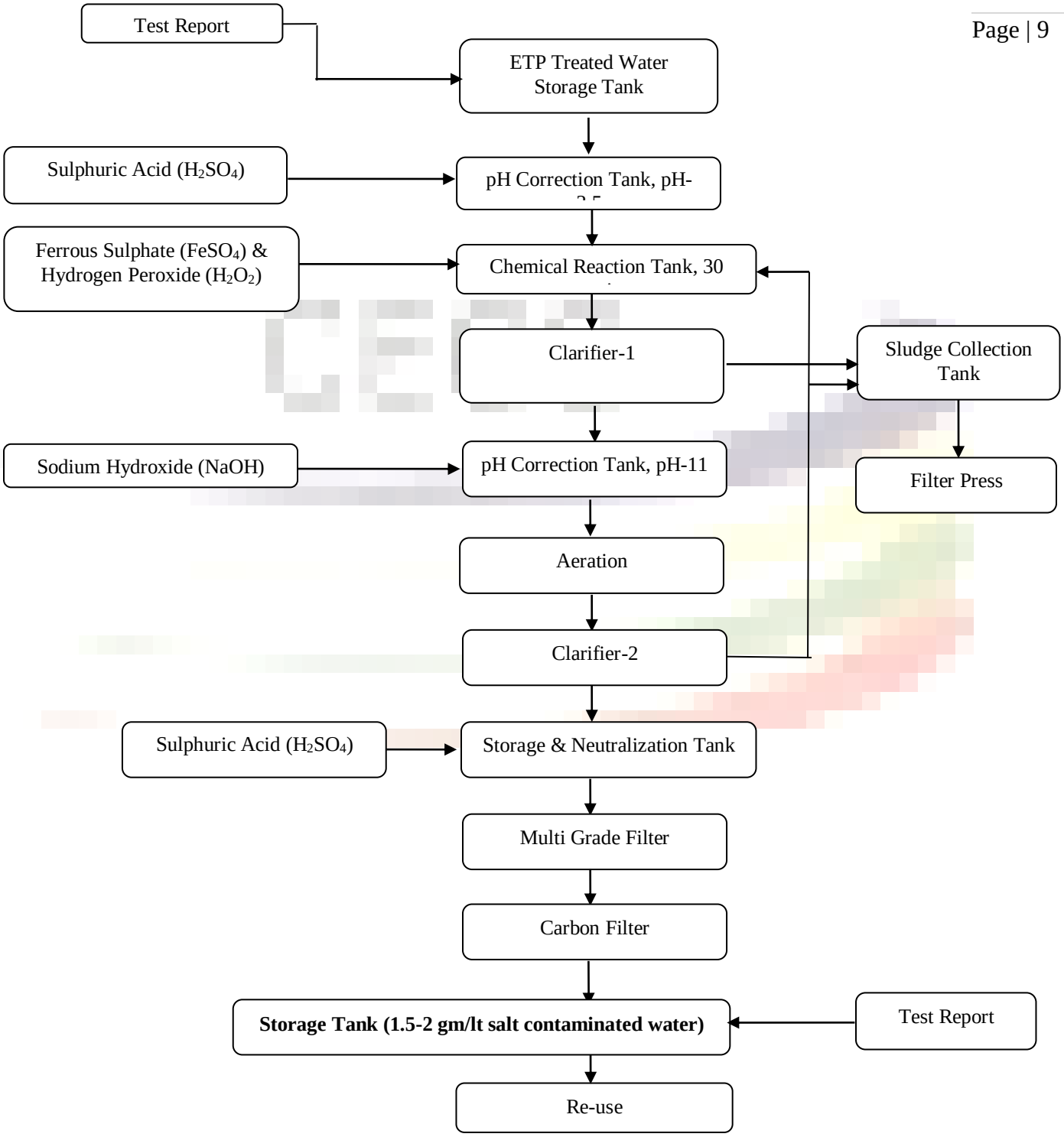
5. Flow Diagram of Bio-Chemical Treatment Process:



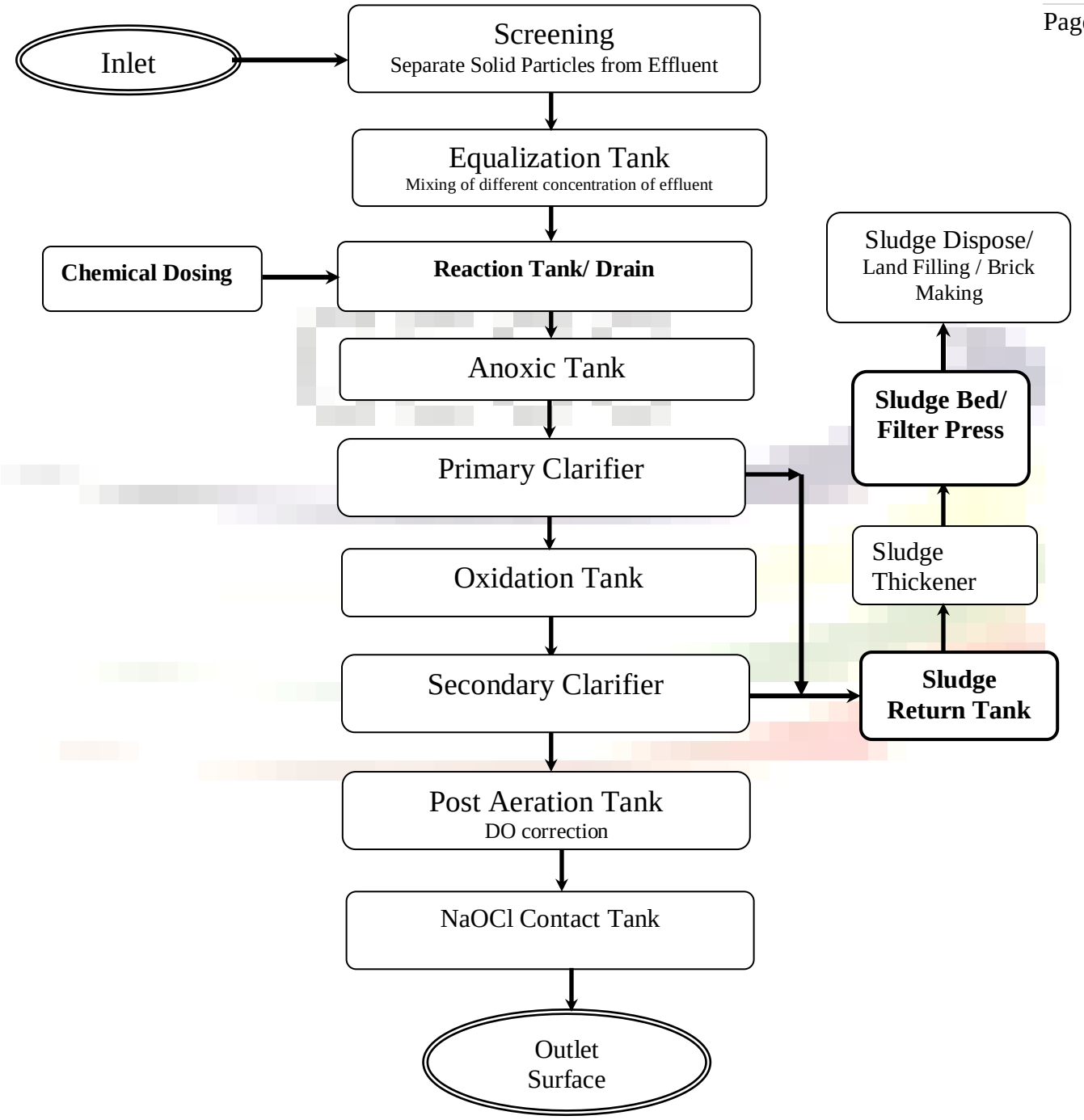
7. Flow Diagram of Chemical Treatment Process:



6. WRP


Test Report
ETP Treated Water Storage Tank
Sulphuric Acid (H_2SO_4)
pH Correction Tank, pH-
Ferrous Sulphate ($FeSO_4$) & Hydrogen Peroxide (H_2O_2)
Chemical Reaction Tank, 30
Clarifier-1
Sludge Collection Tank
Sodium Hydroxide (NaOH)
pH Correction Tank, pH-11
Filter Press
Aeration
Clarifier-2
Sulphuric Acid (H_2SO_4)
Storage & Neutralization Tank
Multi Grade Filter
Carbon Filter
Storage Tank (1.5-2 gm/lt salt contaminated water)
Test Report
Re-use

7. Flow Diagram of Sewage Treatment Process:



1. Biological Treatment Procedure (Anaerobic-Anoxic-Aerobic)

Temperature dropped Process:

Hot effluent is sprayed on air by pumping arrangement or Tower spray system. The suitable temperature of effluent for microorganism at our weather is 18^0 to 40^0c.

Screening:

It has the goal to separate coarse and fine matter at the inlet of the plant avoiding sedimentation and clogging in the successive stages. Here will be included two stages filtration system, one is coarse particles and other one is fine particles.

Storage and Equalization:

Effluent is collected in the equalization tank, which is designed for a minimum storage time 8 hours (Approximately).Normally the effluent generated in the process house varies in concentration during the various stages of manufacture.
Coarse bubble aeration is provided by means of an air blower and distribution system to achieve a uniform and homogenous mixture of different concentration of washing & dyeing discharge.

Neutralization:

The raw effluent contains average pH 11.0 for only reactive dyes effluent and average pH 9.0 for combined effluent of disperse and reactive dyes. The suitable pH of Anaerobic Microorganisms 8 to 9 and the suitable pH of Aerobic Microorganisms 7 to 8. The biochemical reactions of the Anaerobic Microorganisms reduce pH minimum 0.5 – 1.0, so when the effluent pH 9.0 then for plant safety neutralize the pH to 8.0 by controlled acid dosing.

Anaerobic & Anoxic Digester:

Effluent from the equalization tank is pumped to anaerobic digester for reaction. Normally some Cow dung can be used as nutrient of anaerobic microorganism at primary stage (up to 15 days). Color and COD will be removed & pH also reduced by biochemical reaction at this area and formed CH_4 gas, organic acids, N_2 and CO_2. Here aerobic bio mass are used for nutrient as Nitrogen and Phosphorus source. This digestion process ultimately reduces the total sludge quantity.

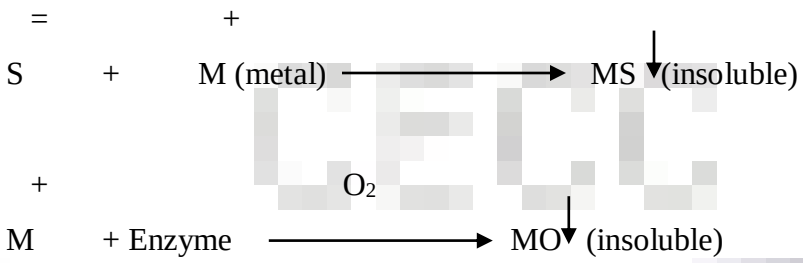
Distribution Tank:

These operations are carried out for proper mixing of neutral effluent & activated recycle sludge & proper feeding to biological oxidation tank.

Aerobic Digester :

To reduce pollution load (BOD, COD etc.) and decolonization reaction by microbial action, in the oxidation process neutral effluent is oxidized by aerobic bacteria and microorganism. Reaction time for aerobic condition is up to 24 - 32 hours. These bacteria are very sensitive about **pH, temperature, dissolved oxygen and nutrients**. Aeration provides oxygen by means of air diffuser in the form of fine air bubble which will oxidize the organic compound and oxidaziable inorganic compound by Biochemical reaction. Some sulfate reducing bacteria plays an important role to removal of heavy metals in the effluent.

In this reduction process resulting in the formation of Biogenic Sulfide, these Sulfides form highly insoluble precipitate with heavy metals such as Cd, Cu, Zn, Cr, etc. and be removed .
This tank is divided into two parts, Oxygen will be provided in one tank by diffuser.



pH:

The bacteria cells have a prevalently protein composition and that by pH less than 5 and more than 9.5, occurs protein de-nitration, it is easy to intuit that in the aforesaid pH condition they will be done to death in a short time.
Moreover, a quick pH exchanged might remarkable diminish the breathing activity of the biomass, therefore it is important to have recourse to neutralization and homogenizing of the effluent before recycling into oxidation tank. As a rule, at the inlet of the plant there is a pH value oscillating between 6.5 and 8.5 provided that the pH of the aerated mixture is maintained as constant as possible with a value between 7 and 8.

Temperature:

The reproduction speed of micro-organism is strictly related to the condition of temperature, as this factor influences all reactions, either chemical or biological.
In fact, we must bear in mind that the temperature is important either for protoplasmic synthesis or for metabolism, but intervenes even in the efficiency of either bioflocculation or O_2 transport from air to water and from water into the activated sludge floc. Indicatively, 25^0C represents the ideal temperature for the management of an activated sludge plant, even if the biological activity persists between 4^0C and 40^0C, with different results.
It is very important to remind, that more than its value, it is most import not to have sharp temperature variations in the oxidation tank.

Dissolved Oxygen:

Indicates the dissolved oxygen concentration in the aerated water-sludge mixture. It is measured in mg/lt or ppm. Presence of dissolved oxygen is a fundamental condition to realize an aerobic biological process.
When the dissolved O_2 concentration in the activated water-sludge mixture is higher than 2.0 – 3.0 ppm, the bacteria respiration speed proceeds regularly; only for the nitrification reaction it is fundamental to assure dissolved oxygen levels higher than 2.5 ppm.
High O_2 levels (over 4 ppm) indicate only a waste and thus affect negatively on the running costs.
If on the contrary we operate at an O_2 concentration less than 1 ppm, the sludge might undergo a morphological modification, in fact, the microbial cells tend to amass in big sludge flocs, diminishing so the transfer speed of O_2 towards the interior of the floc, which leads to have to reduce the specific organic load, to achieve the same purifying level. Therefore, in the aeration tank, we try to maintain of dissolved O_2 between 2.5and 3.0 ppm.

De-Nitrification and De-Phosphonation:

Anoxic is a process to produce N_2 gas and acts as De-Nitrification.
The oxidized effluent requires return to the inlet of oxidation tank to reduce Nitrogen and Phosphate.

Much of dissolved ammonia gas may then be expelled from the water into the atmosphere. The ammonia ion in the waste water may also be oxidized to Nitrate by Bacteria like *Nitrobacter* and *Nitrosomonas,* it is called Nitrification.

$2NH_4^+ + 3O_2 = 2NO_2^- + 2H_2O + 4H^-$

$2NO_2^- + O_2 = 2NO_3^-$

These reactions are slow and require long retention times in the aeration tank as well as sufficient DO. If the flow rate is too high, the slow – growing microorganisms are washed out of the reaction tank.
Once the ammonia has been oxidized to nitrate, it may be reduced by anaerobic bacteria like *Pseudomons* . This denitrification requires a source of Carbon and Methanol is used for the purpose.

$6NO_3^- + 2CH_3OH = 6NO_2^- + 2CO_2 + 4H_2O$

$6NO_2^- + 3CH_3OH = 3N_2 + 3CO_2 + 3H_2O$

De-Phosphonation:

The phosphorous is then taken up by the cell mass in the aerobic zone and it is removed from the liquid stream in the activated sludge. Phosphorous is used for cell maintenance, synthesis and energy transport, it is also stored in microorganism.

Clarification:

After oxidation effluent comes to clarifier with suspended sludge & for new cell settled at the bottom of the clarifier unit. There is also a provision to return the activated sludge in to the distribution tank and a part of it to carry at sludge drying bed or filter press & a part to carry at anaerobic pond as nutrients. Ultimately anaerobic pond will be used as sludge digester. To maintain a certain level of MLSS (3200-3500ppm) in oxidation tank. Clear water is overflowed from clarifier drain and collects in Clear water tank.

Filtration:

This treated water (collected from clarifier) is pumped through in a multigrade filter for final polishing and remove TSS. The treated colorless water is taken for disposal to use as agricultural purpose or as surface water.

Sludge Management:

The concentrated sludge is then taken to sludge bed or filter press aerobic digester. The dried up sludge is manually cleaned for disposal as land filling. Anaerobic sludge will be cleaned from anaerobic digester once a year. This composed sludge can be used as fertilizer or land filing according this analysis report. Total dry sludge will be produced from filter press or sludge bed.

Biochemical Reaction (Biological Oxidation):

Organic Waste+ Bacteria + O_2 ⟶ CO_2 + CH_4 + Radicals (Free) +Sludge + New Cell + Energy

C H N S P

Microorganism

Organic Radicals + O_2 ⟶ CO_2, H_2O, NO_3, Sulphate, Phosphate and CH4,

Microorganisms are responsible for Biochemical Reactions:

Bacteria: Mainly ***Bacilli, Zoogloea, Sphaerotilus, Cocchi, Beggotoa, Spirillum, Vitreoscilla*** etc are responsible for Biochemical Reaction.

Protozoa: Mainly ***Paramecium Caudatum, Epistylis, Stentor Molitor, Euplotes, Vorticella Putrina, Colpidium, Colpidium Campylum, Carchesium*** etc. are responsible for Biochemical Reaction.

Color removal from effluent by Anaerobic, Anoxic & Aerobic treatment

Reactive dyes - For cotton Yarn and Fabrics.
Disperse Dyes - For Polyester Yarn and Fabrics
Direct Dyes - For Woven Fabrics.

Effluent contains mainly carbohydrates, waxes, auxiliary compounds, dyes and surfactants. Main Parameters of effluent BOD_5, COD, pH, TDS, TSS, Color, those are indicated toxic and non toxic depend on their measuring value.

Anaerobic – Aerobic Treatment:

Adsorption & Biodegradation process removed color from effluent. First stage is the adsorption with anaerobic condition and 2nd stage is biological oxidation. The two stages reduce color, COD & BOD,

Decolorized of complex azo dyes and reactive dyes by adsorption of the cellular bio mass, *aeromonas hydrophila* has the greatest capacity for color removal from azo, anthraquinone and indigo dyes. *P.luteola* decolorized of reactive dyes.

Algae: A few algae such as *Chlorella* and *Oscillatoria* are capable of degrading azo dyes and aromatic amine.

Fungi: White rot fungi *Phonerochoete chrysosporuim* degrade wide range of dyes particle and lignin. These fungi use enzyme such as lignin peroxidase (LiP), manganese peroxidase, glucose - 1 oxidase and glucose - 2 oxidase can be degraded commercial azo reactive dyes and indigo dyes. Color removed 40-90% by this enzymatic treatment depending on dyes complexity, nitrogen availability, concentration retention time etc. It is also capable of degrading dioxins polychlorinated compound and chloro organics.

Yeast: Yeast such as *klyveromyces marxianus* have used for Decolorization of Remazol dyes group, reduce color by 78-98%.*Bacillus subtilis* is used to breakdown P-amino azo benzene. Mesophilic and thermophilic yeasts are capable for degradation and Decolorization

Microbial Action:

Heterotrophic bacterial assimilation of organic matter,

$8CH_2O + NH_3 + 3O_2 \Rightarrow C_5H_7NO_2 + 3CO_2 + 6H_2O$ + energy organic matter + ammonium + oxygen ==➔bacterial cell biomass + carbon di-oxide + water + energy (ATP)

When the bacteria in an exponential growth phase with a low bacterial cell biomass (less than approx 3000 mg/lit) the above equation applies, however if the MLSS (mixed liquor suspended solids) concentration is high and the residence time of the effluent is to short a period , then Endogenous Respiration occurs and the bacteria start to consume themselves in accordance to the following equation;

$C_5H_7NO_2 + 5O_2 \Rightarrow 5CO_2 + 2H_2O + NH_3$ + Energy bacterial cell biomass + oxygen ==➔ carbon dioxide + water + ammonium + energy (ATP)

If the system is in endogenous respiration and there is a long residence time of the effluent in the system , then autotrophic bacteria can become established and convert the ammonia to nitrate . However in most cases it is more efficient to spilt the system up into a number of tanks operating in series to give the autotrophic nitrifying bacteria is a better chance of surviving digestion by the heterotrophic bacteria.

2. Bio-Chemical Treatment Procedure

The parts which constitute the Effluent treatment plant are the following as per existing civil structure:

- SCREENING
- STORAGE PIT
- EQUALIZATION TANK
- REACTION DRAIN / TANK
- PRIMARY CLARIFIER
- NEUTRALIZATION TANK
- SLUDGE THICKNER
- BIOLOGICAL OXIDATION TANK
- SECONDARY CLARIFIER
- SLUDGE RETURN TANK
- POST OXIDATION TANK
- SLUDGE DRYING BED

SCREENING

It has the goal to separate coarse and fine matter at the inlet of the plant, avoiding sedimentation and clogging in the successive stages.

STORAGE PIT

All types of effluent come through a suitable drain by filtration and storage for pumping all effluent to enter the plant.

EQUALIZATION TANK

Effluent is collected in this Tank, which is designed for a normal storage of 8 hours. Normally the effluent generated in the process house varies in concentration during the various stages of manufacture. Coarse bubble aeration is provided by means of an air blower and distribution system to achieve a uniform and homogenous mixture of different concentration of washing discharge.

REACTION DRAIN / TANK

Alum or Ferrous Sulphate, Lime and Polyelectrolyte are added by means of dosing with gravity force to reaction tank for sludge formation. The chemicals are injected in the pipeline feeding and controlled by valve. Prepared chemical solutions and its dosing depend on Effluent properties.

PRIMARY CLARIFIER

After reaction effluent comes to clarifier with suspended sludge as flock type, the sludge settles at the bottom of the clarifier unit. Conical Shaped & Lamella set up is provided to quickly settling of sludge at the bottom of the clarifier.

SLUDGE THICKNER

Settled sludge is collected to this tank and removed by pump and taken to the sludge drying bed. The clear water will over flow to Neutralization Tank.

NEUTRALIZATION TANK

Acid will be dosed by gravity force to achieve pH 7.0 to 7.8, due to specially activate the Microorganisms. Acid dosing is controlled by valve.

BIOLOGICAL OXIDATION TANK

Effluent and return activated sludge reciprocally entering into the oxidation tank.
Aeration is provided by means of disk type diffuser for tiny air bubbles are formed. These air bubbles carry oxygen, which is oxidized the presence organic compounds and oxidizable inorganic compounds by Microorganisms, also provide necessary oxygen for biochemical reactions of Microorganisms. This condition reduces BOD and reproduction of Bacteria. The effluent is then taken to Secondary Clarifier.

SECONDARY CLARIFIER

After aeration water comes to clarifier with suspended sludge. Here the precipitated organic sludge settled down at the bottom of the clarifier unit. Conical Shaped set up is provided to quickly settling. The activated sludge is return to Oxidation tank by pumped.

SLUDGE RETURN TANK

Settled sludge returned to Oxidation tank and excess sludge transfer to sludge bed by Pump. This is very important part for Microbial reaction. These activated sludge and their enzyme reacts with Organic and oxidizable Inorganic compound and reduces BOD & COD also.

POST OXIDATION TANK

The treated water from secondary clarifier collects in this tank, here is residual inorganic compounds are oxidized and final polishing of treated water by aeration.

SLUDGE DRYING BED

The concentrated sludge is then taken to sludge bed. The dried up sludge is manually cleared for disposal as land filling / Composed.

The following reactions are occurred in the process:

$Al_2(SO_4)_3 + 3Ca(HCO_3)_2 \longrightarrow 3Ca(SO)_4 + 2Al(OH)_3\downarrow$ (Precipitate) $+ CO_2$.

$Al_2(SO_4)_3 + 3Ca(OH)_2 \longrightarrow 3Ca(SO)_4 + 2Al(OH)_3\downarrow$ (Precipitate)

.

$FeSO_4 + Ca(HCO_3)_2 \longrightarrow Fe(OH)_2 + CaSO_4 + CO_2$

$Fe(OH)_2 + O_2 + H_2O \longrightarrow 2Fe(OH)_3$ (Precipitate)

$Fe_2(So_4)_3 + Ca(HCO_3)_2 \longrightarrow CaSo_4 + Fe(OH)_3\downarrow$ (Precipitate) $+ CO_2$.

HCl / H_2SO_4 may be used to control the pH.

COD removes by these reactions.

Biochemical Reaction:

Organic Waste + Bacteria + $O_2 \longrightarrow CO_2 + CH_4$ + Radicals (Free) +Sludge + New Cell + Energy

C H N S P

Microorganism

Organic Radicals + $O_2 \longrightarrow CO_2, H_2O, NO_3$, Sulphate, Phosphate, and CH_4,

BOD removes by these reactions.

Microorganisms are responsible for Biochemical Reactions-

Bacteria: Mainly *Bacilli, Zoogloea, Sphaerotilus, Cocchi, Beggotoa, Spirillum, Vitreoscilla* etc are responsible for Biochemical Reaction.

.**Protozoa:** Mainly *Paramecium Caudatum, Epistylis, Stentor Molitor, Euplotes, Vorticella Putrina, Colpidium, Colpidium Campylum, Carchesium* etc. are responsible for Biochemical Reaction.

3. WRP *(AOPs)*

Process Description:

Reactive Black, Red, and Yellow are resistant to biodegradation under aerobic conditions although anaerobic color removal was applied by many researches successfully. However, the high quantity and the context of waste water originated from textile industry are not proper to apply anaerobic process because the decolorization takes place by the breakdown of the azo bonds which leads to formation of biodegradable under aerobic condition, and they are toxic than the dye molecules themselves. In this case combined anaerobic & aerobic treatment process is the best to performance biodegradation.

Fenton oxidation (FO) Process which is one of the advanced oxidation processes (AOPs) is composed at acidic pH yielding hydroxyl radicals directly. It is performed four (04) stages, which are pH adjustment to low acidic values, oxidation reactions, neutralization, and Coagulation. At pH lower than 3.5, H_2O_2 and ferrous ions are most stable resulting in a better redox system and decolorizing better. However, at pH value higher than 4.0, ferrous ions easily from ferric ions which have a tendency to produce ferric hydroxo complexes. H_2O_2 is unstable and easily decompose itself in basic (pH>10) solutions. The chemistry of FO process Chemical oxygen demand (COD) and color removal reactions are initiated by the hydroxyl radical. The main mechanism of AOPs function is the generation of highly reactive radicals. Hydroxyl radicals (OH^+) are effective in destroying organic chemicals because they are reactive electrophiles (Electron Preferring) that react rapidly and non-selectively with nearly all electron-rich organic compounds. However, in the main studies of Fenton reagent, it is generally considered that the reaction between H_2O_2 and Fe^{2+} in an acidic aqueous medium ($pH \leq 3$) produces OH radicals and involve the steps presented below

$$Fe^{2+} + H_2O_2 \longrightarrow Fe^{3+} + HO^- + HO\cdot$$

$$Fe^{3+} + H_2O_2 \longrightarrow Fe^{2+} + H^+ + HOO\cdot$$

$$Fe^{2+} + HO\cdot \longrightarrow Fe^{3+} + HO\cdot$$

$$HO\cdot + H_2O_2 \longrightarrow HOO\cdot + H_2O$$

$$Fe^{2+} + HO\cdot_2 \longrightarrow Fe^{3+} + HOO\cdot$$

$$Fe^{3+} + HO\cdot_2 \longrightarrow Fe^{2+} + H^+ + O_2$$

$$2HO\cdot \longrightarrow H_2O_2$$

$$OH\cdot + \text{Organics} \longrightarrow \text{Products } H^+\text{-}O_2$$

Figure: 01 the Fenton Reactions.

Effect of pH:

To determine the optimum pH, pH was changed between 2.5 and 4.0 as 78.6% COD removal was obtained at 3.0 pH, but the maximum COD removal (87%) was proved at 3.5 pH for 100 mgl^{-1} of RB5. Color removal was more than 99% at all pH values. Increasing dye concentration up to 200 mgl^{-1}, Maximum COD and color removal were obtained as 84% and 99%, respectively, at 3.0 pH. Absorbance measurements were in accord with COD and color results (1.3/0.9/0.8) m^{-1}. Indicates that optimum pH varies in a small scale between 3.0 and 3.5 for doubling the dye concentration.

Effect of Temperature:

As seen optimum temperature is 40°C at which 71% COD and 99% color removal were obtained for 100 mgl^{-1} of RB5 concentration. The maximum COD removal (84%) for 200 mgl^{-1} of RB5 was also obtained at 40°C. Highering temperature up to 60°C affected COD removal negatively at both dye concentrations due to the destabilization of flocks resulting in increased ferrous ions which scavenged OH radicals during Fenton's reactions.

Effect of Slow Mixing Time:

Maximum COD removals for both dye concentrations (68% and 84%), respectively) were obtained at 20th min. when mixing time increased up to 30 min COD removal decreased to 55% for 100 mgl^{-1} of RB5 due to flock destabilization. Color was removed higher than 99% for all mixing times.

Fenton Coagulation:

This is the effect of pH, at this stage liquid Caustic (10-15%) dosed to rise pH=8 to11. Contaminated metals are precipitate as metal hydroxide form, like $Fe(OH)_3$, $Ni(OH)_2$, $Pb(OH)_2$, $Cd(OH)_3$ etc and also decrease total Hardness(TH), TDS of waste water.

Table: Appropriate Concentration of pH value

Metal Ion	Metal Hydroxide	pH value for a metal form a solid precipitate
Fe+++	$Fe(OH)_3$	9.00
Ni++	$Ni(OH)_2$	10.0
Pb++	$Pb(OH)_2$	9.00
Cd++	$Cd(OH)_2$	10.50
Cr+++	$Cr(OH)_3$	8.50
Cu++	$Cu(OH)_2$	8.00
Zn++	$Zn(OH)_2$	8.50

To achieve the highest performance need retention time, aeration and clarify the Suspended precipitate by secondary clarifier. Settled precipitate is pumped to reaction tank for reuse of Fenton reaction and excess amount of settled precipitate. discharged by filter press through sludge thickener, Here is noted that small quantity sludge is formed by this stage.

Neutralization:
Then neutralized the clarified water by H_2SO_4 dosing, here maintain pH=6.8 to 7.5.

Filtration:
Multigrade Sand Filtration is used for remove of total suspended solid and storage the filtered water for reusing. The storage of purified water for reuse in dyeing & finishing process.

Conclusion:
The Effective Fenton treatment of textile effluents are promising methods for Purification aimed to reuse of textile waste water, it's resulting to direct environmental and economic benefits. This method provides complete removal of Color and reduces recalcitrant Pollution Loads from dyeing & finishing.

Fenton process & chemical Coagulation are intended to remove Color, turbidity, COD, BOD, TH, SS, TDS and heavy metals. It has indicated that the combined chemical treatment methods are very effective and are Capable of elevating water quality of the treated effluent to the reuse standard of the textile industries.

Therefore, reuse of the effluents represents an economical and ecological challenge for the overall Sectors.

Advantages of Fenton's Process (AOPs):

- Effective;
- Fast Reaction;
- Un-Reactive H_2O_2 degrades oxygen;
- Low production of residual sludge;
- Disinfecting effect;
- Reduce Total hardness (TH) & TDS.
- Remove contaminated heavy metals (Cu, Ag, Zn, Ni, Cd, Pb) be sedimentation.

Disadvantages of Fenton's Process (AOPs):

- Large amount of reagents needed;
- Costs;
- Safety.

Our Glorious Expert Team

1. Mr. Palash Mondal
   B.Sc (Hons). M.Sc (Chemistry), M.S (Environmental Science & Management)
   Managing Director

   18(Eighteen) years working experience on ETP & WTP setup and maintenance & Environment Management.

   Mobile: 01725189310, Email:ceccbd@gmail.com

2. Mr. Faysal Hossain
   B.Sc in Civil Eng
   Manager, Civil

   8 (Eight) years working experience on Structural Design ETP & WTP.

3. Mr. Mahmudul Islam
   GM
   10 (Ten) years working experience on ETP & WTP.

4. Mr. Sheikh Sazzadul Islam
   B.Sc in Electrical
   Manager (Electrical)
   09 (Nine) years working experience on Electro-Mechanical Work.

5. Mr. Ziaur Rahman
   B.Sc (Hons). M.Sc (Chemistry)
   Sr. Executive,
   08 (Eight) years working experience on ETP setup, Operation and maintenance. Experience on **Analytical Laboratorial work**

6. Mr. Shimul Mondal
   Diploma In Electrical
   Site Engr.

   05 (Five) years working experience with ETP setup.

7. Mr. Parvej Hossain
   Diploma in Mechanical Eng.
   Sr. Executive (Mechanical)

   4 (Four) years working experience on ETP setup Operation and maintenance.

8. Mr. Emamul Azam (Nayon)
   B.Sc (EEE).
   Executive (Marketing)

   04 (Four) year working experience on ETP setup Operation and maintenance.

9. Mr. Khyrul Basar
   Supervisor (Mechanical)
   08 (Eight) year working experience on ETP setup and maintenance.

10. Mr. Asif
    Supervisor (Civil)
    03 (Three) year working experience on ETP setup and maintenance.

Our Max. Client List

Sl No	Company Name	Location	Capacity	Process	Status
1	Radisson Blu Water Garden (Hotel)	Dhaka	48 m3/day	Anaerobic & Aerobic	In Operation from 2018
2	East West Medical College & Hospital.	Turag, Dhaka	216 m3/hr	Biological	In Operation from 2022
3	United Health Care (DCP)	Dhaka	48 m3/day	Bio-Chemical	In Operation from 2022
4	United Group (Unimart Indulge Kitchen)	Dhaka	24m3/day	Bio-Chemical	In Operation from 2021
5	Square Hospital Ltd.	Dhanmondi	240 m3/day	Biological	In Operation from 2017
6	Japan East west Medical/ Ship International Hospital	Turag	360 m3/day	Anaerobic & Aerobic	In Operation from 2018
7	United Medical College & Hospital, Satarkul	Satarkul, Dhaka	360 m3/hr	Biological	Submitted (ETP & STP Design Only)

8	Ragib Rabeya Medical College & Hospital.	Sylhet	240 m3/day	Bio-Chemical	In Operation from 2021
9	Mount Adora Hospital	Sylhet	72 m3/day	Bio-Chemical	In Operation from 2022
10	Sylhet Maa O Shishu Hospital	Sylhet	48m3/day	Bio-Chemical	In Operation from 2023
11	Al-Haramain Hospital	Sylhet	48m3/day	Bio-Chemical	In Operation from 2020
12	Square Food & Beverage Ltd.	Pabna	240 m3/day	Biological	In Operation from 2018
13	Square Life science Ltd.	Pabna	312 m3/hr.	ETP+STP	In Operation from 2021
14	Naafco Pharma Ltd.	Valuka	96 m3/day	Bio-Chemical	In Operation from 2023
15	Square Pharmaceuticals Ltd(CD)	Pabna	144 m3/day	Anaerobic & Aerobic	In Operation from 2014
16	Mtropolitan Hospital	Mohakhali, Dhaka	120 m3/day	Bio-Chemical	Under Construction
17	Gono Sastho Pharmaceutical	Tongi, Gazipur	14.4 m3/day	Bio-Chemical	In Operation from 2013
18	Total Food Processing	Khulna	120 m3/day	Bio-Chemical	In Operation from 2021
18	Unipex Fish Processing	Sylhet	120 m3/day	Bio-Chemical	In Operation from 2021
19	CA Knit Wear Ltd. (NAZ Group)	Gazipur	240 m3/hr	Bio-Chemical	In Operation from 2021
20	Unifill Textile Mills Ltd.	Narayangonj	2888 m3/day	Anaerobic & Aerobic	In Operation from 2018
21	Amber Super Paper Ltd.	Narayangonj	3912 m3/day	Biological	In Operation from 2017
22	Nassa Super Wash Ltd.	Ashulia	7200 m3/day	Anaerobic & Aerobic	In Operation from 2016
23	Trade worth Household	Narayangonj	24 m3/day	Bio-Chemical	In Operation from 2017
24	GS Paper Mills Ltd.	Norshingdhi	1920 m3/day	Biological	In Operation from 2022
25	Hamko Paper Mills Ltd.	Narayanganj	360 m3/day	Bio-Chemical	Under Construction
26	Nassa Basic Ltd.	Ashulia	1200 m3/day	Biological	In Operation from 2018
27	Fiza & Co.	Sylhet	240 m3/day	Bio-Chemical	In Operation from 2020
28	NEPC Consortium Ltd. 110 Power Plant	Narayangonj	48 m3/day	Bio-Chemical	In Operation from 2016
29	Norban Comtex Ltd.	Gazipur	1920 m3/day	Bio-Chemical	In Operation from 2016
30	Naheed Group	Hobigonj, Sylhet	4800 m3/day	Anaerobic & Aerobic	In Operation from 2017
31	Amber Pulp & Paper Mills Ltd.	Narayanganj	4440 m3/day	Anaerobic & Aerobic	In Operation from 2016

32	Mark Terry Ltd	Asulia, Savar.	2000m3/day	Biological	In Operation from 2008
33	Tweeze Textile Washing & Allied Indust.Ltd	Tongi, Gazipur.	450m3/day	Physio-chemical	In Operation from 2007
34	Janntex Industries Ltd	Rupshi, Narayangonj.	720m3/day	Physio-chemical	In Operation from 2007
35	Zenith Fabrics Ltd.	Pasdona, Norshidhi.	720m3/day	Physio-chemical	In Operation from 2006
36	4A Yarn Dyeing & Sweater Ltd.	Baipail, Savar.	720m3/day	Physio-chemical	In Operation from 2008
37	Kalibari Dyeing Ltd.	Madhobdhi, Norshingdhi.	480 m3/ Day	Anaerobic & Ae	In Operation from 2010
38	MMK Dyeing & Printing Ltd.	Madhobdhi, Norshingdhi.	960 m3/ Day	Anaerobic & Aerobic	In Operation from 2010
39	Star Dyeing Ltd.	Belabo, Norshingdhi.	480 m3/ Day	Physio-chemical	In Operation from 2010
40	Sourthern Clothings Ltd	Asulia, Savar	240 m3/ Day	Physio-chemical	In Operation from 2010
41	EFE Textile Ltd	Asulia, Savar	120 m3/ Day	Physio-chemical	In Operation from 2010
42	Partex Sugar mills Ltd	Rupgonj, Narayangonj	360 m3/day	Anaerobic & Aerobic	In Operation from 2010
43	Hossain Calendering & Finishing Mills	Belabo, Norshingdhi.	480 m3/ Day	Physio-chemical	In Operation from 2012
44	Surma Dyeing	Norsingdi	120m3/Day	Physio-chemical	In Operation from 2010
45	SIM Fabrics	Nanayongong	840m3/Day	Biological	In Operation from 2011
46	Narshingdi Sizing	Norsingdi	288 m3/day	Bio-Chemical	In Operation from 2011
47	Nasir Dyeing	Norsingdi	600m3/day	Bio-Chemical	In Operation from 2011
48	Sajib Dyeing	Norsingdi	240m3/day	Bio-Chemical	In Operation from 2011
49	Partex Paper Mills	Rupgonj, Narayangonj	360 m3/day	Anaerobic & Aerobic	In Operation from 2011
50	Bangladesh Paper Mills	Rupgonj, Narayangonj	312 m3/day	Bio-Chemical	In Operation from 2011

51	Sparkle Knit Composite	Kabirpur,Savar	840 m3/day	Bio-Chemical	In Operation from 2010
52	Fair & Fame Knit Dyeing	Rupshi, Narayangonj	480 m3/day	Bio-Chemical	In Operation from 2012
53	Alpha Towel	Bipail,Ashulia	720 m3/day	Anaerobic,Aerobic	In Operation from 2011
54	Samree Dyeing	Ghorashal, Norshingdi	1320 m3/day	Bio-Chemical	In Operation from 2012
55	Aungosree Dyeing	Madhobdi, Norshingdi	360 m3/day	Bio-Chemical	In Operation from 2012
56	Amena Dyeing	Madhobdi, Norshingdi	360 m3/day	Bio-Chemical	In Operation from 2012
57	Kakoli Dyeing	Pagla, Narayangonj	1200 m3/day	Anaerobic & Aerobic	In Operation from 2017
58	Five & Five Dyeing	Shaheprotab, Norshingdi	840 m3/day	Anaerobic & Aerobic	In Operation from 2015
59	Salauddin Tex	Araihazar, Narayangonj	1200 m3/day	Anaerobic & Aerobic	In Operation from 2012
60	Sahaba yarn dyeing	Rajendropur,Gazipur	1440m3/day	Anaerobic & Aerobic	In Operation from 2013
61	Tania dyeing	Panchdona,Norshingdi	600m3/day	Bio-Chemical	In Operation from 2013
62	Ali dyeing	Madhobdi,Norshingdi	168m3/day	Bio-Chemical	In Operation from 2012
63	Square Hospital	Danmondi,Dhaka	144 m3/day	Biological	In Operation from 2013
64	Ma Sokhina dyeing	Madhobdi,Narshingdi	1200m3/day	Bio-Chemical	In Operation from 2012
65	Angosree Dyeing	Madhobdi,Narshingdi	360m3/day	Bio-Chemical	In Operation from 2011
66	Ruku dyeing	Saheprotab,norshingdi	240m3/day	Bio-Chemical	In Operation from 2010
67	Akota dyeing	Saheprotab,norshingdi	240m3/day	Bio-Chemical	In Operation from 2019
68	Mitali Fashion Ltd.	Kashimpur, Gazipur		H&M Documentation	In Operation from 2015
69	Shah Rubber industries	Hobigonj, Sylhet	240 m3/day	Biological	In Operation from 2016
70	Vertex Paper Mills	Hobigonj, Sylhet	1200 m3/day	Anaerobic & Aerobic	In Operation from 2015
71	Euro-A-Zipper Ltd.	Adamjee EPZ	144 m3/day	Biological	In Operation from 2019
72	KAC Fashion Ltd.	Gazipur	720 m3/day	Bio-Chemical	In Operation from 2015
73	Euro-A-Zipper, EIA	Adamzee EPZ	120 m3/day	Bio-Chemical	In Operation from 2016
74	Sonali Fabrics Ltd.	Norshingdhi	240 m3/day	Bio-Chemical	Under Construction
75	Next Sweater Ltd.	Gazipur	144 m3/day	Bio-Chemical	Under Construction

76	Sensore Printex Ltd.	Mirpur, Dhaka	48 m3/day	Bio-Chemical	In Operation from 2023
77	VINI Cosmetics	Keraniganj	72 m3/hr.	Bio-Chemical	Work Running
78	Hamko Paper Mills	Kachpur, Narayanganj	144 m3/hr.	Biological	Under Construction
79	NAZ Group	Rajendrapur, Gazipur	8000m3/day.	AOP	Under Construction
80	Gomoti Hospital	Cumilla	120 m3/day.	Biological	Under Construction
81	Johurul Islam Medical College	Kishoregonj	480 m3/day.	Biological	Under Construction