

The Common Process of Industrial Waste Water Treatment

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Abstract— Waste water generated by many different types of industries that have specific process with specific characteristic. Managing program with advanced and acceptable treatment can be useful to control the pollution of industrial wastewater. Reaching the acceptable sewage that can discharge in the environment is desired by all industries which are responsible about the protection of the world. Definition some characteristic about the common pollutant in industrial wastewater and try to introduce some methods to remove them is the goal of this paper.

Index Terms— Wastewater, treatment, environment

I. INTRODUCTION

In very society there are lots of pollution that can be very dangerous for living things and environment. One of the most environmental pollutants is wastewater which produces by industries and discharge to the environment [20]. Sewage is combination of liquids with particles that decomposition of organic matter in the wastewater can make terrible condition with bad odors, lots of bacteria and poisoned substance. Suitable engineering for managing this issue is necessary for controlling and protecting of environment [20]. Discharge wastewater in the environment must be under the national pollutant discharge elimination system (NPDES) [1]. Sustainable development also seems necessary for mankind product if they want to survive in the long run. Sustainable water with suitable treatment management is the goal of this world. Industrial water can use 25% of all worldwide water. Increasing awareness by giving information is important that has conducted industrial to take special treatment to reach the suitable water quality and quantity conservation [7]. Understanding the important characteristic of industrial waste water and methods for controlling can help to rising public information to better control of pollutants. On the other hand risk assessment methods for pollutants in the water that use by industries can be useful for elimination of hazardous items from them.

II. CHARACTERISTIC OF SOME PUBLIC POLLUTANTS IN INDUSTRIAL WASTEWATER

Different pollutant can discharge to the environment before suitable treatment. Sewage have specific characteristic that can be harmful for the environment. These pollutants have been considered in different ways by limitation of effective pollutant, analyzing and identify detrimental substance. Some content in the wastewater are: pathogenic and nonpathogenic bacteria, organic particle, inorganic particle, soluble material,

toxins, gases, emulsions and pharmaceuticals which can be very costly [4].

2.1 Thermal pollution

When the waste water with thermal pollution discharge to the environment even with small degradation difference can be harmful and dangerous for marines and living things in the environment. Nuclear reaction and burning coal, oil and gas in industrial plant can cause thermal pollution. Using the fresh water for cooling towers and boilers tank to decrease their temperature can leads to decrease dissolved oxygen (DO) too.

Decrease DO in aquatic system can change the metabolic rate of aquatic animals with high consumption of food in the short time [3].

2.2 Water hardness

Hard water is water with high mineral. Calcium and magnesium are two important items for water hardness. These insoluble solids caused by thermal decomposition that happen in bicarbonate ions and where it is at concentration. Water hardness can reduce the heat efficiency and decrease the efficiency of metal boiler by overheating and leads to failure of the boiler [5].

2.3 Corrosiveness

There are lots of corrosive substances in industrial wastewater that can effect to material and living tissues. It can harm the pipe system and tanks too.

Generally corrosive refer to acids and alkalis that can cause serious injuries by $\text{PH} > 11$ and $\text{PH} < 3$ [20].

2.4 Color

Textile and chemical industries are main source to discharge color waste that cause by different dyes. They are supposed to have high chemical too keep their colors that can resistance to the sunshine, water, soap and detergent [6].

2.5 Odor

Odor emission is very important problem in waste water. It is as a result of using chemicals, odor volatile compound, microbial activities and volatile sulfate during anaerobic process in the wastewater [12].

2.6 Solids content

Suspended solids, colloid solids and organic solids are three important parts of solids wastewater. They can cause turbidity and sedimentation of sludge. Organic solids can protection of bacteria and decrease oxygen during the process [17].

III. TREATMENT PROCESS

With suitable treatment for industrial wastewater we can have the sewage with less pollution and less harm effect for the environment.

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3.1 Color removal

The majority of dyes are widely used in many different technologies in various kinds of paper, leather, textile, food, cosmetic, plastic, printing, rubber and dye manufacturing that use dyes to provide color for their products. It can cause chromosomal fractures. Carcinogens, mutagenesis and respiratory toxicity. Therefore we desired to focus on special methods to remove dyes from wastewater streams [8].

3.2 Controlling PH

One of the important roles in waste water treatment, especially in industries is control of the PH.

The titration curve for measure PH is suitable [9]. There are three steps for controlling PH:

- Identify the parameter, impurities or the pollutants that are in wastewater.
- Determine the starting PH and ending PH with specific treatment procedure.
- Select appropriate chemical for control [10].

3.3 Toxic metal treatment

Synthetic wastewater prepared with high concentration of toxic metals. For example Zn can have interaction with ACP plus Alumina gel, based on rising of cationic aqua sols that can precipitate with hydrogen phosphate. SHMP-CAD system is also an excellent sorbent for remove of the three important toxic metals (Ca, Pb, Cu) from wastewater [11].

3.4 Odor control

Wind direction and the location of discharge wastewater can effect to odor problem. Pretreatment for the wastewater that has high organic and suspended solids can help to this problem. Also use perfumed products that are nontoxic and biodegradable on the odor source can reduce it. Zeolite and activated carbon can eliminate and adsorb odor gases without any chemical change. The most important character of odor is sulfate that could result in high hydrogen sulfide. Emission of ammonia gas due to anaerobic conditions cause bad odor which can remove with significant PH [12].

Common way to control odor is:

- PH lowers than 7 [12].
- Use some chemical substance to decrease the bacteria that can cause bad odors [13].
- Bio filtration [14].

3.5 Oil and grease removal

Treating wastewater that contains oil and grease before release in the environment is an important subject that needs to attention. Membrane technologies are suitable. Membrane Ultrafiltration (UF) has been identified as the best technology for treatment of oily wastewater [15]. Another effective way to remove oily and greasy wastewater is separation by using microfiltration membrane and powder activated carbon [16].

3.6 Solids removal

Electro coagulation is a process that has two stages to remove TDS and TSS from wastewater.

The first one is destabilization and collection of particles in the short period.

The second one includes precipitation of particles which takes place in a longer time. So the efficiency of remove total suspended solid is low at small time [17].

AL₂(SO₄)₃ and CaCO₃ are two effective coagulant which use for coagulant in treatment process.

In shift 1 we try to show the average removal efficiencies of contaminant in various sewage system,

- (A) TSS and TP removal
- (B) BOD and COD removal
- (C) Nitrogen removal

This graph shows the standard deviation bar in European countries [17].

3.7 Activated sludge process

Activated sludge process is used for removing organic and nutrient matter such as P and N in wastewater treatment plants (WWTPs). Use of higher water depth and fine diffusers also enhance O₂ mass transfer that leads to less energy consumption [19]. The bulk of pollutant with organic material can feed up the bacteria and help to wastewater treatment. So this process focuses on consumption of organic matter by microorganisms.

Aeration tank picture shows in shift 2 which explain the process that what the process happen on wastewater influent. After primary clarifier, wastewater goes to aeration tank and then secondary clarifier. During this process we use activated sludge that it recycles in the system. Final effluent goes for disinfection. This picture shows the activated sludge process [19].

3.8 Wetlands

Wetlands can treatment different types of pollutants. Wetlands can decrease BOD, nutrients and suspended solids with different mechanisms [7]. It can remove high pollutant with easy maintenance, low energy requirement, water recycling and operation. A warm climate can conduct to more microbiological activity with more plants grows. Also decrease the time in microbial biodegradation with high plants help to have more efficient treatment [22].

CONCLUSION

Wastewater can discharge so many hazardous matters to the environment that can be harmful for the living things and the environment. More pollutants come from industries that have specific process and characteristic. Understanding about these pollutants and some common ways to remove them help to better protection of environment. Introducing some common treatment methods to decrease the pollutant from industrial waste water can help to have better environment with better life.

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