International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Review of Assessment of Physicochemical and Biological Parameters on the Quality of Water of Madhotal Lake with Various Locations

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ABSTRACT

Due to the harmful effects of municipal, industrial and hospital wastewater on water, soil, air and agricultural products, wastewater treatment and proper disposal of produced sludge are important from an environmental safety perspective. Many rivers are dammed or dammed due to severe water shortages, brought about by the impacts associated with agricultural growth, industrialization and urbanization. The operation of public sewage treatment facilities, municipal wastewater treatment, and general sewage treatment facilities, cleaning of waste from small industries, also do not comply with the prescribed standards. Therefore, wastewater from treatment plants is, in general, not suitable for domestic purposes and reuse of wastewater is generally prohibited for agricultural and industrial purposes.

Keywords- Waste water, Effluent treatment plants (ETP) and Physical treatment.

1. INTRODUCTION

Economically, effective wastewater treatment has important consequences for saving water, as well as preventing unnecessary water loss. The development of new technologies to treat wastewater from various industries is a matter of concern for us. Although many research papers have been reported on wastewater pollution control studies, very little research work has been done to treat wastewater in steel industries, especially with reference to the design development of industrial effluent treatment plants (ETP). Another beneficial aspect of this research project will be the recycling, reuse of water and sludge from the steel industry. All industrial wastewater treatment technologies can be divided into four categories: - Chemical, Physical, Biological and Mathematical methods. Iran, the demand for water has increased and the annual rainfall is low in regions of North Africa, Southern Europe, and large countries such as Australia and the United States.

As a result, sewage reuse is the most sustainable and long-term solution to water scarcity [1]. In the next 30 years, the world's population will double. Due to population growth, the amount of water available in 1960 decreased to 3300 cubic meters and in 1995 it decreased to 1250 cubic meters. This trend is expected to decrease to 650 cubic meters worldwide by 2025 [2]. Because of this water shortage problem, water from wastewater treatment needs to be increasingly reused in the near future. The reuse of wastewater requires treatment and the use of appropriate wastewater treatment systems [3]. In recent years, more research has been done on wastewater treatment using simple, low-cost, and easy-to-use methods in developing countries [4]. Systems and processes such as activated sludge, aerated ponds, settling ponds, natural and artificial wetlands, trickling filters, circulating biological contactors (RBCs) have been used for wastewater treatment and physical, chemical removal. and biological pollution [5]. Among different wastewater pollutants, microbial agents are becoming increasingly important and their removal efficiency should be reported in different wastewater treatment systems [6-7].

Biological contaminants in wastewater are various types of bacteria (Fecal coliform and Escherichia coli, Salmonella, Shigella, Vibrio cholerae), Parasite cysts and various eggs, bacteria and fungi. All of them can be harmful to natural and human health depending on the type and quantity [8-10]. For example, bacteria in contaminated water can cause cholera, typhoid fever, and tuberculosis, bacteria can cause hepatitis, and protozoa can cause diarrhea. Many microbial agents are attached to suspended solids in wastewater if it is not treated properly and the wastewater spills into the environment, such as river water, green space, and plants, endangering humans and aquatic animals [11-13].

Therefore, the use of appropriate wastewater treatment systems designed for a variety of microbial agents is essential to achieve the most complete elimination possible of biological agents. For example, in a study by Sharafi et al., (2015) with the aim of determining the effectiveness of the removal of parasites from wastewater using a wetland system, the removal rates of protozoan cysts and Parasite eggs were 99.7 and 100%, respectively [15].]. Oko, et. al. (2010) reported that activated sludge processes, oxidation ponds, activated carbon filtration, lime and chlorination coagulation eliminated 50-90% of wastewater bacteria. Wastewater from wastewater treatment plants, is used in Iran without limits and controls like in many other countries. Therefore, it is necessary to implement proper sewage treatment systems, before the water is used for public irrigation. This study focuses on the effectiveness of different wastewater treatment systems in removing microbial agents.

In Iran, a number of these systems have been built to treat wastewater in Arak, Gilan West and Isfahan. Stabilization ponds have high acceptance due to their ease of operation, and the lack of electrical and mechanical equipment compared to other sewage treatment systems, their high efficiency in removing pathogenic organisms [16]. The main effect of stabilization ponds is the need for extensive land, the low level of waste due to the presence of algae, and the production of odors that limit the use of this type of treatment system near residential areas. In order to improve the quality of the resulting wastewater, chemical compounds are required integrated, such as mixing and using microstrainers, stabilization ponds and rock filters.

As for the wetlands of Karimi et al. (2014) on Faecal coliforms, Escherichia coli and Faecal streptococci show that wetlands were not effective in removing microbial agents (removal rate of Fecal coliforms 1.13 × 1014 MPN/100 mL and Escherichia coli 5.03 × 1010 MPN/1010 MPN. In a study conducted by Decamp et al. (2000), the average removal of Escherichia coli in a wet environment was 41 to 72% on the in situ scale and 96.6 to 98.9% assessment scale. In a study by Evanson et al. (2006), the removal rate of Fecal coliforms was 82.7 to 95.99%. The removal of Total coliforms and Fecal coliforms in wetlands is carried out by various biological factors such as nematodes, protozoa, bacterial activity, bacteriophage production, chemical factors, oxidation reactions, detection of bacteria and toxins [17] and disruption of some of these (microbial). communities) will affect the removal rate of Total coliforms and other microbial agents. Removal of bacteria such as Escherichia coli and Cryptosporidium is also carried out in wetlands but is often not in accordance with environmental standards. In addition, although wetlands are economical and widely used in wastewater treatment systems because they are easy to operate, maintain, and operate at a low cost [18].

2. TREATMENT PROCESSES

The collection system in the service area is a combined sewer system that covers one-third of the area, while separate sewer systems cover the remaining area. Under normal operating conditions when the strong flow is below the treatment capacity of the plant, two different main influences are directly discharged, where large particles from untreated wastewater are first removed using screens and gravity settling vessels. The organic matter present in the wastewater is then used for biological treatment (secondary treatment) by aeration. After this step, microorganisms convert ammonia into nitrate and nitrite through the process of nitrification.

3. SAMPLING AND ANALYSIS

The samples tested in this study were collected from two wastewater discharges: One was the bypass waste (intermittent wastewater) after the primary treatment process, and the other was from the regular treated water (continuous wastewater). Samples from bypass debris were collected during rainfall events as catch samples. The sample is pumped from the dechlorination tank to the sample bottle after the pump has been running for at least 15 minutes before sampling to remove the old volume from the pipe.

4. USE OF WATER IS CATEGORIZED BY FOLLOWING

Commercial water uses include clean water for motels, hotels, restaurants, office buildings, other commercial establishments, and public and military facilities. Household water use is probably the most important daily water use for most people. Domestic use includes water used in the home on a daily basis, including water for common domestic purposes, such as drinking, preparing food, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Industrial water use is an important resource for the nation's industries for purposes such as processing, cleaning, transportation, water purification, and cooling in production areas. Major industries that use water include steel, chemicals, paper, and petroleum refining. Industries often use the same water over and over again for more than one purpose.

5. ENVIRONMENTAL IMPACT ASSESSMENTS (EIA)

Environmental Assessment (EA) Environmental Impact Assessment (EIA) is a method by which we can assess various things such as the impact on human environmental health, environmental health and the risks associated with it and the presence of changes in natural resources in certain projects. It is a term used for the evaluation of the environmental effects (positive and negative) of a plan, policy, program, or concrete projects before a decision is made to proceed with the proposed action.

6. AVAIBILITY OF WATER AND USES

Water is one of the most important natural resources for all life on Earth. The availability and quality of water has always played an important role in determining not only where people can live, but also their quality of life. The total source of usable water in the country is estimated at 1123 BCE (690 BCM from surface and 433). BCM from the ground), which is only 28% of the water that comes from rain.

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8. METHODOLOGY

Although more than 75% of the world is covered by water, the availability of fresh water is limited. There are places in India where people have trouble getting clean water for their daily needs. Therefore, it is important to use what we have carefully. Conventional treatment of wastewater helps to reduce the negative environmental and health problems caused by it, but the quality of clean water is not at the level of clean water. Also, various human activities have created new pollutants in wastewater called emerging pollutants. Their presence is a challenge to conventional wastewater treatment methods. In the present study, the effectiveness of modern technology in wastewater treatment

8.1 PRELIMINARY TREATMENT

The purpose of the initial treatment is to separate floating materials such as dead animals, free branches, papers, pieces of rags, and non-living solids that can be fixed. This section also helps in removing oil, grease, etc., from the cleaning water. This treatment reduces the BOD of the wastewater by 15-30%. Inspection, detritus tank, comminutors, flotation unit and skimming tanks are the various units involved in the initial treatment. Inspection is used to remove floating objects. Detritus tank also known as grit chamber, is used to remove sand and grit. Comminutors are used for grinding and comminuting suspended solids. Flotation units and skid tanks are used to remove oil and grease.

8.2 PRIMARY TREATMENT

The physical processes of sedimentation and floating are used in primary treatment to remove organic and inorganic solids. During primary treatment, approximately 5-50% of biochemical oxygen demand (BOD5), 50-70% of total suspended solids (SS), and 65% of oil and grease are removed.

Even if organic nitrogen, organic phosphorus, and heavy metals associated with solids are removed during primary sedimentation, colloidal and dissolved elements are not affected. In most developed countries, the minimum level of pre-application treatment required for wastewater treatment is the primary treatment. This can be considered irrigating edible crops or irrigating orchards, vineyards, and other processed food crops.

Basic sedimentation tanks may be round or rectangular vessels, usually 3 to 5 m deep, with a water retention time of between 2 and 3 hours. Concentrated solids (primary sludge) are usually pumped from the bottom of the tanks to a central well from where they are pumped to the sludge processing units. Scum is also removed from the tank surface by water jets or by means of filtration in sludge processing units.

8.3 SECONDARY TREATMENT

The wastewater from the first settling tank contains 60 to 80 percent of the unstable organic matter that was originally present in the field. Colloidal organic matter that exceeds the primary specifications must be removed by further treatment. Secondary or biological sewage treatment involves changing the state of organic matter and thus converting it into stable forms through oxidation or nitrification. Secondary sewage treatment involves various methods; these methods are broadly divided into two categories called filtration and the activated sludge process. Contact beds, sand filters and trickling filters are various filters used in secondary treatment.

8.4 TERTIARY TREATMENT

Advanced treatment is done when certain parts of the wastewater that cannot be separated into secondary must be removed. The final treatment process improves the quality of the wastewater before it is reused, recycled, or discharged into the environment. The treatment removes inorganic compounds and elements such as nitrogen and phosphorus.

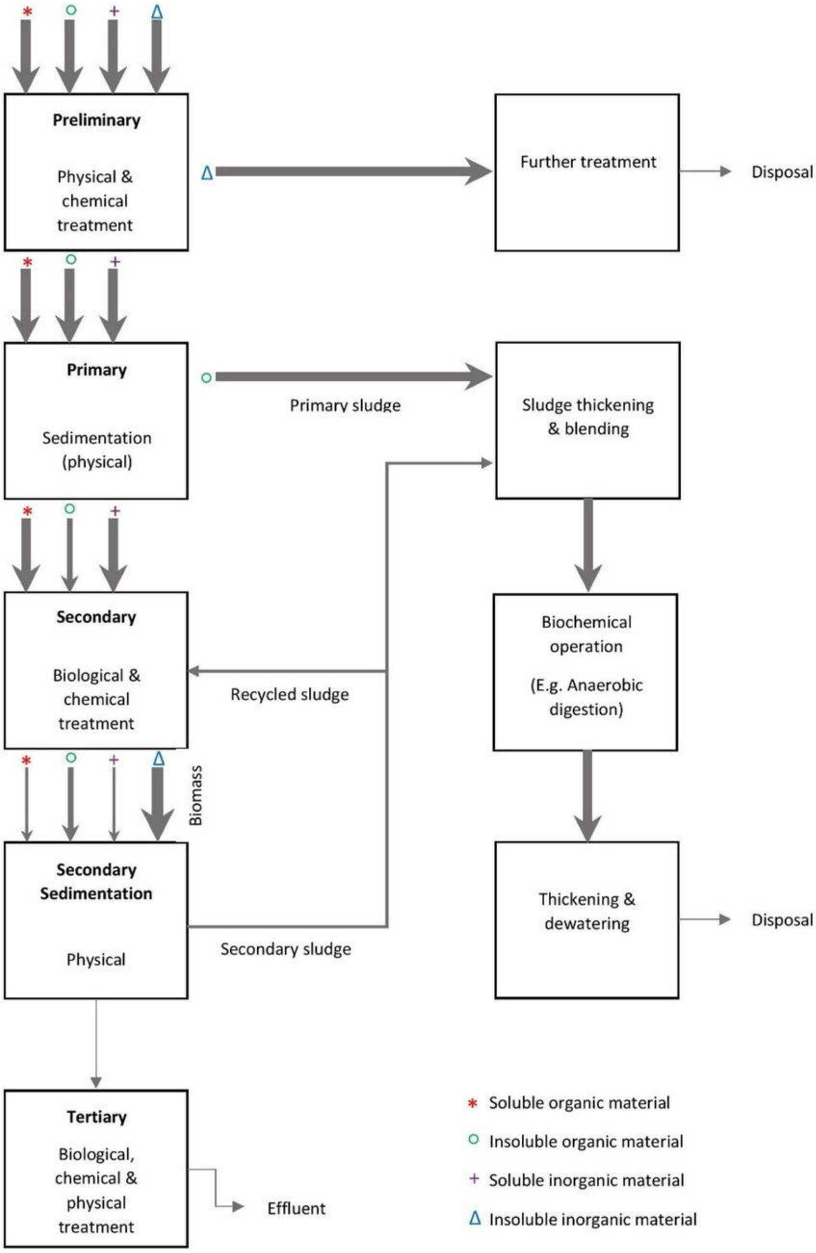

Figure1 Treatment

9. ETP PLANT OPERATION

1. Screen Chamber: Remove relatively large solids to avoid abrasion of mechanical equipment and clogging of hydraulic system.

2. Collection Tank: The collection tank collects the effluent water from the screening chamber, storage and then pumps it to the equalization tank.

3. Equalization tank: The effluents do not have the same concentration at all times; The pH will vary from time to time. Effluents are stored in equalization tanks for 8 to 12 hours which results in homogenous mixing of effluents and helps in neutralization. This eliminates shock loading on the after-treatment system. Continuous mixing also prevents solid build-up within the equalization tank. SS reduces TSS.

4. Flash Mixer: Coagulants are added to the effluent: 1. Lime: (800-1000 ppm) to correct the pH to 8-9 2. Alum: (200-300 ppm) for color removal 3. Poly electrolyte: (0.2 ppm) to settle suspended matter and reduce SS, TSS. The addition of the above chemicals by efficient rapid mixing facilitates the homogeneous combination of flocculates to produce microflocs.

5. Clariflocculator: In a clarifloculator water is continuously circulated by a stirrer. The overflowing water is taken to the aeration tank. The solid particles settle to the bottom, and are collected separately and dried; It reduces SS, TSS. Flocculation provides slow mixing that leads to the formation of macro flocs, which are then ejected into the clarification zone. The frozen solids ie primary sludge is pumped to sludge drying beds. ETP Plant Operation

6. Aeration Tank: Water is passed as a thin film over various ladder shaped arrangements. Dosing of urea and DAP is done.

9.1. NEED OF ETP

1. To clean the effluent of the industry and recycle it for further use.
2. Minimizing the use of fresh/potable water in industries.
3. To cut down on expenditure on purchase of water.
4. To meet the standards for emission or discharge of environmental pollutants from various industries set by the government and avoid heavy fines.
5. Protecting the environment from pollution and contributing to sustainable development.

9.2. TREATMENT LEVELS & MECHANISMS OF ETP

1. Treatment levels: Preliminary
2. Primary
3. Secondary
4. Tertiary (or advanced)

10. MATERIALS AND METHODS

Methodology: The treatment techniques adopted for the treatment of sewage in this research paper are as follows: a. Activated sludge process b. Chlorination c. Filtration Sewage treatment is the process of removing contaminants from wastewater and domestic sewage, both runoff (effluent), domestic, commercial and institutional. It includes physical, chemical and biological processes to remove physical, chemical and biological pollutants. Its purpose is to produce an environmentally safe liquid waste stream (or treated effluent) and a solid waste (or treated sludge) that is suitable for disposal or reuse. The treatment of wastewater is important not only for our own health but also for maintaining our environment. clean and healthy.

11. CONCLUSIONS

The problems associated with reusing wastewater arise from the lack of its treatment. Thus the challenge is to find low-cost, low-tech, user-friendly methods, which on the one hand protect our substantial wastewater-dependent livelihoods from danger and on the other, protect our valuable natural resources from degradation. The use of constructed wetlands is now being recognized as an efficient technology for wastewater treatment. Compared to conventional treatment systems, constructed wetlands require less material and energy, are easily operated, have no sludge disposal problems, and can be maintained by untrained personnel.

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