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Improvements in Effluent Treatment Plant by the Method of Coagulation and Flocculation in Metal Cutting Industry

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Abstract — *The present study has been undertaken to find and evaluate performance of an Effluent Treatment Plant (ETP) of a metal cutting industry. This effluent treatment plant is operating on coagulation and flocculation treatment method. Metal cutting industry is one of the most polluting industries in terms of large amount of water use during production of mechanical components. The wastewater contains dissolved coolant and chemicals which are hazardous for human health and also have bad impacts on environment. It is estimated that the metal cutting industry generate 0.5KL of waste water every day. Such untreated wastewater pollutes land and river system so that proper treatment of metal cutting wastewater is necessary before disposal in environment.*

Keywords-*Effluent; Coagulation; Flocculation; Hazardous; Environment; Flocs; Treatment;*

I. INTRODUCTION

Industrial wastewater treatment covers the both mechanisms and processes used to treat wastewater which is produced as a hazardous byproduct after industrial or commercial activities. After treatment of effluent by the method of coagulation and flocculation, the treated industrial wastewater (or effluent) may be reused or released in gardening or in toilets. Approximate all the production industries produce effluent or wastewater although recent trends in the developing world have been to minimize such production which give rise to wastewater or recycle such wastewater within the production process. However, many industries remain dependent on processes that produce wastewaters. Our principal objective of effluent treatment is generally to allow human and industrial effluents to be disposed in a safe way so that it can't be harmful to our environment and human health as well.
For treatment of effluent, we are using flocculation and coagulation method. In this type of treatment method, different acidic and basic chemicals are used to remove the hazardous suspended solids and total dissolved suspended solids.

II. SOURCES OF INDUSTRIAL EFFLUENT

There are different types of productions industries which produce different components and products. These industries have their specific mechanism and processes of production so it is obvious that their waste water or effluent have not the same constituents with one another. Sources of effluent are:-

- Chemical Industry
- Electric Power Plants
- Food Industry
- Iron and Steel Industry
- Mines
- Nuclear Industry
- Pulp and Paper Industry

III. TREATMENT PROCESSES FOR EFFLUENT

As we have discussed that the effluents have different constituents because it is generated from different industries. So it is simple to understand that the processes or methods for effluent treatment are different. Some of the treatment processes are:

- Brine Treatment
- Solid Removal and Oil & Grease Filtration
- Carbon Filtration
- Chlorification
- Aerated Lagoon
- Ion Exchange
- Settling Basin
- Imhoff Tank

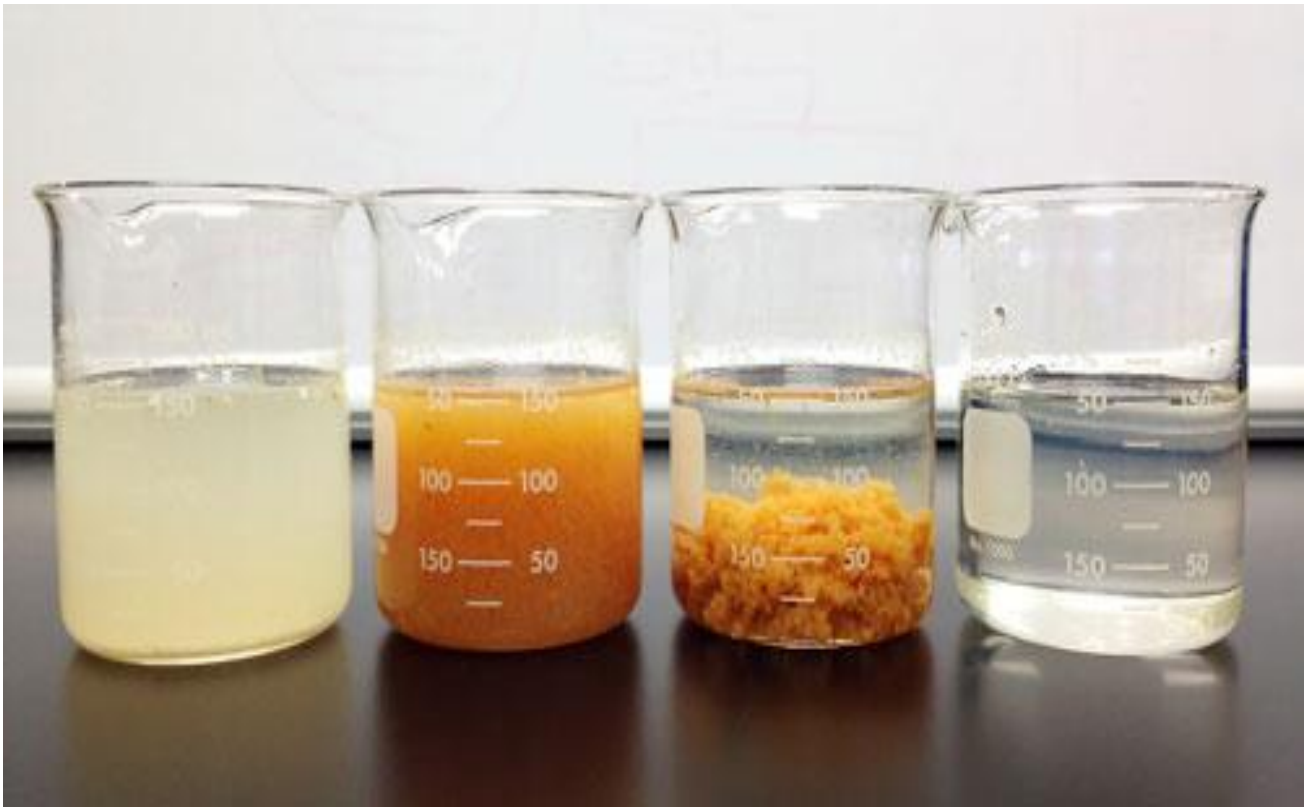
- Septic Tank.
- Extended Aeration
- Coagulation and Flocculation

3.1 Coagulation and Flocculation

Coagulation and Flocculation is the another effluent treatment process. In this process, different acidic and basic chemicals are used which helps in the sedimentation and filtration of the untreated effluent for treatment.

Coagulation is a process which is used to neutralize the charges to form a gelatinous mass to trap particles and forming a enough large mass to settle or be trapped in the filter. Coagulation opposes the stabilization of the particles. Coagulant which have opposite charge to those suspended solids which is mixed in effluent are added to untreated water to neutralize the charges such as clay and organic substances. Chemical named Ferric Chloride (Fe2Cl) is used as coagulant which breaks the mixture of acid and water in effluent.

Flocculation is the process in which gentle stirring, agitation and a chemical name polyelectrolyte is used to encourage the particles to form large mass which is enough to settle down at the bottom of the tank.
Once the charge is neutralize by the coagulation, the small particles of suspended particles are capable of sticking together. When these particles form a large particle by sticking then it is known as microflocs. These microflocs are still invisible to see with naked eyes. So we are using polyelectrolyte to form bigger flocs which helps in easily and fast settlement of the flocs at the bottom of tank.



IV. CONCLUSION

In this paper, some chemicals are mentioned i.e. ferric chloride and polyelectrolyte. We can use this chemicals for the treatment of effluent which are generated from metal cutting industries. But ferric chloride is acidic and hazardous in nature so when using these chemicals, safety precautions must be taken and MSDS (Material Safety Datasheet) of chemical must be read before using it.
As compare to other mentioned effluent treatment methods, this treatment method is more economical, less time consuming and less space required for setting of this type of treatment plant.

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