Effective Removal of Organic Concentration of Textile Effluent by using Natural Adsorbents

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Abstract:- **The textile industry is a large water consumer. Effluent from the textile industry contains toxic compounds. These compounds contaminate the surface water, thereby making it unfit for irrigation and drinking. Since farmers use water from the rivers for agricultural purposes and the residents of the town, use both the surface and underground water from the same area as potable water, it is quite unsafe to discharge this effluent into water body. Suspended solids can clog fish gills, either kill them or reduce their growth rate. They also reduce the ability of algae to produce food and oxygen. Therefore, proper treatment of effluent water and enforcement of pollution control by the regulatory authority on the indiscriminate discharge of textile wastewater into water bodies should be done.Batch adsorption experiments using a low cost, locally available biomaterial as an adsorbent has been used for removal of organic concentrations from effluent of textile industry. This paper results the analyses of waste water treatment from the textile effluent collected from textile industry near Tirupur by using aerobic treatment process means of filtration process. The main aim of this study is to utilize natural low cost adsorbent materials like neem powder, china clay, bark plantain plant, parthenium species powder. The removal efficiency of COD, BOD, colour, total dissolved solids, pH, chloride gave a better result by using these natural adsorbents.**

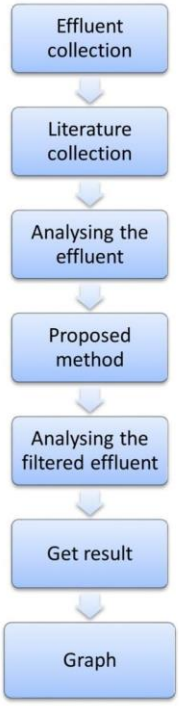
Keywords: Textile Industry, Neem, China Clay

INTRODUCTION

Water pollution is the contamination of water bodies, usually as a result of human activities.Water bodies include for example lakes,rivers, oceans, aquifers and groundwater. In this study Moringa oleifera seeds and Tamarindus indica seeds were used as a coagulant to treat the noyyal river water. The aims of this studt is to find out the efficiency of the natural coagulant Moringa oleifera and Tamarindus indica seeds in removing the Ph,Suspended matter,chloride,sulphate,organic and inorganic solids from the noyyal river water. The optimum dosage of the coagulant has to be analysed the conventional water in the production of concrete is replaced by the treated water and the compressive strength of the concrete is been tested to ensure the efficiency of the coagulant. The study is to find out the efficiency of the natural coagulant.

METHODOLOGY

The methodology followed throughout this project is quoted in the following flow chart.



POLLUTANTS FROM TEXTILE INDUSTRY

In textile industry wastewater varies in terms of amount and composition depending upon the size of the mill. The first source of pollutant is due to the natural impurity in fibers. The second is the chemical materials that are used in the processes. Dissolved solids contained in the industry effluents are also a critical parameter. Use of common salt and glauber salt etc. in these processes directly increase the total dissolved solids (TDS) level in the effluent. TDS are difficult to be treated with the conventional treatment systems. Disposal of high TDS bearing effluents can lead to increase in TDS of ground water and surface water. Dissolved solids in effluent are harmful to the vegetation. Therefore, use of the polluted water for agricultural

purpose is restricted. Presence of color in the waste water is one of the main problems in textile Industry. Colors are easily visible to human eyes even at very low Concentration. Hence, color from textile wastes carries significant esthetic importance. The high color renders the water unfit for use at the downstream of the disposal point .Most of the dyes are stable and has no effect of light or oxidizing agents. They are also not easily degradable by the conventional treatment methods. Removal of dyes from the effluent is major problem in most of textile industries. Waste water of textiles is not free from metal contents.

TREATMENTS

PHYSICAL TREATMENT

ABSORPTION

Adsorption techniques have gained favor recently due to their efficiency in the removal of stable pollutants for conventional feasible.

MEMBRANE FILTRATION

This method has the ability to clarify, concentrate and most importantly, separate dye continuously from effluent

CHEMICAL TREATMENT

OXIDATION PROCESS

This is the most commonly used method for decolorization by chemical means**.**

ION EXCHANGE PROCESS

Ion exchange has not been widely used for the treatment of dye-containing effluents, mainly due to the opinion that ion exchangers cannot accommodate wide range of dyes. This method is Not effective for disperse dyes.

BIOLOGICAL TREATMENT

AEROBIC PROCESS

Aerobic treatment is a biological process that uses oxygen to break down organic matter and remove other pollutants like nitrogen and phosphorus. It converts the organic matter into carbon dioxide and new biomass.

ANAEROBIC PROCESS

Anaerobic Wastewater Treatment processes are based on the treatment of waste and wastewater by a process called anaerobic digestion.

NATURAL ABSORBENTS

An adsorbent can be referred to as a mixture of materials that are insoluble in nature and are used to absorb liquid by picking up and holding it in a material. This material is capable of holding water that causes it to swell and increase in size. In oil and gas industry, various kinds of adsorbents are used that are helpful in dealing with oil spills. Therefore, an adsorbent can be either oil or water attracting.

FILTRATION PROCESS

TYPES OF FILTER

- Slow sand filter
- Rapid Sand Filter or Gravity Fillters
- Pressure Filter

SLOW SAND FILTER

Slow sand filters are used in water purification for treating raw water to produce a potable product. Slow sand filters are best suited for the filtration of water for small towns.

CHARACTERISTICS OF TEXTILE EFFLUENT

Table 1.1 Textile effluent characteristic features

PARAMETERS	VALUES
pH	7.0– 9.0
Biochemical oxygen demand (mg/l)	80-6,000
Chemical oxygen demand (mg/l)	150-12,000
Total Suspended Solids (mg/l)	15-18,000
Total Dissolved Solids (mg/l)	2,900-3100
Chloride (mg/l)	1000-1600
Color (Pt-Co)	50-2500

MATERIALS

FILTRATES

- Natural adsorbents
- Activated Carbon
- Sand
- Gravel

NATURAL ADSORBENTS

- Neem (Azadirachta indica) leaf powder – Removes Organic polltants
- China clay –Removes BOD &COD
- Bark plantain plant –Removes Ph,TDS.
- Parthenium species-Removes Chlorine.

RESULT

Table 5.2 Treated effluent characteristics

S.NO	NATURAL ADSORBENTS	pH	TDS (mg/lt)	CHLORIDE (mg/lt)	BOD (mg/lt)	COD (mg/lt)
1	Neem(Azarichta indica) powder	9.02	528	300.03	301.78	1042.87
2	China clay	8.67	468.24	297.65	280	600
3	Bark plantain	7.5	300	262.97	269.47	943.18
4	Parthenium species	8.20	364.12	250	311.75	790.43

GRAPH

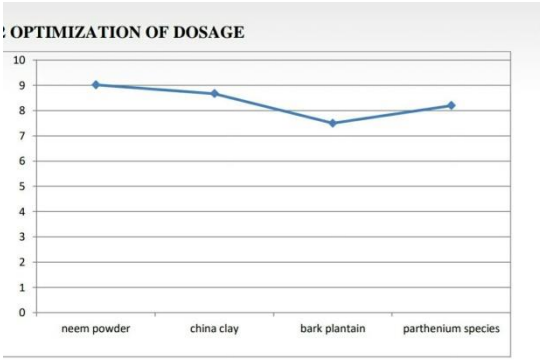


Fig 5.1optimisation of pH

CONCLUSION

Textile Engineering has direct connection with Environmental aspects to be explicitly and abundantly considered. The main reason is that the textile industry plays an important role in the country like India and it accounts for around one third of total export. Out of various activities in textile industry, chemical processing contributes about 70% of pollution. In this study the suitability and effectiveness of the natural adsorbents in the treatment of textile waste water were determined and the effect of the adsorbents on various parameters like pH, TDS, color, chlorine, alkalinity, BOD and COD was also studied by using optimization technique. Natural adsorbents are cheap and easily available source for the treatment of textile effluent.

REFERENCE

[1] Katayon, S., M.N. Megat, M. Asma, L.A.A. Ghani, A.M. Thamer, Azni,Ahmad, B.C. Khor and A.M. Suleyman, (2005). Effects of storge conditions of parthenium species on its performance in adsorption. Bioresource Technology. Ref Type: In Press

[2] Grasiele Scaramal Madrona, Rosangela Bergamascoy,Vanessa Jurca Seolinz Marcia R. Fagundes Klen,(2011). The Potential of Different Saline Solution on the Extraction of the Natural adsorbents Active Component for Water Treatment, International Journal of chemical reactor Engineering.

[3] Anwar, F., S. Latif, M. Ashraf and A.H. Gilani. (2007). Low cost adsorbent: a `food plant with multiple bio-chemical and medicinal uses- a review. Phytother. Res., 21: 17-25.

[4] Beltran-Heredia J., Sanchez Martin j. and M.T. Rodriguez-sanchez.,Textile waste water purification using natural adsorbents.

[5] Daniyansafiyayahaya, Abalaka Moses, Enemaduku and Eru E.O., 2011.The use of neem powder for water purification, Research article.