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Effect of Gold Manufacturing Unit on Ground Water Quality and Treatment by Rambutan Rind Powder and Bamboo Charcoal

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Abstract - *Due to discharge of acid containing wastewater from the major gold manufacturing unit in Choondal, the groundwater polluted. The aim of my project is to assess the effect of gold manufacturing unit in Choondal area. A major gold manufacturing unit in Choondal area discharges acid containing wastewater to the environment which leads to serious health problems to the living beings in the area. The quality of the groundwater is analyzed by collecting water samples from tube wells and bore wells during monsoon, pre monsoon and post monsoon seasons. Various journals on the topic are collected and a brief study is made regarding the various parameters that may affect water quality .Water samples are analyzed for various physicochemical parameters during monsoon like Acidity, pH, Total Hardness, Chlorides, Dissolved Oxygen, Biochemical Oxygen demand, Chemical Oxygen Demand.*

Key Words: Gold manufacturing unit, Water parameters, Rambuttand rind powder, Bamboo charcoal, Saw dust clay filter.

1.INTRODUCTION

Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life. Water which occurs below the water table is known as groundwater. Groundwater is a valuable natural resource; it occurs almost in all geological formation under the earth surface not in a single widespread aquifer but in thousands of local aquifer systems with similar characteristics. Groundwater is used for domestic and industrial water supply. And also used for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water, due to rapid growth of population and the accelerated pace of industrialization.

1.1 Scope of the Project

The scope of our project is to reduce the contamination of groundwater due to the gold manufacturing unit. To determine the necessity of water treatment plant in the gold manufacturing unit and to determine the minimum safe distance between the residences and the gold manufacturing unit. Charcoal filters are not good at removing chemicals that are not attracted to carbon such as heavy metals, fluorides etc.The effectiveness of purification is determined by factors such as the amount of activated charcoal/Rambuttan tind powder and the time water stays in contact with the filter media.

1.2 Objective of the Project

After the detailed study of literature review, here we list out the objects of the project.The project aims are,To assess the effect of gold manufacturing unit on ground water in Choondal area and to propose a remedy for the problems determined from the analysis.To suggest a method for the reuse of affected wastewater for secondary purpose.

2. MATERIALS AND METHODOLOGY

It is the primary work in this project which is finalized after collecting information about the area and it is selected on the basis of groundwater problem which facing. In this area the ground water quality decreases due to acid discharge from gold manufacturing unit.The area selected on the basis of news report about the pollution of groundwater in Choondal in Guruvayoor Muncipality, Thrissur district, Kerala.

Samples for physical and chemical tests were collected in 1 liter plastic bottles. The bottle was cleaned prior to sampling by rinsing the bottle three times in the water to be sampled. The bottle was filled to the top with air as possible and sealed tightly. Water was collected by lowering the closed can to the bottom, opening and closing it there, by hand and bringing at the surface. After the collection, each sample was clearly labelled with permanent ink and relevant details recorded. The sample was taken to the laboratory as early as possible. It was protected from direct sunlight during transportation.

To prepare the coagulant, Rambutan rind was powdered and the sample passing through 75 micron was taken as shown in Figure 3.6. Dosages of rind powder, 5, 10, 15, 20, 25 mg/l were selected for treatment. The coagulant was mixed with wastewater sample and coagulation test was carried out using jar test apparatus as shown in Figure 3.4. The study involved steps such as rapid mixing, slow mixing and

sedimentation in a batch process. The duration and speed used for the test were based on IS 3025. Several beakers were filled with 500 mL of wastewater and different dosages of Rambutan rind powder were added and was then placed on to the floc illuminator and agitated simultaneously to ensure uniform mixing. Different dosages of Rambutan rind powder was added to each jars and sample was given a rapid mixing period of 1 minute at 100 rpm. Next, slow mixing at 40 rpm was given for 9 minutes before the samples were left for sedimentation for 30 minutes each 0.5 km radius. Each set contains 6 water samples.

Fig -1: Jar Test Apparatus

Water samples were analyzed for physical parameters such as pH, Temperature, Total solids and chemical parameters such as alkalinity, hardness, BOD, DO, COD and chloride. Water is analyzed by conducting various experiments.Water is used by water authority from third point for drinking purposes. The water is purified using bamboo charcoal and its parameters are checked. Compare the results obtained from the thre different samples. It is identified that water when purified using bamboo charcoal is better than chlorinated water. The values obtained are expressed through tables and graphs. The process of purification is done with a filter unit figure 3.8 first layers consist of coarse aggregate, second layer includes sand and charcoal and third layer comprises sand and pebble the water collected in a cool area in laboratory.

Fig -2: Filtering Apparatus

3. RESULT AND DISCUSSIONS

The collected samples were analyzed for various parameters. The results of the testing are tabulated. The parameters analyzed are Acidity, pH, Total Hardness, Chlorides, Dissolved Oxygen, BOD and COD.Results of analysis of samples for various parameters during monsoon, post monsoon and pre monsoon seasons are provided in the following tables.

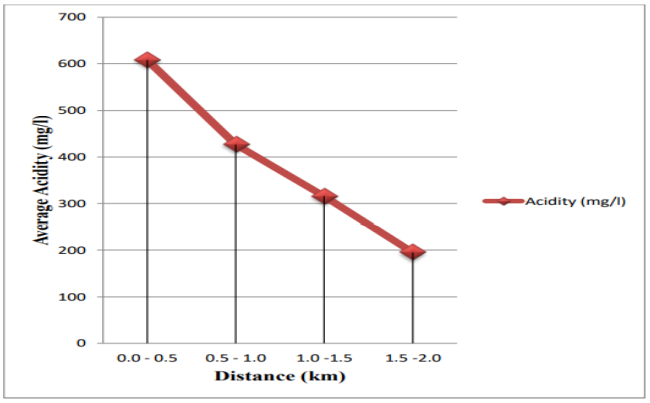

Chart -1: Acidity versus Distance

3.1 Comparison

The acidity, total hardness, BOD and COD are the parameter which exceeding permissible limits and desirable limits of IS Specifications 10500:2012 and their variation according to seasons (monsoon, post monsoon and pre monsoon seasons) are given below.

Water samples were analyzed for physical parameters such as pH, Temperature, Total solids and chemical parameters such as alkalinity, hardness, BOD, DO, COD and chloride. Water from 3 different season is analyzed by conducting various experiments. The parameters checked are within desirable limit as per IS10500:2012. Water is used by water authority from third point for drinking purposes.This sample is collected and its physical and chemical parameters are checked. The water is purified using bamboo charcoal & Rambuttan rind powder and its parameters are checked. Compare the results obtained from the 3 different seasons. The values obtained are expressed through tables and graphs.

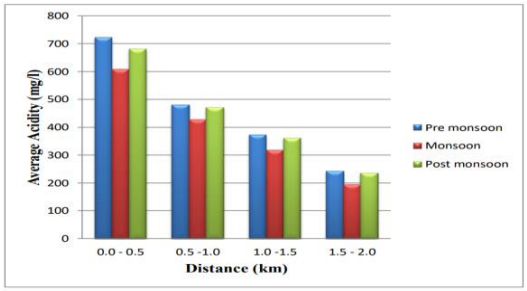

Chart -2: Comparison

4. CONCLUSIONS

The project assessed the effect of gold manufacturing unit in Choondal area in Thrissur District. The parameters in this work were selected on the basis of the site condition and referring the research papers. The project completed in different stages. The first stage completed in monsoon season, Second stage in post monsoon season and third stage in pre monsoon season. The acid is the major waste discharges from the gold manufacturing unit which is the main contaminants in the groundwater of this area. For the purification of gold, acid is used. The water samples were collected from the open wells within 2 km radius of the gold manufacturing unit. After the analysis of various physico-chemical parameters, it was found that Acidity, pH, BOD, COD values exceeds the permissible limits and Total Hardness exceeds the desirable limits IS 10500; 2012 water quality standards in three seasons. The Acidity value more found within 0.5 km radius of the gold manufacturing unit and the acidity values of groundwater samples decreases as moving away from gold manufacturing unit. The acidity values of groundwater samples vary according to seasons. The higher acidity values of 20 collected water samples were found in pre monsoon season. The COD value of groundwater samples increase as moving towards the gold manufacturing unit. The higher COD value found within 0.5 km radius of gold manufacturing unit but it had no any seasonal variations.The Total Hardness and BOD of water samples were almost equal within 2 km radius of gold manufacturing unit and it do not show any seasonal variations. The increase in Total Hardness and BOD of water samples due to some other reasons in that area. The value of all parameters in water samples were in almost equal in three seasons. While in this covid time i also want to introduce a conventional filter as well as sawdust ceramic filter. A filter made of bentonite and sawdust has the ability to filter water off its impurities due to the porous structure. An excellent colour removal was observed with the use of this filter. Filtering aided with clay pots also improves metabolism in our body.

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