“Experimental investigation on effectiveness of natural herbal coagulant and other low cost filter materials in the development of water filters for rural and urban areas situated in Dharwad”

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Abstract—The primary objective of this study is to identify the most appropriate herbal plants for the removal of contaminants from water and also to develop a water treatment kit at an affordable cost for rural folk. Nearly 3 herbs namely Neem, Moringa, and Tamarind were chosen for this study. The effectiveness of these herbs in the removal of Chemical Oxygen Demand (COD), Total dissolved solids (TDS) and Biological oxygen Demand (BOD) has been investigated using locally available domestic wastewater. The results obtained from this study satisfy the drinking water standards prescribed by World Health Organization (WHO). Based on the laboratory experiments we have observed and concluded that, The decrease in COD level after using Neem+Tamarind as a coagulant the initial COD of wastewater was 310 mg/lit which later reduced to 40 mg/lit for the dose of 50 grams.87% of COD has been removed The decrease in BOD level after using Neem+Tamarind as a coagulant and other low cost filter materials in the development of water filters for rural and urban areas situated in Dharwad .

IndexTerms—Natural Herbs, Coagulants, Rapid Gravity Sand filter, Treatment of domestic wastewater.

1. INTRODUCTION:

Water is an important compound which plays many roles. It gives life to plants and animals. It is universal solvent used in many of the reactions. It regulates the temperature. Water is getting polluted not only chemically but also biologically. It is very important to remove harmful microorganisms as they affect the human physiology. Various methods such as ultraviolet treatment, chlorine, chlorine dioxide and ozone treatment are used for water purification. Chlorine is most widely used. Dinking water is a vital resource for all human beings, and the access to safe and clean drinking water is a major concern throughout the world (who). when surface water is used as raw water the removal of organic and inorganic material from raw water is essential before it can be supplied to human for consumption, this is being carried out by chemical coagulation. In developing countries like India, this system is inappropriate because of the expensive and low and non-availability of chemical coagulants. Water treatment plant through natural filters means treating of water through natural materials like herbs, aquatic plants, sand, charcoal, pebbles, gravel, seashells, oysters, coconut etc. its main purpose is to produce water fit for a specific purpose. Neem leaves It indicates that the use of the neem leaves in the water contributes to protecting the environment from contaminants that can harm the environment . For example; farmers use volatile chlorine in water treatment . It may hurt plants and humans themselves if they do not follow same precautions . Moringa seeds It involves use of moringa seed powder as a natural coagulant and flocculent to clarify turbid water treatme

The primary objective of this study is to
1. To provide safe and clean drinking water
2. To collect locally available natural herbs from nearby places.
3. To develop low cost natural coagulant using natural herbs.
4. To find optimum dose of coagulant.
5. To find out maximum BOD and COD removal efficiency.

2. MATERIALS AND METHODOLOGY:

Materials:
Methodology:

Procedure:
1. Collection of water and waste water from different locations situated in dharwad district.
2. Collection of suitable herbs from nearby places situated in dharwad district.
3. Preparation of coagulant from natural herbs.
5. Application of different dose of coagulant to prefabricated filter to check the water quality and optimum dose of coagulant.
6. During study period important controlling parameter like ph, fluoride, acidity, alkalinity, chloride, hardness, cod, bod and other parameters will be analyzed.
3. RESULTS AND DISCUSSION:

In this Research work we have prepared 8 Natural coagulants namely Neem, Moringa, Tamarind, Neem+Moringa, Neem+Tamarind, Moringa+Tamarind, Moringa+Neem, Neem+Tamarind+Moringa. Out those Neem+Tamarind coagulant gives best results after filtration process, The Results and discussion are as below:

Table no1. Coagulant Dosage for COD removal:

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Coagulant</th>
<th>Dose (g)</th>
<th>COD (mg/lit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neem+Tamarind</td>
<td>10</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>20</td>
<td>240</td>
</tr>
<tr>
<td>3</td>
<td></td>
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<td>100</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>

Fig: COD Removal in mg/lit with different dose of Neem+Tamarind and filtration

The above graph shows the reduction in COD level with increasing in the dosage of Neem and Tamarind coagulant. The coagulant prepared using neem and tamarind was good and effectively worked in removing COD level of domestic wastewater after the treatment using rapid gravity filter. About 87% COD has been reduced.

Table no2. Coagulant Dosage for BOD removal:

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Coagulant</th>
<th>Dose (g)</th>
<th>BOD (mg/lit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neem+Tamarind</td>
<td>10</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>20</td>
<td>120</td>
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4. CONCLUSIONS:

Based on the laboratory experiments we have observed and concluded that, The decrease in COD level after using Neem+Tamarind as a coagulant the initial COD of wastewater was 310 mg/lit which later reduced to 40 mg/lit for the dose of 50 grams. 87% of COD has been removed. The decrease in BOD level after using Neem+Tamarind as a coagulant the initial BOD of wastewater was 180 mg/lit which later reduced to 20 mg/lit for the dose of 50 grams. 88% of BOD has been removed.
References:

2. Rahul tripathi, imran ahmad (april 2016): removal of iron content from ground water by herbal techniques, international journal of emerging technologies in engineering research. 119-122.