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Purification of Water by using Cow Dung Ash

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Abstract: *India considered and second most populated *country. He scarcity of water over the country for all the purposes is increasing day by day .Drinking water is of great concern these days .The prevailing most widely used and convenient method in India for Wastewater treatment such as primary to be world's seventh largest and secondary treatment by flocculants and coagulants as well as secondary treatment by using micro organisms and color removal by using activated Carbon. However this method is quite expensive. So the present study is about use of cow dung ash in the secondary treatment of wastewater to reduce the contaminants. Adsorption is performed at different pH of various industrial effluents will be analyzed before and after the treatment with Cow dung ash to find out the effect on effluents. These natural adsorbent is cheap, easily available and ecofriendly. The ever increasing popularity of water purification techniques `has made important to analyze the mineral content , parameters of good purification techniques like RO purifier, UV purifier, etc. there is depletion in the natural mineral content which are essential for human health. Depletion of such natural minerals like zinc, magnesium etc have adverse affect on human health such as risk of cancer, lack of immunity, anxiety, increase in stress and most important cardiovascular diseases. Cow dung ash is full of minerals which can be easily assimilated by our body cow dung ash doesn't remove minerals instead it adds it. This study is to replace advanced purification techniques by cow dung ash which easily available and economically stable alternative.*

***Key Words*: Cow Dung Ash, Purifiers, Diseases.**

1. INTRODUCTION

Water, the basic and indispensable unit of eco-system, is the greenest substance, essential for life and recyclable naturally; hence since ages it has been taken for granted by the human society. A rising quality of life with high rate of resource consumption have an unintended and negative impact on environment, generating waste hulk with far beyond handling capacities of mankind. The threat of water famine looms greatest as our rivers and other water resources are poisoned due to each successive epoch of urbanization and industrialization leading to the water pollution.

Purifying water is a serious issue, generally either we add chlorine or some other chemicals or boil the water in it. Adding chlorine in it has its own defects and side effect. At the same time these radiations in ultra violet water purifying machines and depletion of natural minerals in reverse osmosis and bottled water do untold damage to human body.

Cow dung ash is an excellent water purifier. All harmful bacteria are killed just by adding a pinch or two of cow dung ash in few liters of water.

This option of adding cow dung ash is so cheap that anyone can afford it. It has absolute no side effects. We have to use cow dung ash that comes from vedic cows only. It was established that the use of cow dung is a promising absorbent in the removal of heavy metals from waste water and bring it down to drinkable condition.

In the past few decades, the rapid depletion of easily accessible safe drinking water and detrimental effects on environmental pollution and human health impose the use of alternative advanced water purification sources. In this perspective, cow dung ash and cow urine is one among the alternative renewable sources which can be widely used as a natural purification agents. So it is essential to provide a alternative method of disinfection. We used cow dung ash as a disinfectant alternative to chlorine. Cow dung ash has been used as a pesticide since ages, but its disinfecting property still remains undiscovered. Some researchers have proved that cow dung ash not only purifies water but also improves its mineral content. Moreover, it is economical and eco-friendly.

2. PROBLEM STATEMENT

There have been numerous technological advancements in purification of water till date. Many innovations like the RO purifier, UV purifier are being used in water purification no matter how costly they are.

However, no one has tried to invent any sort of system or a method of economical purification technique. It is observed that, there are numerous purifiers available in market but they do not retain the essential quality minerals and thus eventually affects the human health.

The available advance purifiers in the market adds the artificial minerals to the water which is being purified and these artificial minerals are insoluble in the human body which has adverse effect on the human health. Ultra violet water purifiers only remove micro-organisms but does not remove heavy metals such as arsenic, lead, mercury,

cadmium which are positively toxic and which increases risk of cancer and cardio vascular diseases.

Suggesting economical disinfectant of water through cow dung ash.

3. AIM OF PROJECT

To check feasibility of cow dung ash as a replacement to chlorine disinfectant.

4 . OBJECTIVES

- To demonstrate the need for treatment of surface waters and ground waters for drinking purposes.
- To introduce the concept of the multiple barrier principle and to describe the more common and important key process.
- To check the feasibility of cow dung ash as a disinfectant.
- To check the improvement in the quality of water by adding cow dung ash for the standard parameters (pH, MPN, DO)
- To discuss the assessment of water treatment process by CDA.

5. SCOPE OF THE PROJECT

The project will be dealing with water purification using CDA technique. The main concept is to treat the untreated toxic metal and contaminants present in the water and to retain the essential minerals to an acceptable standard to increase the health of community and to provide a clean and reliable water source. The purification technique will be designed with the project goals in mind. Providing purified and disinfected water to villages for drinking purpose**.**

6. APPLICATION

- It is used for purification of water for safe drinking purposes.
- This technique is feasible and accessible for all, especially the one who cannot afford the expensive water treatment purifiers.
- It is used in an emergency situation where safe drinking water is at utmost priority.
- This treated water is beneficial in various medical treatment and is capable to deal with a serious bacterial infection such as plague.
- The secondary use of CDA and COW URINE is to produce bio water which is further used for farming and other purposes.

7. LITREATURE REVIEW

7.1 INTRODUCTION

This chapter deals with the literature survey of various researchers paper which are related to the disinfection of water with various method .There are various methods of disinfection such as UV radiation, Boiling, solar, RO etc. This survey focuses on use of cow dung ash as a disinfection on water. It has also a property of improving mineral content and dissolved oxygen.

7.2 LITREATURE REVIEW - 1

S.B.Somani et.al studied the alternative approach to chlorination for disinfection of drinking water. This methods are ozone, U-V, boiling, solar etc. This paper concluded the technological advances and development have shown the drawback in using chlorine as disinfectant and necessity of alternative disinfectant. [1]

Adedamola Titi Ojedokun et.al mainly discusses one of the property of cow dung ash as a adsorbent for the removal of heavy metal ions from aqueous solution. This heavy metals are chromium(Cr), lead(Pb), mercury(Hg) etc. They have also given the chemical composition of cow dung ash i.e 12.48% Calcium Oxide, 0.9% Magnesium Oxide, 0.312% Calcium Sulphate, 20% Aluminium Oxide, 20% Iron Oxide and 61% Silica. They have also explained the effect of contact time which is applicable in disinfection process of water by using cow dung ash. [2]

Maria I.Gil et.al discusses most of the study on disinfection agents for the fresh cut food industry have been focused on alternative disinfection treatment to chlorine because of its excessive use, which causes several environmental and human health effects. This alternative methods are boiling, solar, U-V radiation, reverse osmosis, ozone, etc. [3]

Qilin Li et.al discusses the appropriate disinfection without forming harmful disinfection by-product by conventional chemical disinfectants, as well as the growing demand for decentralized our point-of-use water treatment and recycling systems calls for new technologies for efficient disinfection and microbial control. This paper reviews the antimicrobial mechanisms of several nanoparticals, discusses their merits, limitation and applicability for water disinfection and biofouling control, and highlights research needs to utilize novel nanomaterials for water treatment application. [4]

Hardikkumar V. Shrimali mainly discusses the need of disinfection by Reverse Osmosis system and its future scope. RO provides a cost-effective solution that has the

potential to improve the lives of people drinking water with high levels of contaminants. Overall, the membrane field has advanced immensely. Being economical, eco-friendly, versatile, membranes are leading choice for water purification applications and should continue to be for many years to come. [5]

Crites R et.al focus on the advanced disinfection method better than chlorination. They mainly discusses the alternative to chlorine for disinfection process. It is more effective than chlorine in destroying viruses and bacteria. The ozonation process utilizes a short contact time (approximately 10 to 30 minutes). There are no harmful residuals that need to be removed after ozonation because ozone decomposes rapidly. [6]

G katara et.al focus on the checking efficiency of germicidal UV light. U-V light can have efficient inactivation of bacteria up to a distance of 8 feet on either side and exposure time of 30 min is adequate. This waves themselves have no germicidal effect .U-V frequency of waves 400KHz have been demonstrated to provide complete sterilization in 60 min. [7]

2.2 LITREATURE REVIEW – 2

In 2016 A. T. Ojedokun et al. [19] had proposed the presence of heavy metals (e.g., Zn, Cu, Pb, Ni, Cd, etc.) in aqueous solutions constitutes a major environmental problem. The previous work represented the review of the recently published literature discussing the use of cow dung as adsorbent for the removal of metal ions from aqueous solution using batch experiments. The potential health and environmental hazards of metal ions in addition to the kinetic and isothermal models usually assessed to fit the biosorption experimental data were also reviewed. Conclusively, it had been established that the use of cow dung is also called as the promising adsorbent in the removal of heavy metals from waste waters and environment. In 2016 K. Kaur et al. [20] had proposed the application of cow dung ash was assessed for the removal of organic contamination from the wastewater using land fill leachate of known Chemical Oxygen Demand (COD) concentration in batch mode. The effect of various parameters like adsorbents dose, time, pH and temperature had been investigated. Results indicate that up to 79% removal of COD could be achieved using activated cow dung ash (ACA) at optimum temperature of 30ºC at pH 6.0 using 20g/L dose in 120 minute, whereas cow dung ash (CA) shows66% removal at pH 8.0 using 20g/L dose, also in 120 minutes. Data also showed that ACA exhibited 11-13% better removal efficiency than CA. COD removal efficiency of various adsorbents was also compared and it had been found that ACA offered significantly higher efficiency. Freundlich and Langmuir adsorption isotherms were also applied, which depicts good correlations (0.921 and (0.976) with the experimental data. In 2014 M. I. Alfa et al. [21] had proposed the efficiency of the mesophilic bio digestion process in the stabilization and sanitization of cow dung and chicken droppings. Six (6) kg each of cow dung and chicken droppings were collected fresh and free from impurities, pre-fermented, mixed with water in the ratio 1:1 w/v to form slurry, fed into the respective reactors and digested for 30 days at an average ambient temperature of 30degree centigrade. The pH of the medium fluctuated between 6.5 and 8.0. The analysis of the feedstock and effluent of the digesters showed that a total solids reduction of 75.3% and 60.1% were recorded for cow dung and chicken droppings while the reduction in total coliforms had about 95% and 70% respectively for the dung and droppings. Microbial analysis of the bio fertilizer produced reveals both aerobic and anaerobic organisms which include species of Pseudomonas, Klebsiella, Clostridium, Bacillus, Bacteroides, Salmonella, Penicillum and Aspergillus. Escherichia coliand Shigellaspp were removed while species of Salmonella and Klebsiella were still presented in the digestate. In 2014 P. Mullai et al. [22] had proposed the presence of heavy metals in water supplies and wastewater threatens the environment and the health of humans. The adsorption of chromium (VI) onto cow dung ash, a bio-organic waste had been investigated in a batch reactor under two different conditions, namely, initial metal ion concentration and adsorbent dosages. For the five different initial metal ion concentrations such as 500, 600, 800, 900, 1000 mg/L, the steady state values of chromium removal efficiency were 100, 83.33, 88.09, 94.3 and 96 %, respectively, using 20 g of cow dungash under shaking at the end of 3rdh. The equilibrium of the process was found to fit into the two well-known adsorption models, Freundlich and Langmuir. The results obtained in the previous study revealed the potential application of the cow dung ash in the removal of metal ions from the aqueous solution. In 2013 G. Corro et al. [23] had proposed the biogas and had been produced by the co-digestion of coffee-pulp and cow-dung mixture under solar radiation. Gas chromatography and FTIR spectroscopy were used to analyze the chemical compositions of the generated biogas and its post combustion emissions. From the first month of codigestion at mesophylic conditions, methane content in the biogas attains 50% of the yield. This content increased up to 60% and remained almost constant for at least 8 months of further digestion. The FTIR gas spectroscopy analysis revealed the presence of over 70 chemical compounds in the biogas generated after 4 months of co-digestion along with several compounds hazardous to environment and animal health like isocyanic acid, and bromomethane. Combustion emission of the biogas contained several components like CH4, C3H8, CO, SO2, HI, and probably Br2which are strongly harmful to human and animal health. In 2012 A. Ounnar et al. [24] had proposed the anaerobic digestion offers an advantageous alternative to land filling, incineration and composting since it is considered as the most appropriate treatment solution.

Indeed, the biogas naturally produced by the fermentation of organic waste into anaerobic digesters, contains between 40 and 60% of methane, which gives it fuel character and its valorization allows energy conservation while protecting the environment by reducing the greenhouse gases emission. The main aim of the literature explained to popularize the technique of organic waste bio-methanisation or anaerobic digestion in order to produce renewable energy and cleaner environment through the exploitation of research results. The above process supported to the experimental results obtained in the laboratory. The mesophilic anaerobic digestion of cow dung, into an experimental digester of 800 liters capacity, had produced 26.478 m3 of biogas for 77 days with an average optimal. These results are hopeful for the use of cattle wastes mass available in Algeria, or even household wastes.

8. METHODOLOGY

Methodology for this project laided into two phases. The first phase regarding the study of various method of disinfection and their application composition of CDA and performing various tests on it. The second phase is to check quality parameters and analysis after adding CDA.

We have studied various alternatives methos of disinfection to chlorination. Methodology of this project is to study the methods of disinfections carried domestically such as mentioned below

- Boiling.
- Solar
- UV Radiation
- Reverse osmosis
- Ozone disinfection

The following methods have several disadvantages. Despite of these disadvantages these methods are extensively used all over the world.

8.1 CHEMICAL COMPOSITION OF COW DUNG ASH

Cow dung ash is an ecofriendly and low cost adsorbent. It is a bio-organic waste that contains 12.48% Calcium Oxide, 0.9% Magnisium Oxide, 0.312% Calcium Sulphate, 20% Aluminium Oxide, 20% Iron Oxide and 61% Silica. The presence of maximum percentage of silica makes it to exhibits considerable affinity for metal ions.

Advantage of utilizing cow dung ash as activated carbon not only stop environmental problems of foul odour but also used for sterilization of water.

Cow dung ash as a activated carbon can also be used for sterilization of water. GAC works on the principle of adsorption. Adsorption involves the interphase accumulation of concentration of substance at the surface of solid liquid. A water filter medium consisting of activated carbon & silver- coated activated carbon disinfects water. Similarly water passing through column containing GAC & activated carbon fibers impregnated with silver releases silver ion for disinfection of water. It assures minimum residual silver in disinfected water

8.2 PERFORMING SEVERAL TESTS FOR WATER QUALITY AFTER ADDITION OF CDA

Following are the tests performed for water quality check

- pH test
- Turbidity test.
- Total Hardness test
- Conductivity test.
- Calcium test.
- Chloride test.
- TDS -Total Dissolved Solids
- MPN (Bacteriology).

9. DISCUSSION AND CONCLUSIONS

After doing a rigorous study on water by addition of cow dung ash for improving quality of water, we found that

1. Improvement in the quality parameters such as pH, MPN index number etc.

2. Need to provide contact time between water sample and cow dung ash: Cow dung ash is a bi-organic waste and adsorbent. So adsorbent need time to react with provided sample to get better and required results.

3. Cow dung ash is an eco-friendly and low cost adsorbent for disinfection purpose.

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