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PERFORMANCE EVALUATION OF LANDFILL LEACHATE USING COIR PITH AND COCONUT SHELL AS ACTIVATED CARBON

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ABSTRACT:

The goal of this study was to use coir pith and coconut shell as activated carbon to treat landfill leachate for waste water treatment. The purpose of this experiment is to see whether coconut shell could be used to make effective activated carbon. Activated carbon is a common adsorbent in the pollutant removal process. Cotton stems are used in the production of activated carbon in part because they are plentiful in the Vidarbha region and are a common sort of agricultural waste. If this coconut shell can be used to make high-quality activated carbon. Agriculture wastes could be recycled into usable materials. Activated carbon is useful in the filtration of drinking water because it works as an adsorbent, efficiently removing particles and organics. Environmental hazards and disposal were addressed by treating wastewater with fly ash. The treatment bed was made up of three layers of sand, fly ash, and pebbles. Batch adsorption methods employing coconut coir pith activated carbon powder were used to remove copper (Cu) from a Cu electroplating company's effluent (CCPACP). Ac's is used in the treatment of water, wastewater, and leachate in many nations, mostly to polish the color, reduce odor, and remove certain heavy metals. It may be created from agricultural waste such as rich husk, palm oil shells, and coconut shells, and is affordable and readily available. The AC possess huge adsorptive characteristics because to its thin and porous structure, as well as its exceptionally large particle surface area (>1000m2/g). As a result, AC-based adsorption has been discovered to be a potential method to remove pollutants from aqueous solutions. This paper could be research on landfill leachate treatment. Landfill leachate has the potential to be a severe environmental polluter. Leachate is a poisonous black liquid that is released by landfills and dump yards. The leachate could be a poisonous black liquid containing dissolved and suspended materials from the landfill. A filtration process that uses marine sand and ash filter beds, followed by heavy metal removal with activated charcoal powder, is included in the literature review, and the final result might be a filtration technique for treating landfill leachate.

KEYWORDS: Activated carbon, Coconut shell, leachate.

I. INTRODUCTION:

Activated carbon is one of the most efficient solutions to overcome health issues while also giving a visually appealing product at an affordable price. Activated carbon is an exceptionally efficient adsorbent material due to its huge number of cavernous pores. The capability of prepared activated carbon generated from biomaterials to remove pollutants is greater than that of raw biomaterial. The cost of preparing activated carbon using biomaterials is also affordable when considering the cost of commercial activated carbon. Effective wastewater treatment is necessary around the world. The world largest rising population is putting unprecedented stress on the environment. This increasing population demands safe groundwater for drinking. The ecology generally requires uncontaminated surface water in streams and lakes to conserve the flora and fauna that humans has come to rely on for sustenance and recreation. According to Moeller, waterborne illness accounts for 80% of a global burden of disease in developing nation. Diarrhea kills the lives of at least 2,000,000 children every year. As per China, 300 millions of people do not have access to clean drinking water. It is receivable by 95 percent of the total population across rural areas in the United States. Wells that are recharged with groundwater provide clean drinking water (US Environmental Protection Agency, 1998). Because it works as an adsorbent, removing particles and organic pollutants from the water, activated carbon is essential in the purification of drinking water. Because they react with a number of disinfectants, especially chlorine, these organics are a major source of disinfection by-products in water treatment because they react with a variety of disinfectants, particularly chlorine. Activated carbons such groundnut husk, corncob, rice husk, sawdust, tea leaves carbon, eucalyptus bark, and agricultural wastes were used in the previous to decrease pollutants in various industry effluents. In addition, to reduce contaminants in industrial wastewater, a coagulant (Moringa oleifera) is used. Other treatment procedures include electrodialysis, filtration, ozonation, chemical precipitation, bioremediation, reverse osmosis, and many others. The ability of Coconut coir pith activated carbon powder (CCPACP) to extract Cu from Cu electroplating industrial wastewater was investigated over time using various doses and agitation rates. Activated carbon (AC) has been used in a range of applications since its discovery as a robust and effective adsorbent. The origins of AC generation, as well as the methods used to create it, such as pyrolysis activation, physical activation, chemical activation, and steam pyrolysis, are revisited. The major factors impacting alternating current production, as well as potential alternating current applications and future prospects, are investigated. In several nations, AC is used to polish the color of water, wastewater, and leachate.

II. LITERATURE REVIEW:

Literature 1

Pavan S. Kamble, Tauseef Ahmad Ansari, Bharti R. Gautam, and Raju A. Bondre are among those who have contributed to this research. Because it acts as an adsorbent and effectively removes particles and organic material from water, activated carbon is effective in drinking water treatment. The removal of suspended particles from the liquid state in physicochemical treatment is often achieved by processes such as coagulation, flocculation, and sedimentation. These organics are a major concern in water treatment since they react with many disinfectants, particularly chlorine, resulting in the formation of disinfection by-products. The increasing pH indicates that the filter media is effective for pH regulation since it consistently increases the pH closer to neutral from the acidic range. The amount of C.O.D. removed was discovered to be 76.96 percent. As a result, the filter medium was effective in the removal C.O.D. An original dissolved oxygen level of leachate is found to be 5.8 ppm, although after passing the leachate across filter media, the dissolved oxygen content improves to 7.2 ppm. This reading was taken on a different day; it was observed that passing the leachate through filter media increases the D.O. content in the leachate.

Literature 2

Dr. Saswati Datta, Chaitrali Sanjay Kulkarni Sanitary landfilling is presently the most common practice in most countries, owing to the elimination of municipal solid waste (MSW). Despite the numerous benefits, the production of extremely contaminated leachates with substantial changes in volumetric flow and chemical composition is a significant disadvantage. Year after year, the popularity of landfill leachate's environmental impact has compelled authorities to repair increasingly strict pollution control standards. This document might be a research paper on landfill leachate remediation. Landfill leachate has the potential to be a significant polluter of the environment. Leachate production may be a significant issue for municipal landfills or dump yards. The leachate might be a poisonous black liquid that has leached from the landfill and contains dissolved and suspended debris. Leachate is a substance that forms when precipitation or air moisture enters a landfill that is decomposing. The leachate comprises organic and inorganic substances, heavy metals, and microorganisms that will damage both surface water and groundwater if not collected.

III. PREPARATION OF ACTIVATED CARBON:

In a beaker, 50 mL concentrated Sulphuric acid (H_2SO_4) was mixed with 500 mL distilled water. The above-mentioned solution was supplemented with coconut husk and allowed to remain for 24 hours. Then it was taken out of the solution and dried in oven for about 24 hours. After 24 hours, it was taken out of the oven and left open to cool. It was then maintained in a crucible dish in the Maffle Furnace for two hours at 750 degrees centigrade. The coconut husk in the crucible had turned into Activated Carbon after 2 hours, and it was removed with tongs. It was left open for a long time and allowed to cool. The burned coconut husk filaments (activated carbon) were then manually crushed.

IV. METHODOLOGY:

- Sieve the sand manually by sieve sizes 4.75mm (pass) and 2.36mm (retain).
- Take two containers of same size, one with a hole in the bottom to store and flow the water for treatment and the other one for making a reactor.
- Set all the ingredients in order of sand, coir pith, fly ash, coconut shell (activated carbon), in order to make a reactor for treatment. Also, put filter paper between fly ash and coconut shell (activated carbon) to prevent them from mixing with each other as they both are in powdered form.
- Then start the process by putting sewage/ sullage into the first container which has hole at the bottom.
- After 7 days of intervals, we will collect the treated water and get it tested in our environmental lab.

Fig. Working Model

V. RESULT:

COD		TS		pH	
Before	After (7 days)	Before	After (7 days)	Before	After (7 days)
911.2	834.2	1210	950	8.93	6.6
	810.1		800		6.7
	616		650		7.1
	496.7		525		7.8

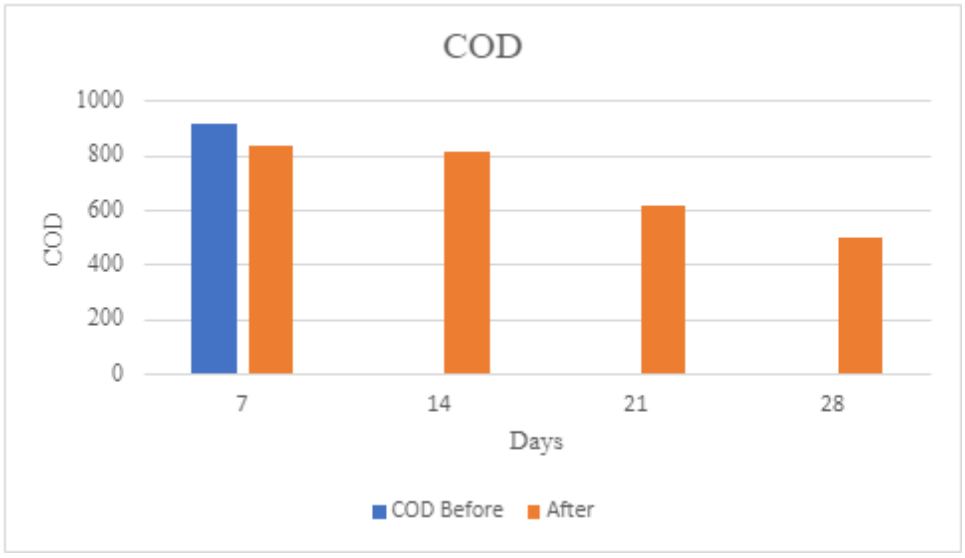

Fig. COD graph

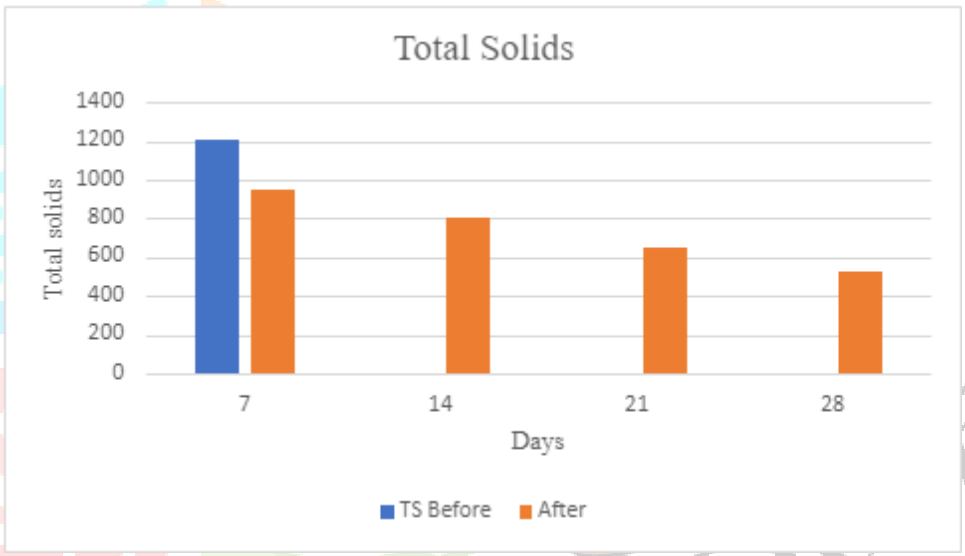

Fig. Total Solids graph

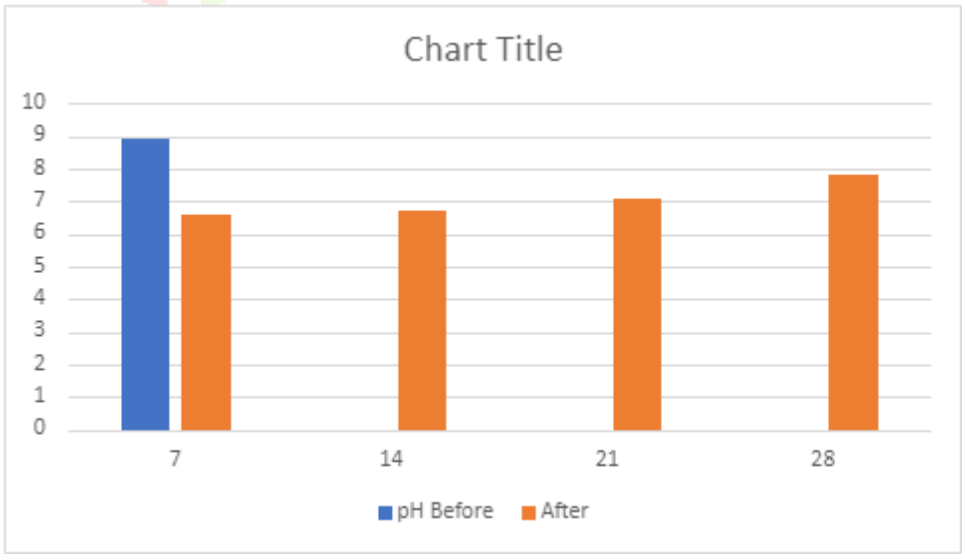

Fig. pH graph

VI. CONCLUSION:

Our research has found that activated carbon made from locally available coconut shell is one of the most adsorbent materials, providing high impurity removal efficiency at an affordable price.

The results of the synthesis provide optimism for using activated carbon made from coconut shell as an adsorbent of good choice for removing contaminants from drinking water, particularly in the south region where coconut is readily available, but further extensive inquiry is required to assess its efficiency for a complete study.

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