APPLICATION OF ACTIVATED CARBON FOR WASTE WATER TREATMENT.

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ABSTRACT:-

Rapid growth of pollution and scarcity of fresh water is expected to stress condition in future for all world. Adsorption is a good technique for reducing the amount of chemicals reaching water bodies and researchers are working on producing activated carbons from cheap sources to replace expensive commercial activated carbons. Adsorption efficiencies of activate carbon obtained from different waste material are compared. This study showed that activated carbon can be used as a strong adsorbent for extracting different contaminants from the flue gas and waste water treatment.

Keywords: Activated Carbon, Adsorbent, Cheap Sources, Waste water treatment.

I. INTRODUCTION :-

Activated carbon obtained from coconut shell having large specific surface area according to previous research study, if activated carbon is used as filter media in waste water treatment reactor then it will helps to remove dissolved solids, suspended solids and some dissolved gaseous also, from a domestic waste water effluent. Large surface area of activated carbon is work as a adsorption media to effectively remove or reduce wide range Of dissolved pollutant in domestic waste effluent. Coconut shell and coal shale can be converted into activated carbon by chemical and physical process. The waste water treatment by using activated carbon method used for the primary and secondary of domestic wastewater and industrial wastewater treatment. Domestic waste water cause the sever environmental problem.

II. REVIEW OF PAPER

1.“Preparation of activated carbon from green coconut shell and its characterization” Dipa Das, Debi Prasad Samal, Meikap BC, Department of Chemical Engineering, Indian Institute of Technology (IT) Kharagpur, West Bengal, India. (DOI: 10.4172/2157-7048.1000248 ,Paper published in 2015)
In this paper activated carbon was prepared from green coconut shells by chemical activation method. Different physical properties such as bulk density, moisture content, volatile matter content, ash content, and surface area and porosity were also determined. The activated carbon was used as adsorbent for the removal of carbon dioxide from flue gas as well as various inorganic contaminants from waste water. This study showed that for the removal of various pollutants from flue gas and waste water treatment activated carbon can be used as a good adsorbent.

2. “A study of coconut shell - activated carbon for filtration and it’s comparison with sand filtration.” Shilpa s. Ratnoji, nimisha singh dept. Of civil engineering, manipal institute of technology, Manipal, Karnataka (issn 2348-0157, vol. 02, no. 03, july 2014)
In this paper author examined reduction and removal of iron, turbidity, biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in river water by making different arrangements of coconut shell activated carbon in the filtration unit. Also its Comparison with sand, a conventional practice in water treatment plants in India was done to reduce these parameters. Finer grade activated carbon showed the maximum iron removal (95%). It also showed reduction in COD, BOD and to some extent turbidity in all types of arrangement which was not so in case of traditional sand filtration process.

3.“An overview of the modification methods of activated carbon for its water treatment applications” Amit Bhatnagar a,William Hogland a , Marcia Marques a,b , Mika Sillanpää c a School of Natural Sciences, Linnaeus University, SE-391 82 Kalmar, Sweden bDepartment of Sanitary and Environmental Engineering, Rio de Janeiro State University, UERJ, Rio de Janeiro, Brazil c Faculty of Technology, Lappeenranta University of Technology, Patteristonkatu 1, FI-50100 Mikkeli, Finland.
An investigation was completed to decide about Rapid Sand Filter which are regularly utilized in Conventional Water Treatment Plants. The Rapid Sand Filter beds are enduring by the issues like Mud ball arrangement, unsuitable profluent. Double Media and mixed media channels can conquer the constraints of RSF. Topping of Crushed Coconut shell is utilized as a Dual Media. Planning Dual Media Filter Capped with Crushed Coconut Shell ends up being increasingly effective, affordable and strong. The example was gathered from close by lake which was exceptionally turbid and having high measure of absolute solids. A Fabricated model was readied having measurement 0.5x0.5x0.9m. Rock, Sand, Coconut shell was filled in the model in the layer of size 20cm, 15cm, 20cm individually. The tests which are directed on test are pH, Turbidity, BOD, Total solids. It improves the presentation of channel regarding high filtration rate, high turbidity evacuation and high diminishing in level of all out solids and subsequently making it increasingly relevant. This channel media decreases about 90% of turbidity. The all out strong was diminished by about 89%.

4. “Study on Application of Activated Carbon in Water Treatment” Jiang Changjia1 , Cui Shuang1*, Han Qing2 , Li Ping1 , Zhang Qikai1 , Song Jianhui1 and Li Mingrui1 1 College of Chemistry, Chemical Engineering and Environmental Engineering, Liaoning Shihua University, Fushun, Liaoning, 113000, China 2 School of Materials & Metallurgy, Northeastern University, Shenyang, Liaoning, 110819, China
Initiated carbon is a decent non-polar adsorbent. Due to its tremendous explicit surface zone and micropore, great adsorption execution and reusing, it tends to be utilized together with an assortment of substances to adsorb different properties of wastewater. This paper principally presents the structure, adsorption system, changed actuated carbon, microbial bound initiated carbon, microwave bound enacted carbon and the future research course of enacted carbon.

5. “Advances in Synthesis and Applications of Microalgal Nanoparticles for Wastewater Treatment” Prashant Agarwal , Ritika Gupta, and Neeraj Agarwal Meerut Institute of Engineering and Technology, Meerut, India.

Fast industrialization, monetary improvement, and populace excess are the significant reasons answerable for the arrival of organic and in organic substances into the environment,further leading to environmental pollution contamination of water. These days, it is adage that waste water treatment has raised concern worldwide and is the need of great importance. In this way, it is important to preserve maintainable vitality and embrace propelled waste water treatment advances. Microalgae culture is picking up tremendous attention as it provides acombined benefit of treating wastewater as a growth medium and algae biomass production which can be utilized for a few domesticated animals purposes. Microalgae are universal and incredibly differing microorganisms which can collect harmful contaminants and substantial metals from wastewater, making them better contender than become a ground-breaking nanofactory.Further more,they are versatile,relatively convenient,and easy to handle,along with various other advantages such as combination can be performed at low temperature with more noteworthy vitality efficiency, less danger, and generally safe to the earth. Comparing with other organisms such as fungi,yeast,and bacteria,microalgae are equally important organisms in the synthesis of nanoparticles;therefore,the study of algae-mediated biosynthesis of nanometals can be taken towards an everbranch and it has been named as phytonanotechnology. Here, a diagram of ongoing advances in wastewater treatment forms through an amalgamation of nanoparticles and microalgae is given.

6. "Waste water treatment using low cost activated carbons derived from agricultural byproducts—A case" study Dinesh Mohan, Kunwar P. Singh, Vinod K. Singh Environmental Chemistry Division, Industrial Toxicology Research Centre, Post Box No. 80, Mahatma Gandhi Marg, Lucknow 226001, U.P., India.

An assortment of ease initiated carbons were created from horticultural waste materials viz., coconut shell, coconut shell filaments and rice husk. The minimal effort actuated carbons were completely portrayed and used for the remediation of different contaminations viz., concoction oxygen request (COD), overwhelming metals, anions, and so on., from mechanical wastewater. Sorption contemplates were done at various temperatures and molecule sizes to examine the impact of temperatures and surface territories. The expulsion of chloride and fluoride expanded with ascend in temperature while COD and metal particles evacuation diminished with increment in temperature, consequently, demonstrating the procedures to be endothermic and exothermic, individually. The energy of COD adsorption was likewise completed at various temperatures to set up the sorption system and to decide different dynamic parameters. The COD evacuation was 47–72% by coconut shell fiber carbon (ATFAC), 50–74% by coconut shell carbon (ATSAC) and 45–73% by rice husk carbon (ATRHC). Moreover, COD evacuation energy by rice husk carbon, coconut shell carbon and coconut fiber carbon at various temperatures was roughly spoken to by a first request rate law. Consequences of this central investigation exhibit the viability and plausibility of minimal effort actuated carbons. The parameters acquired right now be completely used to set up fixed bed reactors for huge scope to treat the tainted water.

7. "Adsorption efficiency of powdered activated carbon applied to a filter bed" Andrzej Bielski Wiesław Zymon Tadeusz Żaba, Institute of Water Supply and Environmental Protection,Faculty of Environmental Engineering, Poland.

This paper presents an investigation on adsorption of natural toxins present in characteristic water on powdered enacted carbon (PAC). Surface water was treated for civil purposes at a water treatment plant. As of now utilized innovative frameworks ineffectively use PAC adsorption limit because of a little main thrust of a mass trade among water and sorbent. Also, the adsorption procedure happens in volume frameworks with concurrent coagulation. The creators proposed another technique where adsorption was conveyed out in a channel bed with PAC applied to its upper layer. The powdered sorbent was applied to the bed at the finish of discharging. Along these lines an all-inclusive contact time among water and PAC was guaranteed, which improved use of carbon sorption limit. Relative examinations were additionally performed with adsorption in a volume framework. The outcomes affirmed that the channel bed indicated a superior use of PAC adsorption limit than the volume framework. The creators built up the PAC adsorption models in flimsy states for both volume and channel frameworks. Recreations affirmed that a use pace of PAC adsorption limit in the channel can be a few times higher than in volume frameworks that are ordinarily utilized for adsorption and coagulation.

8. "Treatment of municipal waste water through adsorption using Different waste biomass as activated carbon" Mustafa Kamal, Rizwan Younas,Muhammad Zaheer, Muhammad Shahid .Department of Chemical Engineering, Balochistan University of Information Technology, Engineering and Management Sciences, Quetta 87300.

Water cleansing is exceptionally important to give spotless and quality water to all livings for their endurance. Different systems for water treatment is being used now a days. The most widely recognized and useable technique is the adsorption. The actuated carbons produced from various fixings like pecan shell, bagasse and the rice husk. The adsorbent produced from actuated carbon can be effectively used for city wastewater to be blessed to receive diminish TSS, TDS, COD, turbidity, EC, pH and Temperature. These actuated carbons happen normally and earth well disposed. Likewise, no terrible impact on people. For the most part utilized for the treatment of city wastewater. Pecan Shell, Bagasse and Rice Husk transformation to actuated carbon limiting the expense of waste exchange and gives modest assets for age of enacted carbon.

9. "Recycling of Waste Sludge: Preparation and Application of Sludge-Based Activated Carbon" Yongning Bian, Qian Yuan, Guocheng Zhu , Bozhi Ren ,Andrew Hursthouse , and Peng Zhang Hunan Provincial Key Laboratory of Shale Gas Resource Utilization and Exploration, Xiangtan 411201, China.

With the quickly expanding mechanical and farming advancement, a lot of slop has been created from a lot of water treatment. Ooze treatment has gotten one of the most significant natural issues. Asset usage of slop is one of the significant proficient strategies for settling this issue. Muck based enacted carbon (SBAC) materials have high adsorption execution and can viably expel ecological toxins including run of the mill natural issue and overwhelming metals through physical and compound procedures. In this way, creating productive SBAC materials is significant and important. At present, readiness, alteration, and use of SBAC materials have increased across the board consideration. This paper gives a survey of the examination on SBAC arrangement and change and its usage in expelling ecological contaminations. It incorporated the following themes present right now: and new strategies for arrangement of SBAC were obviously present; the powerful strategies for improving SBAC execution through physical and compound change were checked on; and the connection of their physic-concoction properties of SBAC with poisons' evacuation efficiencies just as the expulsion systems was uncovered. SBAC has a superior adsorption execution than business initiated carbon in certain viewpoints.

Besides, it is a financially savvy method and has a wide scope of crude materials. In any case, there are still a few downsides to its examination; subsequently, a few proposals for additional examination were given right now.

10. "Activated Carbon as Adsorbent In Advance Treatement of Wastewater" Vikash R Agrawal, Vikrant S Vairagade, Amol P Kedar. Department of Civil, Priyadarshini College of Engineering, Nagpur, Maharashtra, India

A treatability study was done on wastewater gathered from Bhandewadi Wastewater treatment plant, Nagpur, Maharashtra. The point of the examination work was to look at whether the enacted carbon (air conditioning) gives most extreme expulsion of Body, COD, pH, Turbidity from wastewater test. The present research work was embraced to discover level of enacted carbon is increasingly effective for expelling the attributes of wastewater like Body, COD for safe removal in water streams and land. The crude wastewater is put under contact of actuated carbon and checked the proficiency of the enacted carbon for lessening down the hurtful parameters. The wastewater is given a presentation to actuated carbon at 2%, 4% and 6% for 7 and 14 days.

III. CONCLUSION.

The method of adsorption is a powerful technique that can be used to effectively extract or take up toxic materials from gas and liquid phases. Activated charcoal is one of the most significant adsorbents that can be used for such purposes. The use of AC is perhaps the best wide-spectrum control technology currently available. Coconut shell delivers good efficiency when used as filter media in the filtration process. Turbidity, total solid, pH, and BOD were considerably reduced. BOD reduction shows that Coconut shell can effectively extract organic compound. There was considerable reduction in the color intensity also.

IV. REFFERANCE.

[1] Das, Debi Prasad Samal, Meikap BC (2015) "Preparation of activated carbon from green coconut shell and its characterization" Journal of Chemical Engineering & Process Technology. (DOI: 10.4172/2157-7048.1000248).

[2] Shilpa s. Ratnoji, nimisha singh (2014) "A study of coconut shell - activated carbon for filtration and it's comparison with sand filtration." International Journal of Renewable Energy and Environmental Engineering.(ISSN 2348-0157, vol. 02, no. 03, july 2014).

[3] Amit Bhatnagar,William Hogland,Marcia Marques,Mika, Sillanpää (2012) "An overview of the modification methods of activated carbon for its water treatment applications" Elsevier (http://dx.doi.org/10.1016/j.cej.2012.12.038).

[4] Jiang Changjia,Cui Shuang, Han Qing, Li Ping, Zhang Qikai, Song Jianhui and Li Mingrui (2019) "Study on Application of Activated Carbon in Water Treatment" Earth and Environmental Science (doi:10.1088/1755-1315/237/2/022049).

[5] Prashant Agarwal , Ritika Gupta, and Neeraj Agarwal Meerut "Advances in Synthesis and Applications of Microalgal Nanoparticles for Wastewater Treatment" Hindawi Journal of Nanotechnology Volume 2019, Article ID 7392713, 9 pages (https://doi.org/10.1155/2019/7392713)

[6] Dinesh Mohan, Kunwar P. Singh, Vinod K. Singh (2007) "Waste water treatment using low cost activated carbons derived from agricultural byproducts—A case study" ELSEVIER Journal of Hazardious Mterials. (doi:10.1016/j.jhazmat.2007.07.079).

[7] Bielski Wiesław Zymon Tadeusz Żaba(2016) "Adsorption efficiency of powdered activated carbon applied to a filter bed" Pol. J. Environ. Stud. Vol. 26, No. 3 (2017), 985-993 (DOI: 10.15244/pjoes/67652).

[8] Mustafa Kamal, Rizwan Younas,Muhammad Zaheer, Muhammad Shahid (2019) "Treatment of municipal waste water through adsorption using Different waste biomass as activated carbon". Journal (JCleanWAS) (DOI:http://doi.org/10.26480/jcleanwas.01.2019.21.27).

[9] Yongning Bian,Qian Yuan,Guocheng Zhu,Bozhi Ren,Andrew Hursthouse,and Peng Zhang "Recycling of Waste Sludge: Preparation and Application of Sludge-Based Activated Carbon" Hindawi International Journal of Polymer Science Volume 2018, Article ID 8320609, 17 pages (https://doi.org/10.1155/2018/8320609).

[10] **Vikash R Agrawal, Vikrant S Vairagade, Amol P Kedar. "Activated Carbon as Adsorbent In Advance Treatement of Wastewater" IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) Volume 14, Issue 4 Ver. II (Jul. – Aug. 2017), PP 36-40.(DOI: 10.9790/1684-1404023640)**