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The Treatment of Textile Industrial Liquid with Activated Carbon

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Abstract: The preparing innovation and upgraded modern area will influence the climate, decidedly or adversely. In light of the action, the material business of PT. Sinar Surya Indah Telukan Grogol, Sukoharjo created fluid waste which above quality norm. Subsequently, it is expected to deal with the wastewater. The goal of the examination is (a) to know the nature of fluid waste from, material industry and (b) to know the adequacy of dynamic carbon thickness for the decrease of fluid waste focus with boundaries Body 5, COD, Chrom (Cr), TSS (Complete Suspended Strong) and pH. The thickness of dynamic carbon was 0 cm; 5 cm; 7, 5 cm; 10 cm; 12.5 cm; and 15 cm. The boundaries to be investigated were Body 5, COD, Chrom (Cr), TSS, and pH. A research facility test was done in the focal lab of MIPA, Sebelas Maret College. The outcome shows that there was a critical decrease of wastewater quality after prepared utilizing dynamic carbon, the level of decrease was as per the following: COD (83.86%), Body 5 (79.14%), TSS (46.09%), and Chrom (0%). The thickness for compelling dynamic carbon on 15 cm with squander volume as 1,5 liter; breadth 9 cm and stature 40 cm.

Keywords: liquid waste, Active Carbon, Efficiency, Absorption.

1. Introduction

The quick advancement of innovation, particularly in the modern area, has brought about the expanded abuse of normal assets. Develops question number of industry types, air a RTI increment need for crude materials got from nature (normal assets). Endeavors to beat the risks that would undermine regions that outcome from progresses in science and innovation wild should be improved. One exertion that is very pen chime is to lead guideline ashore use and natural administration (Gutti et al., 2012). This plan means to guarantee the safeguarding, limit, and conveying limit of the climate, and to augment the inclusion of all gatherings in natural administration and advancement. Expanding the mechanical area will have impacts, both positive and negative. The positive effect of the advancement of the modern area is the ingestion of work quiet, expanding unfamiliar trade pay to the public authority which thus can improve the government assistance of individuals by and large. Other than the positive effects likewise need consideration and watch out for any adverse consequences by the cycle and the remainder of the creation, which can pollute the general climate. These toxins can be as strong waste (strong squanders), fluid waste (fluid squanders), and waste gases (vaporous squanders) (Mitkus & Šostak, 2009; Riyadi, 1984)

Moreover, with the improvement of the material business, contamination and aggravations brought about by the material business likewise increment, in light of the fact that the creation interaction requires a lot of water, so the results of the creation cycle as fluid waste are additionally a ton. The modern region in Sukoharjo Rule has been creating in accordance with the developing business sector needs. Financial backers reacted decidedly to this to address the market's issues. Hence, numerous business people amplify their organizations by adding the important machines. Squander industry materials if not oversaw as expected can prompt the event of natural contamination and obviously should as of now agree with Materials Quality Waste Fluid (BMLC) (Subramanian & Labs, 2018; Moertinah et al., 2010). With these outcomes, before the fluid waste enters or streams into the accepting water body, it should be dealt with first. This administration means to limit natural contaminations to consent to the foreordained quality guidelines for fluid waste (Bolanca, 2000).

The board of waste fluid during the time spent creation is expected to limit the waste that is delivered, the volume of waste insignificant with focus and poisoness were additionally negligible. The board of waste after the cycle of creation planned to dispose of or decline the degrees of material pollutants are contained in it until the waste fluid fill necessity to be disposed of (fulfill the guideline of value that is characterized) (Krinityn et al., 2003; Dean, 2006). In the administration of the waste fluid to get the outcomes that successfully and effectively should be done uncommon advance administration are executed in a coordinated beginning with endeavors to limit (squander minimization), preparing of waste (squander treatment), until the removal of the garbage (removal). In certain industrial facilities, the manner in which it was proceeded by skipping water squander by zeolite (a stone common) and charcoal dynamic (carbon dynamic) (Anonymous, 2005^b). Carbon

dynamic is a type of charcoal that has been initiated by the substance activator science so the pores open and with such force, adsorption is a lot higher (Talekar & Mahajani, 2008; Jacobs, 1958).

In view of the depiction in the above move required endeavor research by utilizing actuated carbon that ties components of poisons in the water business wastewater, the handling that prompts diminished degrees of fluid waste material industry ie BOD 5, COD, chromium, suspended solids (TSS) and pH utilizing initiated carbon.

2. Theoretical Review

Literature review

Pertinent explores have examined the enacted carbon has been completed. Purwaningsih (2000) investigated the utilization of enacted charcoal palm shells as an adsorbent in fluid waste pressed wood has acquired outcomes that the treatment is the organization of initiated charcoal to changes the nature of water is exceptionally sure, it is shown by the administration of activated charcoal was able to lower BOD, COD, TSS and phenol, Ph wastewater has increased very little. The results of the research obtained BOD values from 51.51 mg / l to 38.53 mg / l, COD from 933.8 mg / l to 426.87 mg / l, Ph from 8.37 to 8.94, TSS from 132.00 mg / l to 78.33 mg / l, phenol from 0.412 mg / l to 0.165 mg / l and color from 37 Pt. Co becomes 366.67 Pt.Co because the activated charcoal needed with NaOH will increase Ph, the color change is not visible at all, because specifically, the color change needs to be studied in more depth, for example, the centrifugal method, filtering, absorption, and other methods.

Peni (2001) explored in 2001 on the examination of the degree of retention actuated charcoal, breccia light, and nut shells to color wastewater batik industry show that the more modest granules and the higher the heap thickness (adsorbent) so the contact time is getting longer and results in the assimilation of the color higher. The shading ingestion effectiveness was 98.19% with actuated carbon, 70.12% with skimming breccia adsorbent, and 62.59% with nut shell adsorbent. The most noteworthy ingestion productivity is utilizing initiated charcoal adsorbent.

Charcoal dynamic are being used k 's in the investigation (Pratiwi, Kamal and Juhanda, 2019) with the title Examination of Impacts of Time Initiation and Adsorption in Use of Carbon Dynamic from Shavings Wood got Adsorbent Waste Fluid. The objective is to decide the impact of value carbon initiated from shavings of wood that have been tried by season of enactment and force adsorption of waste fluid. Initiated carbon is made through pyrolysis until it arrives at a temperature of 5000C with a size of 100-150 cross section and is actuated with 10% H3PO4 for 6 hours, 12 hours, and 18 hours. Carbon dynamic which is delivered is utilized as an adsorbent and tried on a waste fluid substance the shade of materials Sumikaron Yellow Earthy colored S-2RL. Adsorption is finished with a variety of 60 minutes, 2 hours, and 3 hours. Thusly, an answer of substance the shading that has been sequestered via carbon initiated investigated utilizing a spectrophotometer with a Longwave 480nm. In view of the absorbance or focus (%) decrease in shading which is determined utilizing ANOVA with programming Minitab 17, the impact of which is more critical in the utilization of carbon actuated from the shavings of wood that is at the hour of initiation of 12 hours and the hour of adsorption of 3 hours. Carbon is dynamic of waste shavings lumber equipped for decreasing the waste fluid substance shade of 98, 2519 %. Aftereffects of tests starter to compute the quantity of iodine from the adsorbent carbon initiated which has been actuated for 12 hours into a state best to assimilate iodine upwards of 144, 8961 mg/g.

Mizwar and Dienes (2012) introduced the exploration result on stipend on the shade of the waste fluid industry Sasirangan by adsorption of Carbon Dynamic inferred that the adequacy of the arrangement for shading in the waste fluid modern separating by utilizing carbon dynamic business (no brand) which is produced using the shell of coconut molded powder is at 20.75% ± 39.16% at the hour of contact ideal an hour. The example of adsorption of shading via carbon dynamic in research is more disposed to follow the model isotherms, Langmuir, with a limit of adsorption limit of 29,412mg/g.

Finally, Pranoto et al, (2002: 16) examined research on diminishing the degrees of lead and material colors in arrangement utilizing bagasse enacted carbon showed testing with red material color squander, showing that the ideal assimilation strength of bagasse actuated carbon was 2.160 mg/g (34.31%), while for green material colors the retention was 2, 4585 mg/g (3.31%).

The target of the examination is (a) to know the nature of fluid waste from, material industry and (b) to know the adequacy of dynamic carbo thickness for the decrease of fluid waste focus with boundaries Body 5, COD, Chrom (Cr), TSS (All out Suspended Strong) and pH. The thickness of dynamic carbon was 0 cm; 5 cm; 7, 5

cm; 10 cm; 12.5 cm; and 15 cm. The boundaries to be broke down were Body 5, COD, Chrom (Cr), TSS, and pH. A research center test was done in the focal lab of MIPA, Sebelas Maret College.

Liquid Waste and Industrial Wastewater

Squander is substances which present at a specific time and spot isn't wanted by the climate since it has no monetary worth. Squander contains harmful and hazardous contaminations (Ginting, 1995) Fluid waste is an assortment of substances that jeopardize human existence or other living animals and by and large start from human activities, including from mechanical exercises (Daryanto, 1995: 37). Wastewater is fluid that streams into a channel, which incorporates family wastewater, mechanical wastewater, and surface water that can enter the channel. Wastewater is fluid that is released in a channel, which incorporates family wastewater, mechanical wastewater, and surface water that can enter the channel (Cobb et al., 2012; Alearts, 1984).

Wellsprings of fluid waste come from different sources, by and large as exercises of people and mechanical advances. In modern and innovation exercises, water that has been utilized (mechanical wastewater) ought not be discarded quickly in light of the fact that it can cause contamination (Chang, 1998; Wardhana, 2004). Pointers that the ecological water has been contaminated is a change or sign that can be seen through: (1) an adjustment of temperature (2) an adjustment of PH or hydrogen particle fixation (3) an adjustment of shading, smell, and taste (4) the presence of silt, material late. Material industry wastewater boundaries are all out suspended solids, Body, COD, all out chromium, phenol, and pH. Shading is maybe a significant boundary in material waste, due to its apparent effect. The water rate and waste heap of the material business rely upon the interaction utilized and the kind of merchandise created. Fluid waste released into waterway bodies can cause water contamination, so it is important to treat fluid waste prior to releasing it into water bodies. As indicated by the idea of waste, fluid waste treatment cycles can be ordered into 3 sections, specifically actual cycles, compound cycles, and organic cycles. This cycle doesn't run autonomously yet here and there should be completed in mix with each other. The reason for material modern wastewater treatment is to diminish natural and inorganic poisons, suspended solids, and weighty metal tones prior to being released into water bodies (Ike et al., 2019; Sajidan, 2006).

Common waste treatments can be classified into mechanical and biological treatment. To obtain low levels of BOD, COD, suspended solids, Cr, TSS and other parameters, superior processing using activated carbon, sand filters, ion exchange, and chemical purification has been used (Anonymous, 2005). Treatment with activated carbon is a process of filtering wastewater, especially after experiencing a biological or physical-chemical process. Natural activated carbon is carbon granules and carbon powder for wastewater treatment and after use, it needs to be reactivated. Carbon processing is used through the manufacture of charcoal from wood or coal. This material is then burned until it is red (Muñoz, 2005). The wellspring of the crude material for enacted carbon comprises of wood, bagasse, organic product skins, coconut shells, lignite coal, remaining fuel oil (Susanto, 2000). Wastewater treatment utilizing enacted carbon is generally utilized as a consistent cycle of organic wastewater. In this occasion, it is utilized to diminish the levels of certain natural carbons that exist. This cycle is normally used to supplement the organic preparing of modern waste whose natural interaction isn't consistent so it actually has issues with wastewater (Devi et al., 2019; Sugiharto, 1987).

3. Methods

This exploration was directed at PT. Sinar Surrya Indah Telukan Grogol Sukoharjo and in the lab of the Focal MIPA College Sebelah Maret Surakarta, for the production of establishments and research facility tests. As the item is preparing waste fluid mechanical materials by utilizing a carbon actuated. The information acquired for research are essential. Essential information is information gotten from direct exploration results, for this situation, information got from the field and research facility examination aftereffects of the MIPA Center, Sebelas Maret College, Surakarta. Techniques for taking fluid waste are: (1) Examples were taken from the gulf tank of PT. SSI Telukan Grogol Sukoharjo utilizing plastic jerry jars; (2) The jerry jars are cleaned inside by flushing utilizing fluid waste which will be taken multiple times; (3) The jerry jars are loaded up with fluid waste from the gulf straightforwardly by utilizing a pail gradually so that there is no choppiness in the jerry can; (4) When it is full, the jerry jars are shut and utilized as a material to be sifted; and (5) Examples were taken multiple times, on various days, at that point dispensing and lab assessments were done. The factors inspected in this examination incorporate 2 factors, to be specific: The autonomous variable is the thickness of the actuated carbon channel media, with a thickness of 0 cm; 5 cm; 7.5 cm; 10 cm; 12.5 cm; and 15 cm. Body 5, COD, Chrom (Cr), suspended solids (TSS), and pH in material wastewater.

In handling information, the strategy of mechanical preparing information is the scale experimentation research center which means to decide the viability of the thickness of the carbon dynamic against the decrease

of waste fluid to the boundaries Tied Body 5, COD, chromium (Cr), suspended solids (TSS) and pH in material waste. By utilizing the 5 thickness in sifting they at that point mentioned objective facts when against each treatment channel preliminary. The exploration factors comprise of the autonomous variable (the thickness of the actuated carbon channel media from 0 cm, 5 cm, 7.5 cm, 10 cm, 12.5 cm, and 15 cm) and the reliant factors (Body 5, COD, Chrom (Cr), suspended solids (TSS) and pH in material wastewater).

4. Results and Discussion

The exploration did incorporates the production of devices created or experimentation. Examination of fluid waste, which was done multiple times each prior to being streamed into a separating gadget and subsequent to streaming into an enacted carbon channel with 6 varieties of channel media, was the aftereffect of the test.

Table 1. The aftereffects of testing levels of Body, COD, Cr, TSS, and Ph with different channels

Ketebalan Karbon aktif (cm)	Parameter															% tingkat kejenuhan
	COD			BOD			Cr			TSS			Ph			
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	
Sebelum diolah	1069,4	985,0	1058,9	372,3	364,1	376,1	0,1536	0,1656	0,1963	150	170	170	6,06	6,09	5,98	
0 (kontrol)	1016,7	890,1	995,6	324,6	333,6	336,7	0,1128	0,1228	0,1523	140	170	140	6,11	6,18	6,37	
5	731,9	731,9	805,6	214,3	180,6	219,1	0,1074	0,1140	0,1360	90	150	100	6,55	6,52	7,02	
7,5	700,2	552,5	647,5	200,5	120,4	191,6	0,1033	0,1093	0,1292	60	130	80	6,95	6,85	7,25	
10	427,2	399,5	414,3	97,68	88,85	90,52	0,0938	0,1018	0,1137	60	70	70	7,06	7,18	7,3	
12,5	300,4	273,5	287,7	87,13	65,6	86,47	0,0849	0,0950	0,1035	50	50	50	7,33	7,55	8,28	
15	156,9	140,0	148,5	66,59	57,82	65,39	0,0836	0,0836	0,0900	40	30	30	7,97	8,49	8,58	
Rata-rata	148,47			63,27			0,0877			33,33			8,35			
Baku Mutu	150			60			1,0			50			6,0 - 9,0			

Data :

The example I, Squander assortment 1, the waste is somewhat blue

The Example II, Squander assortment 2, rosy hued squander

The Example III, Squander assortment 3, greenish hued squander

Where the outcomes when seen from the table testing the degrees of COD, Body 5, Cr, TSS, and pH with channel varieties as follows: normal COD levels 148.47 mg/L, Quality Standard 150; normal degrees of Body 5 63.27 mg/L, Quality Standard 60; normal Cr content 0.0877 mg/L, Quality Standard 1.0; normal TSS levels 33.33 mg/L, Quality Standard 50; the normal pH level was 8.35, Quality Standard 6.0 - 9.0.

COD boundaries: the aftereffects of estimating COD levels from squander when being treated with varieties in the thickness of actuated carbon.

Table 2. The consequences of the testing and proficiency drop in the degrees of COD in wastewater by initiated carbon thickness variety from 0 cm to 15 cm

Thickn ess activate d carbon (cm)	COD parameter		Derating Efficiency (EP)	
	Before process ed (mg / l)	After processing (mg / l)	Tot al (%)	Activat ed carbon (%)

Sample I

0	1069.4	1016.7	4.93	
5	1069.4	731.9	31.56	26.63

7.5	1069.4	700.2	34. 52	29.59
10	1069.4	427.0	60. 07	55.14
12.5	1069.4	300.4	71. 91	66.98
15	1069.4	156.9	85. 33	80.39
Sample II				
0	985.0	890.1	9.6 4	
5	985.0	731.9	25. 70	16.06
7.5	985.0	552.5	43. 91	34.27
10	985.0	399.5	59. 44	49.80
12.5	985.0	273.0	72. 29	62.65
15	985.0	140.0	35. 78	76.14
Sample III				
0	1058.9	995.6	5.9 8	
5	1058.9	805.6	23. 91	17.93
7.5	1058.9	647.5	38. 85	32.88
10	1058.9	414.3	60. 88	54.90
12.5	1058.9	287.7	72. 83	66.85
15	1058.9	148.5	85. 58	79.60

This shows the connection between the thickness of actuated carbon and COD levels, that the thicker the initiated carbon, the lower the COD levels. The information determined utilizing the semi-logarithmic methodology I. The effectiveness of the computation results utilizing the semi-logarithmic methodology with the condition $Y = \text{hatchet } b$, the condition for test I, $Y = 0.04085 \times 1.096$; test II, $Y = 0.01836 \times 1.402$; and to test III, $Y = 0.02014 \times 1,386$.

Table 3. Consequences of the estimation of the proficiency of decreasing COD levels in fluid waste with varieties in the thickness of actuated carbon from 0 cm to 15 cm.

X thickness activated carbon (cm)	Y (Reduction Efficiency) (%)		
	Sampl e I	Sampl e II	Sample III
5	2384	1753	1874
7.5	3718	3095	3288
10	5096	4633	4898
12.5	6507	6335	6674
15	7947	8180	8593

The connection between the thickness of the initiated carbon layer and the effectiveness of lessening COD levels in general shows that the thicker the enacted carbon layer the capacity to decrease COD levels is more viable. The present circumstance is because of the toxins in the fluid waste that are genuinely adsorbed. the thickness of actuated carbon influences the profound surface region. This surface region is the spot for the bonds to happen between particles or substances that cause the COD levels to ingest. On the off chance that the thickness of actuated carbon diminishes, the surface region additionally diminishes. so the thickness of enacted carbon and surface region has a corresponding relationship.

The presence of thickness likewise influences the contact time. Contact time is the home season of the fluid appendage in the enacted carbon channel or it very well may be supposed to be home time. this time will decide the span of the limiting of toxins from the wastewater. within the sight of adequate thickness, more contaminations will be bound to the adsorbent. Something else from the current surface region will be filled ideally. On the off chance that this contact time is restricted, the sorption runs defectively, in light of the fact that the toxins leave the enacted carbon channel excessively fast.

Boundaries Body 5: consequences of the examination of Body 5 of the loss when treated with actuated carbon thickness variety.

Table 4. The results of estimation and computation of the effectiveness of BOD5 levels in fluid waste with varieties in the thickness of initiated carbon from 0 cm to 15 cm

Thickness activated carbon (cm)	COD parameter		Derating Efficiency (EP)	
	Before processed (mg / l)	After processed (mg / l)	Total (%)	Activated carbon (%)
Sample I				
0	372.3	3426	12.83	
5	372.3	2143	42.45	29.62
7.5	372.3	2005	46.16	33.32
10	372.3	9768.0	73.77	60.93
12.5	372.3	8713	76.6	63.77
15	372.3	6659	82.11	69.28

Sample II				
0	364.1	333.6	8.37	
5	364.1	180.6	50.41	42.03
7.5	364.1	120.4	66.93	58.56
10	364.1	88.85	75.6	67.23
12.5	364.1	65.60	81.98	73.61
15	364.1	57.82	84.12	75.75
Sample III				
0	376.1	336.7	10.47	
5	376.1	219.1	41.75	31.29
7.5	376.1	191.6	49.06	38.6
10	376.1	90.52	75.93	65.46
12.5	376.1	86.47	77.01	66.54
15	376.1	65.39	82.61	72.15

The table shows the connection between the thickness of enacted carbon and Body levels, that the thicker the initiated carbon the Body content declines. The information determined utilizing the semi-logarithmic methodology. The effectiveness of the estimation results utilizing the semi-logarithmic methodology with the condition $Y = \text{hatchet } b$, the condition for test I, $Y = 0.0694 \times 0.87$; test II, $Y = 0.1863 \times 0.539$; and to test III, $Y = 0.0813 \times 0.831$ outcomes can be found in the table beneath.

Table 5. The results of the computation of the effectiveness of diminishing Body levels in fluid waste with dynamic thickness varieties from 0 cm to 15 cm.

X thickness activated carbon (cm)	Y (Reduction Efficiency) (%)		
	Sample I	Sample II	Sample III
5	28.16	44.35	30.97
7.5	40.07	55.19	43.38
10	51.46	64.44	55.1
12.5	62.49	72.68	66.54
15	73.23	80.18	77.17

From the consequences of estimations and charts of the connection between the thickness of the initiated carbon layer and the productivity of diminishing Body levels, it tends to be seen that after treatment by sifting fluid waste through a control channel (without enacted carbon) up to a thickness of 15 cm overall shows that the thicker the actuated carbon layer is, hen the capacity to decrease contaminations, particularly Body 5, is getting greater, as such, the more prominent the proficiency. this capacity is because of the limiting of poisons both natural and inorganic to actuated carbon. the bond is because of the adsorption and ingestion measures. adsorption is the way toward gathering broke up substances in arrangement, by the outside of the retentive substance or item and there is a physical-synthetic connection between the substance and its assimilation.

In the investigation, the diminishing in Body 5 levels with actuated carbon happened actually. Sorption is the way toward joining or entering poisons to enacted carbon, not synthetically, specifically the response among solids and assimilated solutes. Sorbsi in this actual bond on more fragile when contrasted and synthetically sorbsi. Actual sorption is profoundly subject to the appealing powers between the solute and the adsorbent. Accordingly, the thicker initiated carbon layer, the natural and inorganic poisons that have not been bound to the upper part will be limited by the enacted carbon at the base. This is because of the thicker the initiated carbon layer, the more prominent the surface territory. This surface region assumes a vital part in the sorption cycle, in particular as a spot for connection or passage of contaminations or a spot for holding among poisons and adsorbents. Because of this occurrence, the fluid waste from the material business that emerges from the dynamic casualty screening will have a lower Body 5 defilement level. This causes the thicker the layer of enacted carbon, the proficiency of decreasing Body 5 levels, the more noteworthy is the contact time. This contact time is significant, in light of the fact that the adequate contact time, more contaminations are dissipated. this contact time has a cozy relationship with the surface space of the carbon above. albeit the surface region is huge, if the contact time is little, the surface region can't tie the toxins ideally. The room is as yet void in light of the fact that there isn't sufficient time for the holding. in the event that the thickness of the initiated carbon layer is dainty, the contact time will be short.

Boundaries Chrom (Cr): From the estimation of Cr content from squander when preparing with varieties in the thickness of initiated carbon, it tends to be found in the accompanying table:

Table 5. The results of estimation and productive computation of Cr content in fluid waste with varieties in the thickness of enacted carbon from 0 cm to 15 cm.

Thicknes s	COD parameter		Derating Efficiency (EP)		
	activated carbon	Before	After processing	Tot al (%)	Activate d carbon
(cm)	processed (mg / l)	(mg / l)		(%)	
Sample I					
0	0.1536	0.1128	26. 56		
5	0.1536	0.1074	30. 08		3.52
7.5	0.1536	0.1033	32. 73		6.16
10	0.1536	0.0938	38. 93		12.37
12.5	0.1536	0.0849	44. 7		18.14
15	0.1536	0.0836	45. 59		19.03
Sample II					
0	0.1656	0.1228	25. 83		
5	0.1656	0.114	31. 14		5.31
7.5	0.1656	0.1093	34		8.17

10	0.1656	0.1018	38. 53	12.70
12.5	0.1656	0.0950	42. 61	16.79
15	0.1656	0.0896	45. 89	20.07
Sample III				
0	0.1963	0.1523	22. 42	
5	0.1963	0.1360	30. 69	8.27
7.5	0.1963	0.1292	34. 15	11.74
10	0.1963	0.1137	42. 07	19.62
12.5	0.1963	0.1035	47. 20	24.83
15	0.1963	0.0900	54. 14	31.73

It very well may be seen from the table that shows the connection between the thickness of enacted carbon and the Cr content, that the thicker the actuated carbon, the Cr principle diminishes. The information determined utilizing the semi-logarithmic methodology. The effectiveness of the estimation results with the semi-logarithmic methodology with the condition $Y = \text{hatchet } b$, the condition for test I, $Y = 0.0024 \times 0.87$; test II, $Y = 0.00699 \times 0.539$; and to test III, $Y = 0.01035 \times 0.831$ outcomes can be found in the table underneath.

Table 7.The results of the computation of the productivity of decreasing Cr content in fluid waste with varieties in the thickness of enacted carbon from 0 cm to 15 cm

X thickness activated carbon (cm)	Y (Reduction Efficiency) (%)		
	Sample I	Sample II	Sample III
5	3.50	5.20	7.85
7.5	6.87	8.62	13.08
10	11.09	12.34	18.79
12.5	16.08	16.31	24.89
15	21.77	20.47	31.31

From the determined information and the diagram of the connection between the thickness of the enacted carbon layer and the proficiency of lessening the Cr content, it very well may be seen in the wake of going through the control channel (without initiated carbon) up to 15 cm overall that the thicker the actuated carbon layer will be the more viable, all in all, the more prominent the preparing effectiveness. This is on the grounds that the toxins in the fluid waste are truly consumed and the thickness of the actuated carbon influences the Chromium (Cr) content.

Table 8. Suspended Solids (TSS): The aftereffects of estimating TSS levels from squander when preparing with varieties in the thickness of actuated carbon

Thickne ss	COD parameter		Derating Efficiency (EP)		
	activate d carbon	Before processe d (mg / l)	After processing (mg / l)	Total (%)	Activate d carbon (%)
(cm)					
Sample I					
0		150	140	6.67	
5		150	90	40.00	33.33
7.5		150	60	60.00	53.33
10		150	60	60.00	53.33
12.5		150	50	66.67	60.00
15		150	40	73.33	66.70
Sample II					
0		170	150	11.76	
5		170	130	23.53	11.76
7.5		170	70	58.82	47.06
10		170	60	64.71	58.82
12.5		170	50	70.59	52.94
15		170	30	82.35	70.59
Sample III					
0		170	140	17.65	
5		170	100	41.18	23.53
7.5		170	80	52.94	47.06
10		170	70	58.82	41.18
12.5		170	50	70.59	52.94
15		170	30	82.35	64.71

The table at the top shows the connection between the thickness of the dynamic carbon with levels of TSS, that makes thick initiated carbon TSS levels further down.

The information determined utilizing the semi-logarithmic methodology. The productivity of the computation results utilizing the semi-logarithmic methodology with the condition $Y = \text{hatchet } b$, the condition for test I, $Y =$

0.14358 x 0.576 ; test II, Y = 0.01554 x 1.471 ; and for test III, Y = 0.07163 x 0.808 the outcomes can be found in the table beneath:

Table 9. The results of the estimation of the proficiency of lessening TSS levels in fluid waste with varieties in the thickness of enacted carbon from 0 cm to 15 cm

X thickness	Y (Reduction Efficiency) (%)		
activated carbon (cm)	Sample I	Sample II	Sample III
5	3.50	5.20	7.85
7.5	6.87	8.62	13.08
10	11.09	12.34	18.79
12.5	16.08	16.31	24.89
15	21.77	20.47	31.31

From the determined information and the diagram of the connection between the thickness of the enacted carbon layer and the decrease proficiency of suspended substance levels, it very well may be seen that in the wake of going through the control channel (without actuated carbon) up to the thickness of initiated carbon is 15 cm. This is on the grounds that the suspended solids are moderately high which can expand the turbidity in the water. Computation of the decrease proficiency of suspended substances. The surface space of the channel apparatus is 1245.57 cm/gr. In the present circumstance, there is likewise adequate contact time. However, the decrease of suspended substances will directly affect different boundaries, specifically Body 5 and COD. This is on the grounds that the contaminations are as suspended or broken down solids. In the event that the suspended substance can be diminished, Body 5 and COD can likewise be decreased.

The level of corrosiveness (pH) : Consequences of investigation pH of waste when treated with carbon thickness variety is dynamic is appeared in the table beneath this .

Table 10. The results of estimation and computation of the effectiveness of pH levels in fluid waste with varieties in the thickness of actuated carbon from 0 cm to 15 cm

X thickness	Y (Reduction Efficiency) (%)		
activated carbon (cm)	Sample I	Sample II	Sample III
Initial grade	6.06	6.09	5.98
0	6.11	6.18	6.37
5	6.55	6.52	7.02
7.5	6.95	6.85	7.25
10	7.06	7.18	7.30
12.5	7.33	7.55	8.28
15	7.97	8.49	8.58

In view of the aftereffects of the examination, it very well may be broke down that the thicker the actuated carbon layer, the more noteworthy the proficiency of lessening levels of COD, Body 5, TCC, Cr, and pH. As in the conversation of the above boundaries, it is brought about by an enormous enough surface territory on the actuated carbon channel utilized with a size of 20-30 lattice. Likewise because of adequate contact time.

The thickness of the actuated carbon influences the surface territory. The surface territory goes about as a sorption interaction, to be specific as a spot to join or enter pollutants with adsorbents. With a huge surface region, the capacity of enacted carbon to tie contaminations will be considerably more noteworthy. In the event that the thickness of the actuated carbon layer diminishes, the surface territory will consequently diminish.

Significant exploration on the examination of assimilation rates utilizing actuated charcoal, drifting breccia, and nut shells got an ingestion proficiency of 98% with initiated carbon, 70.12% with coasting breccia adsorbent, and 62.59% with nut shells adsorbent, individually. The most noteworthy assimilation proficiency utilizing initiated charcoal adsorbent. From the chart of the normal productivity of diminishing waste substance, it is tracked down that the proficiency expansions in relation to the higher the thickness of the enacted charcoal. So the thicker the layer of actuated charcoal, the more drawn out the contact time, so more toxins are consumed (the diminishing in the waste holder is higher) (Peni, 2001).

The outcomes acquired by utilizing actuated carbon sifting treatment showed that the enacted carbon utilized could decrease the fluid waste substance of the material business PT SSI Grogol Sukoharjo. Before preparing, the fluid limbha level was gotten for the boundaries COD = 1037.33 (mg/l), BOD5 = 371.167 (mg/l), TSS = 163.33 (mg/l), Cr = 0.171 (mg/l) and pH = 6.04. Subsequent to preparing, the degrees of fluid limbha were gotten for the boundaries COD = 148.47, BOD5 = 63.27, TSS = 33.33, Cr = 0.0877 and ph = 8.35. So that there was an abatement in productivity for COD boundaries: 85.69%, BOD5: 82.85%, Cr: 48.71%, TSS: 79.59%.

In line with the research facility investigation, computation of COD expulsion productivity, BOD5, Cr, and TSS that there is a distinction just between the thickness of the layer of initiated carbon. The thicker the enacted carbon layer, the more noteworthy the decrease productivity of the boundaries analyzed. In light of five varieties in the thickness of the initiated carbon layer, and the five boundaries analyzed, specifically COD, BOD5, Cr, TSS, and pH, the best proficiency was accomplished at a thickness of 15 cm actuated carbon for a measurement of 9 cm and a channel stature of 40 cm.

The consequences of the investigation of material modern wastewater completed were contrasted and the quality standard worth of material mechanical wastewater dependent on the Focal Java Commonplace Guideline No. 10 of 2004 concerning the nature of fluid waste as demonstrated in the accompanying table:

Table 11. Correlation of Test outcomes/Estimation of Fluid Waste with Material Industry Fluid Waste Quality Principles

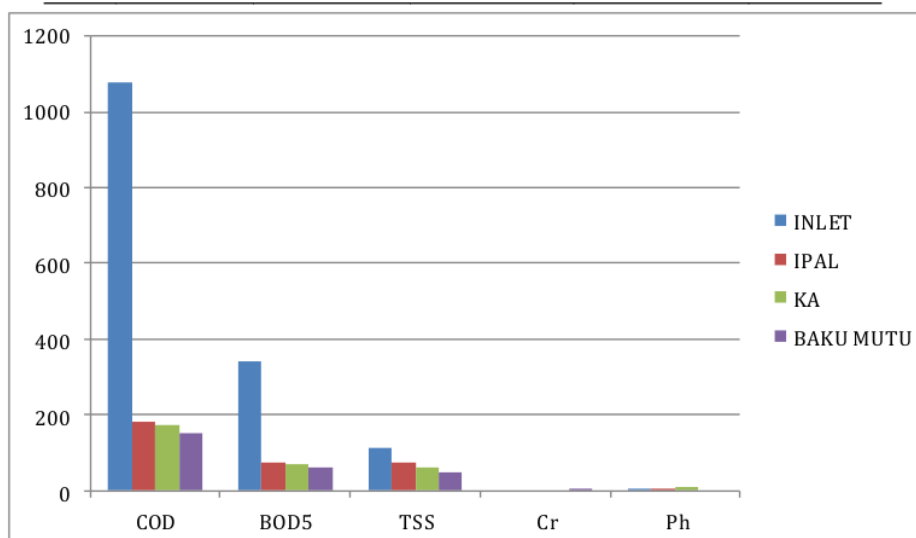
No.	Parameter	Level (mg / l)			Average	% Decrease	
		Quality standards	Experimental results				
			I	II			III
1	COD	150	156.9	140.0	148.5	148.47	85.69
2	BOD5	60	66.59	57.82	65.39	63.27	82.85
3	Cr	1	0.0836	0.0896	0.0900	0.0877	79.59
4	TSS	50	40.0	30.0	30.0	33.33	48.71
5	Ph	6.0-9.0	7.97	8.49	8.58	8.35	

From the table, it tends to be seen that the qualities for COD, Cr, and TSS are beneath the edge, for the BOD5 boundary the worth is over the limit, while the pH is as yet in the typical scope of 6.0 to 9.0 and is antacid, which is demonstrated by the higher pH esteem.

From the examination results, compelling assimilation was gotten from a channel with a width of 9 cm and a stature of 40 cm with a thickness of 15 cm of actuated carbon. Coming up next are the consequences of testing the material business wastewater with a thickness of 15 cm, and the test results for the IPAL Outlet of PT. SSI.

Table 12. Examination of the consequences of testing the material business fluid waste from the delta, PT SSI Sukoharjo outlet, the fluid waste quality norm, and by utilizing separating of 15 cm thick initiated carbon.

No.	Parameter	Test result	Test result	Test result	Quality standards (mg / l)
		Inlet	WWTP outlet	with Carbon	
		PT.SSI (mg /l)	PT.SSI (mg /l)	Active (mg / l)	
1	COD	1079.9	181.3	174.2	150
2	BOD5	343.5	74.06	71.66	60
3	Cr	Sgd	Sgd	Sgd	1
4	TSS	115	75	62	50
5	pH	6.29	6.92	7.83	6.0-9.0



The histogram picture of the test results between the material business wastewater from the gulf, Outlet PT. SSI Sukoharjo, Quality Principles for fluid waste and with utilizing actuated carbon sifting.

Where the tables and charts show that the test outcomes utilizing enacted carbon are superior to the power source and gulf results. From the research facility testing of the UNS MIPA Center, it was acquired that the COD, BOD5, and TSS boundaries surpassed the quality principles dependent on the Focal Java Common Guideline No. 10 of 2004, the Cr boundary was not recognized while the boundary for the ph boundary was as yet in the scope of value principles (ordinary), specifically 6.0 to 9.0. From the portrayal above it is demonstrated that utilizing enacted carbon can diminish squander boundaries like COD, BOD5, and TSS as demonstrated in the table.

Conclusions

In view of the results of the examination and the computation of the productivity of diminishing levels, the accompanying ends can be drawn: (1) The nature of the power source wastewater of PT Sinar Surya Indah Grogol Sukoharjo and the consequences of separating utilizing initiated carbon for the BOD5, COD, TSS boundaries are over the limit, the Cr boundary isn't distinguished and the pH is as yet in the quality standard

scope of 6.0-9.0 dependent on Focal Java Common Guideline No. 10 of 2004. The aftereffects of waste handling with initiated carbon are superior to those from the IPAL PT. SSI; (2) The thicker the initiated carbon utilized, the more productive it is to diminish levels of fluid waste. The thickness of enacted carbon which is viable for filtration is 15 cm thick. While compelling assimilation was gotten for COD, BOD5, and TSS boundaries, the Cr boundary was less powerful for retention as shown by the worth of $1/n = 3.0451$, which surpasses the greatest furthest reaches of ingestion esteems.

Recommendation

To increase the adsorption capacity of activated carbon, it is advisable to carry out pre-treatment of wastewater. This processing is carried out by coagulation and flocculation processes to remove larger substances or particles. This is done to reduce processing costs. Do further research eg activated carbon thickness above 15 cm for a diameter of 9 cm, a height of 40 cm filter, and liquid waste volume of 1.5 liters.

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