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HYDROCARBONS REMOVAL FROM WASTEWATER BY GREEN MATTER (RICE HUSK AS A MODEL)

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Abstract

The removal of Hydrocarbons and some related properties were studied. Rice husks were used as a green adsorbent matter. Two Techniques were applied to comparison any of them are efficient. one of them depend on shaking the samples for 30min. and second was using packed column with rice husks. From the result the shaking is efficient for removing the pollutants.
Keywords : Hydrocarbons, rice husks

Introduction

Wastes are the product of human activities and vary in quantity and quality from one house or industry to another. The difference is according to lifestyle, living standards, technology and legal framework. One of the most important pollutants is the organic materials that take a large area of them (Henze *et al*., 2000). Sewage are combination of hazard and remediation resistant material chemicals and are mostly hard to treat. (El-Ashtoukhy *et al*., 2013). One of the most dangerous types of pollution is the pollution of the non biodegradable compounds found in wastewater. This is due to its ability to move through the environment as well as its environmental and health damage to humans, living organisms and non-living components. Therefore, methods have been devised to remove water pollution from these elements and other pollutants such as ion exchange, Chemical, membrane filtration, adsorption, sintering, and photoelectric methods. The most important and effective methods of wastewater treatment of heavy metals and other harmful pollutants are adsorption, ion exchange, filtration membrane (Abbas *et al*., 2013).

The growing population in urban area impacted the water quality of the urban rivers receiving treated municipal wastewater. Polycyclic aromatic hydrocarbons (PAHs) and their derivatives (SPAHs) are corresponding to the population density (Qiao, *et al.*, 2018).They are generated in big amounts and they are used in a wide ranges of factories uses, firstly as solvents, as ingredient in petrol, and in the making of other matter. Hydrocarbons may presence in wastewater flow to the domestic processing stations. They can be drain with factories sewage, from small plants and nation helps and with municipal wastewater (Escalas *et al*., 2003).

Adsorption on the activated surface of carbon is one of the most efficient methods used in water treatment because of the low cost and availability of materials such as rice, which is considered agricultural waste. It is difficult to ignore them, which have the ability to absorb large amounts of pollutants of all kinds and even very dangerous, as another example of dangerous pollutants, which is very widespread and dangerous and harmful, is phenol, which has harmful effects on both humans and other organisms. And their transfer to groundwater with various organic compounds (Angelova *et al*., 2011).

Materials and Method

Preparation of Rice Husks

Take 500 grams of rice husk and wash with tap water to remove dust and suspended substances and wash with distilled water for several times. Rice husks was dried by oven at (80) ºC. Rice husk was treated with 500 ml from (0.1N) Hydrochloric Acid to activate its outer surface and washed with distilled water to remove the remaining acid.

Finally was dried at a temperature of (100) ºC.

Removal rate calculated as: $R.R=(C_b-C_a)/C_b*100$, Where;

R.R.: Removal rate, C_b: Conc. Before treatment and C_a Conc. After treatment

The First method:

Filling the tube that used for the treatment method.

Some physical and chemical properties were measured before the sample treatment :(Temperature - pH-Electrical Conductivity-TDS - COD and chlorides**)**. Total Hydrocarbons were measured.

The sample was passed in a tube filled with rice husk and at different flow rates (1,1.5, 2) ml / min

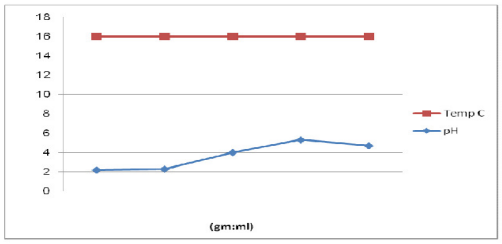
Repeated the measurements of some physical and chemical properties after the sample was treated were mentioned above.

The Second method:

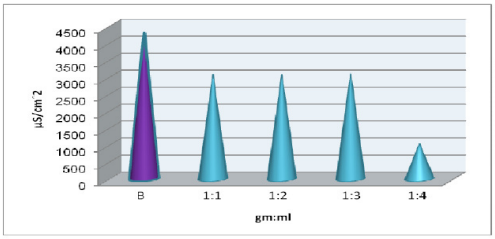
- The ratio (rice husk : wastewater) was set in tightly container at different rates (1:1, 1:2, 1:3, 1:4) g/ mL and then placed in the shaker for 30 minutes.
- Some physical and chemical properties of the sample: (Temperature-pH- Electrical Conductivity-TDS-COD and chlorides) and Total Hydrocarbons were measured before and after treatment.

Results and Discussion

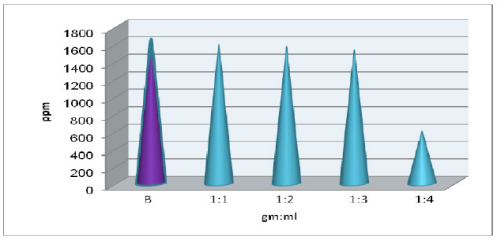
Adsorption is defined as the process in which liquid or gaseous particles are concentrated on a solid surface, which is naturally different from absorption, in which particles are handled by liquid or gas. (Nicholas *et al*., 2002). Recently, some pollutants have been removed using different adsorbents, such as rice husk, which have become more widely used according to their properties such as granular and chemical stabilizers and their availability locally at very low cost and do not need to be renewed again because of the low cost of production. The main components of rice husks are (64-74)% volatile matter, silica, (12-16)% carbon constant and (15-20%) ash (Armesto *et al*., 2002).The results showed different results in terms of removal. It was based on the use of two techniques for the first treatment using shaker and different concentrations and the other using a packed column. The results showed different results in terms of removal, depending on the use of two techniques for treatment using the shaker method with different concentrations and the other method using a packed column. Shaker results showed that the E.C values ranged from (1040-4300) µs/cm^2 while the removal rate (75.8%) and (600-1650) ppm and the removal rate was 63.6% for TDS. COD ranged between (80-166)mg/l with a removal rate of 51.8%. The total values of Hydrocarbons ranged from (110-300) mg / l and the removal ratio was 63.3%. The values of chlorides varied between (3200-8100) mg/l) with removal rate 60.4% Tables (1, 2 & 3).



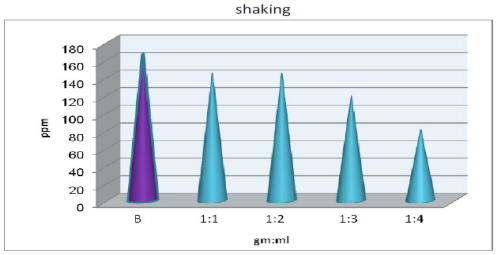
Figure(1). Temperature and pH values of water studied by shaker



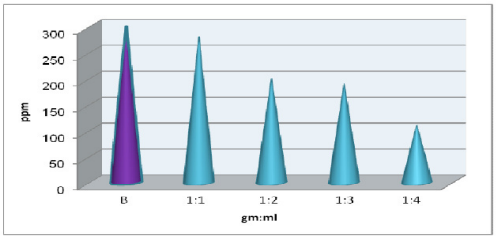
Figure(2).E.C. value for the studied water before and after treatment by shaking



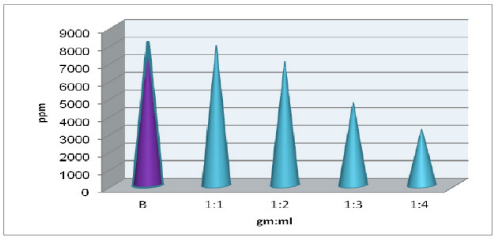
Figure(3) TDS. Value for the studied water before and after treatment by shaking



Figure(4) COD. Value for the studied water before and after treatment by shaking



Figure(5)T.H. value for the studied water before and after treatment by shaking



Figure(6)Chloride value for the studied water before and after treatment by shaking

In the second method, the method of packing column with adsorbent (rice husk), the results were as follows: EC range(1100-4300)µs/cm^2 with removal rate 74.4%, the range of TDS was(840-1650)ppm and removal rate for it was 49%, the low value for COD was 70 ppm and high value was 166ppm with removal range was 57.8%.Total Hydrocarbons range was between 150 ppm and 300 ppm as low and high value respectively and removal rate was 50% and finally the chloride range was (3800-8100) ppm with removal rate was 53%.

Increasing the efficiency of rice husks in reducing Electrical Conductivity with increasing rice husk size and contact time may be due to increased volume accompanied by an increase in the number of minutes of adsorbent (rice husk) and thus increased porosity in addition to the spongy structure, which enables it to retain as many cations and ions (Zahid *et al*., 2002). The reason for the reduction in the low rates of crusts to the treated water is due to the reduced absorption capacity of the mezzase material for the treated water (Al-Amiri *et al*., 2014). The COD is an important factor in determining water quality, the amount of oxygen consumed to oxidize the organic matter present in wastewater to carbon dioxide. Almost all organic matter is oxidized to carbon dioxide by a strong oxidant and is different from the BOD is different from the COD, which is defined as the amount of dissolved oxygen consumed by the microorganisms found in the wastewater responsible for the atmospheric degradation of the biodegradable organic matter in the wastewater (Kumar *et al*., 2014). It is noticeable from the results of the removal that increasing the amount of the adsorbent material is a necessary factor to complete the process of complete treatment because the absorptive capacity of the adsorbent material increases with the amount of adsorbent material, which provides a large surface area to remove the largest amount of pollutants (Mostafa *et al*., 1989).

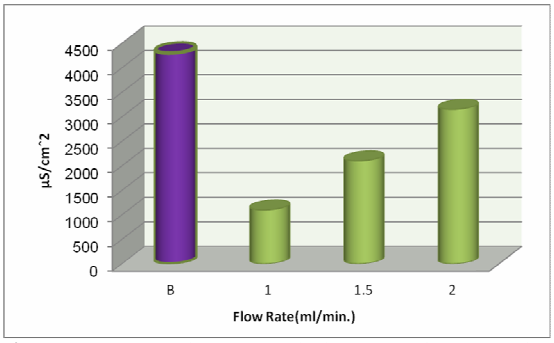


Fig. 7: E.C. value for the studied water before and after treatment by packed column

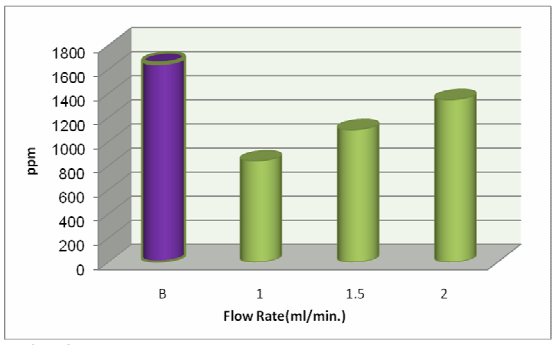


Fig. 8 : TDS. Value for the studied water before and after treatment by packed column

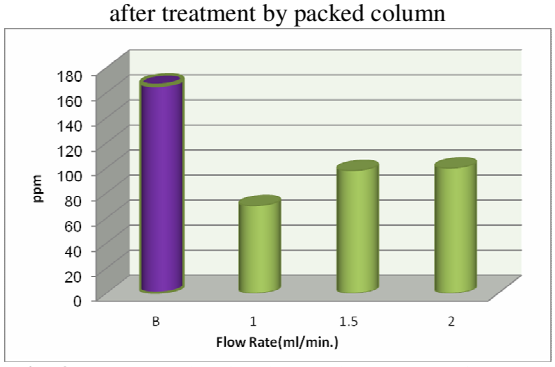


Fig. 9 : COD. Value for the studied water before and after treatment by packed column

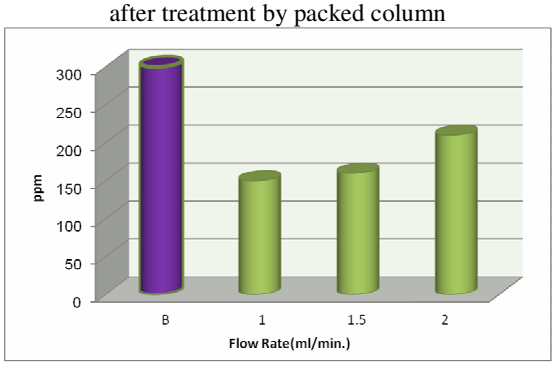


Fig. 10 : T.H value for the studied water before and after treatment by packed column

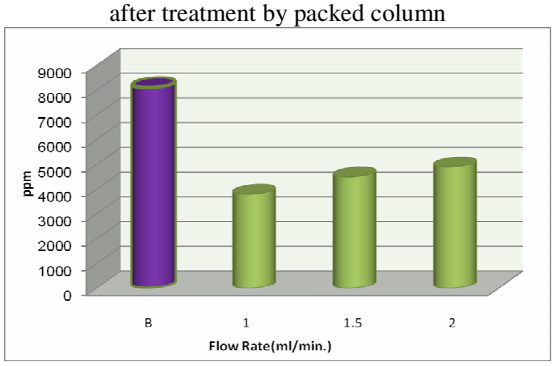


Fig. 11 : Chloride value for the studied water before and after treatment by packed column

Table 1 : Low and high value and percentage of physical and chemical properties for studied wastewater by shaking

No.	Test	Low value	High value	Removal rate%
1	E.C(µs/cm^2)	1040	4300	75.813
2	TDS(ppm)	600	1650	63.6
3	COD(ppm)	80	166	51.8
4	TH(ppm)	110	300	63.3
5	Chloride(ppm)	3200	8100	60.4

Table 2 : Low and high value and percentage of physical and chemical properties for studied wastewater by packed column

No.	Test	Low value	High value	Removal rate%
1	E.C (µs/cm^2)	1100	4300	74.4
2	TDS (ppm)	840	1650	49
3	COD(ppm)	70	166	57.8
4	TH(ppm)	150	300	50
5	Chloride(ppm)	3800	8100	53

Table 3 : Comparison between Tow treatment techniques

No.	Test	Removal rate%	
		Shaking	Packed column
1	E.C (µs/cm^2)	75.813	74.4
2	TDS (ppm)	63.6	49
3	COD(ppm)	51.8	57.8
4	TH(ppm)	63.3	50
5	Chloride(ppm)	60.4	53

The shaking technique was efficient for removing of some studied pollutants according to increase the contact times and the movement of each of adsorbent and samples.

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