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Analysis and removal of Benzene from water by using Activated Carbon

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Abstract: Day to day population grow in huge amount. Due to requirement of day to day products like sunscreens, medicines, creams, shampoos and many more. From these products more number of pollutants is coming in huge amount. These pollutants are in very low concentrations. These low concentration pollutants are called as micropollutants. They are not getting easily removed and not completely biodegradable. Also after treatment plant some pollutants are remain in water. Therefore there is necessity to remove these micropollutants from water. Some advanced treatments are required to treat micropollutants. In this paper activated carbon made by using coconut shells is used to treat benzene. Benzene and forms of benzene are found in every source of water. So activated carbon is used to treat benzene pollutant and tested concentration in High Performance Liquid Chromatography.

Keywords: Benzene, High performance liquid chromatography, Activated carbon, Micropollutant, coconut shells.

I. INTRODUCTION

The increase in the world population also increased the uses of beauty products like sunscreen, sanitizers, face powders, soaps, shampoos etc. Due to this large numbers of micropollutants are coming out in environment. Micro pollutants include substances such as Pharmauticals, personal care products, hormones, expired medicines and industrial chemicals. Micro pollutants found in wastewater treatment plant influents and effluents, hospital wastewater, wastewater from Pharmauticals manufacturing companies, industrial wastewater and even in surface water and ground water. Pharmaceuticals are used at increasing rate and end up in wastewater through excretion and disposal. Micro pollutants do not constitute an immediate health hazard, the long term effects of these permanently present micro pollutants are becoming sensitive to aquatic environment, at low concentrations. Micro pollutants frequently occur at hazardous sites through different media like air, water and soil but major source is water. In rural areas main source is agricultural pesticides. Through fields some micro pollutants goes to surface water and some to the groundwater. In urban areas personal care products, sunscreen, pharmaceuticals goes in main sewers and some pollutants go to surface water.

II. PROBLEM STATEMENT

Main sources of pollutants are pesticides, personal care products and pharmauticals. As we can identify as Benzene and forms are found in water from many sources. Benzene is a majorly occurring pollutant which occurred due to human processes. Due to rubbers, pesticides and other chemicals benzene comes to environment. Natural sources of benzene are forest fires and volcano emissions. Benzene is highly toxic and has many forms of it. High level of it can causes human vomiting and irritation of the stomach. Pollutants are very low in concentration so it is difficult to removal all concentration of pollutants from water.

III. OBJECTIVE

A. To remove pollutant occurring in every water source.
B. To use best treatment method for removal of pollutant.
C. To use economical and easily available method for treatment.
D. To help ecosystem and environment from micropollutants.

IV. METHODOLOGY

As benzene is occurring in large amount in every wastewater and which is very harmful to human beings. Activated carbon is made by using coconut shells which are easily available and economical. Activated carbon used as an adsorbent for the removal of micropollutants in water. So, benzene is taken for testing as pollutant because it is found in every wastewater or water. Two samples are taken, first one is with 15 ml benzene in 150 ml distilled water with intimate contact for 20 minutes at 200rpm and second is 10 gm of activated carbon is mixed with 15 ml benzene in 150 ml distilled water with intimate contact for 20 minutes at 200rpm. After

that second sample is get filtered using filter paper. For checking results High Performance Liquid Chromatography is used. By using chromatogram we identified the reduced concentration of benzene in second sample as compared to first sample which is without activated carbon. Pure benzene sample is also tested in HPLC for the peak point. We set the parameters as per requirements as follows:

A. For Benzene in HPLC-

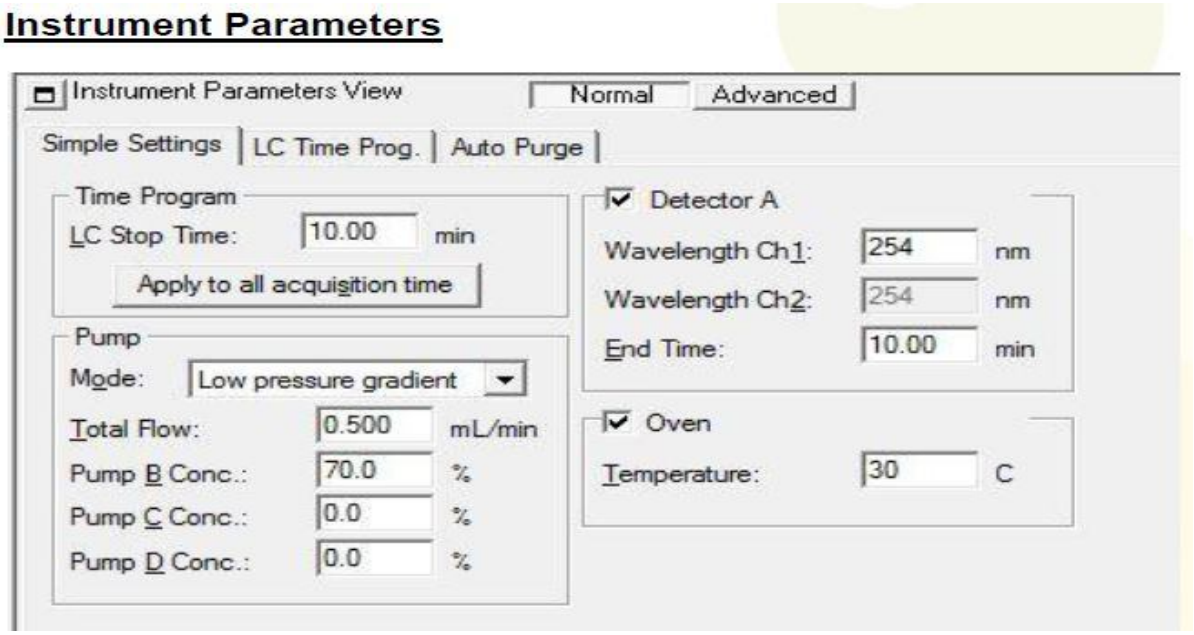

Fig.1: Instrument parameter of HPLC for benzene

PeakTable

Detector A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	6.538	60916159	2607306	100.000	100.000
Total		60916159	2607306	100.000	100.000

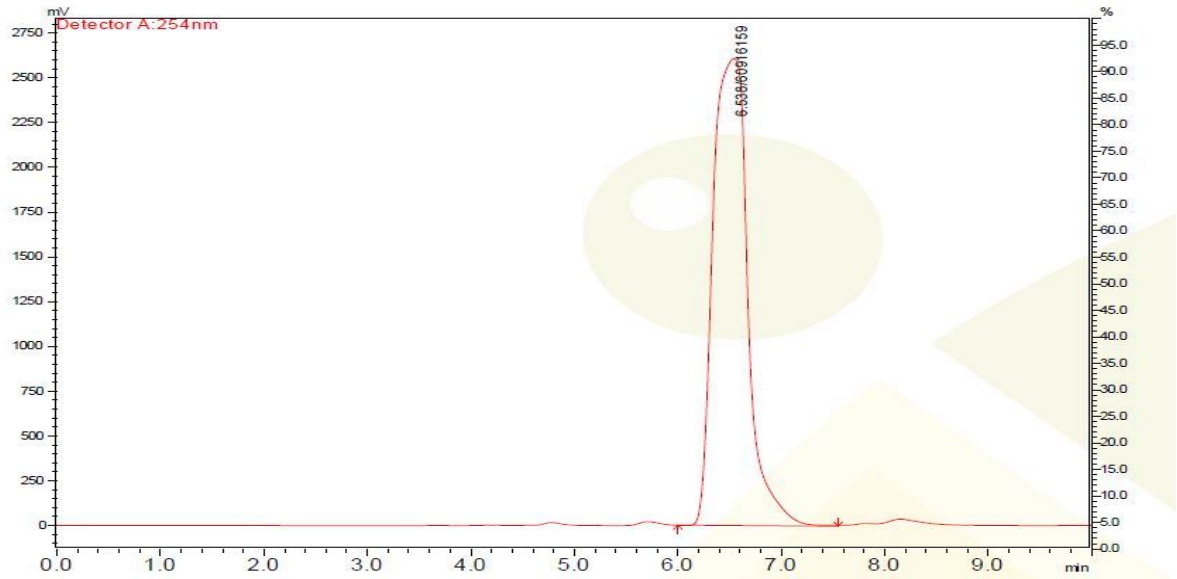

Fig.2: Chromatogram of Benzene

B. For solution of Benzene Without Activated Carbon-

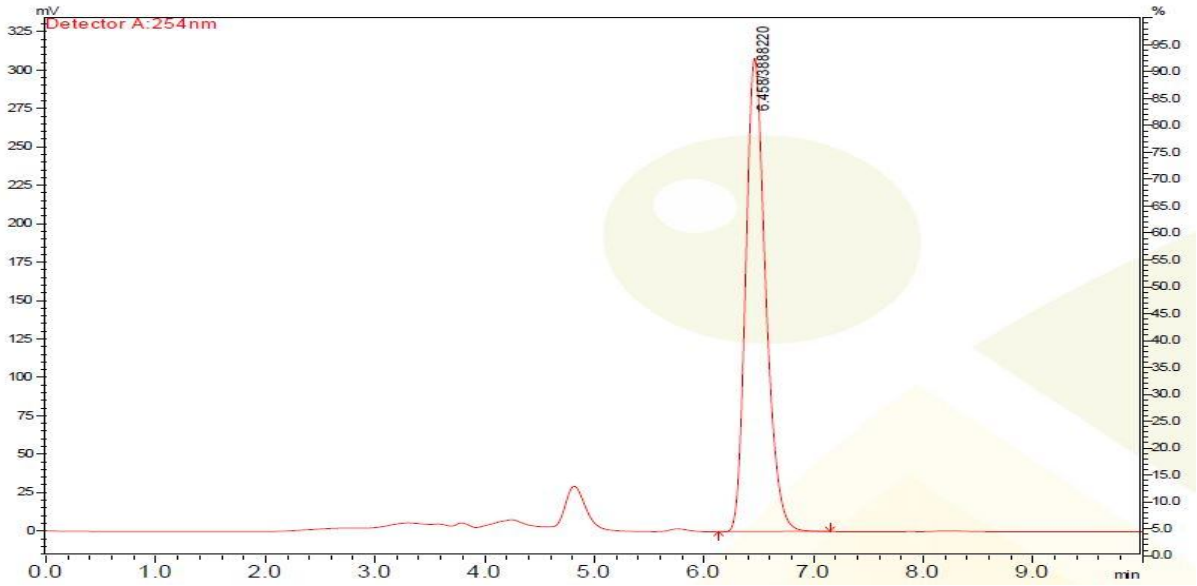

Fig.3: Chromatogram before active carbon dose

PeakTable

Detector A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	6.458	3888220	307910	100.000	100.000
Total		3888220	307910	100.000	100.000

C. For Solution Of Benzene With Activated Carbon Dose

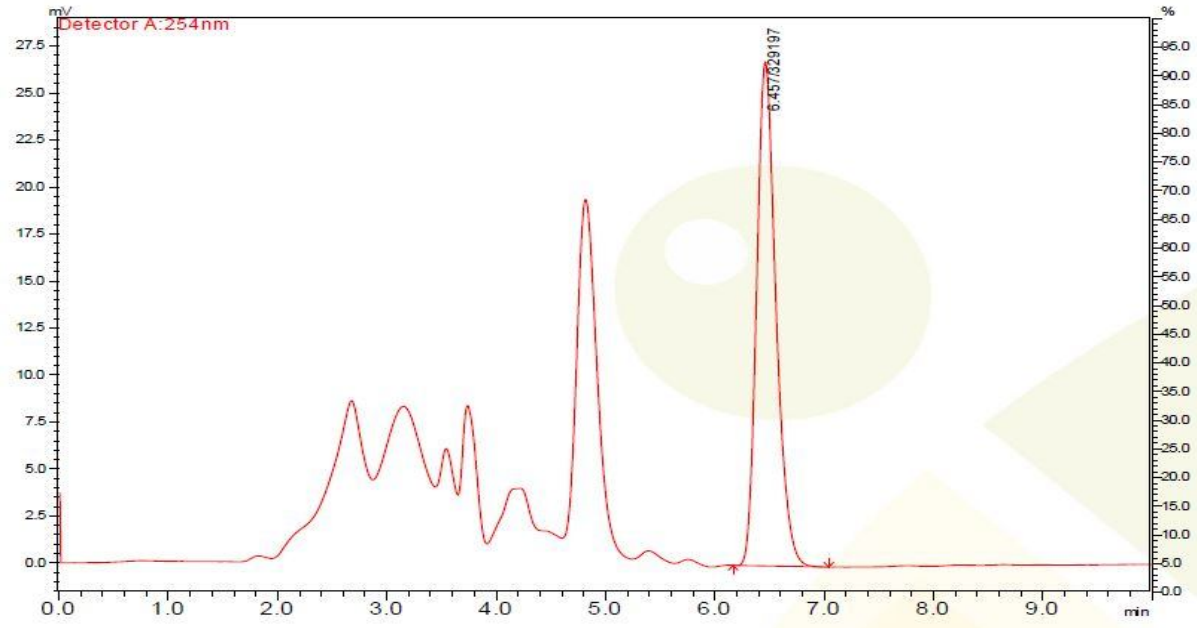

Fig.4: Chromatogram after activated carbon dose

PeakTable

Detector A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	6.457	329197	26821	100.000	100.000
Total		329197	26821	100.000	100.000

IV. RESULT

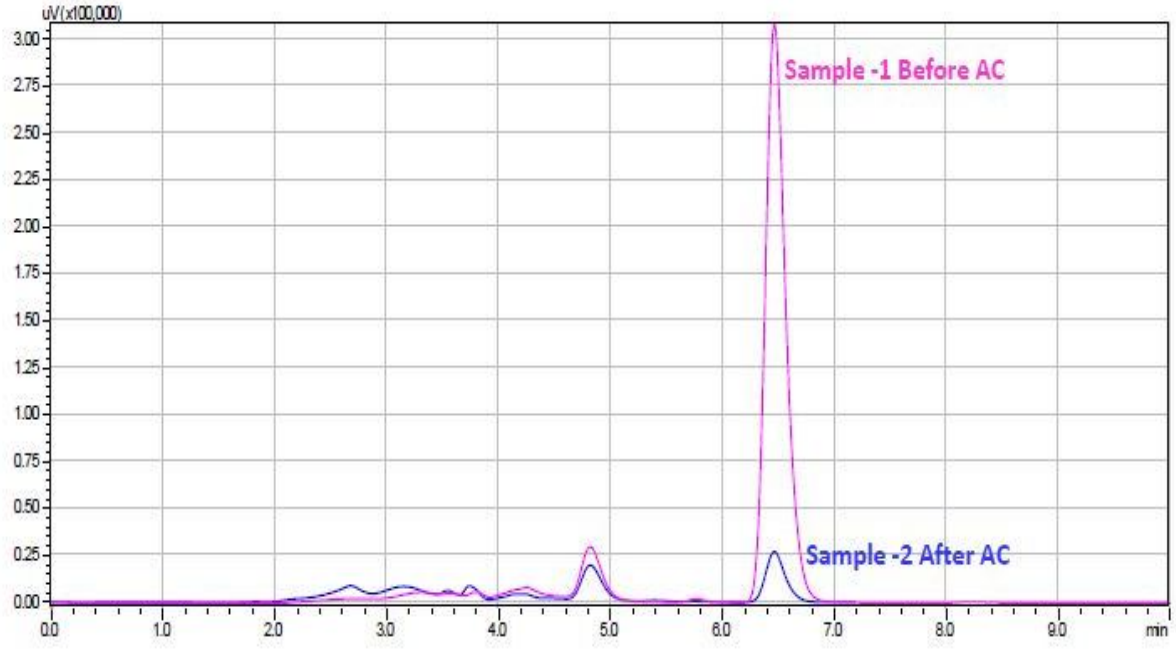

Fig.5: Comparison between with and without activated carbon

V. CONCLUSION

From above comparison chart it is clearly seen that using activated carbon from coconut shells we can reduce the concentration of benzene which is occurring in every source. On site or plants we can use activated carbon for the complete removal of pollutants which is easily available and economical. There is also need of some advanced treatments to treat pollutants which are not easily removed or not completely biodegradable.

VI. ACKNOWLEDGMENT

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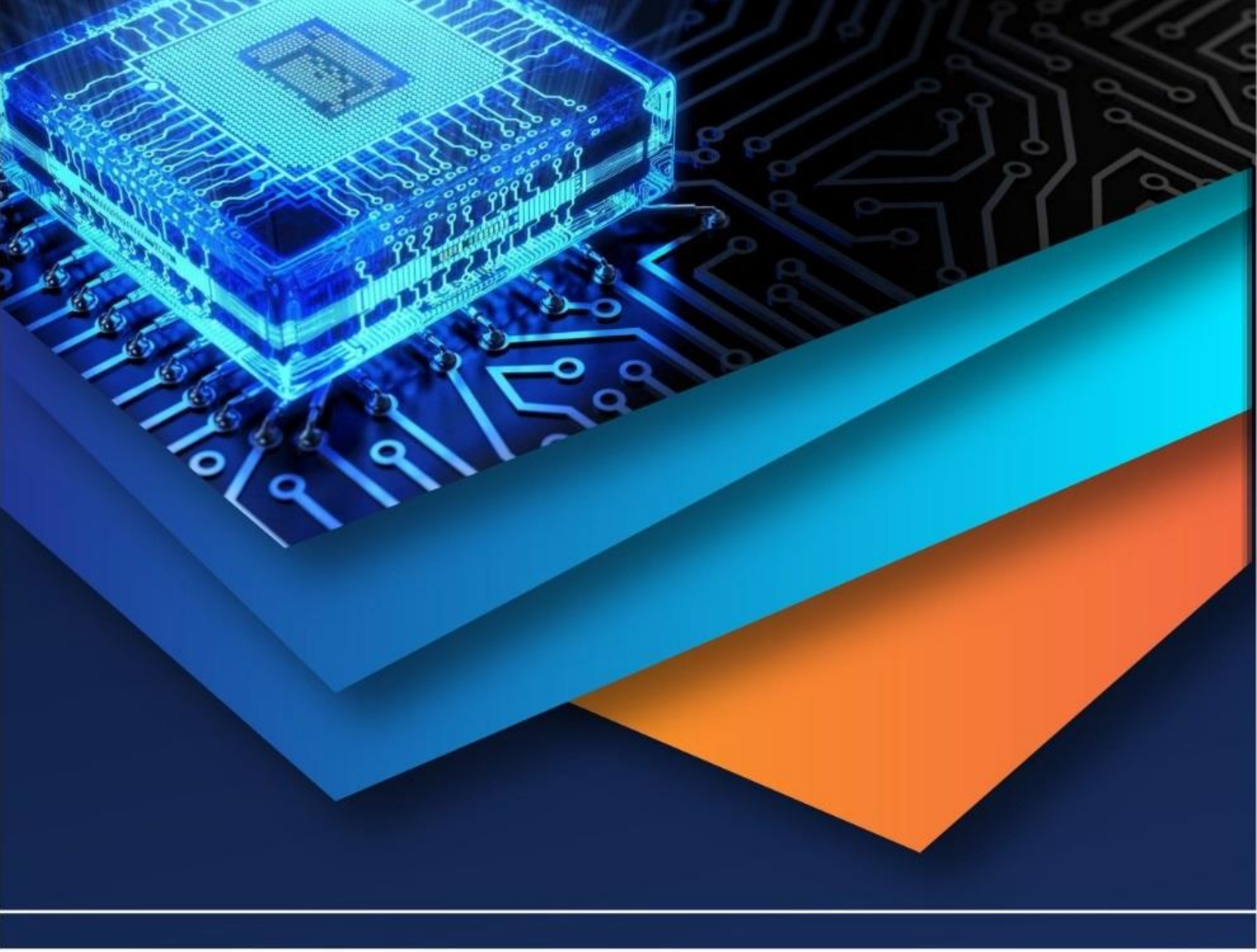

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