Research Article

Preparation of Nano-composites using Coconut husk and Saw dust

Adeeba Riyaz[1] and Ajay Singh[2]*

1-Department of Biotechnology, Uttaranchal College of Applied & Life Sciences, Uttaranchal University, Dehradun, Uttarakhand, 248007,
*2*Department of Chemistry, Uttaranchal College of Applied & Life Sciences, Uttaranchal University, Dehradun, Uttarakhand, India,*

ABSTRACT

A lot of agricultural waste is generated in India and most of the agri- waste is burnt by the farmers ,which creates environmental problem as well economy is lost..Nano-technology is very important emerging technology which is being used in almost every field. Nano composites by using agri-residues like bagasse, coconut-husk and saw dust ash have been used in this study for reduction of pollutants including heavy metals due to adsorption. Adsorption of heavy meats takes place on the surface of nano-composites which help in the removable of heavy metal ions present in water. Saw-dust nano-particles were reinforced with reduced coconut-husk at about 80-100°C and characterised by using FT-IR,UV and SEM techniques. FT-IR and SEM analysis confirm the formation of new nano-composite in the study. So formed nano-composites were also attempted for use in treatment of waste water. In this study it was found that heavy metal like chromium could be adsorbed upto 70-90% and BOD , COD ,colour were reduced upto 70%.

Key words: *Nano composite, coconut-husk, saw dust, waste water treatment, characterisation.*

Corresponding Author: Ajay Singh, Professor & Head, Department of Chemistry, Uttaranchal University, Dehradun, Uttarakhand, India, 248007
E.mail: principal.ucals@uttaranchaluniversity.ac.in; ajay21singh@yahoo.com

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INTRODUCTION

As we all are aware about the fact that in today's world the amount of fresh water available in this earth is only 2.5-2.75%. Indeed it is necessary to purify and recycle the municipal and the industrial wastewater which can be used by the human's plant and animals for various purposes.**[1]** India consists of only 4% of the fresh water available. Due to the growing population and climatic changes the earth is facing a real threat to the availability of fresh water. The wastewater which is been discharged into the rivers and oceans has to be purified through inexpensive treatment such as agro-based adsorbents which is very easy to apply rather than the mechanical process which are very expensive. The contaminated water consists of toxic heavy metals, high PH., biological contaminants and organic pollutants.**[2]** In the case of water treatment nanotechnology has gained a special attention in reducing the heavy metals and all the contaminated pollutants from the waste water in the recent decades. The main objective of this research is to check the BOD and various other parameters from the wastewater by introducing nanoparticles using agricultural wastes such as coconut husk and saw dust which has an amazing adsorbent capacity and behaves as an membrane filtration.**[3]** This research will also be dealt with the applications and the type of effluent which were collected from different industries in order to compare the parameters i.e. before introducing the agro waste and after the treatment of agricultural waste.

MATERIALS AND METHOD

Waste water was collected from pulp and paper mill situated in western UP region. Coconut-husk saw dust and other agro-waste materials were collected from local market. HCl, H_2O_2, Acetone, H_2SO_4 from Rankem were used to carry out the experiments.

Preparation of coconut husk and dust composite

For preparing saw dust –aniline- coconut husk composite , 2 gm ash(dust) , 10 ml aniline, 100 ml of Hydrochloric acid i.e., 90 ml HCL & 10 ml of distilled water is taken along with 10 ml of $K_2Cr_2O_7$ (o.1 M).This mixture was placed in a freezing mixture of ice in an ice bath.2g of the coconut husk was also measured & added slowly to the mixture. After a certain period of time a green colour was observed indicating the polymerization of aniline. The mixture was then stirred for 3 hours continuously in a stirrer of about 800 rpm. Then the sample was placed overnight in the refrigerator at -10℃ for the complete precipitation of the composite. These precipitates of composites were separated then by filtration and washed with acetone and 2.0 mol/Lt. HCl for removing excess of the residual monomer. After washing the left out coconut husk from the filter was put into the Petridis.

These petri dishes were put in the oven at 50°C for 48 hours and then further characterization like SEM (Scanning Electron Microscope), FT-IR & UV was done.

RESULT & DISCUSSION

Agricultural waste material like coconut husk and saw dust were dried and grinded and then used in nano-composite formation. So formed composite was characterised by SEM and FT-IR. SEM analysis images are shown in figure-1 & 2. Figure 1 and 2 confirm the formation of nano-composites. SEM images show morphological characteristics of so formed nano-composites. It can be seen that nano-particles of agriwaste (husk) were also reinforced in 80-90 nm size which are shown in images. FT-IR image is given in figure-3. In FT-IR few absorption peaks (like 3460 cm^{-1} , 1510cm^{-1} 1380 cm^{-1}) were observed which confirm the new bonding and nano-composite formation When such formed nano composite was used in waste water treatment, it has shown pollutant adsorption capacity. Shafeeq Rahman and Praseetha P.K,(2016) studied the grapheme oxide based nano-composite efficiency for wate water treatment.**[4]** All waste water parameters were determined by using standard methods of APHA book.**[5]**Pollutant reduction results are shown in table-1. From the table it is clear that BOD, COD, colour TSS can be removed in the range of 60-70 % by using nano-composite. Metals like Fe and chromium were also adsorbed successfully and reduced up to 90%.

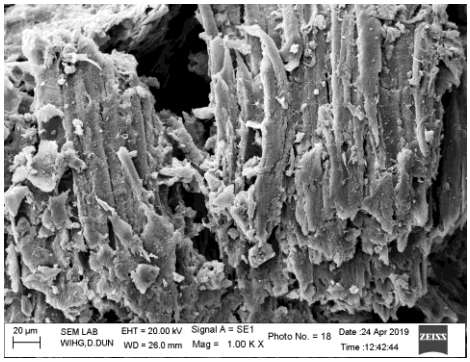

Fig-1: SEM Analysis

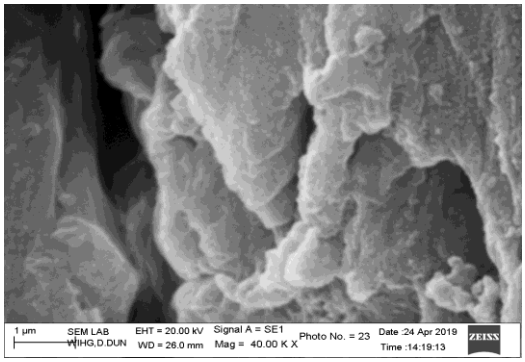

Fig-2: SEM Analysis

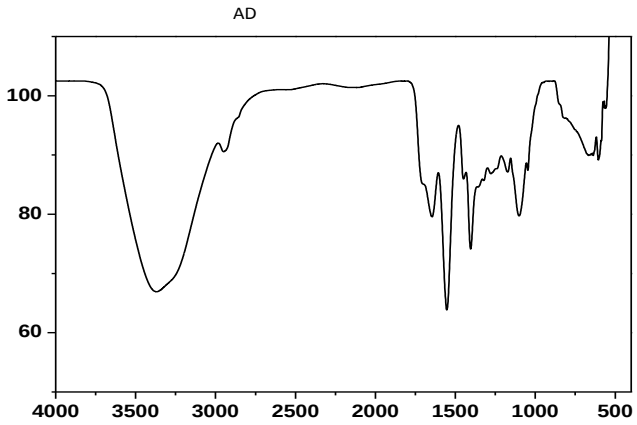

Fig-3: Ft-IR of Nano-composite

Table-1 Pollutant & Metal Reduction by adsorption (Make/ Model : Perkin Elmer Atomic Absorption Spectrophotometer AA-200)

Metals	E-0	E-1	E-2	E-3	Max. Reduction (%)
BOD	250 ppm	180 ppm	120 ppm	80 ppm	68
Colour Pt-Co	480 ppm	300 ppm	250 ppm	140 ppm	70.8
COD	700 ppm	600 ppm	450 ppm	280 ppm	60
Fe	12.5	8.1	6.0	2.8	77.6
Cr	0.36	0.19	0.12	0.004	90

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