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PRIMARY ARTICLE

Colour Removal From Waste Water Using Locally Prepared Adsorbent By Calorimetric Technique

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ABSTRACT

Activated carbon is made from various agricultural waste by physical and chemical activation. The preparation of activated carbon from waste material could increase economic return and also provides an excellent method for solid waste disposal thereby reduce pollution.This study deals with the use of low cost,easily available ,high efficiency and ecofriendly adsorbent as an ideal alternative to the currently used expensive methods of removing colour from waste water.The potential of chana charcoal for the removal of colour from waste water has been investigated. The adsorption of potassium permanganate on prepared activated carbon was investigated. Photocolorimetry technique was applied. The result indicate that it can act as a good adsorbent

Keywords: Activated Carbon, Peanut Shells, Adsorption.

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Introduction :

Activated carbon has long been recognized as one of the most versatile adsorbents to be used for effective remove of low concentrations of organic compounds from aqueous solutions. The activation of carbon provides it with many of its useful properties. Nowadays interest is growing in the use of other low cost and abundantly available agricultural and other waste. In tropical countries a vast variety of fruit and agricultural wastes are likely precursors for the manufacturing of activated carbon include maize cob, almonds shells, ground nut husk, palm seed coat etc. It was found that colour removed by activated carbon is upto 94%. Activated carbon has long been recognized as one of the most versatile adsorbents to be used for the effective removal of low concentration of organic compounds from aqueous solutions.The adsorption process has proved itself more versatile and efficient than other methods such as coagulation,chemical oxidation,and froth flotation[2].Coloured compounds are the most easily recognizable pollutants in the environment.Most industries use dyes and pigments to colour their products.Dischaqrge of dye bearing waste water into streams and rivers from textile,paper,carpet, and printing industries poses a severe problem ,as dyes impart toxicity to aquatic life.Many of the dyes used in industry are stable to light and oxidation ,as well as resistant to aerobic digestion[3]. The activation of carbon provides it with many of it's useful properties,and degree of activation affects it's physical and chemical properties. It was found that the color removal by coir pith carbon was 94% which is comparable with commercial activated carbon[4] (90%) at pH 8.6. The dyes are harmful to all living [organisms] systems polluting water and soil. The uptake of dyes from wastewater using adsorption was reported in literature[5].

Adsorption is one of the techniques that would be comparatively more useful and economical. Several adsorption methods have been developed and tested ranging from low cost waste material such as moss peat[10], hazelnut shell[11] rice husk carbon[12] to more sophisticated adsorbents such as modified clay[13], modified steel slag, nanoscale magnetic material[15]. India is producing peanut on large scale. During use the shells are removed as a solid waste. The abundant and easily available solid waste material peanut shells can be

converted to an effective low cost adsorbent to remove colour from waste water.

EXPERIMENTAL METHOD:

Activated carbon was prepared from chana shells and peanut shells. Chana shells and peanut shellss were collected, washed, dried. It was crushed and roasted. Then it was kept in 5%calcium chloride solution overnight. Later on it was washed several times with distilled water and dried.0.1M $KMnO_4$ as stock solution was prepared.It was in turn diluted. Concentration determined exploitation absorbance values measured before and when treatment exploitation measuring device.

Colorimetric Analysis :

Colorimetry is the oldest known technique for determining any colour. The intensity of colour of a substance is in direct proportion to its concentration, which is in terms of transmittance (Optical density). Concentration of various solution can be determined by colorimetric technique. 0.01M Potassium permangnate solution was prepared. On diluting the solution 0.0125,0.00625, 0.00312, 0.00156 were prepared. The absorbance of different concentrated solution without and with prepared activated carbon was recorded.

Concentration of unknown solution can be calculated as follows:-

$$\text{Concentration of solution:-} \quad \frac{I}{I_0} \times \text{Concentration of standard solution}$$

For colour determination four bottles of different concentrations wres prepared. 50 ml of 0.0125,0.00625,0.003125,0.00156 solutions were prepared and 0.2 gm activated charcoal was added in each bottle. The absorbance was recorded before addition of charcoal and after shaking the bottles for 15 minutes at different wavelengths.

Table: 2 Absorbance of $KMnO_4$ Solution. (For Peanut)

Wavelength λ	0.0125		0.00625		0.003125		0.00156	
	before	after	before	after	before	after	Before	After
400	**0.81**	-	**0.70**	-	**0.54**	-	**0.43**	**0.40**
420	0.65	0.10	0.45	0.07	0.21	-	0.09	-
480	1.80	1.57	1.30	01.26	0.88	0.67	0.61	0.03
500	1.00	-	1.50	1.68	1.03	0.98	0.74	0.28
520	1.78	1.60	1.18	1.29	0.74	0.70	0.48	0.11
540	1.36	1.03	1.06	0.86	0.63	0.49	0.41	0.09
620	0.86	-	0.56	-	0.34	-	0.15	-

Table-3: Wavelength and concentration before and after adsorption

Original wavelength	$1.25x10^{-2}$	6.25 x 10-^{3}	$3.12x10^{-3}$	$1.56x10^{-3}$
400	-	-	$8.08x10^{-3}$	$1.39x10^{-3}$
420	$1.54x10^{-2}$	$9.72x10^{-3}$	-	-
480	$1.09x10^{-2}$	$6.05x10^{-3}$	$2.37x10^{-3}$	$7.67x10^{-4}$
500	-	$5.58x10^{-3}$	$2.96x10^{-3}$	$5.90x10^{-4}$
3520	$1.14x10^{-2}$	$5.77x10^{-3}$	$2.95x10^{-3}$	$3.57x10^{-4}$
540	$9.46x10^{-2}$	$5.07x10^{-3}$	$2.97x10^{-3}$	$3.42x10^{-4}$
620	-	-	-	-

Table: 2 Absorbance of $KMnO_4$ Solution. (For green chana)

Wavelength λ	0.0125		0.00625		0.03125		0.00156	
	before	after	before	after	before	after	Before	After
400	-	-	-	-	-	-	-	-
420	0.30	0.20	007.	0.20	0.02	0.11	0.02	0.01
480	1.98	1.81	1.48	1.46	0.99	0.97	0.68	0.20
500	-	-	1.83	1.84	1.40	1.37	0.09	0.28
520	-	1.96	0.64	1.64	1.21	1.16	1.02	0.11
540	1.59	1.52	1.35	1.33	1.04	0.99	0.08	0.03
620	0.31	0.21	0.05	0.01	-	-	0.04	-
680	0.25	0.16	0.03	0.01	-	-	-	-

Table-3: Wavelength and concentration before and after adsorption

Original wavelength	1.0×10^{-2}	6.25×10^{-3}	$3.12x10^{-3}$	$1.56x10^{-3}$
400	$9.50x10^{-3}$	$4.19x10^{-3}$	$1.90x10^{-3}$	$1.05x10^{-3}$
420	$6.61x10^{-3}$	$1.94x10^{-3}$	$5.94x10^{-4}$	$3.46x10^{-4}$
480	$6.66x10^{-3}$	$2.74x10^{-3}$	$6.38x10^{-4}$	$4.60x10^{-4}$
500	$1.38x10^{-3}$	$2.87x10^{-3}$	$7.26x10^{-4}$	$5.48x10^{-4}$
520	$5.28x10^{-3}$	$3.54x10^{-3}$	$6.74x10^{-4}$	$5.85x10^{-4}$
540	$3.86x10^{-3}$	$1.53x10^{-3}$	$6.43x10^{-4}$	$1.52x10^{-4}$
620	$3.83x10^{-3}$	-	$6.42x10^{-4}$	$1.04x10^{-4}$

RESULT AND DISCUSSION:

. For determination of colour adsorption photocolorimetry technique was used. From observation table it is clear that the concentration of $KMnO_4$ decreases when the content was shaken for 15 minutes along with the activated charcoal prepared from waste peanut shells and green chana shells.It was found that the concentration of the $KMnO_4$ solution decreases as it is adsorbed by activated carbon.It can be shown graphically also.Thus activated charcoal prepared from waste peanut shells and green chana shells can act as adsorbent.

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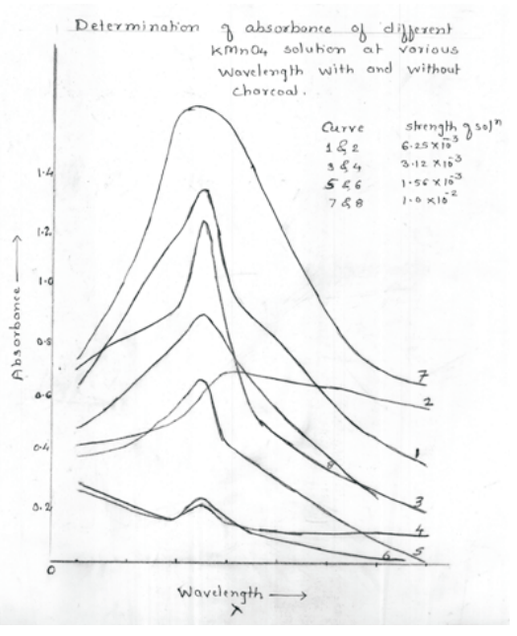

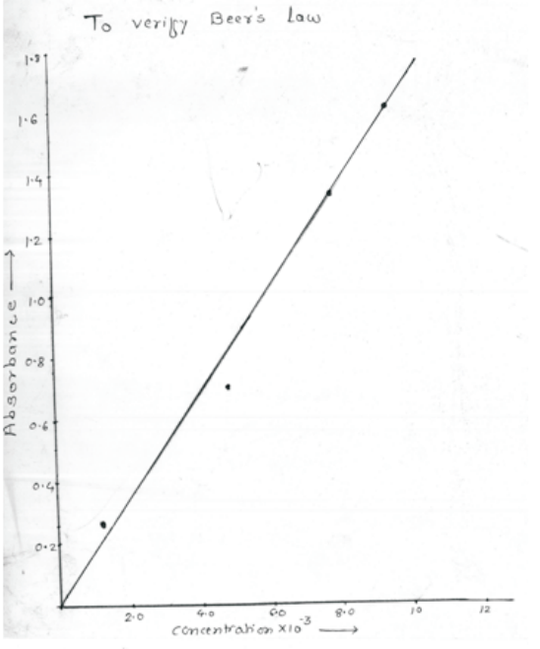

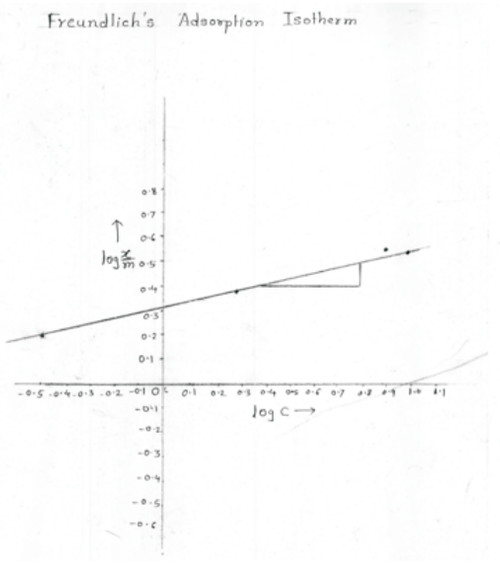
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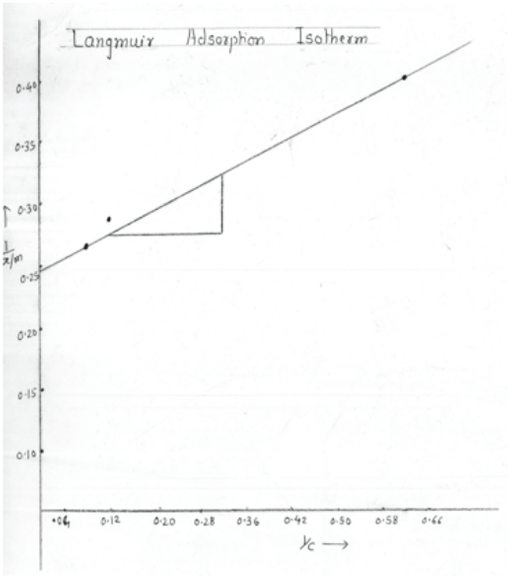
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