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REMOVAL OF MALACHITE GREEN DYE (BASIC DYE) FROM AQUEOUS SOLUTION USING CORN COB AS AN ADSORBENT

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Abstract:-The colored textile effluents have a lot of chronic effect on human life .The presence of colour for effluents is due to the utilization of different dyes in textile industry. corn cob was used to remove malachite green dye from effluent Malachite Green dye is selected because it is not easily degradable and is toxic in nature. The effect of different parameters like p_H,contact time,adsorbent dose, and 80%dye was removed when p mins. 298Kto 308K the adsorption capacity $_H$studied. The amount of adsorption increases with increasing adsorption dose, contact time, p and temperature. The ultrasonic velocity of the dye solution was also pseudo second order model is more fitted than pseudo first order model. This effect is observed due to swelling of the structure of the adsorbent ^{H} which enables adsorbed on adsorbent body.

Keywords:adsorption, Malachite Green, dye, corn cob, adsorption isotherms, adsorption kinetics.

1.0 INTRODUCTION

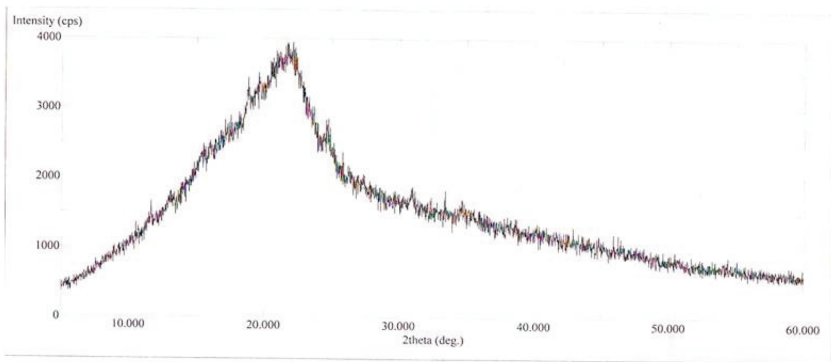
Textile industries always use dyes and pigments to color their products. Color removal from textile effluent is a major environmental problem.(1)Many dyes and their break down products are toxic for living organisms (2)and thus affecting aquatic ecosystem. There are many physical and chemical methods like co-agulation, precipitation, filtration, oxidation, and flocculation. But these methods are not widely used due to their high cost. Adsorptiontechnique (3) is the best versatile the proposed work will undertake using agriculture waste like corncob forremoving dye material (4to7) from aqueous solution.

2.0 MATERIALS AND METHODS:

2.1. Corn cob was thensieved corn cob was 41.m/gm. obtained from BET technique. Malachite Green dye used was from Finer chemicals Ltd. ^{2}

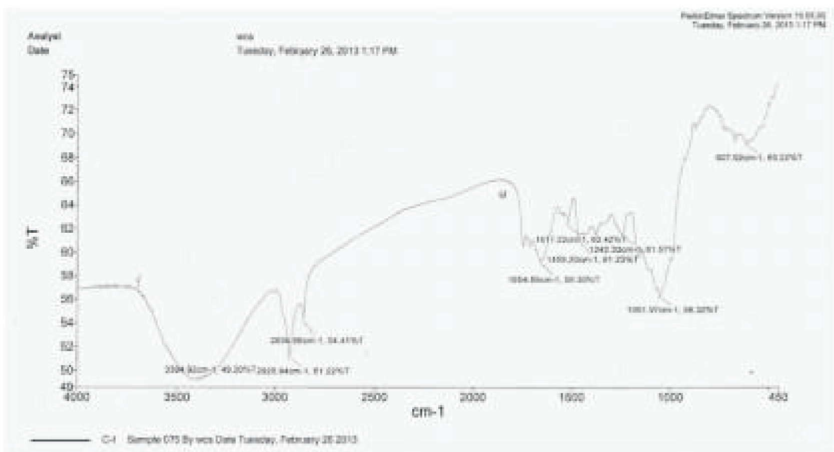
MolecularFormula:$C_{23}H_{25}Cl\ N_2$

2.2 Fluorescence



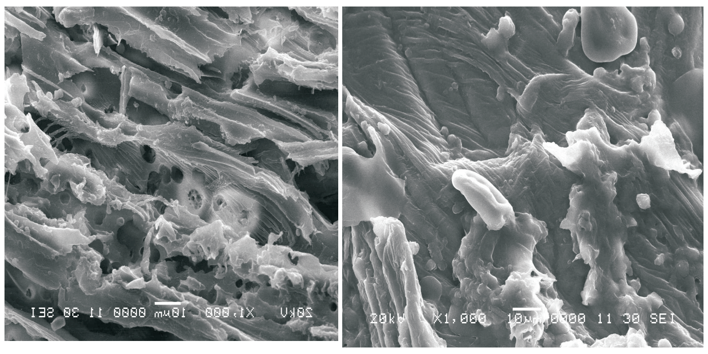
X-ray diffraction pattern of corn cob

2.3 .The IR spectrum of corn cob



corn cob

2.4 (8)as shown in photographs



Corn cob (Before adsorption)   corn cob(After adsorption)
Scanning electron micrograph (SEM) of the corn cob adsorbent

2.5 Experimental Procedure :

$$q_e = \frac{C_o - C_e}{X}$$

Where,

C_o= Initial dye concentration

C_e= Equilibrium dye concentration

q_e= Amount of dye adsorbed per unit mass of adsorbent.

X = Dose of adsorbent.

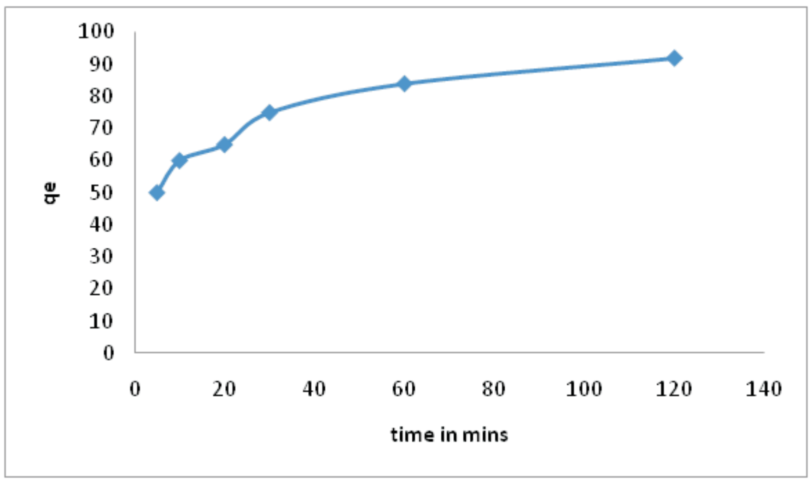


Fig.1 Effect of contact time

3.2 Effect of p^H:

From fig.2 it reveals that when pH of the dye solution increases from 3 to 9 the percentage of dye removal also increases. At p^H= 9, adsorption is maximum. By further increase in p^H adsorption decreases slightly. (9,10)

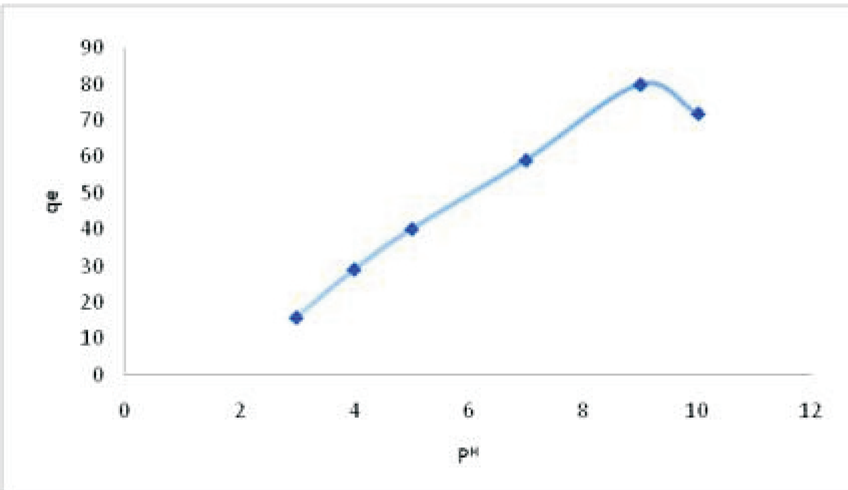


Fig.2 Effect of pH

3.3Effect of adsorbent dose:

The different adsorbent doses were studied from the range 0.5gm to 7.0 gm

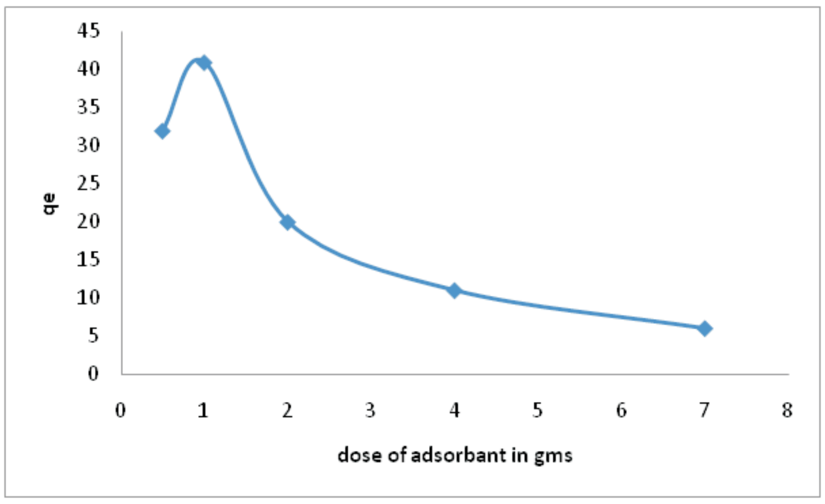


Fig.3 Effect of adsorbent dose

with increase in temperature,

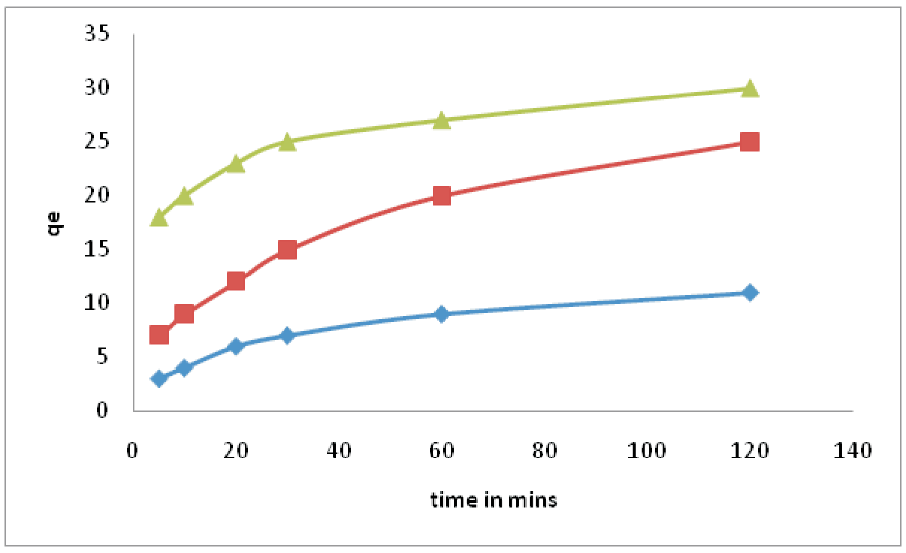


Fig. 4 Effect of contact time

3.5Adsorption isotherm:

$$\frac{C_e}{q_e} = \frac{1}{Q_m \times b} \times \frac{C_e}{Q_m}$$

Where
C_e =Dye concentration at equilibrium(mg/ L)
q_e=Amount of dye adsorbed on the adsorbent (mg/g)
b =Langmuir constant
A graph of C_e/ q_e against C_e was plotted.

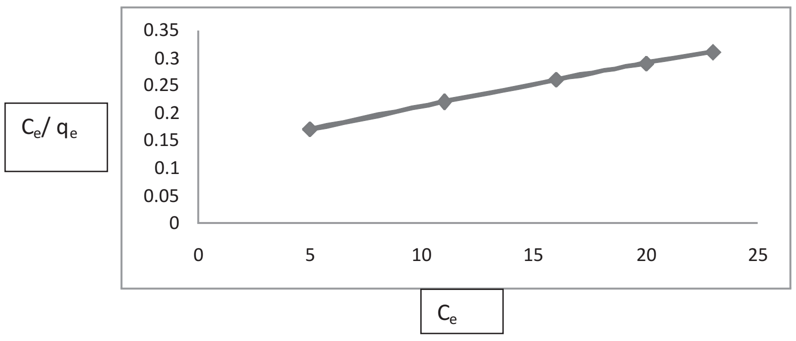


Fig. 5

3.5.2 Freundlich isotherm:

$$\log \quad q_e = \log \quad K_f + \log\frac{C_e}{n}$$

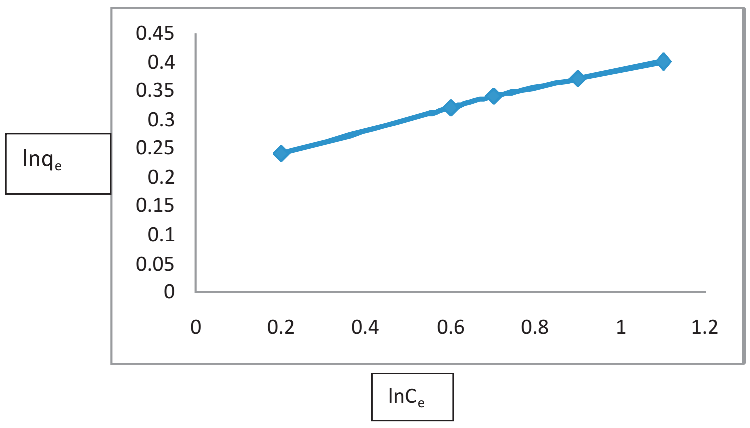


Fig.6

The graph of lnqe against ln C_e was plotted.

factor can be calculated.

3.6 Adsorption kinetics:

3.6.1 Pseudo 1st order model:

$dq/dt = k_1(q_e - q_t)$

A graph of ln(q- q) vs time was plotted.

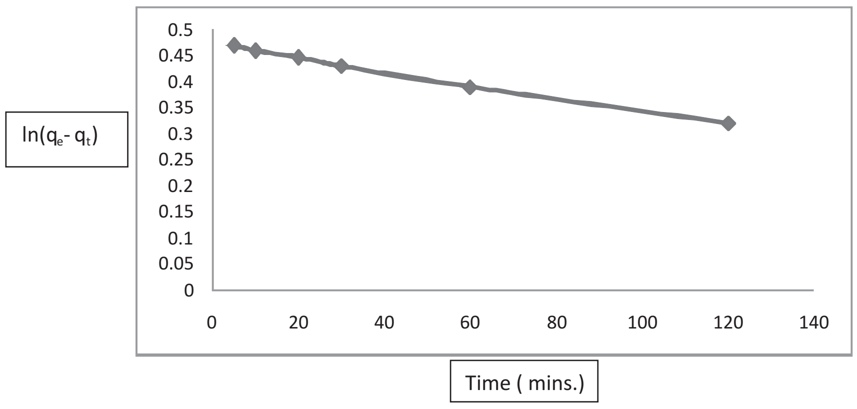


Fig. 7

Slope (K_1) (correlation coefficient)	Intercept (q_e) (Max. adsorption capacity)	Correlation Factor
-0.00129	0.45	-0.92

3.6.2 Pseudo 2nd order kinetics:

The pseudo 2nd

$$\frac{t}{q_e} = \frac{q^2{}_e}{k_2} + \frac{t}{q_e}$$

A graph t/qof

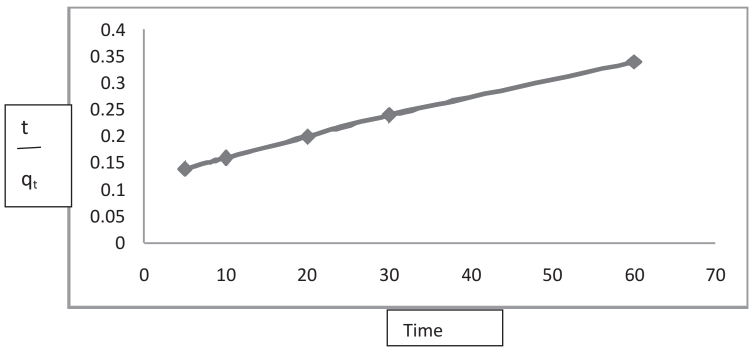


Fig. 8

Slope (K_2)	Intercept (q_e)	Correlation factor
0.00353	0.127	0.99

In case of pseudo 1^{st} order kinetic model, the value of slope and correlation factor are negative. While in case of pseudo 2^{nd}
2^{nd} order kinetics.

The ultrasonic velocity increases from $1.5x10^3$ to $1.56x10^3$ m/sec when the adsorbent dose increases from 0.5 gm to 2.5 gm.

4.0 CONCLUSION:

Corn cob acts as abetter effective low cost Malachite Green.Batch adsorption was shown that yield of adsorption increases by increasing adsorbent dose, contact time,p^H,and temperature and ultrasonic velocity. The fittness of Langmuir modelon the adsorbent surfaces. Similarly Freundlich isotherm also develop approprietly. The pseudo second order kinetics is more favorable than pseudo first order kinetics.

5.0 ACKNOWLEDGEMENT

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