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Methyl bleu removal by waste date fruit

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Abstract. The present paper, study the efficiently of waste date fruit WDF as adsorbent to remove methyl bleu MB from solution. The WDF adsorbent was washed with distilled water and dried at 110 C for 12h to get bio-sorbent. Batch adsorption of MB dye by WDF carried out by fixing MB initial concentration 100 mg/l and different parameters: adsorbent dose (0.075 – 0.15g), contact time (0 -120 min), and different PH solutions cationic and acidic. The maximum adsorption capacity of WDF and MB removal in batch adsorption were 130mg/g and 98% respectively at PH= 10 and room temperature. This work proved, that WDF sorbent can used as low cost to eliminate MB dyes from wastewater industries.

Keywords: methyl bleu, waste date fruit, removal.

1 Introduction

In the recent years, the industry of textile in the world using different dyes as a principal material for its using. However, these dyes were contained in wastewater industries. It is dangerous for environment and harmful for our health. Some PPM of dyes as methyl blue MB in waste water can affect directly in the nervous system and cause carcinogen maladies [3].

Dye removal from wastewater industry being a principal thing for environmental researches.

2 Materials and methods

2.1 Solution preparation

The methyl blue MB was used in this work was purchased from Biochem laboratory, tortola-bri- United Kingdom. Its formula $C_{37}H_{27}N_3Na_2O_9S_3$, molar weight 799.814 g/mole, the structure of MB dye was represented in Fig.1.1g of MB solute was dissolved in 1l of distilled water to get MB solution with concentration 1g/l. the preparation of solution with different PH carried out by using 0.1M Hcl and 0.1M NaOH to find acidic and cationic solution respectively.

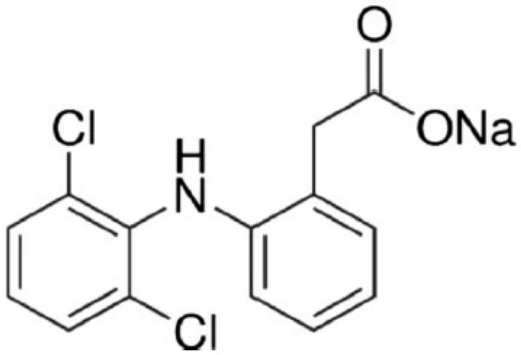

Fig.1 MB structure molecular

2.2 adsorbent preparation

The waste date fruit WDF was washed several times with distilled water to eliminate dirt and dust. The DWF introduced in an oven to dry it at 110 C for 12h to eliminate moisture, then ground it to small piece using mortar and sieve 20 mm sieve mesh. The final adsorbent WDF was stored in close container.

2.3 adsorbent procedure

Study the efficiently of WDF to remove MB dye in batch adsorption was carried out in Erlenmeyer flask contain 100 ml MB solution. Different parameters were used in this work; initial concentration 100 mg/l, adsorbent dose (0.075- 0.15g), contact time (15 -120 min), PH (4 – 10) at room temperature. The samples after sorption were filtered to separate WDF from solution. The concentrations of MB dye after filtration were determined by UV-vis spectrophotometer at 665-nm wave length. The amount of MB removal R (%) and adsorption capacity Q_{max} (mg/g) were determined using the following equations (1) and (2) respectively.

$$R = \frac{C0 - Ceq}{C0} 100 \quad (1)$$

$$Qmax = (C0 - Ceq)\frac{V}{m} \quad (2)$$

Where

C_0: the concentration of MB at t= 0 min (mol/l).

C_{eq}: The concentration of MB at equilibrium time (mol/l).
V: Volume of solution (L).
m: Wight of WDF adsorbent (g).

3 Resultants and discussion

3.1 effect of contact time

In this work shown in Fig.2, the effect of contact time (15 – 120min) on removal MB dye by WDF was carried out with 0.075g of WDF dose, ph= 4, initial concentration 100 mg/l and at room temperature. All these parameters were fixed in this experience. The MB dye removal increased with time between 0 - 45min, this was explained by the empty active sites contain in the WDF adsorbent [3]. After 45 min the percentage of MB removal still unchanged, due to saturation all active sites of the WDF sorbent [1].

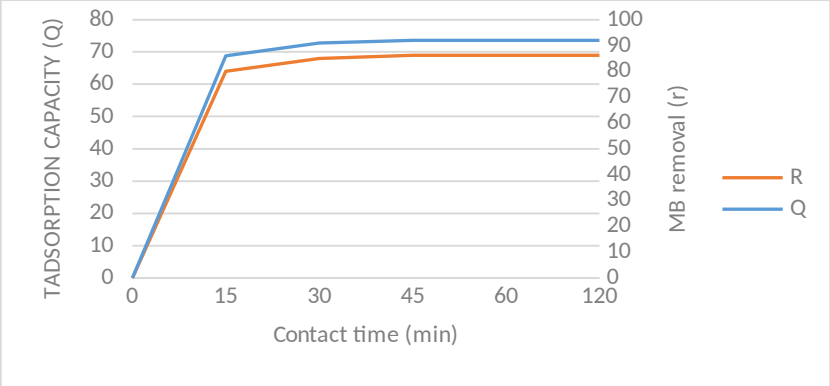

Fig 2, effect of contact time on MB removal

3.2 effect of adsorbent dose

The Fig.03, represent the effect of different dose on removal of MB. In this experiment was used different quantities (0.075 – 0.15 g. the result shown the adsorption capacity of MB was increased with the quantity of WDF adsorbent. this was explained the adsorbent sites active was increased and more WDF surface [2].

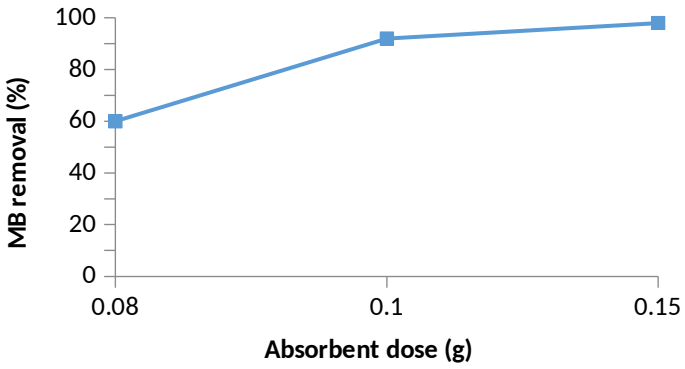

Fig.3, Effect of adsorbent dose on MB removal.

3.3 effect of PH solution

The effect of solution PH on the MB removal was shown in the Fig.5. Different PH solution was used 4, 7 and 10 to study the efficiently of WDF to eliminate MB in cationic and acidic solution. MB removal was increase with the increasing of PH solution. At PH= 4, 88% of MB was removed and at PH=10, 98% of dye was eliminated. These results due to a change of electronegative of WDF surface [5].

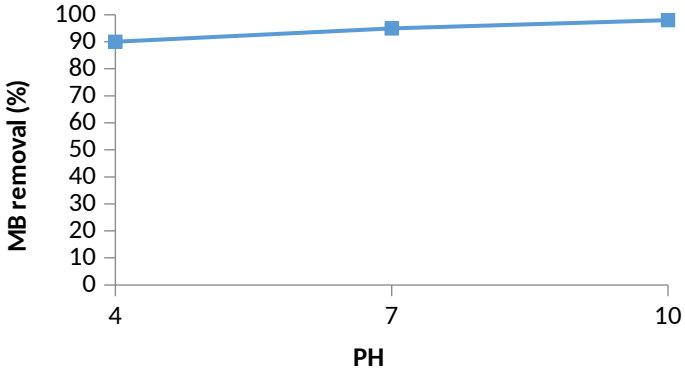

Fig 4, effect of PH solution on MB removal

4 conclusion

The WDF adsorbent prepared from the waste, have an important efficiently to remove MB dye from solution. The WDF can use as low cost adsorbent to trait wastewater of textile industry.

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