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Adsorption of methylene blue dye from aqueous solution by using some plants material

Noor A. Abd Al-Hussein

Environmental Research Center, University of Babylon , Hilla, 5001, Iraq.

Corresponding Author: nooralaa21@yahoo.com.

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Abstract:

This study involves removing of Methylene blue dye (MB) using some plants material (*Citrus utrantiforlial*) by using batch system. The effect of dye concentrations, contact time, and adsorbent dosages on adsorption process respectively . the obtained results show that, MB dye removal was significantly enhanced with the use of adsorbent weight 0.7 mg which showed removal efficiency up to 94% . While the best contact time was 90 min with removal efficiency 94.02, and there was a reverse correlation between the initial dye concentration and the removal efficiency

Key Words: Adsorption, Citrus Utrantiforlial, Methylene Blue.

Introduction:

In present day, the most important problems affecting on people live are inorganic and organic pollutants. The increase of pollution in recent years is due to growing industry [1], several people die from the penalties of unsafe water. [2]
Methylene blue (MB) is main basic dye commonly used for coloring paper, colorant hair temporary, dyeing, leather dyeing, and other medical purpose, MB is selected in this research to estimate the ability of the adsorbent for the removal of MB from its solution.[2] So, it is necessary to diminish dye concentration in the wastewater. The conventional methods for treating dye containing wastewaters are electrochemical treatment, coagulation and flocculation, liquid–liquid extraction and adsorption (3) Many Literature reviews are dealing with methylen blue removal by adsorption such as Deepak ,Fatihaa ,Al-Baidhany [4, 5, and 6]

The main focus of this study is a modest effort to find different and low-cost materials that can be used in remove the methylene blue dye from aqueous solution.

Material and Methods:

First a preparation of stock solution of MB dye ($C1_6H_{18}N_3SCl.3H_2O$) was prepared by dissolving 0.05 gm. of the dye powder in 100 mL distilled water The Citrus aurantifolia shells (used as adsorbent) grinded to fine powder and used directly without any stimulation [7]
Batch adsorption process was employed to regulate the effects of detention time, dye concentration, and adsorbent amount [8]
0.7 g of Citrus aurantifolia powder (material) added into 5-250 ml conical flasks content solution of MB with concentration 20mg/l and 50 mL it shacked meticulously and continuously for 10,30,50,70 and 90 min respectively. The obtained mixtures were clarified with centrifuge, then the absorbance of the supernatant liquids was measured using UV. Visible spectrophotometer at λ max 665 nm. MB was measured (100 ml) and added to (0.1, 0.3, 0.5, 0.7) gram into different flasks. The flasks were shaken severely with adsorbent (The Citrus aurantifolia shells) then using by centrifuged to separate these particles from solution. The concentration was measured by using UV-Spectrophotometer.
The adsorption of MB on adsorbent (Citrus aurantifolia shells) was considered at changed MB concentrations (5, 10, 15 mg L^{-1}).
Dye removal calculated from equation below:

$$\textbf{Removal}\% = \frac{(\mathbf{R^\circ - R})}{\mathbf{R^\circ}} \times \mathbf{100}$$

Where: R^o: absorption dye concentration without any adding, R: adsorption dye after treatment.

Results and Discussion:

Efficiency removal of MB dye was studied with variation of contact time from (10-90 min) and batch was done with initial dye concentration of 20 ppm and adsorbent dose of 0.7g/L. the result show that with the increase of reaction time removal efficiency of dye was increased and reached a maximum R.E 91.1% at 50 min. Then it became nearly stable to the end stages with 94% at 90 so the percent increasing in removal of MB about (0.033) from 50 to 90 min. It is essentially due to the fullness

of the active locations not allow additional adsorption to take place. results of this study agrees with the results mention by AL-Tufaily, Sodeinde [2,9]. The effects of contact time on the adsorption of methylene blue are shown in fig 1.

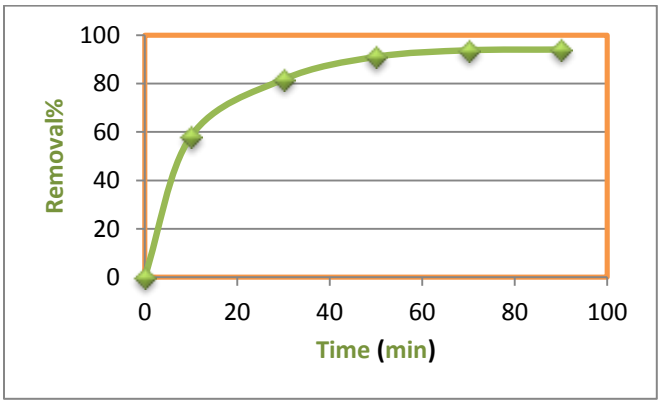

Fig.1: relation between contact time and removal efficiency

Figure 2 indicates that, the dye removal effeciency increased when adsorbent doses increased and then it became nearly to be constant. As seen the removal % increases from 30 to 58.16 at the 10min and from 67.9 to 94.02 at 90 min agitation, This due to fact that sorbent dose increase led to increase the surface area obtainable for adsorption, , because dosage rising provide more spot for dye fullness throughout adsorption this Well-matched with results of [9].

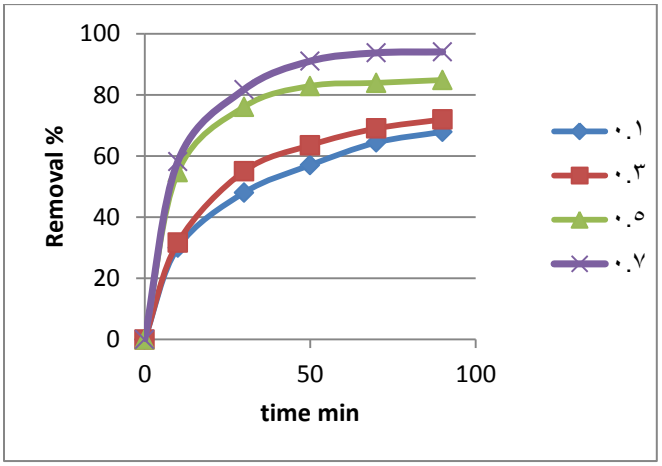

Fig.2: Effect of some plants material (Citrus utrantiforlial) on removal efficiency

The third trial was done to test proficiency of Citrus aurantifolia shells efficiency in removing the MB dye from aqueous solution.

From aqueous solutions on primary concentration of the dye, it can be seen from fig below increasing dye concentration from 5 to 15 mg/l caused drops the removal efficiency from 94.33 to 48.71. Fig (3) illustrates the effect of initial MB dye concentration on removal efficiency at 0.7 g/L adsorbent dose, with optimum detention time 90 min. As the initial concentration

increase, the existing position on adsorbent surface area converted fewer which lead to rise in dye presence adsorbed. Though, dye removal percent lessened.

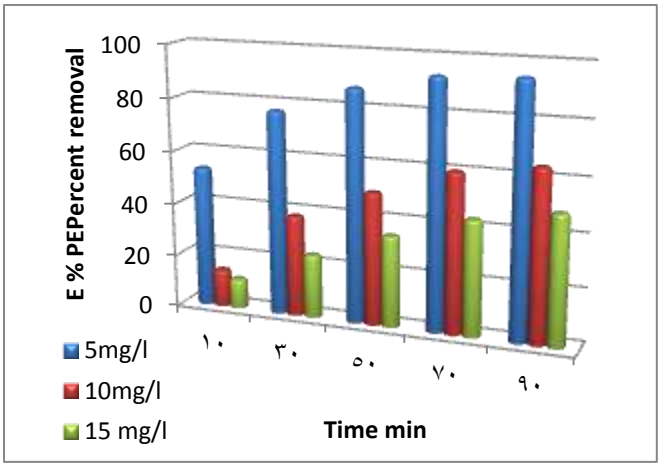

Fig.3: Effect of initial dye concentration on the removal of methylene dye removal

Conclusions

1 Study investigates the ability of some plants material (*Citrus utrantiforlial*) to remove methylene blue from aqueous solution .

2. The adsorption of methylene blue dye was increased when contact time was increased.

3. The optimum detention time is ninety minutes, with initial dye concentration 5mg/l and o.7 mg/l *of* material.

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