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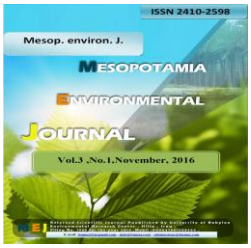

Enhensment adsorption capacity of Phragmites australis powder for Congo red and methylene blue dyes removal

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Abstracte

The influence of the activation methods acidic or (wet method) and thermal (or dry method) on removal efficiency of textile dyes (Congo red and methylene blue) comparing with the sample non activation adsorbents. The results showed increasing in the removal percentage of two dyes, for both used activation methods (acidic and thermal) comparing with the sample non activation adsorbents with progress contact time. At the same time the dry activation was mor active then the wet activation for both dyes, as show in the results the removal Congo red dye efficiency was 81.3% for non-actiation, 87.7% for acidic activation, 96% for thermal activation. the removal methylene blue dye efficiency was 72% for non-actiation, 90.9% for acidic activation, 96.6% for thermal activation.

Keywords: Adsorption, Removal, Congo Red, methylene blue, Textile dyes.

Introduction :

The wastewater treatments methods of Textile dyes and their hazardous fragments have increasing interesting by researchers in the last a few years , due to their toxicity, and dangerous environmental effects[1]. The adsorption one of these conventional technique, play an important bio protective role for the environment, especially if the adsorbent is produced from plants wastes[2-3]. In the literature reviews there are many plants wastes was utilized as adsorbents due to (i) higher adsorption capacity, (ii) alternative low-cost materials and (iii) nontoxic, to treatment the pollution problems of eco-system that produced from the industry wastewater.such plants wastes as *rice husk* to remve Congo red dye [4],

Water lemna to remove methylene blue [5], *Common red* to remove Congo red dye [6] and methylene blue dye [7]. use solid plants wastes as adsorbent to remove other contaminants is an interesting alternative to (i) environmental protective side (as reduced their dangerous effect on the eco- system) and (ii) economic side (provide a profitable utilize of these wastes) [8].the plant waste contain high percentage organic material as cellulose structure form, and relatively low percentage form metals[9]. as know the cellulose contain many function groups like hydroxyl group, and carbonyl group, which can act as the active site in the adsorption process via attraction with function group of the contaminate in the aquose phase[10].

Recently many papers in Literature review improve that the common red have high activity as adsorbent, especially if surface modification of the adsorbent, and to improve the adsorption capacity by several chemical or physical modification methods such as cross-linking [6,7,19], the addition of ionic molecules [5], and the insertion of new functional groups [21] have been used. The thermal activation is a physical treatment involve heating the adsorbent at different temperature, depend on the composition of the adsorbent (mineral composition adsorbent calcination at high temperature, while organic composition adsorbent treated at low temperature), the change in the structure of adsorbent depend on the partical size. Acid activation in these process the adsorbent treated with inorganic acid such as hydrochloric acid, sulfric acid, or phosphoric acid. In this work will achevie comparative study for both acidic and thermal modificationsfor the common reed powder.

Material and Methods

Preparation of Adsorbent

The aquatic plant were used as adsorbent were collected from drying in the north Babylon university - Hilla city middle of Iraq. and remove the suspended impurities by extensively washed in running tap water for 2-3 hours, followed by washing with distilled water. The washed common reed was leave to dried under sun light for ten days. The dried materials was ground in pulverized mill. This ground powder was treated with water till the color release and the powder was oven dried at 25 ^{o}C for 24 hours.

Acidic activeation 2g from dry wast plant was treated with 50ml 0.1M of phosphoric acid for 2hours with strrier, and then powder wshed with excess amount of distill water and dried oven dried at 25 ^{o}C for 24 hours.

thermal activeation 2g from dry wast plant was heated at 80, 60, 100 ^{o}C for 2hours.

Preparation Adsorbate Solution

The stok solution (1000mg/L) of both The dyes [Congo red Chemical formula=$C_{23}H_{22}N_6O_6S_2Na_2$, Formula weight=696.65g.mol^{-1} supplied by BHD Chemicals] and methylene blue [Chemical formula=$C_{16}H_{18}ClN_3S.3H_2O$, was obtained by sigma-alderich chemicals]. were prepared by dissolving appropriate amounts (accurate weighed) of dry powdered dye in double distilled water. The experimental solution was obtained by dilutions were made to obtain the working solution at desired concentrations.

Adsorption study

0.5g of activated common red powder (i.e. adsorbent) was weighted each into 250ml conical flasks. 100ml of the solution dye was measured and added to the each conical flask. The content was shaken rigorously and continuously for 10, 20, 30, 40, 50, 60, min ..etc. The particles of the adsorbent was separation by centrifuged from solution to obtain the equilibrium concentration. The final concentration of each dye was estimated for each sample spectrophometrically at the wavelength corresponding to maximum absorbance for each dye (λmax=497 and 663nm for Congo red and methylene blue

respectively) using a spectrophotometer (UV/VIS-JENWAY,1600, Jerman), the amount of dye removal was calculated from following equation:

$$removal\% = (A° - A)\ A° \times 100\ldots$$

A^o and A is the absorption of concentration of dye before and after adsorption respectively.

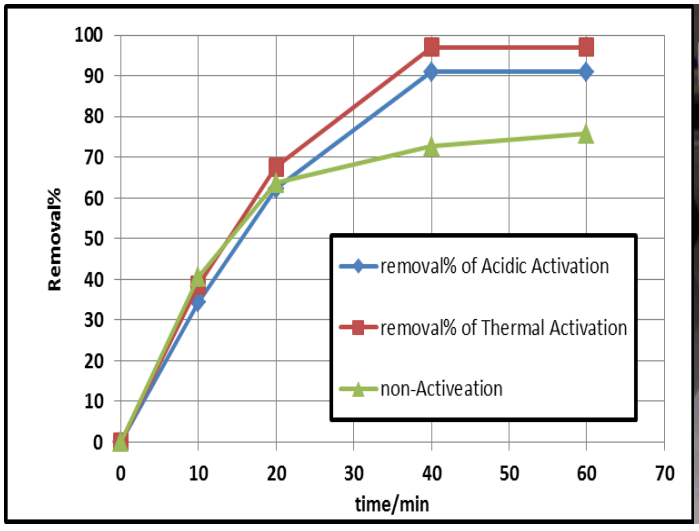
Results and discassion

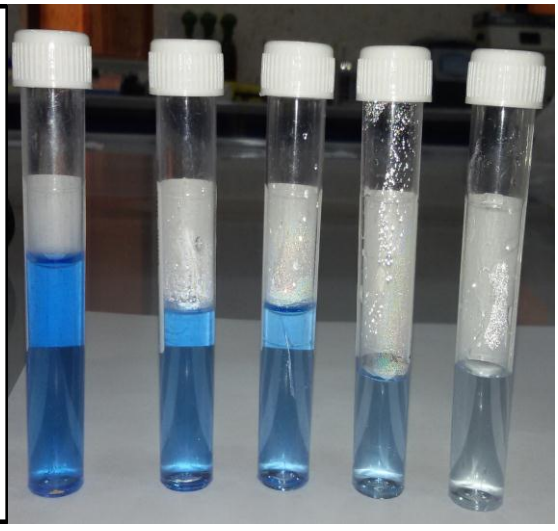
The influence of the activation methods acidic or (wet method) and thermal (or dry method) on removal efficiency of textile dyes (Congo red and methylene blue) comparing with the sample non activation adsorbents were studies with different contact time (10-80 min) and The experiments were achieves with initial dye concentration 10mg/L at pH-6.0 for both dyes, room temperature (22±2^{o}C) and adsorbent dose-1g/L common reed powder. The results which are obtained at these conditions are shown in Fig. (1), Fig. (2)

The results showed increasing in the removal percentage of two dyes, for both used activation methods (acidic and thermal) comparing with the sample non activation adsorbents with progress contact time. At the same time the dry activation was mor active then the wet activation for both dyes, as show in the results the removal Congo red dye efficiency was 81.3% for non-actiation, 87.7% for acidic activation, 96% for thermal activation.

the removal methylene blue dye efficiency was 72% for non-actiation, 90.9% for acidic activation, 96.6% for thermal activation.

The thermal actviation involve dehydreatin process, realase the miostuer, and impurite adsorbed on the common reed powder, this lead to increasing surface eara and increasing active site of the catalyst[13].





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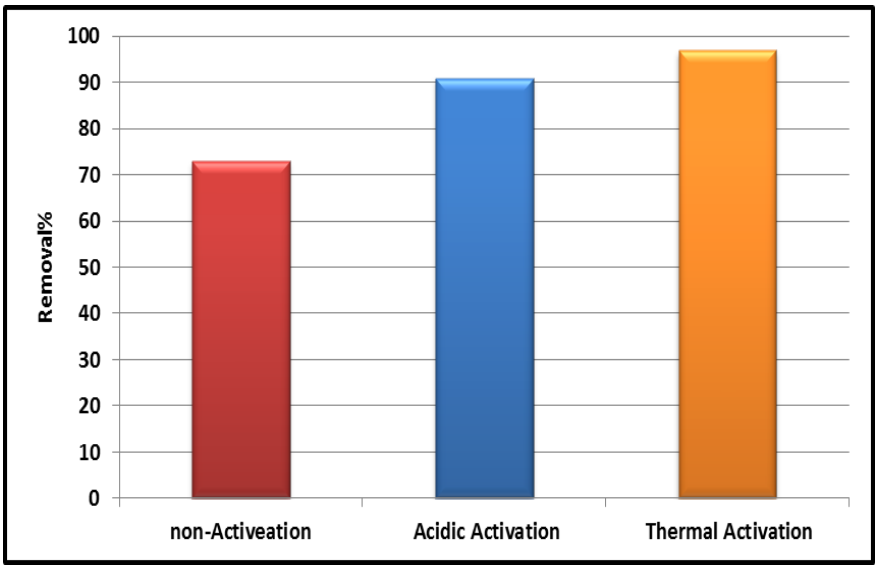

Fig.1. Adsorbtion of methylene blue on Non, Acidic, and thermal activeation of adsorbents.

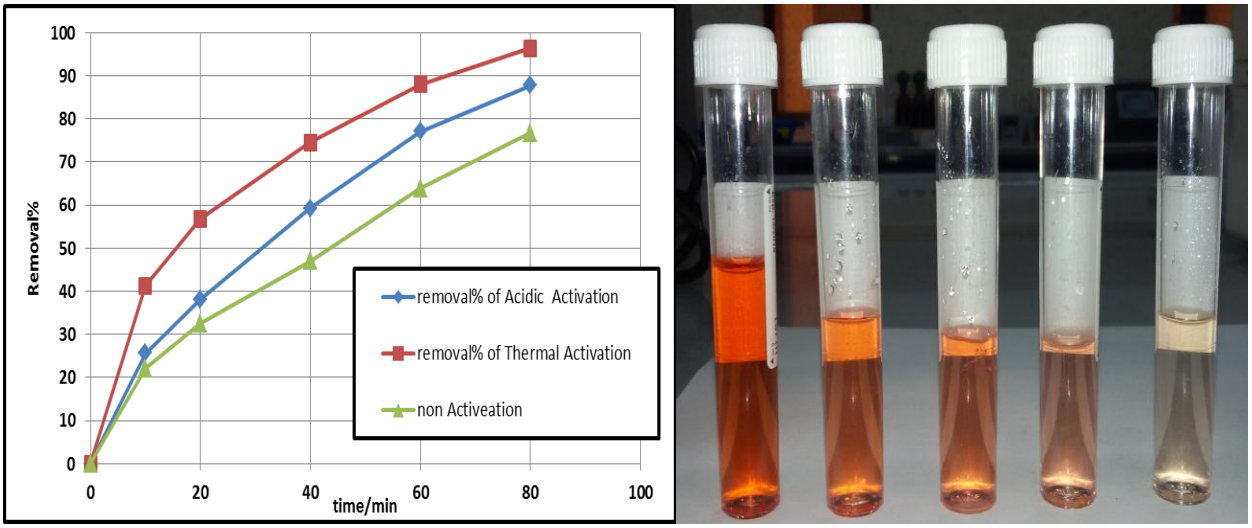

Fig.2. Adsorbtion of Congo red dye on Non, Acidic, and thermal activeation of adsorbents.

Physical properties inhencement with the acidic activation, like increasing in the poure size, surface earea. Also the chemical changes occure due to acidic activation such as cation exchanges[14].

The wet activation favorable due to (i) low cost, (ii) decomposition of adsorbents is controlled via: acid concenreation, temperature, time imergenation.

Conclusion

The effect of the wet and dry activation on the removal textile dyes has been investigated, This study has shown increasing in the removal percentage of two dyes, for both used activation methods (acidic and thermal) comparing with the sample non activation adsorbents with progress contact time. At the same time the dry

activation was mor active then the wet activation for both dyes. The optimum operating condition were 10 mg/l initial dye concentration, 1 gm/L adsorbent dosage, pH 5.5 and 80 min contact time.

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