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Q1 Qualitative analysis of acid washed black cumin seeds for decolorization of water through removal of highly intense dye methylene blue

Sharf Ilahi Siddiqui, Geetanjali Rathi, Saif Ali Chaudhry

Q3 Q2 Department of Chemistry, Jamia Millia Islamia, New Delhi, India

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ABSTRACT

Dyes in water change the colour, taste and odour of water, are highly visible, and can be toxic and cancerous for the colour water consumption human beings. Basic dyes particularly, methylene blue, MB has high colour intensity, shows intense colour even at low concentration, and are very toxic due to their complex structure. Instead of adsorption, removal of MB from water using various traditional treatment methods is costly and less effective. The use of bioadsorbent provides easy and low cost technique for removal of MB. For searching the adequate technique of dye removal, adsorption efficiency and mechanism of bioadsorbent can be analyzed. To this, MB removal efficiency of seeds of medicinal plant, black cumin seeds were analyzed. The data are supplied in the article.

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Specifications table

Subject area	Environmental Chemistry
More specific subject area	Adsorption
Type of data	Table, image, graph FTIR, XRD, SEM-EDX and TEM

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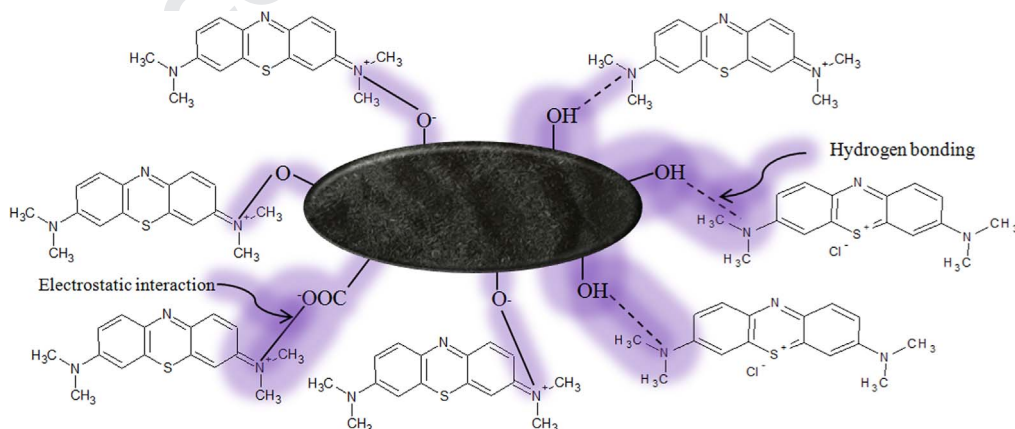
How data was acquired	
Data format	Analyzed
Experimental factors	Hydrochloric acid washing of black cumin seeds, amount of black cumin seeds, initial concentration of methylene blue, time of reaction and temperature of reaction
Experimental features	Methylene blue removal efficiency of black cumin seeds
Data source location	New Delhi, India
Data accessibility	The data is with this article.
Related research article	The Data are in "Sharf Ilahi Siddiqui, Geetanjali Rathi, Saif Ali Chaudhry, Acid washed black cumin seed powder preparation for adsorption of methylene blue dye from aqueous solution: Thermodynamic, kinetic and isotherm studies- S0167-7322(18)30489-6" In Press.

Value of the data

- Black cumin seeds are highly porous, amorphous and have large functional sites.
- High rate and efficiency of removal of methylene blue from water.
- Low quantity of black cumin seeds is sufficient.

1. Experimental design

Black cumin seeds were washed with inorganic acid, hydrochloric acid. Surface and particles properties of acid washed black cumin seeds were analyzed by FT-IR, XRD, SEM-EDX and TEM [1] (Supplementary Fig. S.1–5). MB removal efficiency of acid washed black cumin seeds, AWBC were analyzed according to the batch adsorption experiments under the various conditions such as effect of amount of AWBC, pH of solution, concentration of MB in solution, time and temperature of reaction [1] (Supplementary Fig. S.6–9). The efficacies of AWBC were compared to the un-washed black cumin [1]. The concentrations of MB before adsorption and after adsorption in the water were analyzed by UV-vis absorption spectroscopy. The FT-IR spectrum of post adsorption AWBC ((Supplementary Fig. S.1) confirmed the interaction between acid washed black cumin and MB dye (Scheme 1) [1]. The removal efficiency of AWBC for MB was compared to other adsorbent (Table 1).



Scheme 1. : Proposed mechanistic pathway for electrostatic and hydrogen bonding interactions between MB and AWBC.

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