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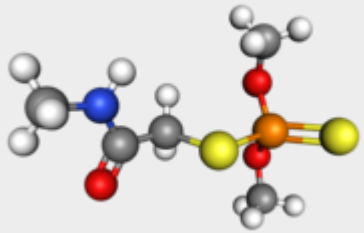
PHYSICAL CHEMISTRY 2021 Satellite Event 7th WORKSHOP SPECIFIC METHODS FOR FOOD SAFETY AND QUALITY

ECO-FRIENDLY ACTIVATED CARBON AS AN ADSORBENT FOR DIMETHOATE REMOVAL FROM WATER

ABSTRACT: *The use of organophosphate pesticide (OPs) **dimethoate (DMT)** is common in almost every continent for agricultural purposes. **DMT** is highly toxic for mammals. Efficient procedures for its elimination from the environment are crucial. We used activated carbon material from viscose fibers for **DMT** removal from water. It was shown that 1 g of investigated material is capable of adsorbing 2.5×10^{-4} mol of **DMT**.*

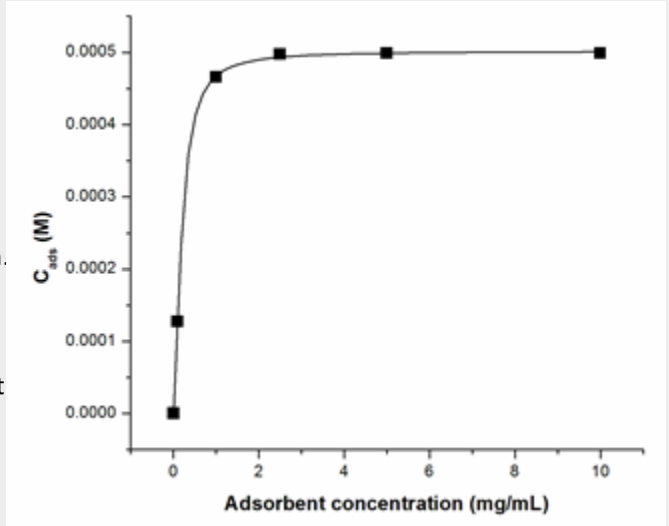


METHODS:
Activated carbon material obtained from viscose fibers was dispersed in double-distilled water (concentrations ranging from 0.01 to 10 g dm^{-3}), and the desired amount of **DMT** stock solution was added to provide the targeted concentration of adsorbent and OP. Then, the vessel containing the adsorbent + **DMT** mixture was placed on a laboratory shaker and left overnight (21h) at 25 °C to ensure that equilibrium was reached.

RESULTS AND DISCUSSION:
The investigated material in concentrations ranging from 0.01 to 10 mg/mL was incubated with 5×10^{-4} mol dm^{-3} **DMT** for 21 h at 25 °C. The concentration of adsorbed **DMT** was calculated as a difference between its initial concentration and the equilibrium concentration (Ceq) of **DMT** measured with UPLC after removing the adsorbent.

Adsorbent (mg/mL)	Dimethoate leftover (%)	Dimethoate uptake (%)	C_{ads} (M)	C_{eq} (M)
10	0.23	99.77	4.988x10^{-4}	0.012x10^{-4}
5	0.26	99.74	4.987x10^{-4}	0.013x10^{-4}
2.5	0.55	99.45	4.972x10^{-4}	0.028x10^{-4}
1	6.88	93.12	4.656x10^{-4}	0.344x10^{-4}
0.1	74.55	25.45	1.272x10^{-4}	3.728x10^{-4}
0.01	100	0	-	5.000x10^{-4}

- The adsorbent in the concentration of 1 mg cm^{-3} was able to eliminate 93.12 % of 5×10^{-4} mol dm^{-3} **DMT** under the given experimental conditions.
- Calculated concentrations of adsorbed **DMT** for different amounts of adsorbent were used to determine the minimal concentration of adsorbent necessary to remove all **DMT** from the aqueous solution.
- It can be concluded that 2 mg cm^{-3} of The investigated adsorbent is able to adsorb 5×10^{-4} mol dm^{-3}.
- Having that in mind, it is noticeable that 1 g of the studied material is capable of adsorbing 2.5×10^{-4} mol of **DMT**.
- In comparison to literature data, this value is significantly higher [4].



CONCLUSION: Activated carbon material obtained from viscose fibers was used for dimethoate removal from water. It was shown that 1 g of the investigated material is capable of adsorbing 2.5×10^{-4} mol of **DMT**. The adsorbent in the concentration of 1 g dm^{-3} was able to eliminate 93.12 % of 5×10^{-4} mol dm^{-3} **DMT** under the given experimental conditions.

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