The data presented in this article was related to the research article entitled, “The use of Cerastoderma Lamarcki shell for Acid Black 1 adsorption from aqueous solutions.” The characterization data of Cerastoderma Lamarcki shell was analyzed using various instrumental techniques (X-ray diffraction and SEM). The kinetic and isothermal data of pH, initial AB1 concentration, contact time, and CLS dosage were investigated. The optimum conditions for AB1 adsorption using CLS adsorbent were found to be 2 g of adsorbent, pH 2, and a contact time of 60 min. The adsorption data of CLS fit well with the Langmuir model and pseudo-second order model. Finally, the experimental data showed that CLS is a suitable and effective adsorbent for the removal of Acid Black 1 dye from aqueous solutions.
low-cost adsorbent for the removal of AB1 from aqueous solutions. © 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

1. Data

The prepared CLS adsorbent was in the form of a powder (Fig. 1). The morphology of the CLS adsorbent is shown in Fig. 2. The crystal structure of CLS was studied by x-ray diffraction (Fig. 3). The kinetic, isotherm, and thermodynamic parameters were estimated using models listed in Table 1. Data on the isotherms and kinetics for adsorption of chromium ions onto Cerastoderma lamarcki shell is presented in Tables 2 and 3. Figs. 4–7 present the comparison data for AB1 adsorption by CLS for the parameters of contact time, initial AB1 concentration, pH, and CLS dosage, respectively.

Value of the data

- Biochar from CLS was applied to remove Acid Black 1 from an aqueous solution.
- Data in this article, including isotherm and kinetic parameters, is informative for modeling and predicting the adsorption capacity of CLS for Acid Black 1 removal.
- The acquired data is advantageous for coastal areas wanting to scale up and design an adsorption column with Cerastoderma lamarcki shells as the medium for removing AB1 from wastewater.
2. Materials and methods

2.1. Materials

Acid black 1 (80% purity), HCl, and NaOH (to adjust pH) were supplied by Sigma-Aldrich. All chemical materials required in this study were purchased from Merck Co. Double-distilled water was used to prepare working solutions.

2.2. Preparation of biosorbent

Samples of Cerastoderma lamarcki shell (CLS) were collected from the coast of the Caspian Sea in Mazandaran province, Iran. After collection, the shells were washed with tap water to remove any dirt or other contaminant. After the initial wash, they were washed twice more with deionized water. Then, the shells were dried in an oven at 85 °C for 12 h. Next, they were crushed using a hammer mill and sieved to 70–250 μm. Finally, the end product was stored in a polyethylene container for later use. Fig. 1 shows the Cerastoderma Lamarcki shells [1–7].
2.3. Design of experiments

The adsorption of Acid Black 1 (AB1) by the low-cost adsorbent CLS was examined using batch studies. The effects of different variables, namely solution pH (2–11), initial AB1 concentration (50–250 mg l⁻¹), contact time (5–240 min), and CLS dosage (2–20 g l⁻¹) were investigated. Initially, the stock solution of AB1 (1000 mg l⁻¹) was prepared with double-distilled water and stored under standard conditions [8]. AB1 concentrations were prepared by proper dilution (C₁V₁ = C₂V₂) using the stock solution. To start the tests, a 250-ml Erlenmeyer flask was employed. Then, certain amounts of the stock solution and CLS were added. To obtain optimum contact time, 25 ml of the stock solution prepared by dilution was poured into the flask; 0.7 gr (7 g l⁻¹) of adsorbent was added at an adjusted pH of 3. The samples were placed in a shaker and shaken at a constant rate of 150 rpm for various time periods. Each CLS dosage was added to 100 ml of AB1 solution. The solution pH was adjusted using 0.1 M HCl and NaOH. After experiments, the remaining adsorbent was separated from the solution by centrifugation (3500 rpm, 10 min). Then, the residual AB1 concentration was determined by spectrophotometry (UV-UVIS, 622 nm). The experiments were conducted at the constant temperature of 25 ± 1 °C [2,8]. Finally, the amount of AB1 adsorbed onto the CLS adsorbent was calculated using Eq. 1 [8]:

\[
q_e = \frac{V(C_0 - C_e)}{m}
\]

Where, \(C_0\) and \(C_e\) are the initial and final concentrations of AB1 in solution (mg l⁻¹), respectively. \(V\) is the volume of AB1...
Table 3
Isotherm model constants for AB1 adsorption onto CLS adsorbent.

| Isotherm type | Isotherm parameters | Value  |
|--------------|---------------------|--------|
| Fraundlich   | n                   | 2.022  |
|              | K_f                 | 1.473  |
|              | R^2                 | 0.889  |
| Langmuir I   | K_L                 | 0.039  |
|              | R^2                 | 0.983  |
|              | q_m                 | 15.877 |
| Langmuir II  | K_L                 | 0.025  |
|              | R^2                 | 0.991  |
|              | q_m                 | 20.894 |
| Langmuir III | K_L                 | 0.042  |
|              | R^2                 | 0.75   |
|              | q_m                 | 15.6   |
| Langmuir IV  | K_L                 | 0.031  |
|              | R^2                 | 0.75   |
|              | q_m                 | 18.133 |

Fig. 4. Effect of contact time on AB1 adsorption on CSL adsorbent (pH = 2, adsorbent dosage = 7 g l\(^{-1}\)).

Fig. 5. Effect of initial AB1 concentration dose on adsorption on CLS adsorbent (pH = 2, adsorbent dosage = 7 g l\(^{-1}\), contact time = 60 min).
solution (ml), and m is the weight of the CLS (g). The removal efficiency of AB1 was calculated using Eq. 2 [9]:

$$R\% = \frac{(C_0 - C_t)}{C_0}$$ (2)

Where, $C_0$ and $C_t$ represent the initial and t AB1 concentrations (mg l$^{-1}$), respectively. All stages were repeated several times to determine optimum pH, CLS dosage, and AB1 concentration values.

2.4. Equilibrium adsorption modeling

Isotherm models such as Langmuir and Freundlich were applied to determine the relationship between equilibrium capacity ($q_e$) and equilibrium concentration ($C_e$). Adsorption kinetic models were used to predict the rate of adsorption and adsorption mechanisms. To describe AB1 adsorption on the CLS adsorbent, four kinetic models (pseudo-first-order, pseudo-second-order, Elovich, and intraparticle diffusion) were used [9,10].

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