**Regeneration of activated carbon by combined ultrasound and persulfate treatment**

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**1.Study of initial concentration and adsorption equilibrium time**

Take 0.2g of activated carbon were placed in 200mL of different initial concentration of ofloxacin (50mg/L, 100mg/L, 150mg/L, 200mg/L, 300mg/L) solution, using a water bath constant temperature shaker for uniform shaking, the experimental temperature is 25 ℃, the rotation speed of 180 rpm, the adsorption time of 0-7 h, respectively, adsorption experiments were carried out at different times, respectively. Samples were taken and the data were calculated and organized, and the experimental results are shown in **Fig.S1**

According to **Fig. S1**, under the condition of different initial concentrations of of ofloxacin, the trend of the amount of ofloxacin adsorbed by the activated carbon basically reaches the same, in the beginning of the adsorption of 30min, the activated carbon adsorption speed is very fast, ofloxacin is adsorbed by a large amount ofloxacin; after 30min, the amount ofloxacin adsorbed is still increasing gradually, but the adsorption speed is slowing down, and the adsorption amount ofloxacin adsorption is in a smaller tendency after 300min. After 300 min, the adsorption amount of ofloxacin was in a small trend. When the adsorption was carried out to about 360min, the growth of the adsorption amount of ofloxacin was basically in a stable trend, from the overall adsorption process, basically, the adsorption time of 360min can be set as the adsorption equilibrium point of the activated carbon adsorption of ofloxacin.



**Fig.S1** Adsorption amount of ofloxacin adsorbed by activated carbon at different adsorption times

**2.Adsorption isotherm**

We used the most widely used adsorption models, Langmuir and Freundlich adsorption isotherm models, to thermodynamically analyze the adsorption of ofloxacin on activated carbon

(1) Langmuir adsorption isotherm model

The Langmuir model equation is:

 (1)

(2) Freundlich model

The Freundlich model equation is:

 (2)

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**Fig.S2** Model fitting for isothermal adsorption of ofloxacin on activated carbon

According to the adsorption data, the correlation coefficients (R2) of the Langmuir and Freundlich models were 0.99793 and 0.91669, respectively; therefore, the Langmuir model accurately describes the adsorption of ofloxacin on the activated carbon, which indicates that the active sites on the surface of the carbon material are more homogeneous, and that there is a reversible chemical reaction between ofloxacin and the activated carbon with no interaction between molecules. The constant n in the Freundlich model is the inhomogeneity coefficient, which can be used to reflect the adsorption effect between adsorbent and adsorbent. When n is between 2-10, the adsorption is easy adsorption i.e. preferential adsorption. The coal-based activated carbon used in this experiment has n greater than 2 and can adsorb efficiently to remove ofloxacin from water. According to Eq. (1), the theoretical maximum adsorption capacity of the activated carbon for ofloxacin is 87.19 mg/g.

**3.Preparation of waste activated carbon for laboratory use**

The activated carbon was sieved again with a 30-50 mesh standard sieve before use, and the experimental conditions of activated carbon preparation were determined by combining the results of static adsorption experiments of activated carbon. The saturated carbon was prepared by using a four-connected constant temperature magnetic stirrer, according to the maximum adsorption capacity and adsorption equilibrium time mentioned above, 50g of activated carbon was added to the initial concentration of 7.5g/L ofloxacin solution, and stirred at a constant temperature under the condition of 25℃, 160rpm for 8h. After adsorption, the static adsorption saturated activated carbon was filtered and dried at 60℃ for 10h, and then grouped to take samples to check the residual adsorption capacity, and then sealed and dried in bags to be retained for regeneration. After meeting the requirements, the static adsorption saturated activated carbon was filtered and dried at 60℃ for 10h, and the remaining adsorption capacity was tested by sampling in groups, and then sealed and dried and stored in bags for regeneration.