

Dear editor

We have revised our manuscript carefully according to the reviewer's suggestion. Our responses to the comments of the referees are described in the following paragraphs.

1# General comment: All the experimental results should be more detailed interpreted and explained.

Answer: Thank you for your kind suggestion, we have revised our manuscript and explained the experimental results more detail.

2# Line 27: "...when phosphorus in water exceeds 0.01 mg/L." Add here as reference the paper: Evolution of trophic parameters from Amara Lake, Environmental Engineering and Management Journal, 14(3), (2015), 559-565, because it is relevant for this observation.

Answer: Thank you for your kind suggestion, reference [1] have been added.

3# 2.4. Batch adsorption experiments: The variation intervals of each experimental parameter analyzed in this study should be mentioned here.

Answer: Thank you for your kind suggestion. We have described the experimental parameter in detail.

In the adsorption kinetics study, the concentration of phosphate was 20 mg/L and tested time was 2, 5, 10, 20, 30, 45, 60, 90 and 120 min. In the adsorption isotherm experiment, the concentration of phosphate was ranging from 100 to 500 mg/L with the variation intervals of 50 mg/L. We have revised it in the experimental section. Also the dose rate of radiation grafting was added (dose rate: 10 kGy/pass) (Section 2.2).

4# Lines 122-123: "In curve (d), the adsorption peak of N-H was disappeared and 1656 cm^{-1} appeared due to quaternization reaction." This observation should be more detailed explained.

Answer: Thank you for your kind suggestion. We have referenced more published papers and explained the IR spectra in detail.

After quaternization reaction, the peaks at 1656 cm^{-1} and 3409 cm^{-1} were attributed to quaternary nitrogen appeared and the intensity of N-H peaks sharply decreased, meaning that tertiary amines were converted to quaternary ammonium. The bands at 2960 cm^{-1} are assigned to C-H antisymmetric and symmetric stretching of $-\text{CH}_2-$, indicating successful introduction of alkyl chain from 1-bromohexane.

3# 3.2.3. TG Analysis: The utility of these experimental results should be highlighted more.

Answer: Thank you for your kind suggestion, we have rewritten the discussion of TG Analysis.

The weight loss below 100 °C was due to the loss of water in the samples. The weight loss of the origin cotton linter happened in the range from 340 °C to 420 °C, which showed a one-step weight loss. The weight loss of CLF-g-GMA occurred at 220 °C and terminated at 420 °C, which was due to the complex thermal decomposition of the cotton linter and grafted epoxy groups and ester in GMA. The decrease of the degradation temperature for cellulose after grafting of GMA also happened in reference. But for CLF-g-GMA-PEHA and QCLF

samples, the thermal degradation curves have two districts. The main decomposition temperature occurred between 220 and 450 °C, the second loss weight took place at 450 °C, which might be due to the residual mass of solid carbon. It suggested that the adsorbents have good thermal resistance for application in phosphate removal.

4# Line 157: “The origin phosphate concentration at pH 7...” How was obtained this value of pH???

Answer: Thanks for your kind suggestion, we have revised it.

In this paper, pH was adjusted with 0.1 mol/L HCl or 0.1 mol/L NaOH. Because the origin pH of NaH_2PO_4 solution without pH adjustment was about 7, which was in the range of 4-8, so the phosphate concentration without pH adjustment was used for further batch and column adsorption tests.

5# 3.3.3. Adsorption kinetics: The experimental results included in this section should be more detailed interpreted. 3.3.4. Adsorption isotherms: The same observation as above. 3.4. Column experiments: Again, the experimental results included in this section are too brief presented. Some additional comments/observation should be included to obtain a properly interpretation of these results.

Answer: Thanks for your kind suggestion. We have interpreted the experimental results more detail. Reference [39] have been added.

Temkin model have also used to fit the experimental data of the adsorption isotherms. We tried our best to improve the manuscript and made some changes in the manuscript follow the comments and the similarity report. These changes will not influence the content and framework of the paper. And here we did not list the changes but marked in red in revised paper.

Once again, Thanks very much for your comments and suggestions. We are looking forward to your positive response.

Thanks and best regards.

Sincerely yours,

Long Zhao