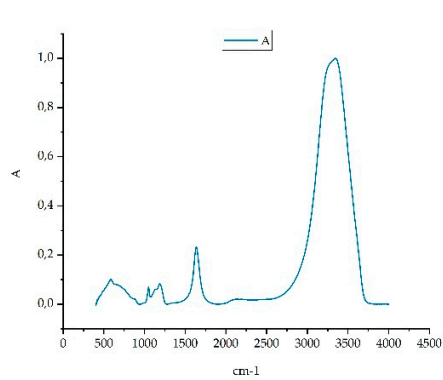
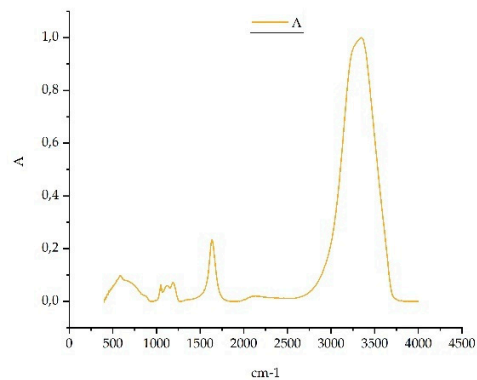


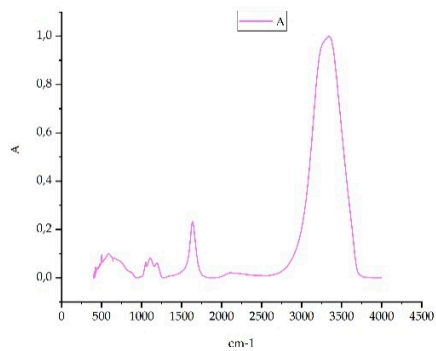
Supplementary materials:



PTS 1

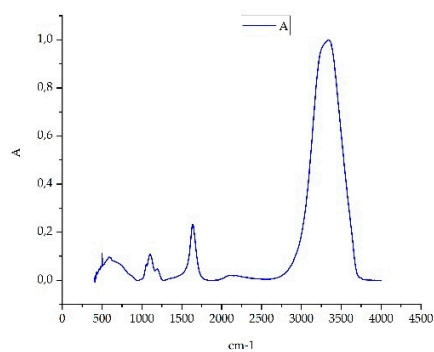


PTS 2

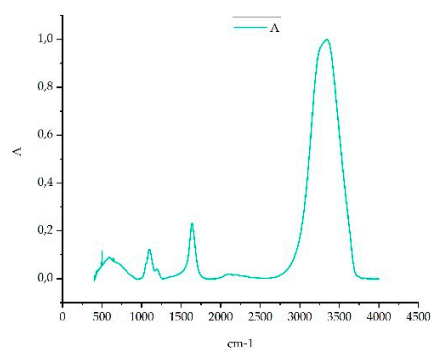


PTS 3

Figure S1: FTIR analysis of PTS with different ratio (a) PTS 1:1 ratio, (b) PTS 1:2 ratio and (c) PTS 1:3 ratio



a. PTS 4



b. PTS 5

Figure S2: FTIR analysis of PTS with different ratio (a) PTS 1:4 ratio, (b) PTS 1:5 ratio

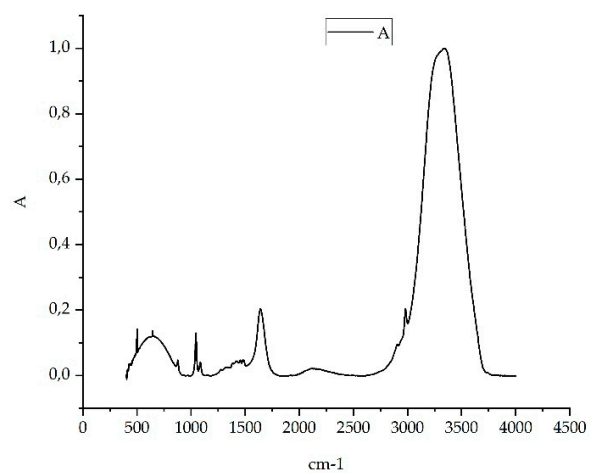
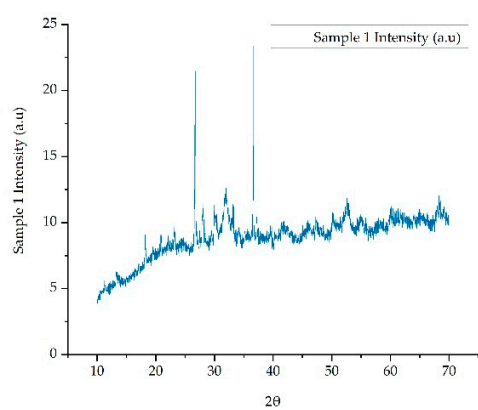
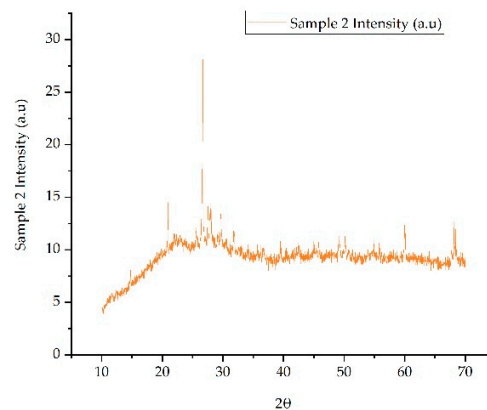


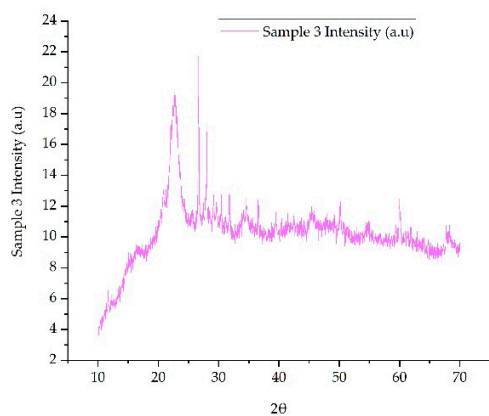
Figure S3: FTIR analysis of synthesized Ce-CTA material



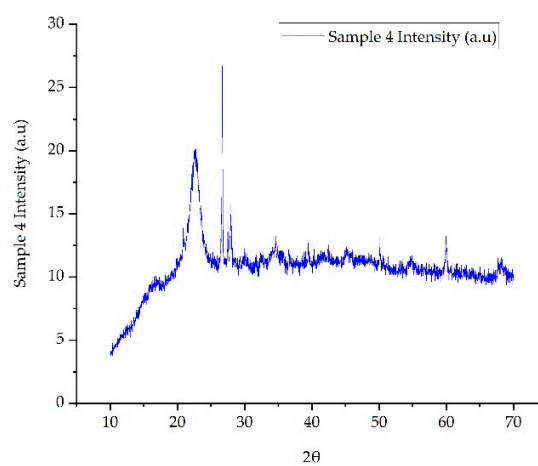
a.



b.

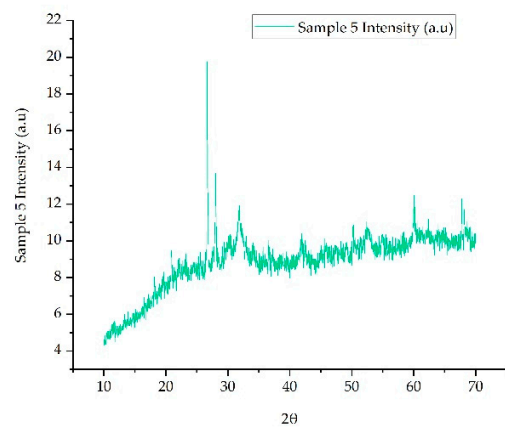


c.

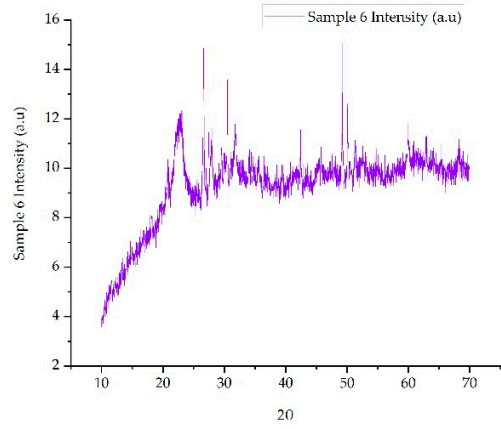


d.

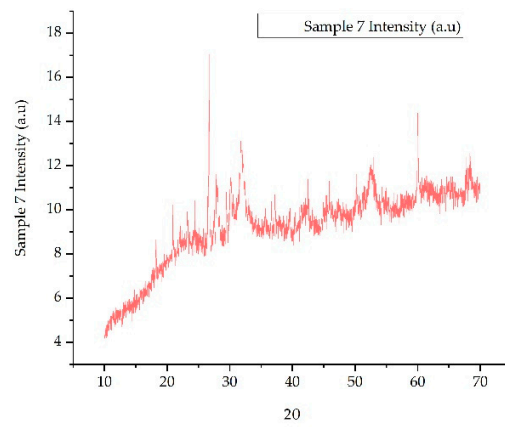
Figure S4: XRD analysis of sludge materials after coagulation-flocculation at pH 3 (a) Sample 1 – raw sludge (b) Sample 2 with PTS only, (c) Sample 3 with Ce-CTA and (d) Sample 4 with PTS+Ce-CTA



a.

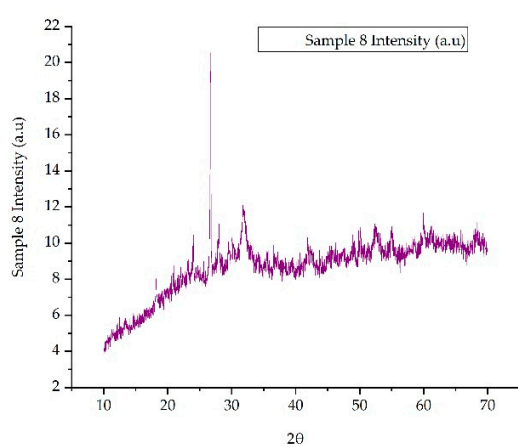


b.

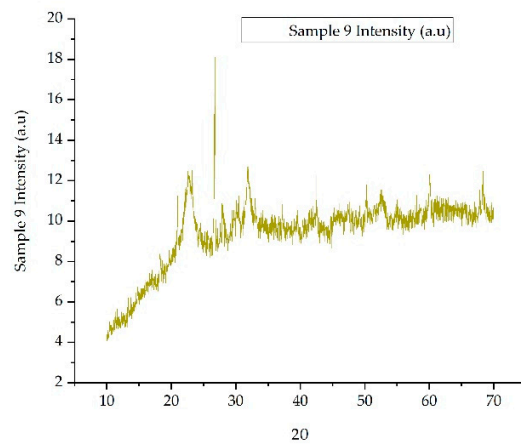


c.

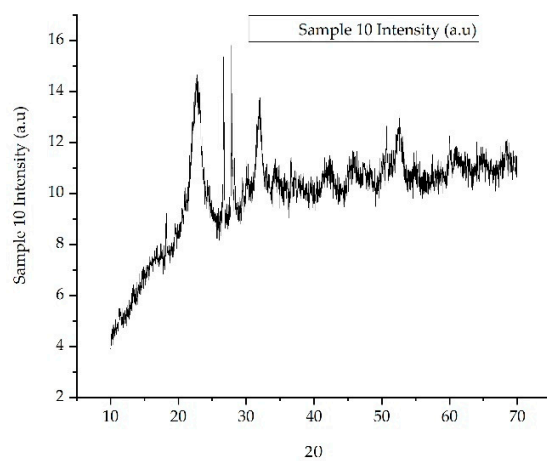
Figure S5: XRD analysis of sludge materials after coagulation-flocculation at pH 6 (a) Sample 5 with PTS only, (b) Sample 6 with Ce-CTA and (c) Sample 7 with PTS+Ce-CTA



a.



b.



c.

Figure S6: XRD analysis of sludge materials after coagulation-flocculation at pH 9 (a)) Sample 8 with PTS only, (b) Sample 9 with Ce-CTA and (c) Sample 10 with PTS+Ce-CTA