LABORATORY FOR INDUSTRIAL WATER AND ECOTECHNOLOGY (LIWET)

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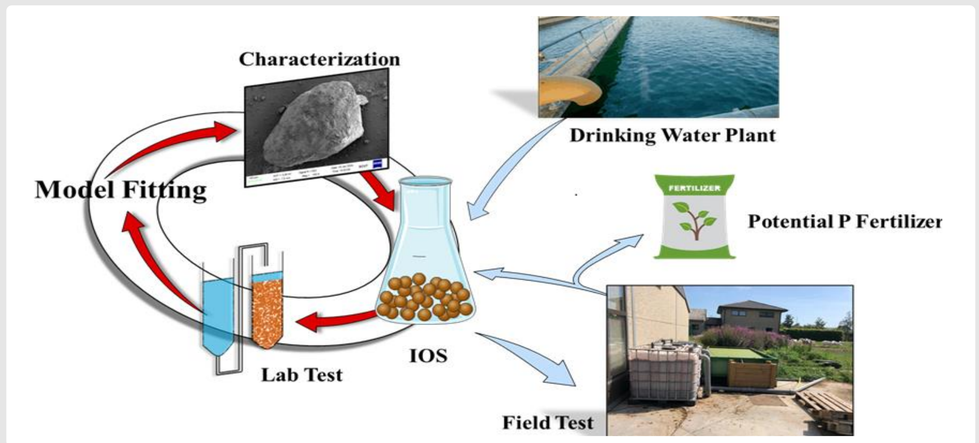
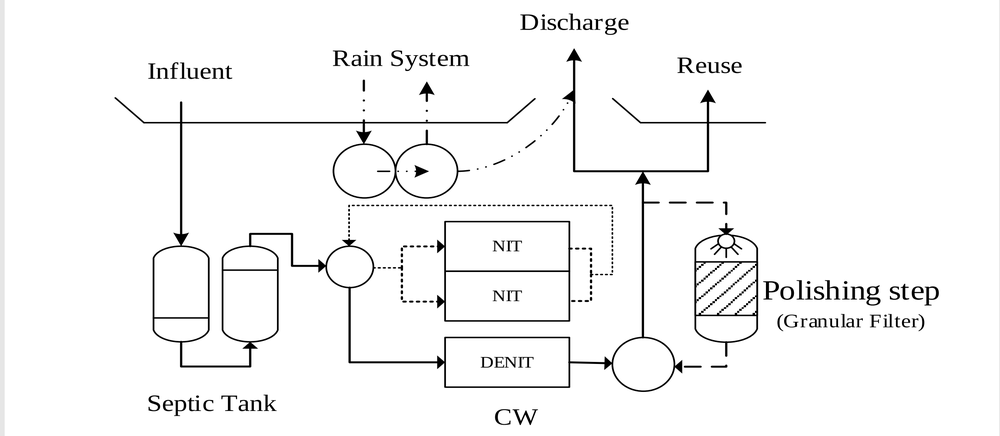
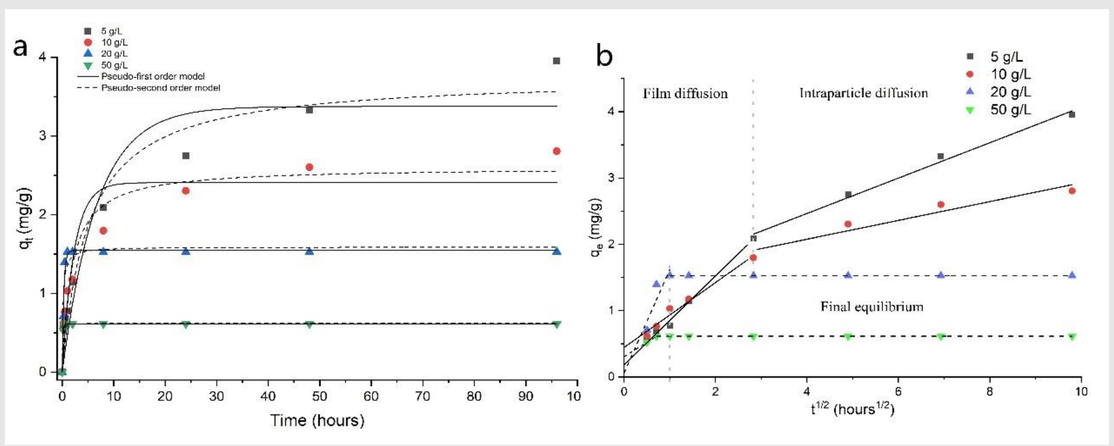
POLISHING GOAT FARM WASTE WATER IN VIEW OF ADVANCED PHOSPHATE REMOVAL

The objective of this study is to fully characterise a waste substrate from drinking water industry (IOS) in view of P removal and recovery in lab and field scale.



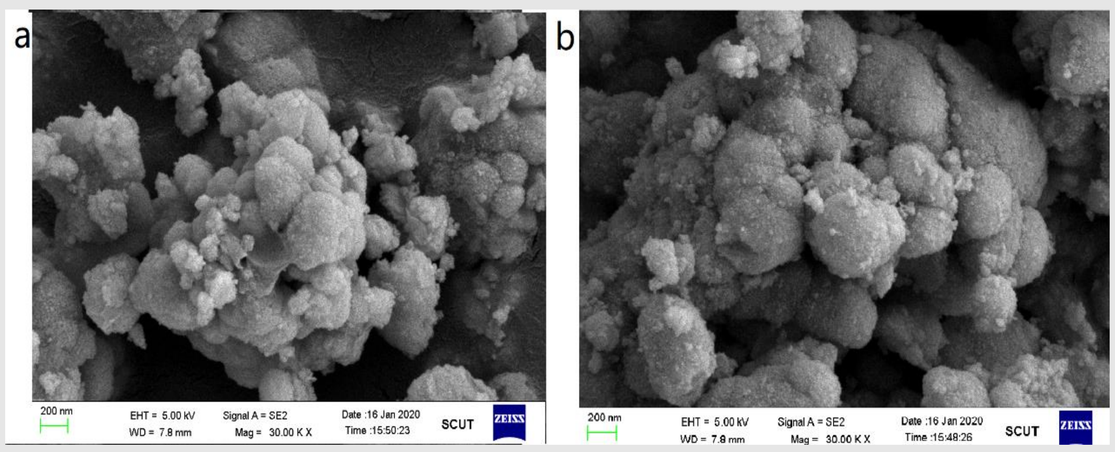


Lab Test

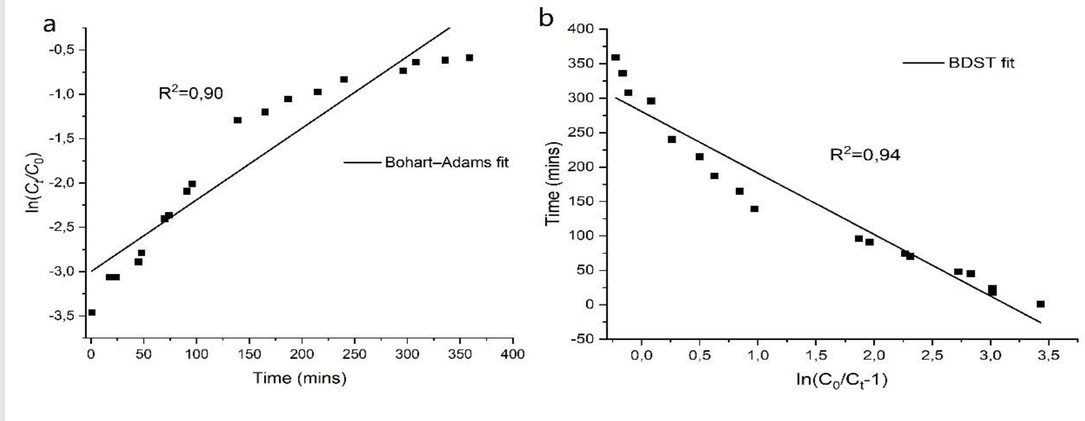


(a) adsorption kinetics model fit and (b) Weber-Morris (WB) intraparticle diffusion model fits

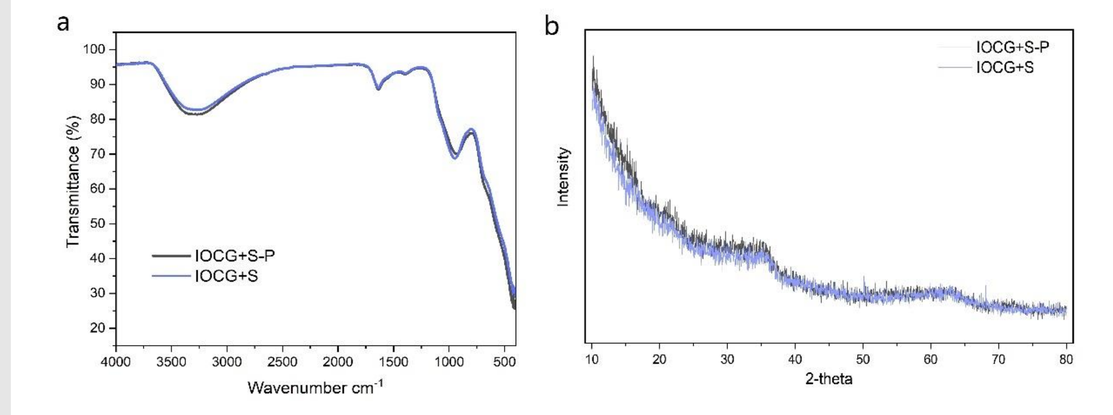
Characterization and Field Test



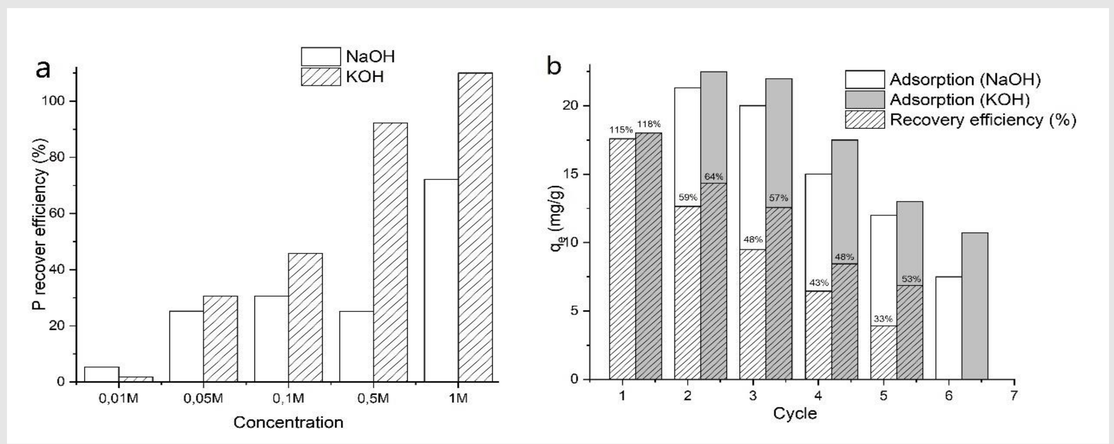
SEM micrographs (a) pristine IOS and (b) after adsorption (used IOS)



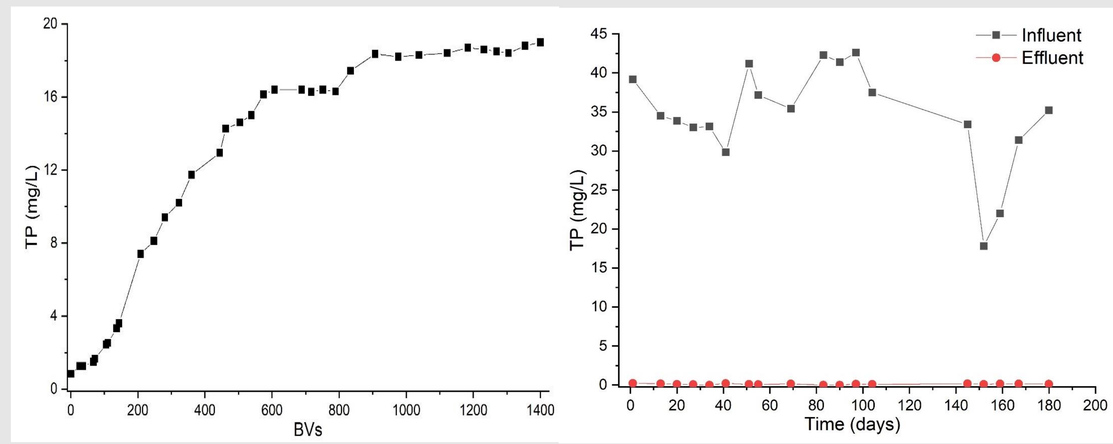
P adsorption breakthrough curve using (a) Bohart-Adams model fit and (b) BDST model fit



Adsorbent characterisation results in (a) FT-IR spectra and (b) XRD spectra



P recovery of IOS at (a) different concentrations of desorption agents and (b) a reusability test



Breakthrough curve in lab scale and experiment scale

Conclusion

- IOS gives nearly 100% TP removal efficiency within a wide pH range (2-9) which was much better than the other materials
- SEM and EDS showed that the surface of IOS has become rough after adsorption and Si and Ca was released in the process of P adsorption.
- FTIR and XRD results showed that the active sites of IOS remained almost unchanged which means the potential good reusability of IOS.
- In a regeneration and reusability test, KOH gave better results than NaOH, and IOS can remain above 70% adsorption capacity after five adsorption/desorption cycles.
- BDST and Bohart−Adams model were used to predict breakthrough curve from lab scale to field scale
- The designed granular filter as a polishing step of goat farm constructed wetland system has kept TP below 0.2 mg/L for more than 180 days.
- IOS is a promising, ecological material which can be widely used in decentralized wastewater treatment for P removal

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