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The effect of acidic pH during the hydrothermal carbonization process of undigested sewage sludge conducted under different conditions

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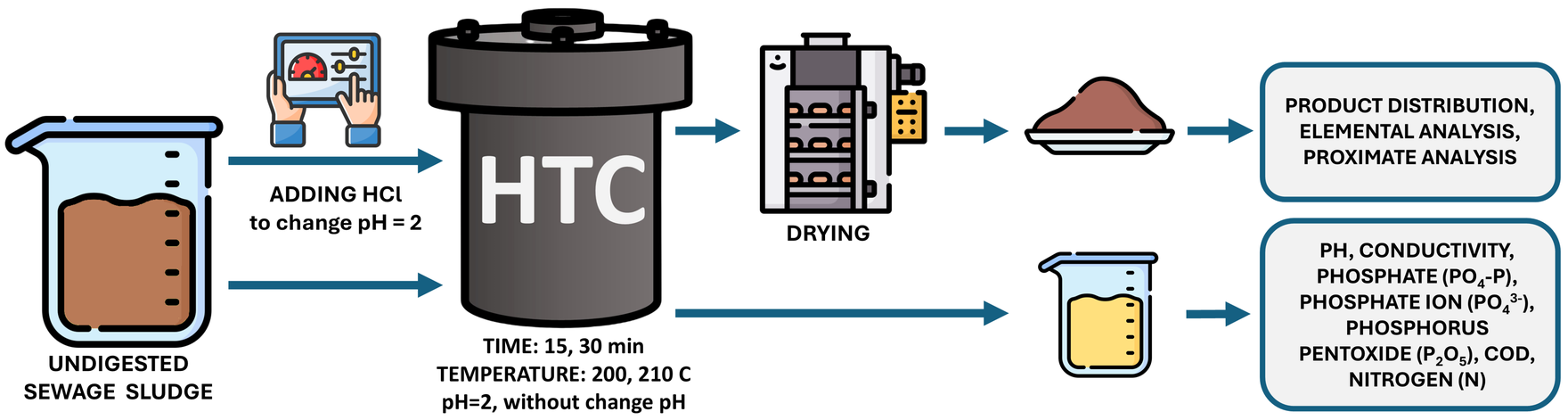
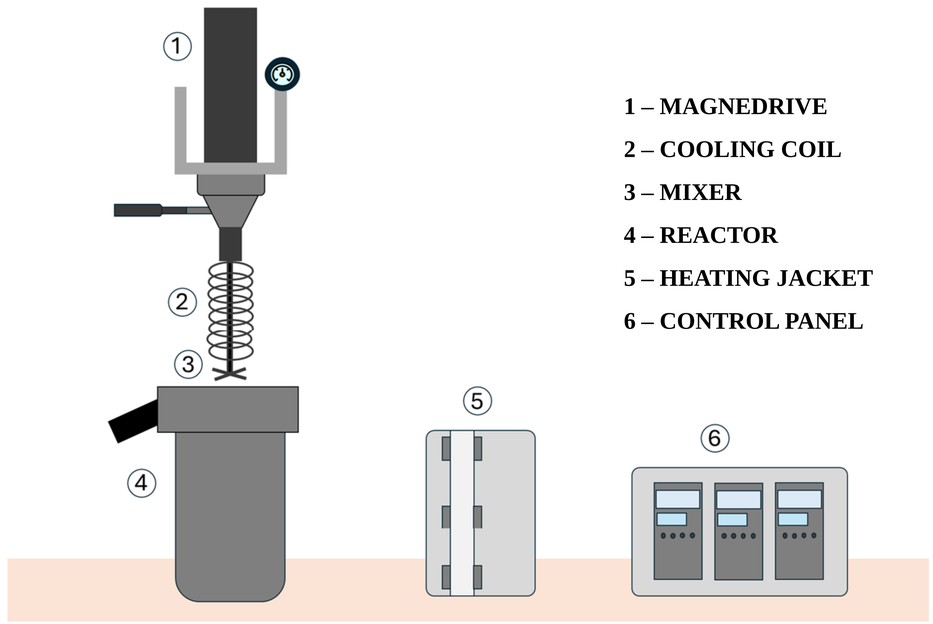
ABSTRACT



SEWAGE SLUDGE

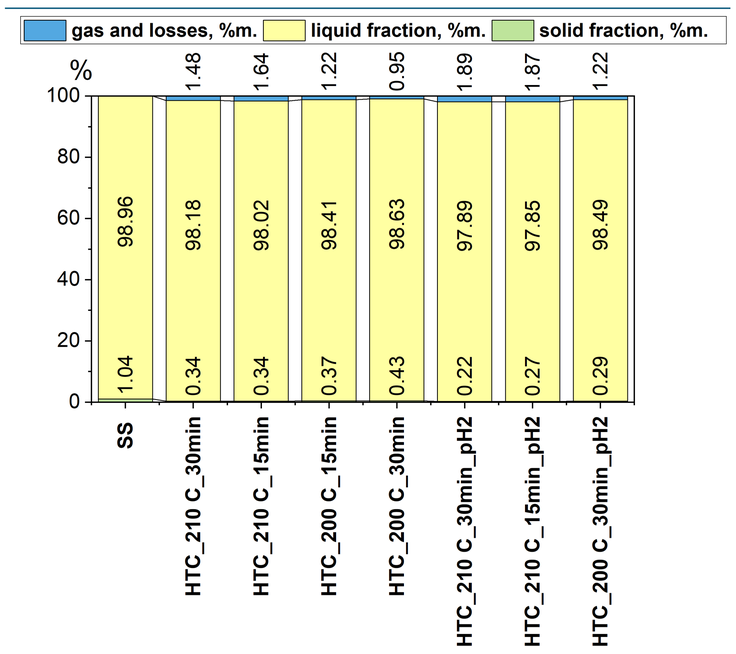
Parameter	Value
K, mg/l	63.0
P, mg/l	145
Cr, mg/l	0.160
Cu, mg/l	2.00
Cd, mg/l	0.0166
Ni, mg/l	0.205
Pb, mg/l	0.281
Zn, mg/l	11.0
Hg, mg/l	<0.0001
N, mg/l	737
PO_4-P, mg/l	>16.3
PO_4, mg/l	>50.0
Loss on ignition, mg/l	8555

EXPERIMENTAL STATION



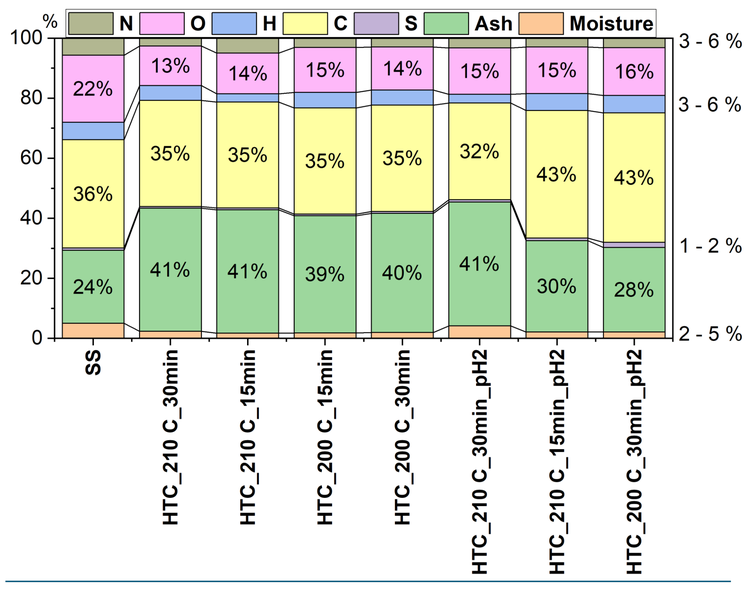
HYDROCHAR

MASS YIELD

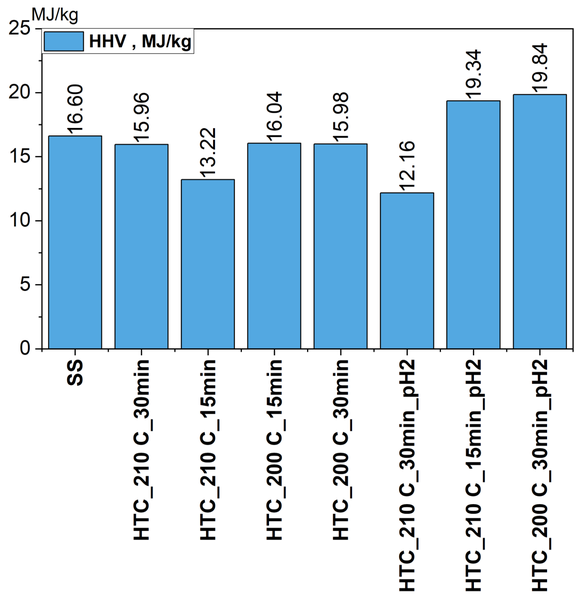


VISUAL APPEARANCE

COMPOSITION

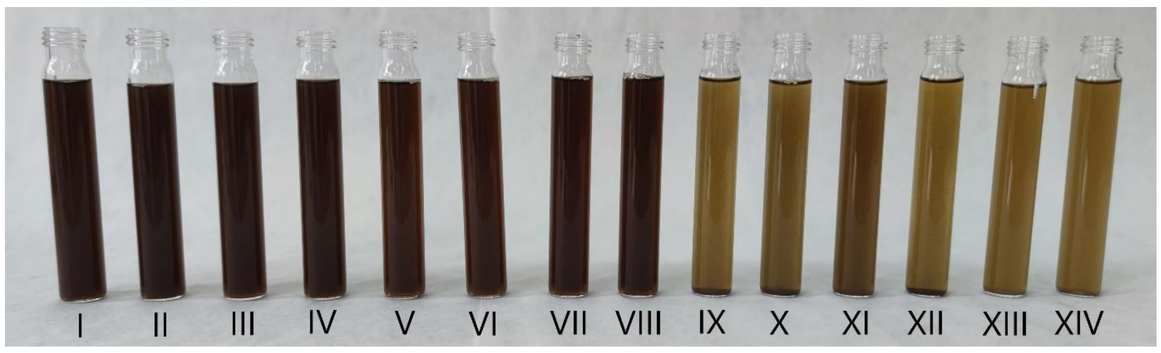


HIGHER HEATING VALUE



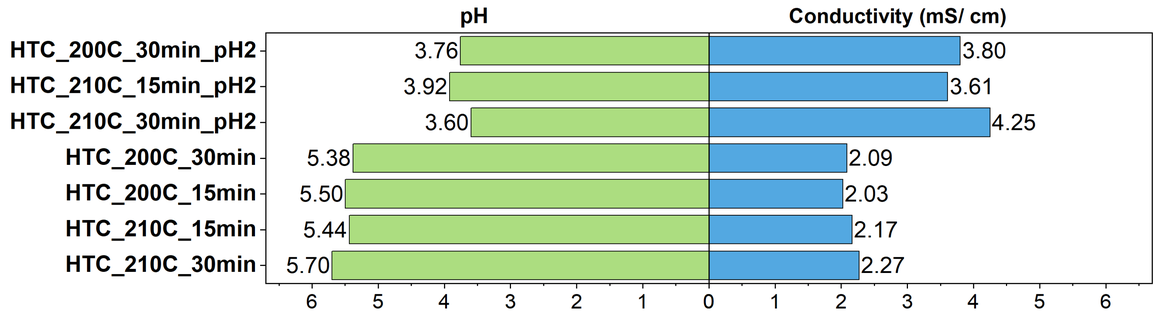
LIQUIDS

VISUAL APPEARANCE

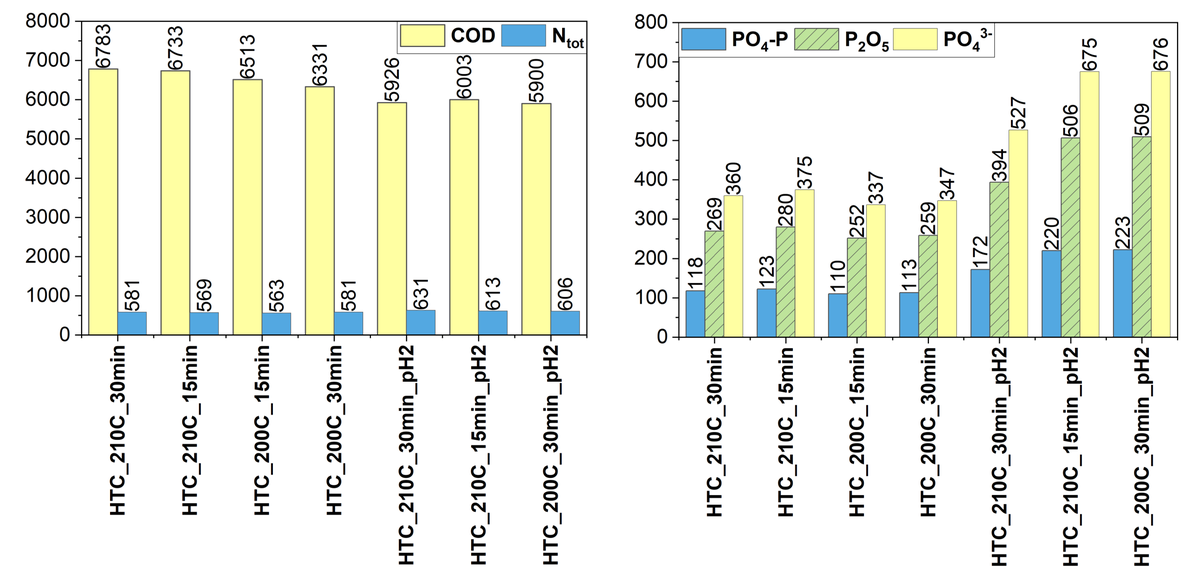


I, II- HTC_210 C_30min; **III, IV**- HTC_210 C_15min; **V, VI**- HTC_200 C_15min; **VII, VIII**- HTC_200 C_30min; **IX, X**- HTC_210 C_30min_pH2; **XI, XII**- HTC_210 C_15min_pH2; **XIII, XIV**- HTC_200 C_30min_pH2

CONDUCTIVITY AND PH



COD, N_{tot}, PO_4-P, P_2O_5, PO_4^{3-}



CONCLUSIONS

1. Hydrothermal carbonization significantly reduces the moisture content in hydrochar, improving its energy properties.
2. The presence of an acidic environment (pH=2) promotes the migration of phosphorus into the liquid phase, increasing its concentration.
3. The mass yield of hydrochar is low, indicating intensive transformation of components into liquid and gas phases.
4. The liquid phase after the HTC process contains high concentrations of nitrogen and phosphorus compounds, which can be utilized in agriculture.
5. Hydrochar produced at a lower pH shows higher carbon content, making it more calorific than the raw sludge.

ACKNOWLEDGEMENTS

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