

Experimental investigations of polyethylene hydrothermal treatment towards high hydrocarbons

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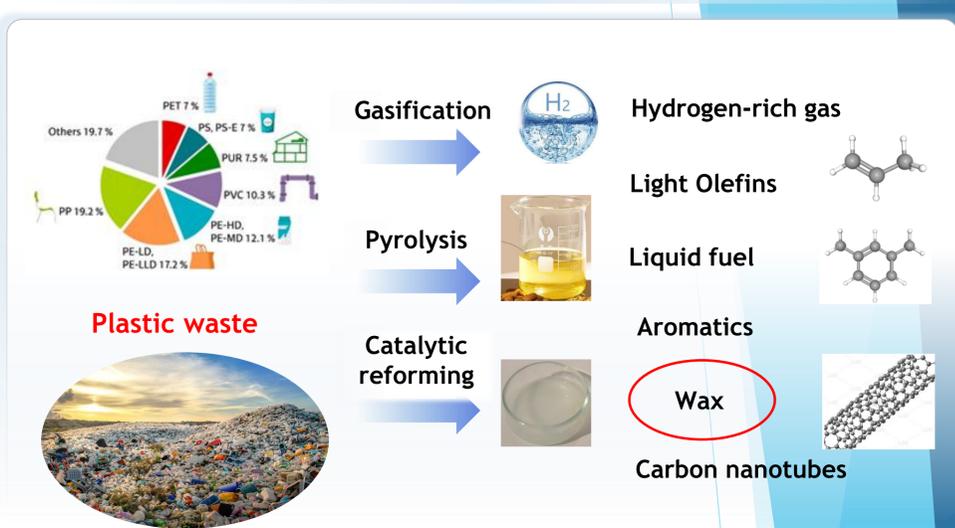
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The generation and improper disposal of large quantities of plastic waste have posed a serious threat to the global ecosystem.

Thermochemical conversion enables the conversion of plastics into high value-added fuel chemicals for a circular economy.



Traditional waste disposal methods are difficult to effectively solve the problem of plastic pollution, and **there is an urgent need for more efficient methods of resource utilization.**

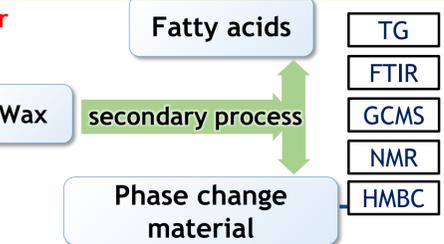


Preparation of pyrolytic waxes under mild conditions using autoclave hydrothermal method to overcome the limitations of conventional methods

Key question

Wide distribution of wax carbon number

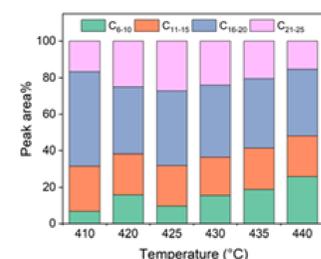
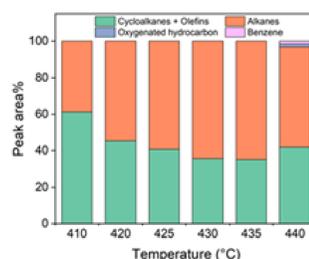
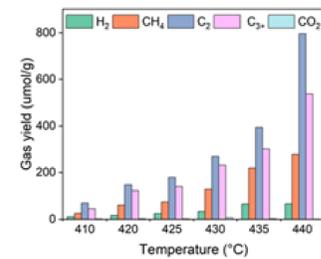
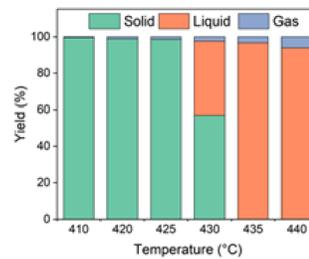
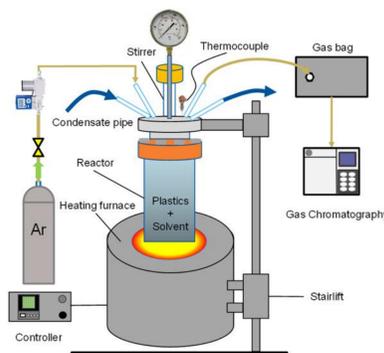
1. Mechanism of catalytic oxidation of stearates and efficient catalytic development based on polymetallics



Key question

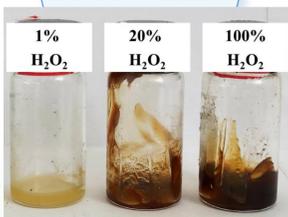
Difficult to introduce functional groups

2. Mechanisms affecting phase change heat storage capacity and carbon number separation based on physical and chemical properties



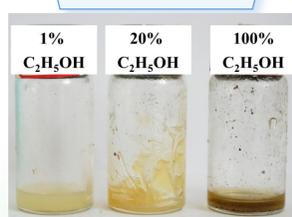
The hydrothermal waxes were all **straight-chain alkanes**, and the effect of the addition of polar solvents on the product distribution was investigated

Peroxide



C₂₂ C₂₁ C₂₀
Oxygen environment for more uniform product distribution

Ethanol



C₂₂ C₁₉ C₁₁
Cyclisation, branching and aromatization of products

Acetic acid



C₂₂ C₁₈ C₁₅
Promotion of polyethylene chain splitting

Conclusions

- At lower hydrothermal temperatures (410-420 °C) the wax resembled hard paraffin while at higher temperatures (430-440 °C) it exhibited diesel-like characteristics.
- The wax obtained at 425 °C showed optimal viscosity and solubility, facilitating further processing.
- The addition of C₂H₅OH or CH₃COOH promoted PE chain splitting. C₂H₅OH addition specifically enhanced the cyclization, branching, and aromatization of the products. H₂O₂ addition, which promoted an oxygen environment, more disordered product distributions were obtained.

Acknowledgements

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