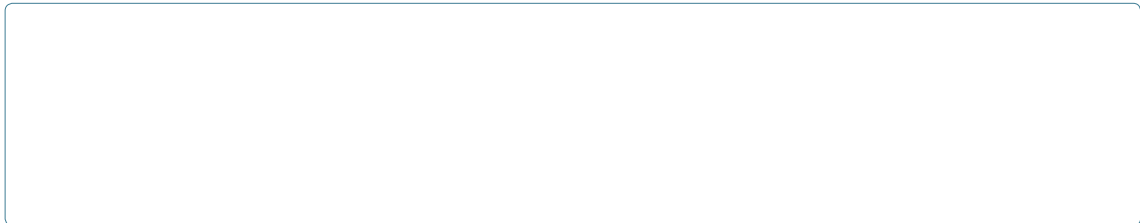




applications.



Keywords: Sustainable solvents; Biphasic systems; Industrial CO₂ capture; Absorption kinetics; Stability characteristics; Carbon dioxide

Introduction

The escalating levels of CO₂ in the atmosphere and their impact on global climate change have led to a growing interest in CO₂ capture technologies. This paper focuses on the development of a biphasic system for CO₂ capture, focusing on absorption dynamics.

CO₂ capture, focusing on absorption dynamics

term performance and economic viability in industrial CO₂ capture applications. Stability considerations encompass solvent reusability, resistance to degradation, and compatibility with process conditions. Robust solvent formulations exhibit minimal loss of CO₂ capture capacity over multiple cycles of absorption and regeneration, ensuring continuous operation with minimal maintenance requirements. Moreover, stability against impurities and fouling agents prevalent in industrial flue gases is essential for maintaining solvent performance over extended periods.

Future perspectives: The ongoing research and development of sustainable biphasic solvents hold promise for advancing CO₂ capture technology towards commercialization. Future efforts should focus on further enhancing solvent efficiency, stability, and scalability to meet the growing demand for carbon capture in various industrial sectors. Additionally, interdisciplinary collaborations between researchers, engineers, and policymakers are essential for accelerating the adoption of biphasic solvent-based CO₂ capture solutions and addressing the challenges associated with large-scale implementation.

Conclusion

Sustainable biphasic solvents offer a promising pathway for industrial CO₂ removal, combining efficiency with environmental stewardship. By understanding the absorption dynamics and stability traits of these solvents, researchers and engineers can design optimized capture processes tailored to specific industrial applications. Continued innovation and collaboration are essential for realizing the full potential of biphasic solvent-based CO₂ capture and mitigating the impacts of anthropogenic carbon emissions on the environment. Biphasic solvents represent a significant advancement over traditional single-phase solvent systems, providing enhanced CO₂ solubility, selectivity, and resistance to degradation. The synergistic interaction between aqueous and organic phases facilitates rapid mass transfer, leading to high CO₂ absorption rates and improved capture efficiency. By optimizing solvent composition and process parameters, researchers

and engineers can further enhance the performance of biphasic solvents, making them suitable for diverse industrial applications. Sustainable biphasic solvents offer a promising pathway for industrial CO₂ removal, combining technological innovation with environmental stewardship. By harnessing the absorption dynamics and stability traits of biphasic solvents, we can move closer to achieving our goals of mitigating carbon emissions and combating climate change on a global scale.

References

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