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# Exploring the Adsorptive Properties of Activated Carbons from Collagen Biomass

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## Introduction

Activated carbon is a highly porous material that exhibits remarkable adsorptive properties, making it a vital component in various applications, including water purification, air filtration and even energy storage. Traditionally derived from materials such as coal, wood and coconut shells, the production of activated carbon has come under scrutiny due to concerns about sustainability and environmental impact. In recent years, there has been increasing interest in utilizing alternative, renewable sources for the production of activated carbon, with one such promising source being collagen biomass. Collagen, a natural protein abundant in animal tissues such as hides, bones and connective tissues, is a waste product in many industries, including the food and leather industries [1].

Converting collagen into activated carbon not only offers a way to recycle these waste materials but also presents an opportunity to create a more sustainable and potentially cost-effective alternative to traditional activated carbons. This paper aims to explore the adsorptive properties of activated carbons derived from collagen biomass, evaluating their performance in various adsorption processes and comparing their effectiveness to conventional activated carbons. By examining the preparation methods, structural characteristics and adsorption capabilities of collagen-derived activated carbons, this study aims to provide insight into their potential for industrial and environmental applications [2].

## Description

Collagen-derived activated carbons offer a unique opportunity to address both environmental and economic challenges. Collagen, a fibrous protein, is typically obtained from animal sources such as cows, pigs and fish. In its raw form, collagen is not a suitable adsorbent due to its relatively low surface area and porosity. However, when activated through physical or chemical methods, collagen can be transformed into a highly porous material with a large surface area capable of adsorbing a wide range of pollutants, including heavy metals, organic compounds and gases. The activation process generally involves heating the collagen under controlled conditions or treating it with chemical agents such as phosphoric acid or potassium hydroxide. These processes enhance the surface area and introduce a network of pores, which significantly increases the material's adsorptive capacity [3].

The properties of collagen-derived activated carbons such as surface area, pore volume and the presence of functional groups are crucial factors that influence their effectiveness in adsorption. Additionally, the adsorption mechanisms are complex and can vary depending on the nature of the adsorbate. Understanding these mechanisms is essential for optimizing the use of collagen-based activated carbons in specific applications, such as water treatment, air purification and even the removal of pharmaceutical contaminants [4]. Furthermore, this research delves into the cost-effectiveness and sustainability of using collagen as a raw material, which could potentially provide an eco-friendly alternative to more traditional sources of activated carbon. The potential of collagen biomass as a resource for activated carbon production aligns with the increasing global focus on waste valorization and the reduction of carbon footprints in manufacturing processes [5].

## Conclusion

The exploration of activated carbons derived from collagen biomass presents a promising pathway for addressing both environmental sustainability and economic efficiency in the production of adsorbents. Collagen, a naturally abundant byproduct of the food, leather and fish industries, offers a renewable and cost-effective alternative to conventional activated carbon sources. Through the activation process, collagen biomass can be transformed into a material with high surface area, porosity and functional groups, making it effective for adsorbing a variety of contaminants.

The findings from this study indicate that collagen-derived activated carbons show comparable or even superior adsorptive performance to traditional activated carbons in certain applications, such as the removal of heavy metals and organic pollutants. Moreover, the use of collagen biomass aligns with the principles of sustainability, offering an innovative way to recycle waste materials and reduce environmental impact. However, further research is necessary to optimize the activation process, enhance the material's adsorptive capacity and evaluate its performance under real-world conditions. In conclusion, the development of activated carbon from collagen biomass holds significant promise for industrial applications, contributing to the advancement of cleaner, more sustainable technologies for environmental remediation.

## References

1. Gil, R. R., B. Ruiz, M. S. Lozano and E. Fuente. "Influence of the pyrolysis step and the tanning process on KOH-activated carbons from biocollagenic wastes. Prospects as adsorbent for CO2 capture." *J Anal Appl Pyrolysis* 110 (2014): 194-204.
2. Yakout, S. M. and G. Sharaf El-Deen. "Characterization of activated carbon prepared by phosphoric acid activation of olive stones." *Arab J Chem* 9 (2016): S1155-S1162.
3. Yang, H. M., D. H. Zhang, Y. Chen and M. J. Ran, et al. "Study on the application of KOH to produce activated carbon to realize the utilization of distiller's grains." *IOP Conf Ser: Earth Environ* 69 (2017): 012051.
4. Benedetti, Vittoria, Francesco Patuzzi and Marco Baratieri. "Characterization of char from biomass gasification and its similarities with activated carbon in adsorption applications." *Appl Energy* 227 (2018): 92-99.
5. Alasfar, Reema H., Said Ahzi, Nicolas Barth and Viktor Kochkodan, et al. "A review on the modeling of the elastic modulus and yield stress of polymers and polymer nanocomposites: effect of temperature, loading rate and

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