

Durian Husk as a Potential Biomass Activated Carbon to Remove Contaminants in Water

Jarrett Lee Min Chung¹, Thun Qi Fay², Zheng Huiwen³

Sekolah Menengah Kebangsaan Pandan Mewah, Ampang, Malaysia.

jarrettlmc@gmail.com¹

ryanthunqf.hp@gmail.com²

huiwenzheng16@gmail.com³

Abstract

We are no longer strangers to the water crisis in this age of ultra-development. Malaysia is also facing a water crisis, whereby half of our rivers are either moderately or severely polluted. Due to the rising need for clean water, we intend to provide an innovative solution to relieve the water pollution issue in Malaysia, which is through the use of durian husk activated carbon. Activated carbon is a form of carbon that has been processed to contain a large number of pores for adsorption. In this research, we aim to study durian husk as a potential biomass activated carbon to remove water contaminants. Our research contributes to the research gap by comparing the efficiencies of different biomass activated carbons that are prepared using similar methods. We identified durian husk as a potential high-quality biomass activated carbon due to its high carbon content and the presence of multi-sized pores, which further contributes to the durian husk's capability to adsorb particles in water. In our methodology, water samples taken from different sources were treated with different biomass activated carbons (durian husk, coconut husk, charcoal, banana peel and orange peel) and tested based on the following parameters: turbidity, pH level, biochemical oxygen demand (BOD), and chlorine test. The results show that durian husk-based activated carbon is a viable alternative to current mainline activated carbons. Not only does it contribute to the reduction of food waste, but there is also a practical application of implementing durian husk activated carbon in household filters and water treatment plants.

Keywords: Activated carbon, biomass, durian husk, water purification

1. INTRODUCTION

One of the major problems the world faces is the water crisis where rivers are getting polluted and freshwater supply is depleting. Due to the rising need for clean water, an innovative solution is provided to relieve the water pollution in Malaysia, which is by using activated carbon. Activated carbon is a processed form of carbon that has a high surface area to volume ratio, with a high number of pores of varying sizes for adsorption. With the development of science and technology, biomass-based activated carbon is gradually replacing conventional charcoal activated carbon. Therefore, the chosen biomass in this paper is the durian husk, with the main factor being the abundance of durians in Malaysia.

2. OBJECTIVE

This research project aims to study the uses and application of durian husk activated carbon in water purification by comparing it to other biomass activated carbons, namely charcoal, coconut husk, banana peel, and orange peel activated carbon. On a secondary note, this study provides a possibility to repurpose durian husk waste and, in turn, reduce durian husk waste in our country.

3. NOVELTY & INVENTIVENESS

Research involving durian husk activated carbon is especially apt in Malaysia as the durian is native to our tropical country. The development of durian husk activated carbon in purifying polluted water is a novel study that was first researched in May 2021 by C.M. Payus. Previous studies on durian husk activated carbon were solely focused on improving the adsorption capability of durian husk activated carbon. However, our research is the first study that compares the potential of durian husk activated carbon in water purification with other mainstream or prospective biomass activated carbons through similar preparation methods. Our chosen methodology will be able to prove the true prospect of using durian husk activated carbon for water purification purposes.

4. PRACTICALITY & USEFULNESS

Our research could play a role in addressing the growing global crisis of clean water. This is by no means a foreign dilemma as Malaysia is also facing the same issue. By using durian husk activated carbon to create low-cost water filters, it is hoped that more of the populace would be able to access clean water, and the water pollution issue of our country can be relieved. The durian husk activated carbon can be a potential alternative to charcoal as a carbon filter for water purification. From our study, it is found that durian husk activated carbon is able to reduce the biochemical oxygen demand (BOD) of water and reduce its pollution rate. Its water purifying capabilities are comparable to that of coconut husk activated carbon and better than charcoal activated carbon. Despite being a seasonal fruit, the Malaysian annual production of durian fruit is currently at 330,000 tonnes and is expected to surpass 440,000 tonnes by 2030. This makes

durian husk a viable choice to be implemented in household water filters or even for wide-scale usage in water treatment plants.

5. CONCLUSION

Durian husk activated carbon is a feasible and potential biomass activated carbon in water purification. This project could aid in the development of the water purification system of our country, as well as open up a new chapter in the use of durian husk, which will additionally reduce durian husk waste. We hope that this research project could become a precursor for future study and research in order to improve and fully maximise the potential of durian husk in water purification.