



CHARCOAL SOAP

Transforming Waste into Worth

Local bak kwa (meat jerky) businesses rely heavily on charcoal to enhance the smoky flavour of their products. However, the disposal of used charcoal contributes to water wastage and rising waste management costs. To tackle this, the team comprising mechanical engineering and bio-chemical technology students combined their expertise to repurpose charcoal waste into two practical innovations.

First, they used burnt charcoal ash to create a charcoal-infused soap, offering a natural and biodegradable alternative to chemical-based cleaning agents.

Second, they treated burnt charcoal chunks to produce activated charcoal for a water filter which enhances water purification by trapping heavy metals and impurities through adsorption. To further sustainability efforts, the team used 3D printing to develop a compact water filtration unit to house the charcoal filter. The water filtration unit can be easily reproduced and adapted for both household and industrial use.

Innovators' Inspiration

"Charcoal waste from food production is often overlooked, leading to pollution and resource wastage. Seeing so much discarded charcoal in the food industry, we wanted to give it a second life. By transforming burnt charcoal into useful products, we not only reduce waste but also create sustainable alternatives for everyday use. Whether it's chemical-free soap or water purification, small innovations can lead to significant environmental benefits."

~ Keanu Skye Swyny Fonseca

What's So Special

- The charcoal-infused soap is made from burnt charcoal ash and biodegradable materials. Due to charcoal's high absorbency, it traps dirt and impurities more effectively, requiring less water for rinsing.
- Burnt charcoal chunks which are used in the water filter undergo activation through steam or carbon dioxide, increasing their surface area from 5.0m²/g to 1000m²/g. The charcoal chunks are also soaked in 85% phosphoric acid. These treatments significantly boost their adsorption capacity.
- The charcoal water filter's effectiveness was proven through microscopy studies and ICP-MS (Inductively Coupled Plasma Mass Spectrometry) heavy metal analysis.
- Supports Singapore's Sustainable Living goals under the Singapore Green Plan 2030, which emphasises the importance of reducing waste and promoting circular economy practices.
- By merging their cross-disciplinary expertise, the team successfully developed a solution that is technically sound and environmentally impactful.

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