

HIGH SURFACE AREA SPHERICAL SHAPED ACTIVATED CARBONS FROM BOURBON WASTE

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Bourbon production has increased 275% in the last two decades, with around 1.7 million barrels produced in 2017, most located within the state of Kentucky. Wastes from the distillation column, or whole stillage, have traditionally been used as animal feed on local farms. However, farm production has remained flat, resulting in an excess of stillage beyond what can be consumed as animal feed leading to a viable disposal challenge.

Average stillage composition is around 6-12% in total solids, where approximately 50% is sugars, 20% is proteins and 20% is fats. Current research examines the hydrothermal carbonization (HTC) of whole bourbon stillage. Advantageously, raw whole stillage contains the necessary water to solids content for HTC, and the high sugar content results in high yields of spherically-shaped hydrochar. The production of hydrochar from bourbon stillage is also looked at as a means to reduce the carbon footprint of the bourbon production process.

A treatment temperature of 200°C and treatment times of 1-5 hours were studied. The presence of proteins yields a high nitrogen content in the hydrochar, homogeneously distributed within the resultant spherically shaped particles. Hydrochars were subsequently carbonized and steam activated at 900°C, with carbon yields between 10-70%. Steam activation allowed for production of a range of pore size distributions and surface areas, between 1000 m²/g at 30% burn-off to 1500 m²/g at 60% burn-off. These carbons are suitable for a range of high-value applications.