# Polycyclic Aromatic Hydrocarbons (PAHs) in Biochar

Biochar may be an effective soil amendment capable of improving the ion exchange capacity and nutrient and water retention properties of soils. Also, because it is stable for long periods, biochar may be suitable for carbon sequestration. However, biochar can contain various concentrations of polycyclic aromatic hydrocarbons (PAHs), which are known carcinogens (Figure 1). The PAH (polycyclic aromatic hydrocarbon) content of biochar may therefore restrict its beneficial uses or even result in its being classified as a hazardous waste. On the other hand, PAHs (polycyclic aromatic hydrocarbons) sorb strongly to black carbon, which limits their solubility in sediments and soils. Because biochar is a form of black carbon, the PAHs (polycyclic aromatic hydrocarbons) in biochar may have limited mobility and bioavailability.

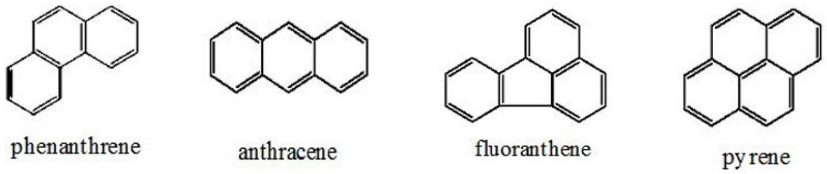
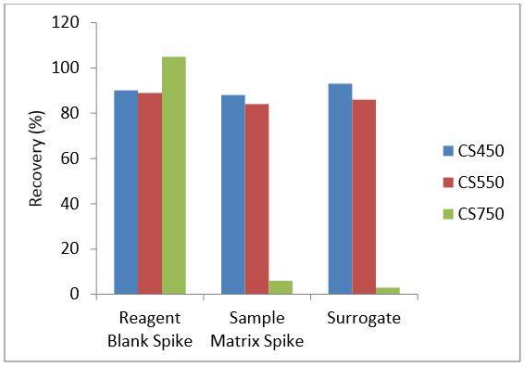



**Figure 1: Chemical structure of selected PAH (polycyclic aromatic hydrocarbon)** ***(source image for PAH (polycyclic aromatic hydrocarbon) structures)***

Biochar properties depend on the starting material and production conditions. It is likely that PAH (polycyclic aromatic hydrocarbon) sorption and bioavailability also depend on these factors. John Scott (Senior Analytical Chemist at ISTC) collaborated with Drs. Michael Machesky and Thomas Holm (both geochemists at the Illinois State Water Survey) to characterize the binding of a representative PAH (polycyclic aromatic hydrocarbon) compound to a set of biochars and the effects of these biochars on PAH (polycyclic aromatic hydrocarbon) bioavailability.




**PAH (polycyclic aromatic hydrocarbon) recovery from biochar.**

Results showed that less PAHs (polycyclic aromatic hydrocarbons) are found in the biochar after pyrolysis as the pyrolysis temperature increases. A surrogate PAH (polycyclic aromatic hydrocarbon) (typically not found in nature) was added to biochars that were pyrolyzed at different temperatures (450°, 550°, and 750° Celsius). Nearly 90% of the PAH (polycyclic aromatic hydrocarbon) remained on the biochar produced at 450° and about 85% remained at 550°. However, for biochar produced at 750° the remaining surrogate PAH (polycyclic aromatic hydrocarbon) was approximately 5% or less than the known added amount.

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### Publications

- **Sorption of Polycyclic Aromatic Hydrocarbons (PAHs) to Biochar and Estimates of PAH Bioavailability (Research Report RR-124)**

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