Utilizing the Adsorption Properties of Renewable Mediums to Reduce Methane

Yeager, Megan (School: Chesapeake Science Point Public Charter School)

Methane is the second most abundant anthropogenic greenhouse gas after carbon dioxide and accounts for about 20 percent of global emissions. My project tests the ability to utilize the adsorption properties in activated carbon to reduce the amount of methane in the air. I hypothesize that I can adsorb methane from the air using activated carbon derived from coconut husks. I designed an air-tight testing chamber that would allow me to circulate methane, exposing it to activated carbon. Using 2 MQ-4 gas sensors, I recorded the methane concentration every 30 seconds over 7 days. The data showed a downward trend of methane concentration with the concentration decreasing by 4.63% on an average daily basis.To further test the adsorption properties of activated carbon, I manufactured by own waste based activated carbon using spent coffee grounds. The manufactured coffee ground based activated carbon decreased by 12.7% after a 7 day period with an average daily decrease of 2.125%.Overall the methane level decreased by 27.2% over the 7-day span, proving my hypothesis correct. From the testing it can be concluded that;The adsorption properties of activated carbon are capable of reducing methane levels in the air, temperature affects the adsorption rate and properties of activated carbon. With higher temperatures making the adsorption process less effective and that activated carbon has a carrying capacity and is only able to adsorb a certain amount of methane before being unable to adsorb more.Because activated carbon can be manufactured from carbon-based waste products and its methane adsorption properties are proven, methane concentration in the air can be reduced in the atmosphere using activated carbon derived from readily available waste products.