Building an Attachable Device to Capture Carbon Dioxide Emissions From a Lawnmower

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According to the US Environmental Protection Agency, gas-powered lawnmowers make up five percent of total air pollution in the United States. In this project, a homemade bubble column reactor was used to capture the carbon dioxide in the emissions from a lawnmower and react it with sodium hydroxide to convert it to sodium bicarbonate, which is a non-harmful substance that can be used for everyday cleaning. Four prototypes were constructed progressively solving problems with airflow, especially as related to exhaust pressure and volume. The problem of splashing liquid in the reactor caused by high exhaust pressure was resolved by using a ball valve to split the gas stream. The ball valve also reduced the amount of exhaust gas that was captured and cleaned, a problem that could be solved by scaling up the system in the next prototype. Trials of the final system tested various concentrations of sodium hydroxide to assess the carbon dioxide absorption rate as measured by a pH indicating color shift. The current apparatus demonstrated a successful chemical reaction that worked best with lower concentrations of sodium hydroxide. This prototype successfully captured carbon dioxide from the engine exhaust and converted it into useful sodium bicarbonate. The remaining wastewater can be easily treated in a water treatment facility, making this a green cycle. Future development will scale up the system to capture a higher percentage of the exhaust and thus more carbon dioxide.

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