

Methane Removal Paste

AME 410 Interactive Materials

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Motivation

Our motivation behind making an air filter is air pollution, specifically Methane and Carbon Dioxide harming the environment.

Project Idea

Our Biodesign project is a filter that is placed on top of roofs and placed in air conditioning systems. The filter will be made from a compound of coffee grounds and potassium hydroxide that has been heated and then formed into a usable shape. The compound is able to absorb both methane and CO₂ exceptionally well. Once the compound has been exhausted and absorbed the material can be used as a fuel source that burns much more cleanly than typical fossil fuels.

Sensors/ Inputs/ Outputs

- Methane sensor to sense the methane concentration in the air.
- LCD to tell the user the amount of methane and CO₂ in the air.

Gases Activated by Filters

These are a list of some of the gasses/materials that activated carbon effectively filters:

Hydrocarbons can be [gases](#) (e.g. [methane](#) and [propane](#)), [liquids](#) (e.g. [hexane](#) and [benzene](#)), [waxes](#) or low melting [solids](#) (e.g. [paraffin wax](#) and [naphthalene](#)) or [polymers](#) (e.g. [polyethylene](#), [polypropylene](#) and [polystyrene](#)).

Basically any hydrocarbon sticks to the honeycomb structure of the activated carbon and is caught, like a filter.

Impact

Carbon Dioxide is a colorless, odorless gas. 0.04% of concentration is the normal level of carbon dioxide in the atmosphere. With 1 – 1.5% has a slight effect on chemical metabolism after exposure of several hours. At 3%, carbon dioxide is weakly narcotic at this level, resulting in deeper breathing, reduced hearing, headaches and an increase in blood pressure and pulse rate. At 4-5%, breathing becomes deeper and more rapid. Signs of intoxication become more evident after 30 minutes exposure. At 5-10% breathing becomes more laborious with headache and loss of judgement. At 10%, when CO₂ concentration increases above 10%, unconsciousness will occur in less than one minute. Unless prompt action is taken, further exposure will eventually result in death.

(<https://www.analoxsensortechnology.com/blog/2016/02/11/carbon-dioxide-gas-detection-dangers-co2/>).

Methane is also a massive problem, accounting for twenty percent of the total radiative forcing from all the long-lasting global greenhouse gases. While methane does not last as long as carbon dioxide, it is initially far more devastating due to how effectively it absorbs the heat of the sun. In the first two decades after release, methane is 84 times more potent than CO₂.

There are cities and towns around the Phoenix area that equal up to 72 metric tons of carbon dioxide equivalent (<http://coolclimate.berkeley.edu/maps>). Awareness and active implementation of the devices on buildings and structures, vehicles, and personal uses, would actively help minimize the carbon footprint.

Further Implementation

- DIY uses to sell for homes, apartments, and businesses
- Create a set of instructions to safely prepare and use the paste

Related Work

www.scientificamerican.com/article/methane-proves-hard-to-capture/

<http://newatlas.com/coffee-carbon-capture-methane/39299/>