Activated Carbon Foam Surfaced Carbon Dioxide Scrubber with an Environmentally Sustainable Gas Purification System Using Bicarbonate Ions

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An activated carbon foam surfaced carbon dioxide scrubber with an environmentally sustainable gas purification system using bicarbonate ions removes carbon dioxide from the atmosphere at low concentrations and ambient temperatures to purify it for further use (fuel conversion, glucose, etc.) with very limited heating. This is done using a porous carbon foam reaction surface, as well as an aqueous sodium carbonate adsorbent that allows for cyclical repetition by reusing the original adsorbent that reforms as one of the respective end products of sodium bicarbonate decomposition. Concentration and mass data of the resultant, purified gas was collected from a carbon dioxide probe and balloon respectively. Data results indicated overall system success, but it should be noted that the scrubber apparatus, as a whole, was built to represent a small scale model of what could be a commercialized scrubber for future applications. As a result, measured volumes and masses in graphical representations and data tables may seem low, but a further, up-scaled analysis shows the favorable potential of a system of this environmentally and economically sustainable nature when compared to current scrubbing methods. Ideally, the scrubber can be used on Mars to collect the abundant gas from the atmosphere and convert it into methane fuel for ascent/descent vehicles in space; on Earth it can be used in conjunction with smokestacks at industrialized factories, as well as on the individual level and, in turn, has the potential to reduce the carbon footprint created by humans.

Awards Won:
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