Novel Artificial Synthesis of Sugars from Non-Organic Compounds for Renewable Cellular Energy

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The purpose of this investigation was building a reactor that combined carbon dioxide and water molecules into artificially synthesized carbohydrates and identifying those carbohydrates that were produced by comparing them against known lab-grade controls. The reactor was built from high gauge wires, a 3–to-6 VDC input high-voltage-output generator, sewing needles, hypodermic needles, and a glass container. The glass container held the chemical reaction, while the wires connected the power source, high-voltage generator, on-off switch, and needles. The needles served to amplify and focus the high-voltage electrical arc. To identify the analytes from the non-biological reaction, a UNICO S2150UV spectrophotometer and K3 software (PC Software pn#S2150-401 V1.05 and V1.13) were utilized. The analytes were also tested by adding Benedict's solution and iodine. The spectrophotometer gave absorbance and transmittance of the substance under different wavelengths from 195 to 400 nm (Unico S-2150 Series Spectrophotometer User's Manual) that was used as a guide to identifying the output of the reactor. The Benedict's test helped to identify any sugars that were produced, based on four lab-grade controls (glucose, sucrose, fructose, and dextrose). The iodine test ruled out that any starches were present. Crystalline sugar was also grown by evaporating the liquid from the output of the generator and compared with sugar crystals taken from lab-grade controls. This is a model for future investigation into the synthesis of edible substances for exploration into space, including Mars. This investigation also modeled a possible solution for recycling excess carbon dioxide from the Earth's air.

Awards Won:

Drexel University: Full tuition scholarship $200,000