Hydrogen Production by Artificial Photosynthesis Through the Photocatalytic Splitting of Water in the Presents of Sunlight and a Photo Catalyst

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Hydrogen as a fuel is a clean source of energy to support zero-carbon energy strategies. However, most of the current major methods of producing hydrogen are fossil fuel reliant thus affecting the environment and human health. Using an artificial photosynthesis system, we tested the hypothesis that hydrogen can be produced from splitting water in the presence of sunlight. We made our system using a transparent container containing 500cm³ acetic acid, 1500cm³ water and a cathode connected through an external circuit to a silicon semiconductor metal coated with titanium dioxide acting as the photo anode. The system was exposed to sunlight for 6 hours during the day. Results were collected after an interval of an hour. Hydrogen was collected using displacement of water and oxygen using downward delivery of gases. After 6 hours of experimentation, we managed to get 201,2cm³ of hydrogen overall. At each interval the amount of hydrogen produced varied due to the variation in light intensity. To test whether the gas was hydrogen indeed, we tested using a burning splint which burnt with a ‘pop’ sound. The amount of oxygen also produced was 93.5cm³ overall which we tested using a glowing splint and it relighted. The study showed us that hydrogen production from artificial photosynthesis through photocatalytic water splitting is feasible. The system proved to be 13.4% efficient since it produced 2/15 of the expected amount of hydrogen. For further research, we would want the system to be unaffected by light intensity as well as be more efficient using the more advanced materials.

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