**Experiment (9) Preparation of the Electrolyzer Module and wind powered hydrogen production**

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**(i) Components Used**

* Wind Turbine Generator (Horizon model)
* Electrolyzer module
* Hydrogen and oxygen storage cylinders
* Water-filled electrolyte tubes
* Red and black connecting wires
* Mounting and connector bases

**(ii) Objectives**

* To demonstrate the conversion of wind energy into chemical energy
* To use electricity generated by a wind turbine to split water into hydrogen and oxygen using an electrolyzer
* To observe the storage of hydrogen and oxygen in respective cylinders for later use in a PEM fuel cell
* To reinforce the concept of renewable energy storage

**(iii) Procedure**

1. We first mounted the wind turbine on its base in a secure position.
2. Red and black wires were used to connect the output of the wind turbine directly to the electrolyzer module.
3. Two water-filled gas cylinders were connected to the electrolyzer using gas transfer tubing — one for hydrogen (H₂) and one for oxygen (O₂).
4. When wind (or fan air indoors) caused the turbine blades to spin, electricity was generated and sent to the electrolyzer.
5. The electrolyzer initiated electrolysis of water, resulting in visible gas bubble formation inside each cylinder.
6. The system was left to operate until a noticeable volume of hydrogen and oxygen was collected for fuel cell use.

**(iv) Observations**

* Bubbles quickly formed in both gas cylinders, indicating active water splitting.
* Hydrogen was generated at approximately twice the volume of oxygen (H₂:O₂ = 2:1).
* The process began as soon as the turbine reached a minimum rotation speed.
* This clean, quiet process effectively showcased energy storage from wind.

**(v) Precautionary Measures**

* Confirmed water levels in the electrolyzer and gas cylinders before operation.
* Ensured tight, leak-free connections between tubes and cylinders.
* Checked turbine wiring polarity to ensure correct electrolysis direction.
* Handled the system gently to avoid tube dislodgement.
* Performed the setup in an open or well-ventilated space due to gas production.