

## Renewable Hydrogen Production from Household Waste

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### INTRODUCTION

In countries like United States of America & other multiple countries from waste, there is a process called next generation thermo-chemical process which helps in transformation of solid waste which incorporates plastics, municipal solid waste, medical waste and wastewater sludge into the hydrogen without burning the waste. The proportion of carbon dioxide in the waste is directly proportional to the amount of carbon in the waste products.

Organizations like hospitals, industries, ports, processors and others bring out a huge waste which would favor the hydrogen production and gives a positive impact on production and sales of hydrogen

### HYDROGEN CAN BE PRODUCED BY FOLLOWING METHODS

#### Method 1

The electrolysis method is performed through water which is a simple method to produce hydrogen gas. In this process, water will be disintegrated into hydrogen gas and oxygen gas in which the oxygen gas is impure.

#### Method 2

In this process, we use pencil which is made up of pure lead/pure graphite as electrodes; here we will be adding a small amount of salt to acts as an electrode. Graphite is electrically neutral which makes it eligible to be adequate electrode. Disassociation of salt into ion takes place in the presence of water which rises the current flow which helps in improving electrolysis reaction.

#### Method 3

Frequent release of hydrogen gas takes place from chemical reaction. Zinc reacts with hydrochloric acid to form zinc chloride and hydrogen gas. Replacement of aluminum or iron can be done as majority of the metals tend to react with acid and liberate hydrogen gas. This reaction should be carried out in the environment like within a fume hood and to put-on goggles and gloves. Transpose of a glass container on the metal. Here the gas is superseded by liquid.

#### Method 4

A robust reaction takes place between strong bases & metals. In this method, aluminum reacts with sodium hydroxide, it results in evolution of hydrogen gas and sodium aluminate. Hydrogen can also be produced from biomass which involves refining with organic materials at immense temperate which doesn't involve combustion. Liberation of hydrogen gas takes place when we blend oxygen & steam. The liberated carbon monoxide when fused with additional steam hydrogen can be reduced. This process of recycling takes place by using plant respiration cycle and to produce biomass.

Other options include fermentation, pyrolysis, biological agents, and anaerobic bacteria which utilizes similar gasification process without oxygen where a clean hydrogen gas is produced. Most of the hydrogen produced in the USA is been generated from fossil fuels and electrolysis by ignition of municipal waste hydrogen can be generated. By using food waste hydrogen can be produced which contains starch, protein, lipids, volatile fatty acids from which hydrogen is generated.

Fermentation process involves accomplishment of hydrogen production from anaerobic bacteriogenesis, there are four fermentation types which are as follows Acetate type fermentation, Ethanol type fermentation, Propionate type fermentation, Butyrate type fermentation. Hydrogen production depends on several criteria which are as follows pH, temperature & organic loading rate.

### CONCLUSION

Production of renewable hydrogen from household wastes is the effective with less investment like electrolysis methods with water, pencil, from various chemicals reactions & other production techniques from hydrogen involves fermentation which is of different types is considered to be simple, economical & conventional.

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