

Application Technique of Hydrogen and Oxygen for Co-Fuel Small Trucks

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Abstract

The Petroleum Crisis and high demand affecting all Thailand and research must actively find renewable energy. Hydrogen and Oxygen gas or Hydroxy Gas can be produce on small plates of stainless steel with Theoretical of Electrolysis and Potassium hydroxide (KOH) and can be applies to a solvent for an electrolytic. The 60 x 100 mm of stainless steel plates are the anode and cathode. The 12-V and 14-A of the Diesel engine are electric sources for the electrolysis. Hydroxy gas are produced by the circuit of 600 milliliters per minute and applied to small truck diesel engines by passing water in a Bubbler. Hydroxy Gas bubbles supply to the air chamber diesel engine by a flexible tube for co-air supply. A 15,000 Kilometers test has proven to save fuel of 10 % when applied to co-air supply to diesel engines by normal function. Hydroxy gas generator box assembling by simple material PVC and all accessories can be found in Thailand hardware supply. Total cost 2,500 Baht including installations for Diesel Engines truck, The 1 liter of pure water shall be added for operating engine and continues to use up to 800 kilometers for trial operating truck and after the completion of 50,000 the Hydroxy generator should be re-cleaned as one cycle completion. In conclusion this research can produce witch composed of Hydroxy and can be used as any alternative energy.

Keywords : Hydrogen and Oxygen gas, Hydrogen and Oxygen gas generator, Hydroxy Gas, Hydroxy generator, HHO

1. Introduction

Thailand has a trade deficit from import volumes of energy, especially petroleum is key. The petroleum oil import growth from fine problems including the needs for high-volume and price variability with height adjustment according to market demand. The strategy to development or education to find substitute fuels is an alternative.

The alternative in the world energy are currently[1] in interested how to use energy from hydrogen gas[2], but they are still having problems because hydrogen has flammable properties and may cause an explosion easily, Hydrogen gas can produce slow and continuously, a control of limit current and voltage of electricity, that process gas, we call electrolytic. Hydroxy Gas (HHO) is a gas produced in the process of electrolytic. Gas caused by the separation of water, hydrogen and oxygen in a molecule of water, Ratio 2:1.

The study was conducted using gas Hydrogen and Oxygen, made from stainless sheet metal by electrolytic process, Potassium hydroxide (KOH) solution is a conductor to process gas, the gas called Hydroxy Gas (HHO), and applied together HHO gas with diesel fuel to use as a CO FUEL for a diesel engines in pickup trucks.

2. Experiment

Step 2.1, Plate used as part for production Hydroxy Gas used a stainless steel[3] which was # 316, 1 mm thickness and cut size of 60 x 100 mm, cutting the angle on the left side to secure and manage a circuit in a HHO box generator to in an electrolytic water separation processes.

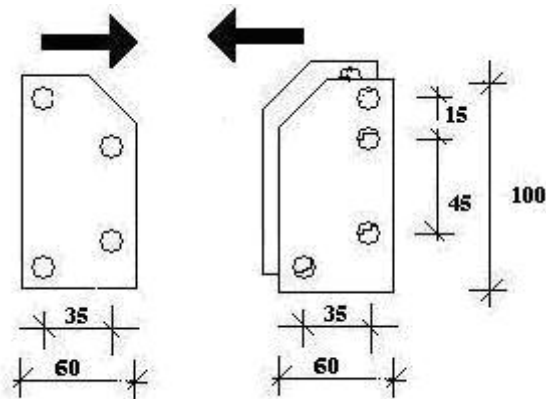


Fig. 1 Plate for HHO gas generator Structures

This requires spacing of 3 millimeters between sheets with a total of 3 plates in 1 set and called a Cell. One cell had 3 plates assembled as a kit and will be assembled together with PVC insulation barrier between the sheet and the specific area around the screw head only. The application requires the first and third plate to be attached to the anode and second plate to be connected to a negative power source.

Step 2.2, Gas generator box is made from PVC sheets forming links. Cells to be installed in the gas generator room. Installation of six rooms, each cell connected in series. This provides a HHO gas generator.

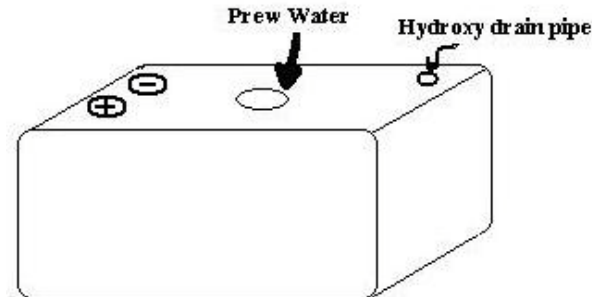


Fig. 2 PVC Box for HHO gas generator

The simple depiction box size with dimensions of 120 mm long, 240 mm wide, 160 mm height the and gas flow channels are 4 mm wide. In the box it can control a chamber to produce Hydroxy gas. The process required to isolate 6 cells in series and separate cells work together, but extract maximum performance during the cycle, then the gas will flow through the box provided and then flow together in order to supply it to the engine. The box it provides services for the water distillation unit. When using a water will be used to break the gas need to add water, 1 liter per 800- 1,000 km approximate after installing a cell circuit into each box. Connect the circuit with a stainless flat line plate then fitting by securing with appropriated bolts and nuts. When finished assemble cell the circuit in the HHO generator box then add KOH solution concentration approximately 2-5% into the generator box to upper level and then connect a DC 12 volt positive and negative to the circuit.

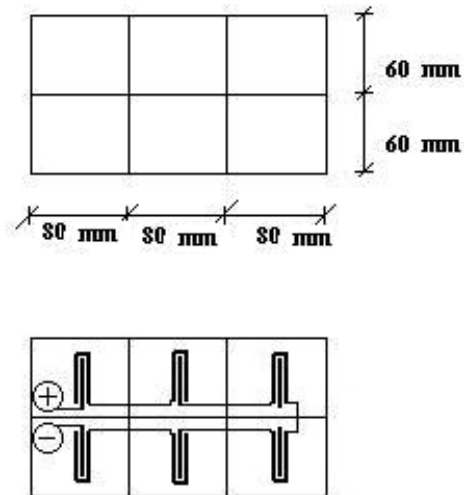
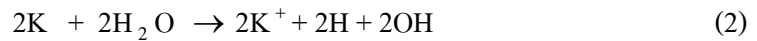
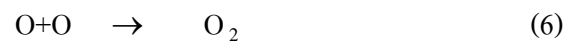
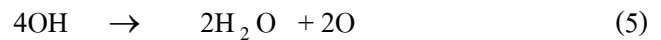


Fig. 3 PVC Box sides & cells connecting

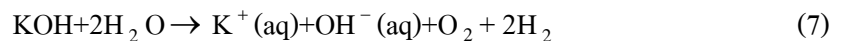
Reactions that occur at cathode [4]



Reaction at the Anode [5]



And the reaction occurs [6]



In the process use of HHO gas, it should be controlled by the gas flow through by the passage of water contained in cylindrical containers with specific direction of gases flow and equipment that we call a Bubbler[7]. This was considered a very important process, before applying HHO gas to be used as Co fuel with diesel fuel.

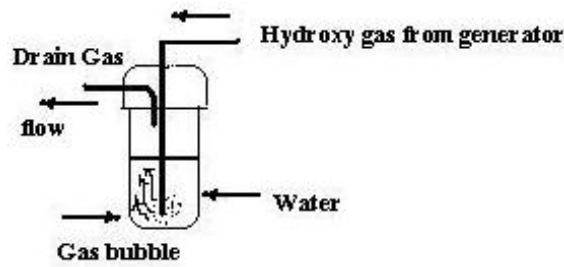


Fig. 4 Bubbler connecting for protection of back fire

Step 2.3, Electrical installation and used after review and tested for leakage of HHO gas generator was ready to be installed for use with internal combustion engine in small truck vehicle by a limited space in order to reserve a convenient space for operation and maintenance after installation. The next step, connected to the HHO generator to It's internal electric circuit and install a protection circuit with fuse size 25 amps, connect all component with electric wire and wrap Insulation to extra layer to security of using the car.

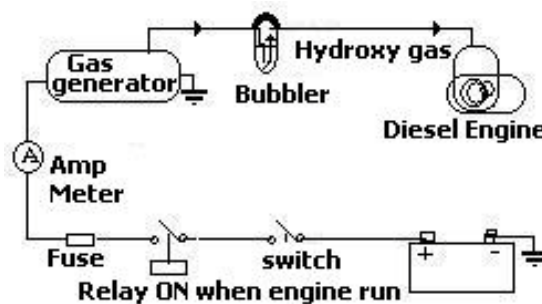


Fig. 5 Electric circuit and bubbler protecting

Another necessary need to provide an equipment and additional use, such as ammeter installed to measure the power switch for cutting cycles when not need, for electrical relay control circuits to connect and disconnect. Ready and able to set electricity produced HHO generator.

Step 2.4, Operational tests of Hydroxy gas produced from the experiment were able to produce gas by the amount of electricity at 12-14 amperes, voltage 12-13.5 volts, temperatures in a series cells produced gas 35-45 degrees Celsius, the nature of the gas is clear, colorless, odorless and lighter than air volume. Measuring tests by replacing the water 500 to 800 ml / min. and can produced continuously.

HHO gas will be flow in direction that controls the production and that is not much gas, so no need for any engine tuning. The promotion will be a complete combustion and get more drive in full capacity. Electricity will be supplied to HHO gas generator. Usually all small truck vehicles had installed electric alternator, a maximum power 70 amps per hour and normal use in car just support only electrical equipment which is not heavy duty, such as air conditioning, lighting and amplifiers only, still have powering left little then can be used and managed without affecting the normal operation system. The electric current were detected from the small truck vehicles normally using electricity only at 25-30 amps per hour, If managed and supply 15 amps per hour to a gas generator it will be not over supply maximum power.

3. Results and Discussions

Stage 1: Laboratory results of the physical production set to produce Hydroxy gas (HHO), measured in cubic milliliter with KOH solution concentration about 2-3 and 5%.and electric supply at current 12-14 amperes, voltage 12-13.5 volts, approximately: HHO gas by measuring test replacements the water got volumes of 500 to 800 ml / min and produced continuously.

Stage 2 : Test has been modified and scaled from Gas chambers, recently in order to install applications in chamber diesel engine vehicles.

Small truck vehicle had installed HHO gas generator in three sampling product lines and all small truck using the engines of 2,500 cc, with Turbo Intercooler.

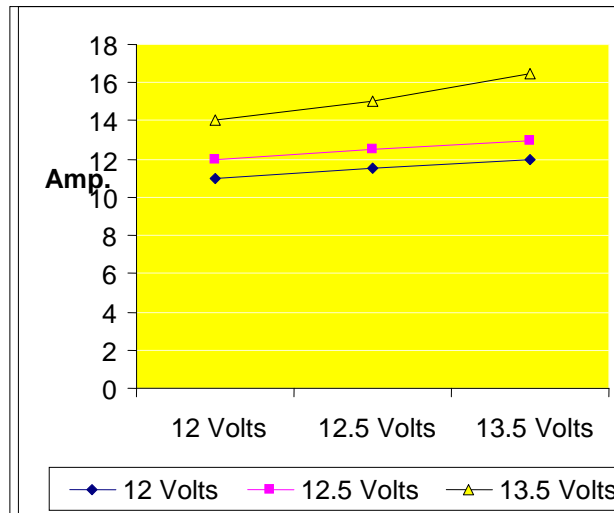


Fig. 6 Electric current supply 12, 12.5 & 13.5 V.

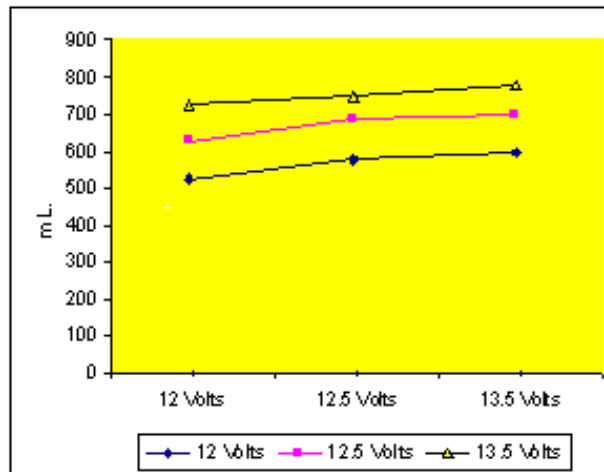


Fig. 7 Hydroxy gas at supply 12, 12.5 & 13.5 Volts.

1. Trial process, started with a plan to communicate with trucks user. Using regular routes and regular cargo weight, time to work any similar regularly use. The trial is voluntary and welcome to a record data of owners of the use and rate of fuel consumption. The total test distance has the length of 5,000 kilometers.

2. The results are averages of three vehicles from the product of small truck in Southeast Asia. There using diesel engines 2,500 cc with turbo intercooler compare between and before after applying HHO gas to a CO FUEL with diesel fuel.

The Result of the total distance 1,500 km using HHO gas as CO FUEL with diesel fuel were able to save fuel consumption. Diesel fuel has accounted for approximately 10-12% of fuel use. Test for small trucks 2,500 cc with turbo intercooler from 3 sampling.

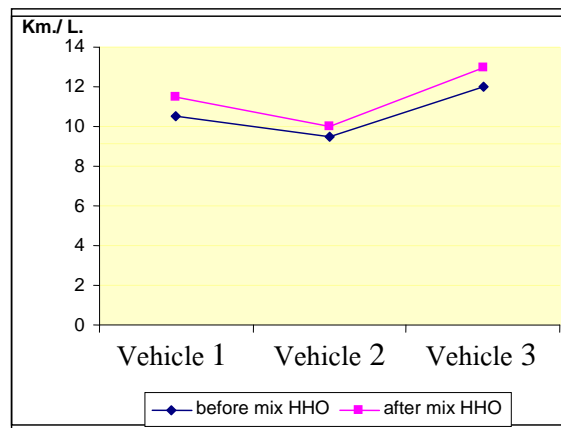


Fig. 8 Fuel consumptions before and after mix. HHO gas.

HHO generator production has a cost of 2,500 Baht and installation of other equipment such as electrical cables, protective clothing, including gas piping and other facilities around 1,500 Baht. Total approximates are 4,000 Baht.

4. Conclusion

Hydroxy Gas (HHO) is a gas produced in the process of electrolytic. Gas caused by the separation of water, hydrogen and oxygen in a molecule of water, Ratio 2:1. The study was conducted using gas Hydrogen and Oxygen, made from stainless sheet metal by electrolytic process, Potassium hydroxide (KOH) solution is a conductor to process gas, the gas called Hydroxy Gas (HHO), and applied together HHO gas with diesel fuel to use as a CO FUEL for a diesel engines in small trucks vehicle. The result of the total tests using HHO gas as CO FUEL with diesel fuel were able to save fuel consumption. Diesel fuel has accounted for approximately 10-12% of fuel use. Hydroxy Gas at a CO FUEL will be the alternative energy and cleaned energy.

5. Acknowledgement

The author would like to thank the Electronics the division for Agricultural Research Unit in Faculty of Engineering.

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This paper was submitted on 19 August 2011 and published on 5 September 2011.