# Biogas-An Investigation & Comparsion Of Natural Fuels

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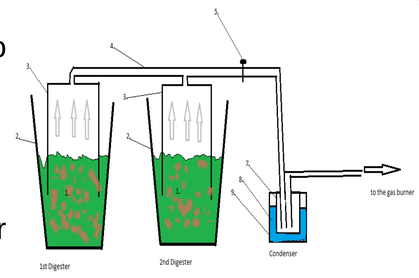
**Introduction:**
Tanzania will soon have a population close to 50 million. 80% of Tanzanians live in rural areas where their energy needs are met by burning wood. This is very bad for health and our ecosystem. Biogas is becoming a viable alternative source of energy with many advantages. Biogas is simple a gas that is produced by the breakdown of organic matter in the absence of oxygen. In this project we aim to build a simplified biogas plant and demonstrate its use. Tanzania with population of about 40 million people which grows at a rate of about 2% per annum with about 80% of Tanzanians living in rural areas where 94% of their energy needs are satisfied by burning wood. With very dangerous effects of the dependency on wood; such as the destruction of ecosystems and smoke from fuel wood leads to respiratory and eye diseases.
By our suggestion, Biogas is the alternative source of energy that Tanzanians living in rural areas should use for the daily energy needs.

## Materials
Our biogas generator is built using: cow dung, 2 X 50L and 20L containers, piping, clips and a condenser unit comprising of water and two small containers as shown in Fig.1..

**Method**:
- Animal waste is put into container 2 and left to settle for a few days in the absence of air.
- As the gas is produced, it collects in the pipes (4).
- When the valve is opened, biogas flows through the condenser. It will enter and leave through the two pipes. During this stage water vapour will turn to liquid and the biogas will be dehydrated.
- The biogas can flow direct to the burner



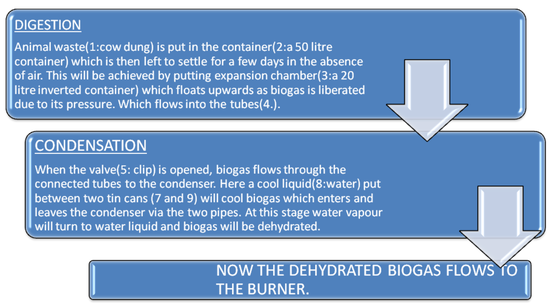

**Exp 1.**
Preparation of simple biogas digester (floating drum)

**Procedure**;
-equal amount of cow dung and water were fed into the digester. i.e. 1:1
-the system was left for one week, and there was continuous replacements after each two days.
**Observation**;
The floating drum rose up and the balloon seemed to expand. The gas was allowed to flow to the burner and burn with clean non-luminous flame.
**Conclusion**;
- There was gas produced and burned.

**Exp 2.**
To show the importance of using correct ratios of water and cow dung.
**Requirements**: Three 0.5L, cow dung and water.
**Procedures**:
-In bottle labeled A equal amount of water and cow dung were fed in the ratio of 0.125L: 0.125L respectively.
-In bottle labeled B contained excess amount of water in the ratio of 0.15L: 0.1L
-In bottle labeled C contained excess cow dung in the ratio of 0.1L: 0.15L
**Observation:**
Bottle A was observed to experience maximum expansion than the other.
**Conclusion:**
**For the maximum biogas production it is advised to use equal ratio of wastes with water.**

**Exp 3.**
**Aim:** To determine which kind of material/wastes ate good in biogas production.
**Procedure:**
-Six bottles labeled A, B, C, D, E and F were taken
-Bottle A contained right proportion of cow dung and water.
-Bottle B contained water, pig dung and cow dung.
-Bottle C contained water, food remains and cow dung.
-Bottle D contained water, plant leaves and cow dung.
-Bottle E contained water, soap solution and cow dung.
-All bottles contained wastes at the same ratio. The bottles were shrinked in order to observe the gas when produced.
**Observation:**
-Bottle A, B and C were observed to expand to a greater extent.
-Bottle E seemed to expand less.

## Results:
The gas produced burnt with a very hot flame. To investigate the gas we compared it with other burning materials: **charcoal**, **paper**, **paper charcoal**, **dried animal dung**, **wood** and **dried orange peel.** Table 1 shows the results for the different materials:




| | Hotness | Time Taken to Light | Smoke Produced | Soot Produced | Cost |
|---|---|---|---|---|---|
| **Biogas** | Very hot flame | Instantly lit | None | None | Cheap |
| **Charcoal** | Relatively low | Took long time | Much smoke produced | Too much soot | Expensive |
| **Paper charcoal** | Relatively low | Took long time | A Little smoke produced | Too much soot | Cheap |
| **Dried Animal Dung** | Hot | Took long time | Much smoke produced | Too much soot | Cheap |
| **Kerosene** | Very hot | Instantly lit | A Little smoke produced | A little soot | Expensive |
| **Wood** | Relatively low | Took long time | Much smoke produced | Too much soot | Exploits human labor |
| **Dried orange peels** | Low | Took very long time | Much smoke produced | Too much soot | Cheap |

## Conclusions:
Biogas appears to be an excellent source of energy. It increased the water to the highest temperature and produced no smoke or soot. The disadvantage is the amount of dung necessary to produce enough gas for a household. According to the results above; Other sources of energy are not sufficient in all categories compared to biogas. For example kerosene is good at all categories except for the cost which Is expensive compared to biogas.
Therefore biogas is the best alternative source of energy that should be adapted in rural areas where electricity is rarely available and where people are small scale livestock keepers with few cows and a small area for cultivation.

## References:
www.En.wikipedia.org/wiki/biogas
www.biogas-tanzania.org/index.php/partners/centre_for_agricultural_mechanisation_and_rural_technology_camartec/

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