

Purification of Biogas at Domestic Level

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Abstract:

When we use biogas plant in domestic level the organic material we use is animal dung, kitchen waste and extra organic material, but the amount of biogas we obtain is not well purified for the combustion process or if we use biogas in our kitchen stove. In other words we can say that the calorific value of the biogas is less and reduced, thus efficiency in cooking of the food is not increase due to proper incomplete combustion of biogas. The possible cause of the incomplete combustion is presence of other gases into the biogas like CO₂, H₂S and other gases. It is stated that normal methane is about 60-70% and rest other gases present into the biogas. This paper is based on how to increase calorific value of biogas in household or domestic level.

Keywords: biogas, potassium hydroxide.

Introduction:

We know that the average calorific value of the biogas is (4776.91 K cal/m³)^[1] When it contains 55-65% of methane and 35-45% CO₂, 0.5-1 % H₂S and some amount of the water vapour. And calorific value of methane is 9506.0 Kcal/m³. Also, we know the calorific value of the LPG is 8962.5 Kcal/m³ (density of methane will be -0.717 kg/m³)^[2]. So if we do not want to waste fossil fuel and we need to use renewable energy. Therefore biogas is the most suitable option for it. But its calorific value is low. The reason is due to presence of CO₂ which reduces the combustion rate of the biogas.

Material & Methods

In order to improve calorific value of the biogas, we need to remove CO₂ from it^[3]. In domestic level, filtering the biogas or removal of CO₂ will be quite costly compared to the industrial techniques that we use in industries. Therefore there should be some sort of domestic and cheaper method that can be utilized in village, home anywhere.

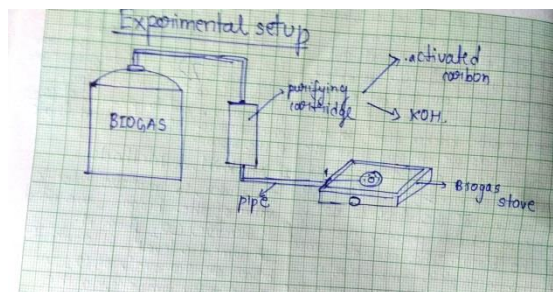
Material Required:-

1. Biogas plant (biogas)
2. Biogas stove
3. Gas pipes
4. Connectors
5. Purifying cartridge
6. KOH (potassium hydroxide solution)

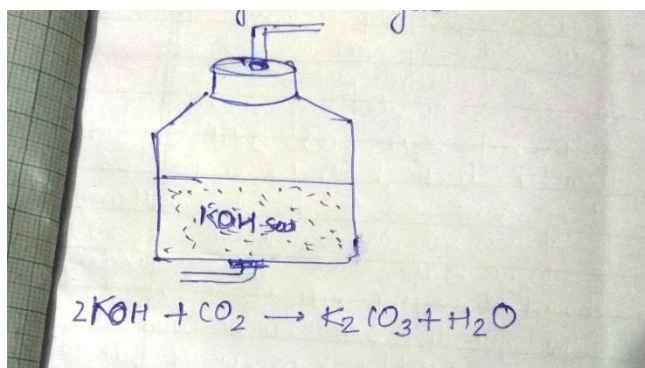
SET UP

The basic setup starts with the biogas plant, through which pipe is connected through the purifying cartridge and biogas stove is also connected to the help of pipe and connector with the help of clips.

Since if we use KOH soluble in water, it is good, absorbent of CO₂, which can easily absorb CO₂ and pass out CH₄ and other gases. Thus improve in the calorific value of the biogas.



The KOH will absorb the CO₂ content that is present into the biogas. Passes out the rest component or gases throughout the pipe. The reaction is shown below.



The mixture of KOH with water should be 40:60^[4].

Following data is shown when biogas is been purified by the KOH technique by the given setup.

Biogas obtain from biogas plant	Biogas has been purified by the experimental setup.
CH ₄ 61.52%	79.51%
CO ₂ 32.34%	15.53%

Conclusion:

From the following table we conclude that the composition of methane will be more after passing it to the KOH solution . therefore we conclude that definitely the calorific value of biogas will also rise.

References:

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