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When I heard that you can make free gas from kitchen scraps for stoves, heaters, or even propane refrigerators, I knew I had to look in to it. And, I love it! Here is everything you need to know to get started making your own biogas.Biogas (primarily methane) is produced by composting organic material in a low oxygen environment. Mix compost solids at a ratio of 30:1 carbon / nitrogen, with 1:1 water to solids in an airtight container with gas collector. Allow fermentation at 70F-105F for until gas production slows. Remove compost tea and repeat.While the process is simple, there are quite a few details to get right. In this article, I"ll go through each part in detail, to help you get started building a home-scale biogas generator.

You can use many household organic “waste” materials to produce your own natural gas for cooking, lighting, and space and water heating. This gas, known as “biogas,” can also replace fossil-based natural gas to fuel an engine or an absorption cooling system, such as a gas refrigerator or chiller. Some gasoline engines are designed for or can be modified for use with natural gas, propane or biogas. Diesel engines can accept up to 80 percent biogas.

Biogas is a mixture of primarily flammable gases — mostly methane — along with carbon dioxide that forms anywhere organic material decomposes anaerobically (without oxygen), such as in water, deep in a landfill, or in the guts of animals, including you.

I prefer the term “generator” for the system, because it conveys the intention of producing something. By constructing a home biogas generator, you can make enough fuel to at least provide your cooking energy. A family with modest daily cooking needs will at a minimum require the output of a warm, well-fed, 200-gallon (27-cubic-foot) generator. This much biogas will allow for about one hour of daily stovetop cooking. Start small to develop an understanding of biogas by making a small generator from a single 55-gallon barrel.

A well-managed methane digester can produce approximately its own volume of biogas each day. Anywhere from 10 to 60 percent of the solids will convert into biogas during digestion, so expect between 3 and 18 cubic feet of available biogas energy for each pound of dry material.

The exact makeup of biogas depends on what you feed to the digester. The main ingredient of biogas is methane. Methane (chemically known as CH4) is the primary component of conventional natural gas, commonly used for cooking and heating, although biogas is not as energy-dense. The methane content of biogas will probably range from 50 to 80 percent, compared with about 70 to 90 percent in utility-supplied natural gas. Natural gas contains up to 20 percent other combustible gases, such as propane, butane and ethane, while biogas does not. Biogas’ primary noncombustible components are carbon dioxide, some water vapor, nitrogen and possibly traces of hydrogen sulphide.

If you can compost it, you can digest it. Ideal biogas ingredients are those materials of which you have a plentiful, convenient and consistent supply, so you can make steady and useful quantities of biogas. Nearly any combination of vegetables, food scraps, grass clippings, animal manure, meat, slaughterhouse waste and fats will work as long as your recipe contains the correct ratio of carbon and nitrogen. Avoid using too many woody products, such as wood chips and straw, which contain large amounts of lignin (a part of plant cell walls resistant to microbial breakdown), which tends to clog up the digestion process.

A methane generator usually contains a feeding tube for filling the digester vessel, an effluent outlet to remove digested solids and liquids (called the “digestate”), a gas outlet, and a collection tank for storing the biogas.

To produce biogas at home, first mix water with your organic material, or “feedstock.” The range of total solids in the mix for optimal biogas generation is 2 to 10 percent, meaning that 90 to 98 percent of the material inside your generator can be water, including the water that is part of your feedstock. Chop or shred solid material into 1-inch or smaller bits. Having more surface area available to microbes will promote better digestion of organic material. Fibrous material may digest more readily if it ages for a few days (allowing fungi and bacteria to begin breaking down the fiber) before going into the generator.

After you’ve added the feedstock, add enough water to make a slurry, and then add a starter culture of methane-producing organisms. These microbes, known as “methanogens,” exist naturally in most animal dung, so if you use manure, you won’t need to add them. But if you want to digest only food scraps or grass, you’ll need to inoculate the mix to get the biological processes going (ideally, you’ll need to do this only one time).

Maintain a temperature within the container that is close to body temperature, 90 to 100 degrees Fahrenheit, and you should be generating biogas in about a week. To reduce the amount of external heat required, place the generator in the sun or inside a greenhouse. For extra insulation, wrap the generator with thin, flexible foam insulation or even Bubble Wrap, covered with UV-resistant, 6-mil black or clear polyethylene plastic.

As you produce biogas, pipe it into a simple holding container, such as a small barrel inverted into a larger barrel that is filled with water. Any storage container that is airtight and expandable as gas flows in and out can be used. Apply external weight to the storage container to achieve the correct pressure required by your gas appliance.

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