APPARATUS FOR PRODUCING ORTHOHYDROGEN AND/OR PARAHYDROGEN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an apparatus for producing orthohydrogen and parahydrogen.

2. Description of Related Art

Conventional electrolysis cells are capable of producing hydrogen and oxygen from water. These conventional cells generally include two electrodes arranged within the cell which apply energy to the water to thereby produce hydrogen and oxygen. The two electrodes are conventionally made of two different materials.

However, the hydrogen and oxygen generated in the conventional cells are generally produced in an inefficient manner. That is, a large amount of electrical power is required to be applied to the electrodes in order to produce the hydrogen and oxygen. Moreover, a chemical catalyst such as sodium hydroxide or potassium hydroxide must be added to the water to separate hydrogen or oxygen bubbles from the electrodes. Also, the produced gas must often be transported to a pressurized container for storage, because conventional cells produce the gases slowly. Also, conventional cells tend to heat up, creating a variety of problems, including boiling of the water. Also, conventional cells tend to form gas bubbles on the electrodes which act as electrical insulators and reduce the function of the cell.

Accordingly, it is extremely desirable to produce a large amount of hydrogen and oxygen with only a modest amount of input power. Furthermore, it is desirable to produce the hydrogen and oxygen with "regular" tap water and without any additional chemical catalyst, and to operate the cell without the need for an additional pump to pressurize it. It would also be desirable to construct the electrodes using the same material. Also, it is desirable to produce the gases quickly, and without heat, and without bubbles on the electrodes.

Orthohydrogen and parahydrogen are two different isomers of hydrogen. Orthohydrogen is that state of hydrogen molecules in which the spins of the two nuclei are parallel. Parahydrogen is that state of hydrogen molecules in which the spins of the two nuclei are antiparallel. The different characteristics of orthohydrogen and parahydrogen lead to different physical properties. For example, orthohydrogen is highly combustible whereas parahydrogen is a slower burning form of hydrogen. Thus, orthohydrogen and parahydrogen can be used for different applications. Conventional electrolytic cells make only orthohydrogen and parahydrogen. Parahydrogen, conventionally, is difficult and expensive to make.

Accordingly, it is desirable to produce cheaply orthohydrogen and/or parahydrogen using a cell and to be able to control the amount of either produced by the cell. It is also desirable to direct the produced orthohydrogen or parahydrogen to a coupled machine in order to provide a source of energy for the same.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a cell having electrodes and containing water which produces a large amount of hydrogen and oxygen in a relatively small amount of time, and with a modest amount of input power, and without generating heat.

It is another object of the present invention for the cell to produce bubbles of hydrogen and oxygen which do not bunch around or on the electrodes.

It is also an object of the present invention for the cell to properly operate without a chemical catalyst. Thus, the cell can run merely on tap water. Moreover, the additional costs associated with the chemical catalyst can be avoided.

It is another object of the present invention for the cell to be self-pressurizing. Thus, no additional pump is needed.

It is another object of the present invention to provide a cell having electrodes made of the same material. This material can be stainless steel, for example. Thus, the construction of the cell can be simplified and corresponding costs reduced.

It is another object of the present invention to provide a cell which is capable of producing orthohydrogen, parahydrogen or a mixture thereof and can be controlled to produce any relative amount of orthohydrogen and parahydrogen desired by the user.

It is another object of the invention to couple the gaseous output of the cell to a device, such as an internal combustion engine, so that the device may be powered from the gas supplied thereto.

These and other objects, features, and characteristics of the present invention will be more apparent upon consideration of the following detailed description and appended claims with reference to the accompanying drawings, wherein like reference numerals designate corresponding parts in the various figures.

Accordingly, the present invention includes a container for holding water. At least one pair of closely-spaced electrodes are positioned within the container and submerged under the water. A first power supply provides a particular pulsed signal to the electrodes. A coil is also arranged in the container and submerged under the water. A second power supply provides a particular pulsed signal through a switch to the electrodes.

When only the electrodes receive a pulsed signal, then orthohydrogen can be produced. When both the electrodes and coil receive pulsed signals, then parahydrogen or a mixture of parahydrogen and orthohydrogen can be produced. The container is self pressurized and the water within the container requires no chemical catalyst to efficiently produce the orthohydrogen and/or parahydrogen.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of a cell for producing orthohydrogen including a pair of electrodes according to a first embodiment of the present invention;

FIG. **2** is a side view of a cell for producing orthohydrogen including two pairs of electrodes according to a second embodiment of the present invention;

FIG. **3** is a side view of a cell for producing orthohydrogen including a pair of cylindrical-shaped electrodes according to a third embodiment of the present invention;

FIG. **4***a* is a diagram illustrating a square wave pulsed signal which can be produced by the circuit of FIG. **5** and applied to the electrodes of FIGS. **1–3**;

FIG. **4***b* is a diagram illustrating a saw tooth wave pulsed signal which can be produced by the circuit of FIG. **5** and applied to the electrodes of FIGS. **1–3**;

FIG. **4***c* is a diagram illustrating a triangular wave pulsed signal which can be produced by the circuit of FIG. **5** and applied to the electrodes of FIGS. **1–3**;