



US 20030126796A1

(19) **United States**

(12) **Patent Application Publication**
Hibino et al.

(10) **Pub. No.: US 2003/0126796 A1**

(43) **Pub. Date: Jul. 10, 2003**

(54) **FUEL GAS FOR A FUEL CELL**

(22) Filed: **Dec. 20, 2002**

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(30) **Foreign Application Priority Data**

Jan. 10, 2002 (JP) 2002-003215

Publication Classification

(51) **Int. Cl.⁷** **C10J 1/28**

(52) **U.S. Cl.** **48/195; 252/373; 429/17; 429/19**

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(57) **ABSTRACT**

A fatty acid such as an acetic acid or a butyric acid is added to a fuel gas for a fuel cell as an odorant. This makes it possible to add an odor to the fuel gas without poisoning an electrode catalyst and an electrolyte, and to prevent the odor from remaining in an exhaust gas emitted from the fuel cell.

(21) Appl. No.: **10/323,976**

FUEL GAS FOR A FUEL CELL

INCORPORATION BY REFERENCE

[0001] The disclosure of Japanese Patent Application No. 2002-003215 filed on Jan. 10, 2002 including the specification, drawings and abstract are incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of Invention

[0003] The invention relates to a fuel gas for a fuel cell, and more particularly to a fuel gas for a fuel cell having an odor by which a gas leakage can be immediately detected.

[0004] 2. Description of Related Art

[0005] As a fuel gas for a fuel cell supplied to an anode side of a fuel cell, a reformed gas rich in hydrogen obtained by reforming light hydrocarbons such as a hydrogen, a natural gas or a naphtha has been used. Generally, an odorant is added to such a fuel gas for a fuel cell so that a gas leakage can be easily detected when it occurs.

[0006] For example, Japanese Patent Laid-Open Publication No. 2000-233901 discloses an example of the fuel gas to which a sulfur based odorant is added.

[0007] Conventional odorants added to fuel gases for fuel cell are sulfur based substances such as a mercaptan, as mentioned above. However, it is known that these substances may poison an electrode catalyst or an electrolyte in a fuel cell, which results in degradation in performance of the fuel cell. Therefore, a desulfurizer may be provided in order to remove sulfur components contained in the odorants. However, desulfurization may not be adequately executed, and the above-mentioned problem of poisoning the catalyst cannot be entirely solved.

[0008] In addition, there exists a problem that since the fuel cell does not utilize a combustion reaction unlike an internal combustion engine, the odorant remains in an exhaust gas emitted from the fuel cell, which causes confusion with the gas leakage.

SUMMARY OF THE INVENTION

[0009] The invention was made in view of the conventional problems. It is an object of the invention to provide a fuel gas for a fuel cell that does not poison an electrode catalyst and an electrolyte in a fuel cell, and by which a leakage can be easily detected when it occurs.

[0010] In order to attain the above-mentioned object, a fuel gas for a fuel cell according to the invention is comprising a reaction gas which produces an electricity by a chemical reaction, and an odorant which does not poison an electrode catalyst and an electrolyte, and dissolves in water so that an odor thereof disappears.

[0011] According to the above-mentioned structures, it is possible to prevent the odorant from poisoning the electrode catalyst or the electrolyte in the fuel cell, and to easily detect the gas leakage when it occurs. In addition, the odorant dissolves in water so that the odor disappears, which makes it possible to prevent confusion with the gas leakage due to a remaining odor in an exhaust gas.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Hereinafter, an embodiment according to the invention (hereinafter referred to as embodiments) will be explained.

[0013] As mentioned above, an odorant is added to a fuel gas supplied to a fuel cell in order to easily detect a gas leakage, which makes it possible to detect the gas leakage by the odor when the gas leakage occurs. As mentioned above, it is necessary to employ an odorant that does not poison an electrode catalyst or an electrolyte.

[0014] Also, even after the fuel gas for a fuel cell is supplied to the fuel cell and undergoes a reaction, the odorant does not undergo a reaction and remains unchanged. Therefore, the same odor as that of the fuel gas is imparted to the exhaust gas emitted from the fuel cell, which may cause confusion with the gas leakage. Thus, it is necessary to employ an odorant that does not impart the odor to the exhaust gas emitted from the fuel cell.

[0015] In addition, it is preferable to add a fatty acid into a reformed hydrogen gas, in a case where a reformer is used as means of producing the fuel gas for a fuel cell mounted on a vehicle.

[0016] As a result of a thorough study conducted by the inventors from the above-mentioned each viewpoint, it was found that the fatty acid having an odor is suitable as the odorant.

[0017] When the fatty acid is used as the odorant, degradation in performance can be prevented since the electrode catalyst or the electrolyte in the fuel cell are not poisoned.

[0018] Also, some fatty acids having a relatively low carbon number have pungent odors, and are water-soluble. Therefore, although the fuel gas for a fuel cell to which the fatty acid is added has an odor, the fatty acid dissolves in water produced by an electrochemical reaction occurred in the fuel cell, which prevents the odor from remaining in the exhaust gas emitted from the fuel cell. This precludes a possibility that the exhaust gas from the fuel cell is confused with a leaked gas because of its odor. Therefore, it becomes possible to detect the gas leakage, when the fuel gas leaks from the fuel cell.

[0019] The acetic acid or the butyric acid can be exemplified as fatty acids used as the odorants. Both the acetic acid and the butyric acid have strong odors, and also do not poison the electrode catalyst or the electrolyte. Further, the fatty acids dissolve in water produced by the electrochemical reaction of hydrogen and oxygen in the fuel cell, which prevents the exhaust gas from exuding the odor.

[0020] For example, in the case of the butyric acid, adding approximately 2 to 10 ppm of butyric acid to the fuel gas for a fuel cell allows the fuel gas for a fuel cell to exude the odor that can be sufficiently detected by human nose. Also, since the butyric acid dissolves in reaction product water, no odor remains in the exhaust gas emitted from the fuel cell.

[0021] However, in a case where water is recovered from the exhaust gas from the fuel cell, dissolved fatty acid components need to be removed. Therefore, it is preferable to provide a removal process.

[0022] As explained above, according to the invention, an odor can be added to a fuel gas without poisoning an electrode catalyst and an electrolyte in a fuel cell by employing fatty a acid having an odor such as an acetic acid or a butyric acid as an odorant added to a fuel gas for a fuel cell. Thus, the odorant dissolves in water produced by an electrochemical reaction, which makes it possible to provide the fuel gas for a fuel cell whose odor does not remain in an exhaust gas emitted from the fuel cell.

What is claimed is:

1. A fuel gas for a fuel cell comprising:

a reaction gas that is supplied to a fuel cell and produces electricity by a chemical reaction; and

an odorant which is added to the reaction gas, is non-poisonous to an electrode catalyst and an electrolyte in the fuel cell, and dissolves in water so that an odor thereof disappears.

2. The fuel gas for a fuel cell according to claim 1 wherein:

the odorant is a fatty acid having an odor.

3. The fuel gas for a fuel cell according to claim 2 wherein:

the fatty acid is one of an acetic acid and a butyric acid.

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