[Document title] CLAIMS

[Claim 1]

A hydrogen generation system configured as a magnesium-recycling hydrogen generation system, the hydrogen generation system comprising:

a by-product acquisition unit configured to separate a by-product from a post-reaction solution, which is a solution after reacting with a hydrogen generation material containing a hydrogen-containing magnesium compound that generates hydrogen via a reaction with the solution, to acquire the by-product including more than one type of oxygen-containing magnesium compound that contains oxygen produced by the reaction;

a raw material production unit configured to react the by-product with a halogen-containing substance containing halogen and other atoms than the halogen to produce a raw material containing magnesium halide;

a hydrogen generation material production unit configured to reduce the raw material with plasma containing hydrogen to produce the hydrogen generation material; and

a hydrogen generator configured to react the hydrogen generation material with the solution to generate hydrogen.

[Claim 2]

The hydrogen generation system according to claim 1, wherein

the hydrogen-containing magnesium compound is magnesium hydride,

the oxygen-containing magnesium compound is magnesium hydroxide or magnesium oxide, and

the halogen-containing substance is an ammonium salt containing the halogen.

[Claim 3]

The hydrogen generation system according to claim 2, wherein the hydrogen generation material production unit includes

a treatment chamber where the raw material is reduced

with the plasma containing hydrogen to produce the hydrogen generation material,

a decompressor configured to discharge gas from the treatment chamber to decompress the inside of the treatment chamber, and

an ammonia supply unit configured to supply ammonia to the gas which has been discharged from the treatment chamber and is on its way to the decompressor.

[Claim 4]

The hydrogen generation system according to claim 3, wherein the ammonia supply unit is further configured to supply ammonia generated when the raw material is produced in the raw material production unit.

[Claim 5]

The hydrogen generation system according to claim 3 or 4, wherein

the hydrogen generation material production unit further includes an ammonium salt acquisition unit configured to acquire an ammonium salt containing the halogen produced by a reaction between the ammonia and hydrogen halide in the gas discharged from the treatment chamber, and

the ammonium salt acquired by the ammonium salt acquisition unit is utilized as the halogen-containing substance used in the raw material production unit.

[Claim 6]

The hydrogen generation system according to claim 1, wherein

the hydrogen-containing magnesium compound is magnesium hydride,

the oxygen-containing magnesium compound is magnesium hydroxide or magnesium oxide, and

the halogen-containing substance is a hydrogen halide.

[Claim 7]

The hydrogen generation system according to claim 6, wherein the hydrogen generation material production unit includes

a hydrogen halide acquisition unit configured to acquire a hydrogen halide produced by a reduction reaction in gaseous form, and

the hydrogen halide acquired by the hydrogen halide acquisition unit is used in the raw material production unit.

[Claim 8]

The hydrogen generation system according to any one of claims 1 to 7, wherein the hydrogen generator includes

a reaction unit configured to store the solution and perform the reaction to generate hydrogen, and

a material storage configured to store the hydrogen generation material to be supplied to the reaction unit.

[Claim 9]

A hydrogen generation method, which is a magnesium-recycling hydrogen generation method, the hydrogen generation method comprising:

separating a by-product from a post-reaction solution, which is a solution after reacting with a hydrogen generation material containing a hydrogen-containing magnesium compound that generates hydrogen via a reaction with the solution, to acquire the by-product including more than one type of oxygen-containing magnesium compound that contains oxygen produced by the reaction;

reacting the by-product with a halogen-containing substance containing halogen and other atoms than the halogen to produce a raw material containing magnesium halide;

reducing the raw material with plasma containing hydrogen to produce the hydrogen generation material; and

reacting the hydrogen generation material with the solution to generate hydrogen.