[0009a] In another aspect, the present disclosure refers to a method for treating acidic exhaust gas by using the acidic exhaust gas treatment agent disclosed herein, the method comprising the steps of: (1) bringing the acidic exhaust gas into contact with the acidic exhaust gas treatment agent to adsorb an acidic substance in the acidic exhaust gas; (2) desorbing the acidic substance adsorbed on the acidic exhaust gas treatment agent in step (1) to regenerate the acidic exhaust gas treatment agent; and (3) recovering the acidic substance desorbed from the acidic exhaust gas treatment agent in step (2).

~~[0009b] In yet another aspect, the present disclosure refers to equipment for treating acidic exhaust gas by using the acidic exhaust gas treatment agent as disclosed herein, the equipment comprising: means (1) for bringing the acidic exhaust gas into contact with the acidic exhaust gas treatment agent to adsorb an acidic substance in the acidic exhaust gas; means (2) for desorbing the acidic substance adsorbed on the acidic exhaust gas treatment agent in means (1) to regenerate the acidic exhaust gas treatment agent; and means (3) for recovering the acidic substance desorbed from the acidic exhaust gas treatment agent in means (2).~~

[0010] In some examples, the present disclosure provides the following [1] to [7].

[1] An acidic exhaust gas treatment agent comprising a complex of Mg-Al layered double hydroxide with at least one of manganese oxide and a permanganate compound.

[2] The acidic exhaust gas treatment agent according to [1], wherein the complex is at least one of manganese dioxide-composite Mg-Al layered double hydroxide and permanganate-type Mg-Al layered double hydroxide.

[3] The acidic exhaust gas treatment agent according to [1] or [2], comprising carbonate-type Mg-Al layered double hydroxide.

[0011] [4] A method for treating acidic exhaust gas by using the acidic exhaust gas treatment agent according to any one of [1] to [3], the method comprising the steps of: (1) bringing the acidic exhaust gas into contact with the acidic exhaust gas treatment agent to adsorb an acidic substance in the acidic exhaust gas; (2) desorbing the acidic substance adsorbed on the acidic exhaust gas treatment agent in step (1) to regenerate the acidic exhaust gas treatment agent; and (3)

CLAIMS

[Claim 1]

An acidic exhaust gas treatment agent comprising a complex of at least one of compounds of represented by the following formulae (1) and (2):

$$Mg_{1-x}Al_x(OH)_2(MnO_2)_{2.5x}(Cl)_x \cdot mH_2O \quad (1)$$

$$Mg_{1-x}Al_x(OH)_2(MnO_4)_x \cdot mH_2O \quad (2)$$

wherein, x = 0.20 to 0.40, and m = 1 to 12.

[Claim 2]

The acidic exhaust gas treatment agent according to claim 1, comprising carbonate-type Mg-Al layered double hydroxide.

[Claim 3]

A method for treating acidic exhaust gas by using the acidic exhaust gas treatment agent according to any one of claim 1 or 2, the method comprising the steps of:

(1) bringing the acidic exhaust gas into contact with the acidic exhaust gas treatment agent to adsorb an acidic substance in the acidic exhaust gas;

(2) desorbing the acidic substance adsorbed on the acidic exhaust gas treatment agent in step (1) to regenerate the acidic exhaust gas treatment agent; and

(3) recovering the acidic substance desorbed from the acidic exhaust gas treatment agent in step (2).

[Claim 4]

The method according to claim 3, wherein a treatment cycle comprising steps (1) to (3) is repeatedly performed, and in step (1) of at least one of the treatment cycles after the second treatment cycle, the acidic exhaust gas treatment agent regenerated in step (2) of at least one of the treatment cycles before the treatment cycle is used for at least part of the acidic exhaust gas treatment agent.

[Claim 5]

~~Equipment for treating acidic exhaust gas by using the acidic exhaust gas treatment agent according to any one of claim 1 or 2, the equipment comprising:~~

~~means (1) for bringing the acidic exhaust gas into contact with the acidic exhaust gas treatment agent to adsorb an acidic substance in the acidic exhaust gas;~~

~~means (2) for desorbing the acidic substance adsorbed on the acidic exhaust~~

~~gas treatment agent in means (1) to regenerate the acidic exhaust gas treatment agent; and~~

~~means (3) for recovering the acidic substance desorbed from the acidic exhaust gas treatment agent in means (2).~~

~~[Claim 6]~~

~~The~~ The method according to claim 3, wherein the manganese dioxide-composite Mg-Al layered double hydroxide is produced, without requiring a reduction process, by adding Mg-Al oxide to a potassium permanganate aqueous solution, filtering the resulting mixture to obtain a precipitate, and drying the precipitate.