DESCRIPTION

Title of Invention

METHOD FOR TREATING ACIDIC EXHAUST GAS, EQUIPMENT FOR TREATING ACIDIC EXHAUST GAS, AND INCINERATION FACILITY

Technical Field

[0001]

The present invention relates to a method for treating an acid exhaust gas, an equipment for treating an acid exhaust gas, and an incineration facility.

Background Art

[0002]

In combustion exhaust gas that is discharged from incinerators in incineration plants, acidic gas, which is a harmful acidic material, such as hydrogen fluoride is contained. Therefore, before the release of combustion exhaust gas into the atmosphere, there is a need to reject the acidic gas. Hereinafter, combustion exhaust gas containing acidic gas will be referred to as acid exhaust gas.

[0003]

Patent Literature 1 describes a method for treating an acid exhaust gas in which an acid exhaust gas that occurs in an incineration plant is brought into contact with a solid-form acid exhaust gas treatment agent containing a layered double hydroxide, thereby treating an acidic material such as hydrogen chloride.

Citation List

Patent Literature

[0004]

PTL1: JP 2016-190199 A

Summary

Technical Problem

[0005]

However, in the method for treating an acid exhaust gas described in Patent Literature 1, there has been a problem in that the usage amount of the

layered double hydroxide increases due to the fact that the reaction rate between the layered double hydroxide and an acidic gas component in the acid exhaust gas is slow. In addition, an increase in the usage amount of the layered double hydroxide creates a problem in that the size of an equipment for treating is likely to increase.

In addition, in the case of a CO_3-type Mg-Al layered double hydroxide, which is known as an acid exhaust gas treatment agent, there has been a problem in that, as a regenerant used to regenerate the CO_3-type Mg-Al layered double hydroxide subjected to the treatment of an acid exhaust gas, an expensive carbonate needs to be used. The use of an expensive regenerant leads to an increase in initial and running cost, and, in a case where the usage amount of the layered double hydroxide is large as described above, this problem is significant.
[0006]

In consideration of the above-described problems, an objective of the present disclosure is to provide a method for treating an acid exhaust gas, an equipment for treating an acid exhaust gas, and an incineration plant that are capable of reducing the amount of a layered double hydroxide necessary for the treatment of an acid exhaust gas and capable of suppressing an increase in cost at the time of regenerating the layered double hydroxide subjected to the treatment of the acid exhaust gas.

Solution to Problem
[0006a]

In an aspect, there is provided a method for treating an acid exhaust gas, comprising:

a first step of treating an acidic gas in an acid exhaust gas with a OH-type Mg-Al layered double hydroxide,

wherein in the first step, at least hydrogen chloride in the acid exhaust gas is absorbed by the OH-type Mg-Al layered double hydroxide.
[0006b]

In another aspect, there is provided an equipment for treating an acid exhaust gas comprising means for performing the method for treating an acid exhaust gas as defined above.
[0006c]

In another aspect, there is provided an incineration facility comprising:

an incinerator; and

the equipment for treating an acid exhaust gas as defined above.

[0007]

As a result of repeating intensive studies to solve the above-described problems, the present inventors found that the above-described problems can be solved by treating an acid exhaust gas with a OH-type Mg-Al layered double hydroxide and completed the present disclosure.

That is, the present disclosure provides [1] to [10] below.

[1] A method for treating an acid exhaust gas having a first step of treating an acidic gas in an acid exhaust gas with a OH-type Mg-Al layered double hydroxide.

[2] The method for treating an acid exhaust gas according to [1], wherein the OH-type Mg-Al layered double hydroxide used in the first step contains a regenerated product obtained by exchanging an interlayer anion of a break-through OH-type Mg-Al layered double hydroxide with a hydroxide ion.

[9] The equipment for treating an acid exhaust gas according to [8], wherein the second pipe guides the OH-type Mg-Al layered double hydroxide subjected to an acid exhaust gas treatment from the first unit to the regeneration device and guides the regenerated product from the regeneration device to the first unit.

[10] An incineration facility having an incinerator and the equipment for treating an acid exhaust gas according to any one of [6] to [9].

Advantageous Effect of Disclosure

[0008]

According to the present disclosure, it is possible to provide a method for treating an acid exhaust gas, an equipment for treating an acid exhaust gas, and an incineration facility that are capable of reducing the amount of a layered double hydroxide necessary for the treatment of an acid exhaust gas and capable of suppressing an increase in cost at the time of regenerating the layered double hydroxide subjected to the treatment of the acid exhaust gas.

Brief Description of Drawings

[0009]

[Fig. 1] Fig. 1 is a view schematically showing a temporal change in the adsorption status of an adsorption target material when a fluid containing the adsorption target material is circulated in an adsorption tower filled with an adsorbent. Fig. 1(a) shows a temporal transition of the concentration gradient of the adsorption target material in the adsorption tower, Fig. 1(b) shows the adsorption rate of the adsorbent at an arbitrary position from the inlet of the adsorption tower to the outlet of the adsorption tower at a break-through time (t_B), and Fig. 1(c) shows a temporal change in the concentration of the adsorption target material at the outlet of the adsorption tower from the break-through time (t_B) forward.

[Fig. 2] Fig. 2 is a schematic configuration view showing an example of an equipment for treating an acid exhaust gas and an incineration facility according to an embodiment of the present invention.

[Fig. 3] Fig. 3 is a schematic view showing an example of the status of the treatment, regeneration and transfer of a layered double hydroxide in first and second units and a transition thereof while first and second steps are performed.

CLAIMS

[Claim 1]

A method for treating an acid exhaust gas, comprising:

a first step of treating an acidic gas in an acid exhaust gas with a OH-type Mg-Al layered double hydroxide,

wherein in the first step, at least hydrogen chloride in the acid exhaust gas is absorbed by the OH-type Mg-Al layered double hydroxide.

[Claim 2]

The method for treating an acid exhaust gas according to claim 1, wherein the OH-type Mg-Al layered double hydroxide used in the first step comprises a regenerated product obtained by exchanging an interlayer anion of a break-through OH-type Mg-Al layered double hydroxide with a hydroxide ion.

[Claim 3]

The method for treating an acid exhaust gas according to claim 1 or 2, further comprising:

a second step of ion-exchanging an interlayer anion of a break-through OH-type Mg-Al layered double hydroxide with a hydroxide ion to generate a regenerated product of the OH-type Mg-Al layered double hydroxide,

wherein in the first step, at least a part of the regenerated product generated in the second step is used.

[Claim 4]

The method for treating an acid exhaust gas according to claim 1 or 2, further comprising:

a second step of ion-exchanging an interlayer anion of a break-through OH-type Mg-Al layered double hydroxide with a hydroxide ion to generate a regenerated product of the OH-type Mg-Al layered double hydroxide,

wherein in the second step, the regenerated product is generated using the OH-type Mg-Al layered double hydroxide subjected to an acid exhaust gas treatment in the first step.

[Claim 5]

The method for treating an acid exhaust gas according to claim 1 or 2, further comprising:

a second step of ion-exchanging an interlayer anion of a break-through OH-type Mg-Al layered double hydroxide with a hydroxide ion to generate a regenerated product of the OH-type Mg-Al layered double hydroxide,

wherein the first step and the second step constitute one cycle, the cycle is repeatedly performed, and

as at least a part of the OH-type Mg-Al layered double hydroxide to be used in the first step of any of second or later cycles, a regenerated product regenerated in the second step of a cycle prior to the cycle is used.

[Claim 6]

A equipment for treating an acid exhaust gas comprising means for performing the method for treating an acid exhaust gas according to any one of claims 1 to 5.

[Claim 7]

The equipment for treating an acid exhaust gas according to claim 6, comprising a first unit comprising: a container that accommodates the OH-type Mg-Al layered double hydroxide used in the first step; and a first pipe for guiding an acid exhaust gas that occurs from an occurrence source to the container.

[Claim 8]

The equipment for treating an acid exhaust gas according to claim 7, further comprising a second unit comprising: a regeneration device that generates a regenerated product by exchanging an interlayer anion of a break-through OH-type Mg-Al layered double hydroxide with a hydroxide ion; and a second pipe for guiding the regenerated product from the regeneration device to the first unit.

[Claim 9]

The equipment for treating an acid exhaust gas according to claim 8, wherein the second pipe guides the OH-type Mg-Al layered double hydroxide subjected to an acid exhaust gas treatment from the first unit to the regeneration device and guides the regenerated product from the regeneration device to the first unit.

[Claim 10]

An incineration facility comprising:

an incinerator; and

the equipment for treating an acid exhaust gas according to any one of claims 6 to 9.