

« CLAIMS »

1. Lime-based sorbent suitable for use in a flue gas treatment process comprising :

- at least 70 wt. % of $\text{Ca}(\text{OH})_2$ with respect to the total weight of said lime-based sorbent under a dry form after drying until constant weight at 150°C, and;
- at least 0.2 wt. % to at most 10 wt. %, preferably at least 1 wt.% to at most 5 wt.%, more preferably at least 1.2 wt.% to at most 2.5 wt. forming materialslime-based

2. Lime-based sorbent according to claim 1, wherein the said first additive is selected among:

- the group of hydrogels forming materials of synthetic origin including polyacrylates, polyacrylic acids, crosslinked polyacrylates and polyacrylic acids, or crosslinked acrylamide and acrylate copolymers, in particular those partially neutralized with sodium and/or potassium, or
- the group of hydrogels forming materials of natural origin including guar gum, alginates, dextran or xanthane gum or a combination thereof and/or;
- the group of cellulose ethers, including hydroxyalkyl or carboxyalkyl cellulose ethers, in particular carboxymethyl cellulose or hydroxyethyl methyl cellulose (HEMC).

3. Lime-based sorbent according to claim 1 or 2, wherein the said superabsorbent polymer is selected among crosslinked polymers of acrylic or methacrylic acid, crosslinked graft copolymers of the polysaccharide / acrylic or methacrylic acid, crosslinked terpolymers of acrylic acid or methacrylic acid / acrylamide / sulfonated acrylamide and their alkaline earth or alkaline metal salts.

4. Lime-based sorbent according to any one of preceding claims, further comprising sodium wherein the amount of sodium expressed under its equivalent Na_2O oxide form in said lime-based sorbent measured by XRF is of at least 0.1 weight % of sodium, preferably at least 0.3 weight %, preferably at least 0.5 weight %, preferably at least 0.7 weight %, preferably at most 15 weight %, preferably at most 7 weight %, preferably at most 5 weight %, preferably at most 2.5 weight % with respect to the total weight of said sorbent under a dry form.

5. Lime-based sorbent according to any one of the preceding claims, having a BET specific surface area comprised of at least 3 m^2/g , preferably

at least 10 m²/g, more preferably at least 20 m²/g, preferably at least 40 m²/g measured by manometry with adsorption of nitrogen after degassing in vacuum at 190°C for at least 2 hours and calculated according the multipoint BET method as described in the ISO 9277/2010E standard.

5 6. Lime-based sorbent according to any one of the preceding claims, having a total BJH pore volume of at least 0.01 cm³/g, preferably at least 0.05 cm³/g, more preferably at least 0.1 cm³/g, more preferably at least 0.2 cm³/g determined by manometry with adsorption of nitrogen after degassing in vacuum at 190°C for at least 2 hours and calculated according the multipoint BJH method as
10 described in the ISO 9277/2010E standard.

7. Premix for use in a process of manufacturing of a lime-based sorbent, the premix comprising:

- at least 70 wt.%, more preferably at least 85 wt.% of quicklime with respect to the total weight of said premix under a dry form after drying until constant weight
15 at 150°C, and;

- at least 0.2 wt. % to at most 10 wt. %, preferably at least 1 wt.% to at most 5 wt.%, more preferably at least 1.2 wt.% to at most 2.5 wt.%, with respect to the total weight of said premix under a dry form after drying until constant weight at 150°C, of a first additive selected among the group of hydrogels forming materials of natural
20 or synthetic origin, in particular superabsorbent polymers (SAPs) or in the group of cellulose ethers or a combination thereof, with respect to the total weight of said premix under a dry form.

8. Process of manufacturing a sorbent suitable for a use in a flue gas treatment process, the process of manufacturing comprising the steps of :

25 - slaking quicklime with water in a hydrator via a non-wet route;
- collecting a slaked lime at an exit of the hydrator;

characterized in that said process comprises a further step of adding at least a first additive selected among the group of hydrogels forming materials of natural or synthetic origin, in particular superabsorbent polymers (SAPs) or in the group of
30 cellulose ethers or a combination thereof, said first additive being added before, during or after said step of slaking, at a weight ratio relative to the weight of said slaked lime comprised between 0.2 and 10%, preferably at most 5 wt.%, more preferably at most 2.5 wt.%, wherein the amount of said slaked lime is expressed

under equivalent CaO and the amount of said first additive is expressed under dry equivalent form after drying until constant weight at 150°C.

9. Process of manufacturing according to claim 8, wherein the said first additive is selected among

5 - the group of hydrogels forming materials of synthetic origin includes crosslinked polyacrylates or crosslinked acrylamide and acrylate copolymers, in particular those partially neutralized with sodium and/or potassium,

 - the group of hydrogels forming materials of natural origin includes guar gum, alginates, dextran or xanthan gum or a combination thereof or

10 - the group of cellulose ethers, includes hydroxyalkyl or carboxyalkyl cellulose ethers, in particular carboxymethyl cellulose or hydroxyethyl methyl cellulose (HEMC).

10. Process of manufacturing according to claim 8 or 9, wherein

 - said first additive is provided at least partially in a solution or in a suspension
15 and added to said water and/or to the slaked lime, and/or;

 - said first additive is provided at least partially under solid form and added to said quicklime and/or to the slaked lime.

11. Process of manufacturing according to any one of claims 8 to 10, characterized in that it further comprises a step of addition of an amount of a
20 second additive being a salt or hydroxide of an alkali metal before and/or during and/or after said step of slaking, the amount of a salt or hydroxide of an alkali metal being sufficient for obtaining in said slaked lime, a content of an alkali metal expressed in oxide equivalent of this alkali metal equal to or greater than 0.2% and equal to or less than 3.5% by weight on the basis of the total weight of the slaked
25 lime.

12. Process of manufacturing according to any one of the claims 8 to 11, wherein the residence time of quicklime being slaked inside the hydrator is comprised between 5 and 45 minutes, preferably between 20 and 40 minutes and more preferably between 25 and 35 minutes.

30 13. Process of manufacturing according to any one of the claims 8 to 12, in which the first additive is added before or during the said step of slaking, further comprising a step of drying said lime-based sorbent and/or a step of

granulometric cutting of said lime-based sorbent and/or grinding or milling said lime-based sorbent.

14. Process of manufacturing according to any one of the claims 8 to 13 in which the said first additive is added to the slaked lime after the said step of slaking, the process further comprising:

- a step of granulometric cutting of the collected slaked lime such that to remove a fraction of particles outside a first range of values, and ;

- a step of granulometric cutting of the said first additive under a powdered form such that to remove a fraction of particles outside a second range of values overlapping or being equal to the first range of values, in order to provide particles of hydrated lime and particles of additive having similar particle size distribution, and ;

- blending the said slaked lime and the said first additive in a homogenizing device.

15. Use of a lime-based sorbent according to any one of the claims 1 to 6 or obtained from a process according to any one of the claims 8 to 14, in a flue gas treatment process including circulating dry scrubber process or dry sorbent injection process.

16. Flue gas treatment process wherein gas containing pollutants are circulated through a duct before reaching a particulate control device, characterized in that it comprises a step of injection of a lime-based sorbent according to any one of the claims 1 to 6.