form of a powder formed of particles, the particles having a specific distribution of dimensions. This composition is remarkably effective but is expensive.

In order to be able to generalize the application of purification treatments to the flue gases produced by industrial processes, it is important in many cases to reduce the cost of the reactants used.

EP 0 858 429 describes a composition comprising at least 80 % of sodium bicarbonate, less than 20 % by weight of sodium carbonate, from 0.2 % to 0.7 % by weight of ammonia, expressed as ammonium ions, and 2 to 10 % by weight of water. This composition, obtained by heat treatment of crude bicarbonate from an ammonia-soda plant, however releases high amounts of ammonia (NH_3) when stored, in particular in closed atmospheres. This generates rapidly ammonia concentrations above toxicity thresholds that are detrimental to the health of people handling such composition.

The invention is targeted at providing a reactive composition based on sodium bicarbonate which can be used in treatments for the purification of flue gases, presenting high amount of ammonia compounds useful in flue gas mitigation of nitrogen oxides by catalytic conversion to nitrogen, though releasing less ammonia during storage and handling than known compositions of the prior art. Moreover, the invention relates also to a process that renders possible to produce this composition under advantageous economic conditions.

SUMMARY OF THE INVENTION

The disclosure consequently relates to a reactive composition comprising between 60 % and 98 %, preferably between 80 and 98 %, by weight of sodium bicarbonate, between 1 % and 40 %, preferably between 1 % and 12 % by weight of sodium carbonate and between 0.02 % and 2.0 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+, characterized in that the composition comprises less than 1.0 %, preferably less than 0,9 %, more preferably less than 0,8 % by weight of water.

In one aspect, there is provided a reactive composition comprising between 60 % and 98 % by weight of sodium bicarbonate, between 1 % and 40 % by weight of sodium carbonate and between 0.02 % and 2.0 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+, characterized in that the composition comprises less than 1.0 %, preferably less than 0.9 %, more preferably less than 0.8 % by weight of water measured by weight loss at a temperature of 25 °C placing about 3 g of the composition in a watch-glass and

in a dissicator in the presence of silicagel under vacuum at about 50 mbar absolute pressure, during 24 hours.

In another aspect, there is provided a reactive composition comprising between 80 % and 98 % by weight of sodium bicarbonate, between 1 % and 20 % by weight of sodium carbonate and between 0.02 % and 2.0 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+, wherein the composition is in the form of particles having a diameter D_{90} of less than 100 µm and a diameter D_{50} of less than 75 µm, preferably a diameter D_{90} of less than 50 µm and a diameter D_{50} of less than 35 µm, more preferably a diameter D_{90} of less than 35 µm and a diameter D_{50} of less than 20 µm, even more preferably a diameter D_{90} of less than 30 µm and a diameter D_{50} of less than 15 µm, measured by laser diffractometry, characterized in that the composition comprises less than 1.0 %, preferably less than 0.9 %, more preferably less than 0.
8 % by weight of water measured by weight loss at a temperature of 25 °C placing about 3 g of the composition in a watch-glass and in a dissicator in the presence of silicagel under vacuum at about 50 mbar absolute pressure, during 24 hours.

In a further aspect, there is provided a process for the production of a composition as disclosed herein, according to which :

• particles resulting from crude bicarbonate particles from an ammonia-soda plant are introduced into a gas stream at a temperature of more than 30°C comprising air, in order to form a gas stream laden with particles;

• the gas stream laden with particles is introduced into a mill in order to form a gas stream comprising ground particles having a diameter D_{90} of less than 100 µm and a D_{50} of less than 75 µm, preferably a D_{90} of less than 50 µm and a diameter D_{50} of less than 35 µm, more preferably a diameter D_{90} of less than 35 µm and a diameter D_{50} of less than 20 µm, even more preferably a diameter D_{90} of less than 30 µm and a diameter D_{50} of less than 15 µm measured by laser diffractometry; to obtain a composition as disclosed herein.

In yet another aspect, there is provided a process for the purification of a flue gas comprising acidic impurities, such as hydrogen chloride or sulphur oxides, according to which a reactive composition as disclosed herein is introduced into the flue gas, at a temperature of 100 to 600°C, and the flue gas is subsequently subjected to a filtration or a dedusting.

DETAILED DESCRIPTION OF THE INVENTION

Before the present formulations of the invention are described, it is to be understood that this invention is not limited to particular formulations described, since such formulations may, of course, vary. It is also to be understood that the terminology used herein is not intended to be limiting, since the scope of the present invention will be limited only by the appended claims.

CLAIMS

1. Reactive composition comprising between 60 % and 98 % by weight of sodium bicarbonate, between 1 % and 40 % by weight of sodium carbonate and between 0.02 % and 2.0 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+, characterized in that the composition comprises less than 1.0 %, preferably less than 0.9 %, more preferably less than 0.8 % by weight of water measured by weight loss at a temperature of 25 °C placing about 3 g of the composition in a watch-glass and in a dissicator in the presence of silicagel under vacuum at about 50 mbar absolute pressure, during 24 hours.

2. Composition according to the preceding claim wherein the composition is in the form of particles having a diameter D_{90} of less than 50 μm and a diameter D_{50} of less than 35 μm, measured by laser diffractometry.

3. Reactive composition comprising between 80 % and 98 % by weight of sodium bicarbonate, between 1 % and 20 % by weight of sodium carbonate and between 0.02 % and 2.0 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+, wherein the composition is in the form of particles having a diameter D_{90} of less than 100 μm and a diameter D_{50} of less than 75 μm, preferably a diameter D_{90} of less than 50 μm and a diameter D_{50} of less than 35 μm, more preferably a diameter D_{90} of less than 35 μm and a diameter D_{50} of less than 20 μm, even more preferably a diameter D_{90} of less than 30 μm and a diameter D_{50} of less than 15 μm, measured by laser diffractometry, characterized in that the composition comprises less than 1.0 %, preferably less than 0.9 %, more preferably less than 0.8% by weight of water measured by weight loss at a temperature of 25 °C placing about 3 g of the composition in a watch-glass and in a dissicator in the presence of silicagel under vacuum at about 50 mbar absolute pressure, during 24 hours.

4. Composition according to claims 1 or 2 comprising between 80 and 98 %, by weight of sodium bicarbonate.

5. Composition according to claims 1, 2 or 4 comprising between 1 % and 12 % by weight of sodium carbonate.

6. Composition according to one of the preceding claims comprising between 2 % and 12 % by weight of sodium carbonate.

7. Composition according to one of the preceding claims, comprising between 85 % and 95 % by weight of sodium bicarbonate.

8. Composition according to one of the preceding claims, comprising from 0.02 % to 0.17 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+.

9. Composition according to one of claims 1 to 7, comprising from 0.2 % to 0.7 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+.

10. Composition according to one of claims 1 to 7, comprising more than 0.7 % and less than 2.0 % by weight of ammonia, expressed in the form of ammonium ions NH_4^+.

11. Composition according to one of the preceding claims, comprising from 0.01 % to 5 % by weight of additives selected from zeolites, dolomite, magnesium hydroxide, magnesium (hydroxy) carbonate, lime, calcium carbonate, sodium chloride, zinc chloride, sodium sulphate, calcium fluoride, hydrocarbons, talc, lignite coke, activated carbon or active charcoal, fatty acids and fatty acid salts.

12. Process for the production of a composition according to one of the preceding claims, according to which :

- particles resulting from crude bicarbonate particles from an ammonia-soda plant are introduced into a gas stream at a temperature of more than 30°C comprising air, in order to form a gas stream laden with particles;

- the gas stream laden with particles is introduced into a mill in order to form a gas stream comprising ground particles having a diameter D_{90} of less than 100 μm and a D_{50} of less than 75 μm, preferably a D_{90} of less than 50 μm and a diameter D_{50} of less than 35 μm, more preferably a diameter D_{90} of less than 35 μm and a diameter D_{50} of less than 20 μm, even more preferably a diameter D_{90} of less than 30 μm and a diameter D_{50} of less than 15 μm measured by laser diffractometry;

- to obtain a composition according to claims 1-11.

13. Process according to claim 12, in which the crude bicarbonate particles from an ammonia-soda plant have a water content of at most 15 % in weight, preferably at most 12 %, more preferably at most 10 %, and even more preferably at most 8 % in weight of water before being introduced into the gas stream.