CLAIMS

1. Process for the decarbonation of limestone, dolomite or other carbonated materials, said process comprising the following steps:

- heating particles of carbonated materials in a reactor of a first circuit up to a temperature range in which carbon dioxide of the carbonated materials is released to obtain decarbonated particles comprising CaO and/or MgO;
- conveying particles of carbonated materials by a first entraining gas in the first circuit for preheating said carbonated materials, said entraining gas comprising said carbon dioxide, said gas composition being substantially free of nitrogen;
- separating the carbonated particles from a first entraining gas flow ;
- transferring the decarbonated particles to a cooling section of a second circuit comprising a second entraining gas in which the conveyed decarbonated particles release a portion of their thermal energy;
- separating the decarbonated particles from a second entraining gas flow;

wherein said second entraining gas is substantially free of carbon dioxide, and wherein the first and second circuits are separated by selective separation means allowing the passage of solids while substantially preventing the passage of the entraining gases.

2. Process according to Claim 1, further comprising a step of introducing the particles of carbonated materials in a pre-heating section of the first circuit so that said particles are pre-heated by the first entraining gas by means of a solid-gas heat exchange.

3. Process according to any of the preceding claims, further comprising a step of introducing the particles of carbonated materials in a heating section of the second circuit, the heating section being positioned downstream of the cooling section, so that the released heat from the decarbonated particles to the second entraining gas is used to heat the particles of carbonated materials by means of a solid-gas heat exchange, the heated particles being subsequently transferred to the reactor or upstream of the pre-heating section.

4. Process according to any of the preceding claims, further comprising a step of separating the particles of carbonated materials from a second entraining gas flow.

5. Process according to any of the previous claims, further comprising a step of recirculating at least a portion of the carbon dioxide released in the reactor in the first circuit, preferably recirculating said carbon dioxide to the reactor.

6. Process according to any of the previous claims, further comprising a step of separating at least one constituent, in particular water, from at least one portion of the first entraining gas exiting the reactor.

7. Process according to any of the previous claims, further comprising a step of recycling at least a portion of the heat of the second entraining gas, preferably exchanging heat from the second entraining gas to the first entraining gas, more preferably through a gas-gas heat exchanger positioned between the first circuit and the second circuit.

8. Process according to any of the previous claims, further comprising a step of separating the particles of decarbonated materials from a first entraining gas flow.

9. Process according to any of the previous claims, wherein the step of separating the carbonated particles from a first entraining gas flow comprises a step of inertially separating the carbonated particles from the first entraining gas flow.

10. Process according to any of the previous claims, wherein the step of separating the decarbonated particles from a second entraining gas flow comprises a step of inertially separating the decarbonated particles from the second entraining gas flow.

11. Process according to any of the previous claims, wherein the step of separating the particles of carbonated materials from a second entraining gas flow comprises a step of inertially separating the particles of carbonated materials from the second entraining gas flow.

12. Process according to any of the previous claims, wherein the step of separating the particles of decarbonated materials from a first entraining gas flow comprises a step of inertially separating the particles of decarbonated materials from the first entraining gas flow.

13. Process according to any of the previous claims, wherein the particles of the carbonated minerals have a d90 less than 10 mm, preferably less than 6 mm, more preferably less than 4 mm.

14. Device for the decarbonation of limestone, dolomite or other carbonated materials, for carrying out the process according to any of the preceding claims comprising:

- a first circuit in which a first entraining gas substantially free of nitrogen conveys particles of said carbonated mineral, said first circuit comprising a reactor in which said particles are heated to a temperature range in which carbon dioxide is released to obtain decarbonated particles comprising CaO and/or MgO;

- a second circuit in which a second entraining gas substantially free of carbon dioxide is circulated, the second circuit comprising a cooling section in which the decarbonated particles transferred from the first circuit, release a portion of their thermal energy to the second entraining gas;
- at least one selective separation means connecting the first and second circuits arranged so as to allow the transfer of either the particles of carbonated materials or the decarbonated particles of said materials between the first circuit and the second circuit while substantially preventing the passage of gases, in particular a siphon element, a loop seal, single or multiple flaps, table feeder, cellular wheel sluice, fluid seal-pot, “Dollar” plate, or any of the following valves: rotary valves, cone valve, J valve, L valve, trickle valve and flapper valve; characterised in that the first circuit comprises a pre-heating section, said pre-heating section comprising at least a first solid/gas suspension heat exchanger and/or a second solid/gas suspension exchanger, preferably said second solid/gas suspension exchanger being positioned downstream from said first solid/gas suspension heat exchanger.

15. Device according to Claim 14, wherein the second circuit comprises a heating section positioned downstream from the cooling section of the second circuit, preferably said cooling section and heating section each comprising a solid/gas suspension heat exchanger.

16. Device according to any of Claims 14 to 15, wherein a first selective separation means connecting the first and the second circuit allowing the transfer of the decarbonated particles from the first circuit to the second circuit while substantially preventing the passage of gases, the first selective separation means being connected upstream of an inlet of the first suspension heat exchanger of the second circuit.

17. Device according to any of Claims 14 to 15, comprising a second selective separation means, connecting the first and the second circuit allowing the transfer of the carbonate particles from the second circuit to the first circuit while substantially preventing the passage of gases, wherein a return passage of the second solid/gas suspension heat exchanger of the second circuit is connected to the first circuit, preferably said selective separation means being connected to the reactor or upstream of an element of first circuit, said element being the first solid/gas suspension heat exchanger or the second solid/gas suspension heat exchanger.

18. Device according to any of Claims 14 to 15, wherein the reactor comprises an externally-fired calciner, said externally-fired calciner comprising an exhaust passage,

said passage being connected to the second circuit, preferably upstream of the heating section.

19. Device according to any of Claims 14 to 18, wherein the first circuit comprises a recycling passage for recycling at least a portion of the first entraining gas from a position downstream from the pre-heating section or the condenser to a position upstream of the reactor.

20. Device according to any of Claims 14 to 19, wherein the second circuit comprises a heat-recovery element, preferably said heat-recovery element being configured to exchange the heat accumulated in the second entraining gas to the first entraining gas at a section of the first circuit, more preferably said heat-recovery system being a heat exchanger positioned between the first circuit and the second circuit.