## CLAIMS

1. A composition comprising at least one calcium-magnesium compound fitting the formula $aCaCO_3.bMgCO_3.xCaO.yMgO.zCa(OH)_2.tMg(OH)_2.uI$, wherein I represents impurities, a, b, z, t and u each being mass fractions $\geq 0$ and $\leq 50\%$, x and y each being mass fractions $\geq 0$ and $\leq 100\%$, with $x + y \geq 50\%$ by weight, based on the total weight of said at least one calcium-magnesium compound, characterized in that said at least one calcium-magnesium compound is in the form of particles, said composition having an accumulated calcium and magnesium content in the form of oxides, greater than or equal to 20% by weight based on the total weight of the composition, is in the form of compacts, each compact being formed with said compacted and shaped particles of calcium-magnesium compounds, said compacts having a Shatter Test Index of less than 10%.

2. The composition according to claim 1, wherein said at least one calcium-magnesium compound has mass fractions such that $x + y \geq 60\%$, preferably $\geq 75\%$, preferentially $\geq 80\%$, and still more preferentially $\geq 90\%$, more particularly $\geq 93\%$, or even $\geq 95\%$ by weight, based on the total weight of said at least one calcium-magnesium compound.

3. The composition according to claim 1 or claim 2, wherein said compacts have a Shatter Test Index of less than 8%, preferably less than 6%, and more preferentially less than 4%, in particular less than 3%.

4. The composition according to any of the preceding claims, wherein the accumulated calcium and magnesium content in the form of oxides is greater than or equal to 40% by weight, advantageously ≥ 60% by weight, preferably ≥ 80% by weight, in particular ≥ 90% by weight, preferentially ≥ 93% by weight, or even equal to 95% by weight, based on the total weight of the composition.

5. The composition according to any of the preceding claims, having a specific surface area measured by manometry with adsorption of nitrogen after degassing *in vacuo* at 190°C for at least 2 hours and calculated according to the multi-point BET method as described in the ISO 9277:2010E standard, greater than or equal

to 0.4 $m^2/g$, preferably greater than or equal to 0.6 $m^2/g$, more preferentially greater than or equal to 0.8 $m^2/g$ and even more preferentially greater than or equal to 1.0 $m^2/g$ and in particular greater than or equal to 1.2 $m^2/g$.

6. The composition according to any of the preceding claims, having a total pore volume determined by porosimetry by introducing mercury according to Part 1 of the ISO 15901-1:2005E standard, greater than or equal to 20%, preferably greater than or equal to 25% and even more preferentially greater than or equal to 30%.

7. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20% after an Accelerated Ageing Test of Level 1 at 30°C under 75% of relative humidity (i.e. 22.8 $g/m^3$ of absolute humidity) for 2 h.

8. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20% after an Accelerated Ageing Test of Level 2 at 40°C under 50% of relative humidity (i.e. 25.6$g/m^3$ of absolute humidity) for 2 h.

9. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20% after an Accelerated Ageing Test of Level 3 at 40°C under 60% of relative humidity (i.e. 30.7 $g/m^3$ of absolute humidity) for 2 h.

10. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20%, preferably less than 10%, in particular less than 5%, more particularly less than 3%, after an Accelerated Ageing Test of Level 4 at 40°C under 70% of relative humidity (i.e. 35.8 $g/m^3$ of absolute humidity) for 2 h.

11. The composition according to any of the preceding claims, further comprising an organic additive as a binder or a lubricant.

12. The composition according to any of the preceding claims wherein said particles have a size of less than or equal to 7 mm, observable by optical microscopy or by scanning electron microscopy and before compaction having a size of particles $d_{100}$ of less than or equal to 7 mm, in particular less than or equal to 5 mm.

13. The composition according to any of the preceding claims, wherein said particles of said at least one calcium-magnesium compound before compaction have a $d_{90}$ of less than or equal to 3 mm.

14. The composition according to any of the preceding claims, wherein said particles of said at least one calcium-magnesium compound before compaction have a $d_{50}$ of less than or equal to 1 mm.

15. The composition according to any of the preceding claims, wherein said compacts are of a regular and homogeneous shape, typical of products from methods for shaping fines via a dry route, for example selected from the group of lozenges, tablets, compressed tablets, briquettes, platelets, balls or further « soap bar » shapes and have a size comprised between 10 and 100 mm, preferably greater than or equal to 15 mm, preferably greater than or equal to 20 mm, and preferably less than or equal to 70 mm, preferably less than or equal to 50 mm.

16. The composition according to any of the preceding claims, wherein said compacts have an average weight per compact of at least 1 g, preferably of at least 5 g, preferentially of at least 10 g, and in particular of at least 15 g.

17. The composition according to any of the preceding claims, wherein said compacts have an average weight per compact of less than or equal to 200 g, preferably less than or equal to 150 g, preferentially less than or equal to 100 g and in particular less than or equal to 50 g.

18. The composition according to any of the preceding claims, wherein said compacts have an apparent density comprised between 1.5 and 3, advantageously between 1.5 and 2.8 and preferably between 1.7 and 2.6.

19. The composition according to any of the preceding claims, wherein said compact includes a through-orifice.

20. The composition according to any of the preceding claims, further comprising one or several oxides, such as an oxide based on aluminum, an oxide based on silicon, an oxide based on iron, an oxide based on manganese.

21. The composition according to any of the preceding claim, further comprising one or several hydroxides, such as a hydroxide based on aluminum, a hydroxide based on silicon, a hydroxide based on iron, a hydroxide based on manganese.

22. The composition according to any of the preceding claims, wherein said compact is free of macrodefects, on the basis of simple visual inspection, of inspection under an optical microscope or further of inspection with a scanning electron microscope (SEM).

23. A composite material comprising several successive layers for forming a multi-layer structure wherein at least one layer is formed with said compact product of the composition according to any of the preceding claims.

24. A method for making a composition in the form of a compact comprising the following steps:

a) providing a composition of particles comprising at least particles of at least one calcium-magnesium compound fitting the formula $aCaCO_3.bMgCO_3.xCaO.yMgO.zCa(OH)_2.tMg(OH)_2.uI$, wherein I represents impurities, a, b, z, t and u each being mass fractions $\geq 0$ and $\leq 50\%$, x and y each being mass fractions $\geq 0$ and $\leq 100\%$, with $x + y \geq 50\%$ by weight based on the total weight of the calcium-magnesium compound in a confinement space between two punches having a section comprised between 1 and 40 $cm^2$, advantageously comprised between 1 and 20 $cm^2$, preferably between 1 and 10 $cm^2$, in particular between 2 and 10 $cm^2$,

b) compacting said particles for forming a compact product with a three-dimensional shape, by applying a compaction pressure comprising 200 MPa and 700 MPa, preferably comprised between 250 MPa and 500 MPa, more preferentially between 300 and 500 MPa, and even more preferentially between 375 and 490 MPa,

c) releasing the compaction pressure and

d) ejecting said compact product from said confinement space.

25. The method according to claim 23, comprising, prior to said provision step, a step for mixing the particles in order to form the composition of particles in order to obtain a homogeneous composition of particles wherein the particles are homogeneously distributed in the composition of particles.

26. The method according to claim 23 or claim 24, wherein said composition of particles which is provided, contains additives either of an organic nature such as for example conventional binders or lubricants, or of a mineral nature such as for example oxides or hydroxides based on aluminum, silicon, iron, manganese and the like, or further additives with a hardness greater than or equal to 5 on the Mohs scale, said additives having a size of particles $d_{100}$ of less than or equal to 200 µm, preferably less than or equal to 150 µm and more preferentially less than or equal to 100 µm.

27. The method according to any of claims 23 to 26, wherein said space confined between said two punches is lubricated beforehand by means of a lubrication step during which a lubricant in the form of a powder, such as for example calcium or magnesium stearate, is deposited at the surface of said space confined between said two punches, said lubricant in the form of a powder being compacted with the particles of the composition of particles and represents advantageously between 0.01 and 0.3%, preferably between 0.02 and 0.1% by weight based on the total weight of the compact product.

28. The method according to any of claims 23 to 27, wherein said collected compact product is then heat-treated between 700°C and 1,200°C for a predetermined time period comprised between 1 and 90 minutes, preferably greater than or equal to 5 minutes and less than or equal to 60 minutes, more particularly greater than or equal to 10 minutes and less than or equal to 30 minutes.

29. The method according to claim 28, wherein said collected compact product is heat-treated at more than 800°C and advantageously at more than 900°C and at less than 1,100°C, preferably at less than 1,000°C.

30. The method according to any of claims 23 to 29, further comprising a step for surface treatment of said collected compact product, optionally after heat treatment if it is present, at a temperature greater than or equal to 50°C, preferably greater than or equal to 100°C, and preferably greater than or equal to 150°C, and less than or equal to 700°C, advantageously less than or equal to 500°C, preferably less than or equal to 400°C, in particular less than or equal to 300°C, advantageously less than or equal to 250°C, for a time period comprising between 5 and 60 minutes, preferably comprising between 10 and 30 minutes under a flow of gas containing $CO_2$ and steam.

31. The method according to any of claims 23 to 30, wherein said gas flow has a steam concentration comprised between 5 and 25% of volume and preferably between 5 and 15%.

32. The method according to any of claims 23 to 31, wherein said flow of gas has a $CO_2$ concentration in the gas comprised between 5 and 40% by volume and preferably between 10 and 25%.

33. A method for making a composite material comprising several successive layers in order to form a multi-layer structure wherein at least one layer is formed with said compact product of the composition by the method according to any of claims 23 to 32 and further comprising an additional compaction step for said at least one layer of said compact product and for another compact layer before said ejection step.

34. The use of the composition according to claims 1 to 22 or stemming from the method according to claims 23 to 33, in steel working, in particular in oxygen converters or else in electric arc furnaces, in the treatment of fume gases, in the treatment of waters, in the treatment of waste sludges and waters, in agriculture, in the building industry and civil engineering, such as for example for stabilizing soils.

## CLAIMS

1. A composition comprising at least one calcium-magnesium compound fitting the formula $aCaCO_3.bMgCO_3.xCaO.yMgO.zCa(OH)_2.tMg(OH)_2.uI$, wherein I represents impurities, a, b, z, t and u each being mass fractions $\geq 0$ and $\leq 50\%$, x and y each being mass fractions $\geq 0$ and $\leq 100\%$, with $x + y \geq 60\%$ by weight, based on the total weight of said at least one calcium-magnesium compound, said at least one calcium-magnesium compound being in the form of particles, said composition having a calcium and magnesium accrued content in the form of oxides, greater than or equal to 60% by weight based on the total weight of the composition, and being in the form of compacts, each compact being formed with said compacted and shaped particles of calcium-magnesium compounds, wherein the said at least one calcium-magnesium compound is selected from the group consisting of quick lime, quick dolomitic lime, and quick magnesian lime resulting from the calcination of natural limestones or dolomites, of slags having a mass content from 40% to 70% by weight of CaO and from 3 to 15% by weight of MgO, and of their mixtures, said composition consisting of said at least one selected calcium-magnesium compound and of one or several oxides or hydroxides selected among the group consisting of oxides and hydroxides based on aluminum, iron and manganese, said composition comprising 1 to 30% by weight of oxides or hydroxides of aluminum, expressed as $Al_2O_3$ equivalent, 1 to 30% by weight of oxides or hydroxides of iron, expressed as $Fe_2O_3$ equivalent, or 1 to 10% by weight of oxides or hydroxides of manganese, expressed as MnO equivalent, and in that said compacts have a Shatter Test Index of less than 10%.

2. The composition according to claim 1, wherein said at least one calcium-magnesium compound has mass fractions such that $x + y \geq 75\%$, preferentially $\geq 80\%$, and still more preferentially $\geq 90\%$, more particularly $\geq 93\%$, or even $\geq 95\%$ by weight, based on the total weight of said at least one calcium-magnesium compound.

3. The composition according to claim 1 or claim 2, wherein said compacts have a Shatter Test Index of less than 8%, preferably less than 6%, and more preferentially less than 4%, in particular less than 3%.

4. The composition according to any of the preceding claims, wherein the calcium and magnesium accrued content in the form of oxides is greater than or equal to 80% by weight, in particular ≥ 90% by weight, preferentially ≥ 93% by weight, or even equal to 95% by weight, based on the total weight of the composition.

5. The composition according to any of the preceding claims, having a specific surface area measured by manometry with adsorption of nitrogen after degassing *under vacuum* at 190°C for at least 2 hours and calculated according to the multi-point BET method as described in the ISO 9277:2010E standard, greater than or equal to 0.4 $m^2/g$, preferably greater than or equal to 0.6 $m^2/g$, more preferentially greater than or equal to 0.8 $m^2/g$ and even more preferentially greater than or equal to 1.0 $m^2/g$ and in particular greater than or equal to 1.2 $m^2/g$.

6. The composition according to any of the preceding claims, having a total pore volume determined by porosimetry with intrusion of mercury according to Part 1 of the ISO 15901-1:2005E standard, greater than or equal to 20%, preferably greater than or equal to 25% and even more preferentially greater than or equal to 30%.

7. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20% after an Accelerated Ageing Test of Level 1 at 30°C under 75% of relative humidity (i.e. 22.8 $g/m^3$ of absolute humidity) for 2 h.

8. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20% after an Accelerated Ageing Test of Level 2 at 40°C under 50% of relative humidity (i.e. 25.6$g/m^3$ of absolute humidity) for 2 h.

9. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20% after an Accelerated Ageing Test of Level 3 at 40°C under 60% of relative humidity (i.e. 30.7 $g/m^3$ of absolute humidity) for 2 h.

10. The composition according to any of the preceding claims, having a Shatter Test Index of less than 20%, preferably less than 10%, in particular less than 5%, more particularly less than 3%, after an Accelerated Ageing Test of Level 4 at 40°C under 70% of relative humidity (i.e. 35.8 $g/m^3$ of absolute humidity) for 2 h.

11. The composition according to any of the preceding claims, further comprising an organic additive as a binder or a lubricant.

12. The composition according to any of the preceding claims wherein said particles have a size of less than or equal to 7 mm, observable by optical microscopy or by scanning electron microscopy and before compaction having a size of particles $d_{100}$ of less than or equal to 7 mm, in particular less than or equal to 5 mm.

13. The composition according to any of the preceding claims, wherein said particles of said at least one calcium-magnesium compound before compaction have a $d_{90}$ of less than or equal to 3 mm.

14. The composition according to any of the preceding claims, wherein said particles of said at least one calcium-magnesium compound before compaction have a $d_{50}$ of less than or equal to 1 mm.

15. The composition according to any of the preceding claims, wherein said compacts are of a regular and homogeneous shape, typical of products from methods for shaping fines via a dry route, for example selected from the group of lozenges, tablets, compressed tablets, briquettes, platelets, balls or further « soap bar » shapes and have a size comprised between 10 and 100 mm, preferably greater than or equal to 15 mm, preferably greater than or equal to 20 mm, and preferably less than or equal to 70 mm, preferably less than or equal to 50 mm.

16. The composition according to any of the preceding claims, wherein said compacts have an average weight per compact of at least 1 g, preferably of at least 5 g, preferentially of at least 10 g, and in particular of at least 15 g.

17. The composition according to any of the preceding claims, wherein said compacts have an average weight per compact of less than or equal to 200 g, preferably less than or equal to 150 g, preferentially less than or equal to 100 g and in particular less than or equal to 50 g.

18. The composition according to any of the preceding claims, wherein said compacts have an apparent density comprised between 1.5 and 3, advantageously between 1.5 and 2.8 and preferably between 1.7 and 2.6.

19. The composition according to any of the preceding claims, wherein said compact includes a through-orifice.

20. The composition according to any of the preceding claims, wherein said compact is free of macrodefects, on the basis of simple visual inspection, of inspection under an optical microscope or further of inspection with a scanning electron microscope (SEM).

21. A composite material comprising several successive layers for forming a multi-layer structure wherein at least one layer is formed with said compact product of the composition according to any of the preceding claims.

22. A method for making a composition in the form of a compact comprising the following steps:

a) providing a composition of particles consisting of at least particles of at least one calcium-magnesium compound fitting the formula $aCaCO_3.bMgCO_3.xCaO.yMgO.zCa(OH)_2.tMg(OH)_2.uI$, wherein I represents impurities, a, b, z, t and u each being mass fractions $\geq 0$ and $\leq 50\%$, x and y each being mass fractions $\geq 0$ and $\leq 100\%$, with $x + y \geq 60\%$ by weight based on the total weight of the calcium-magnesium compound, said calcium-magnesium compound being selected from the group consisting of quick lime, quick dolomitic lime, and quick magnesian lime resulting from the calcination of natural limestones or dolomites, of slags having a mass content from 40% to 70% by weight of CaO and from 3 to 15% by weight of MgO, and of their mixtures, and of particles of one or several oxides or hydroxides selected among the group consisting of oxides and hydroxides based on aluminum, iron and manganese, said composition comprising 1 to 30% by weight of oxides or hydroxides of aluminum, expressed as $Al_2O_3$ equivalent, 1 to 30%

by weight of oxides or hydroxides of iron, expressed as $Fe_2O_3$ equivalent, or 1 to 10% by weight of oxides or hydroxides of manganese, expressed as MnO equivalent, said composition having a calcium and magnesium accrued content in the form of oxides greater than or equal to 60% by weight based on the total weight of the composition in a confinement space between two punches having a section comprised between 1 and 40 $cm^2$, advantageously comprised between 1 and 20 $cm^2$, preferably between 1 and 10 $cm^2$, in particular between 2 and 10 $cm^2$,

b) compacting said particles for forming a compact product with a three-dimensional shape, by applying a compaction pressure comprising 200 MPa and 700 MPa, preferably comprised between 250 MPa and 500 MPa, more preferentially between 300 and 500 MPa, and even more preferentially between 375 and 490 MPa,

c) releasing the compaction pressure and

d) ejecting said compact product from said confinement space.

23. The method according to claim 22, comprising, prior to said provision step, a step for mixing the particles in order to form the composition of particles in order to obtain a homogeneous composition of particles wherein the particles are homogeneously distributed in the composition of particles.

24. The method according to claim 22 or claim 23, wherein said composition of particles which is provided, contains conventional binders or lubricants, or further additives with a hardness greater than or equal to 5 on the Mohs scale, said additives having a size of particles $d_{100}$ of less than or equal to 200 µm, preferably less than or equal to 150 µm and more preferentially less than or equal to 100 µm.

25. The method according to any of claims 22 to 24, wherein said space confined between said two punches is lubricated beforehand by means of a lubrication step during which a lubricant in the form of a powder, such as for example calcium or magnesium stearate, is deposited at the surface of said space confined between said two punches, said lubricant in the form of a powder being compacted with the particles of the composition of particles and represents advantageously between

0.01 and 0.3%, preferably between 0.02 and 0.1% by weight based on the total weight of the compact product.

26. The method according to any of claims 22 to 25, wherein said collected compact product is then heat-treated between 700°C and 1,200°C for a predetermined time period comprised between 1 and 90 minutes, preferably greater than or equal to 5 minutes and less than or equal to 60 minutes, more particularly greater than or equal to 10 minutes and less than or equal to 30 minutes.

27. The method according to claim 26, wherein said collected compact product is heat-treated at more than 800°C and advantageously at more than 900°C and at less than 1,100°C, preferably at less than 1,000°C.

28. The method according to any of claims 22 to 27, further comprising a step for surface treatment of said collected compact product, optionally after heat treatment if it is present, at a temperature greater than or equal to 50°C, preferably greater than or equal to 100°C, and preferably greater than or equal to 150°C, and less than or equal to 700°C, advantageously less than or equal to 500°C, preferably less than or equal to 400°C, in particular less than or equal to 300°C, advantageously less than or equal to 250°C, for a time period greater than or equal to 5 minutes, preferably greater than or equal to 10 minutes, and less than or equal to 60 minutes, preferably less than or equal to 30 minutes under a flow of gas containing $CO_2$ and water steam.

29. The method according to any of claims 22 to 28, wherein said gas flow has a water steam concentration greater than or equal to 5% by volume, and less than or equal to 25% by volume, preferably less than or equal to 15%.

30. The method according to any of claims 22 to 29, wherein said flow of gas has a $CO_2$ concentration in the gas is greater than or equal to 5% by volume, preferably greater than or equal to 10%, and less than or equal to 40% by volume, preferably less than or equal to 25%.

31. A method for making a composite material comprising several successive layers in order to form a multi-layer structure wherein at least one layer is

formed with said compact product of the composition by the method according to any of claims 22 to 30 and further comprising an additional compaction step for said at least one layer of said compact product and for another compact layer before said ejection step.

32. The use of the composition according to claim 21 or stemming from the method according to claim 31 or of the composition according to claims 1 to 20 or stemming from the method according to claims 22 to 30, in steel working, in particular in oxygen converters or in electric arc furnaces, in the treatment of fume gases, in the treatment of waters, in the treatment of waste sludges and waters, in agriculture, in the building industry and civil engineering, such as for example for stabilizing soils.