single-unit dosage forms, which instantaneous disperse or dissolve in an aqueous environment such as the saliva. However, the fast dissolving dosage forms of the present invention are not limited to intrabuccal or oral administration only. The fast disintegrating dosage forms can be also dissolved in another aqueous environment such as tap water, tea or juices. The fast dissolving dosage forms comprising functionalized natural and/or synthetic calcium carbonate (FCC) are therefore useful in pharmaceutical and confectionary fields. The functionalized natural or synthetic calcium carbonate (FCC) can be prepared from either natural ground calcium carbonate comprising mineral or from synthetic calcium carbonate, sometimes also named as precipitated calcium carbonate, or mixtures thereof.

The present invention also comprises a method for the preparation of the fast disintegrating dosage form such a tablet, mini-tablets (i.e. tablets with diameter less than 3 mm), granules or pellets by direct compression, extrusion, granulation or roller compaction.

The present invention relates also to the use of FCC in fast disintegrating dosage form.

Description of the Invention

The present invention relates to intrabuccally fast disintegrating and disintegrating dosage forms tablets, mini-tablets, granules, or pellets comprising functionalized natural and/or synthetic calcium carbonate (FCC) as novel pharmaceutical excipient. The fast disintegrating dosage forms of the present inventions comprises functionalized natural or synthetic calcium carbonate or functionalized blend of natural and synthetic calcium carbonates, at least one active or inactive ingredient and at least one disintegrant, wherein said functionalized natural or synthetic calcium carbonate is a reaction product of natural or synthetic calcium carbonate or mixtures

Claims

1. A fast disintegrating dosage form comprising functionalized natural and/or synthetic calcium carbonate, at least one active ingredient and at least one disintegrant, wherein said functionalized natural or synthetic calcium carbonate is a reaction product of natural or synthetic calcium carbonate with carbon dioxide and one or more acids, wherein the carbon dioxide is formed in situ by the acid treatment and/or is supplied from an external source, and wherein the tablet disintegrates in less than or in 3 minutes, preferably in less than or in 2 minutes, more preferably in less than or in 1 minute, still more preferably in less than or in 30 seconds, when introduced into an aqueous environment.

2. A fast disintegrating dosage form according to claim 1 , wherein the source of natural calcium carbonate is selected from the group of marble, calcite, chalk, limestone and dolomite and/or mixtures thereof.

3. A fast disintegrating dosage form according to claim 1, wherein the synthetic calcium carbonate is precipitated calcium carbonate (PCC) comprising aragonitic, vateritic or calcitic mineralogical crystals forms, especially prismatic, rhombohedral or scalenohedral PCC or mixtures thereof.

4. A fast disintegrating dosage form according to any of claims 1 to 3, wherein the acids are selected from the group of hydrochloric acid, sulfuric acid, sulfurous acid, hydrosulfate, phosphoric acid, phosphoric acid in combination with acetic, formic or citric acid or acid salts thereof, and mixtures thereof, preferably is phosphoric acid.

5. A fast disintegrating dosage form according to any of the claims 1 to 4, wherein the functionalized natural or synthetic calcium carbonate has BET specific surface area of from $5m^2/g$ to $200m^2/g$, preferably from $15m^2/g$ to $150m^2/g$, more preferably from $40m^2/g$ to $100m^2/g$, measured using nitrogen and the BET method according to ISO 9277:2010.

6. A fast disintegrating dosage form according to any of claims 1 to 5, wherein the functionalized natural or synthetic calcium carbonate has a weight median grain diameter d_{50} of from 0.1 to 50 µm, preferably from 0.5 µm to 25 µm, more preferably from 0.8 µm to 20 µm, still more preferably from 1 µm to 15 µm measured using Malvern Mastersizer X long bed.

7. A fast disintegrating dosage form according to any of claims 1 to 6, wherein the functionalized natural or synthetic calcium carbonate has an intra-particle porosity determined as the pore volume per unit particle volume within the range of from 20 vol.% to 99 vol.%, preferably form 30 vol.% to 80 vol.%, more preferably from 40 vol.% to 70 vol.%, .-%, most preferably from 50 vol.% to 65 vol.%. calculated from mercury porosimetry measurement.

8. A fast disintegrating dosage form according to any of claims 1 to 7, wherein the at least one active ingredient is selected from the group comprising pharmaceutically active ingredients, inactive pharmaceutical precursors, biologically active ingredients, inactive biological precursors and/or mixtures thereof.

9. A fast disintegrating dosage form according to any of claims 1 to 8, further comprising natural or synthetic scenting agents, natural or synthetic flavoring agents, natural or synthetic coloring agents, natural or synthetic sweeteners and/or mixtures thereof.

10. A fast disintegrating dosage form according to any of claims 1 to 9, wherein the at least one disintegrant is selected from the group comprising modified cellulose gums, insoluble cross-linked polyvinylpyrrolidones, starch glycolates, micro crystalline cellulose, alkyl-, hydroxyalkyl-, carboxyalkyl-cellulose esters, alginates, microcrystalline cellulose and its polymorphic forms, ion exchange resins, gums, chitin, chitosan, clays, gellan gum, crosslinked polacrillin copolymers, agar, gelatine, dextrines, acrylic acid polymers, carboxymethylcellulose sodium/calcium, hydroxpropyl methyl cellulose phtalate, shellac or mixtures thereof.

11. A fast disintegrating dosage form according to any of claims 1 to 10, wherein the at least one disintegrant is present in the range from about 0.3 wt% to about 10 wt%, preferably from about 0.5 wt% to about 8 wt%, more preferably from about 1 wt% to about 5 wt% based on the weight of functionalized natural or synthetic calcium carbonate.

12. A fast disintegrating dosage form according to any of claims 1 to 11, wherein the fast disintegrating dosage form further comprises an effervescing agent.

13. A fast disintegrating dosage forms according to claim 12, wherein the effervescing agent is selected from the group comprising acids, acid salts, or hydrogen carbonates.

14. A fast disintegrating dosage form according to any of claims 1 to 13, wherein the fast disintegrating dosage form comprises tablets, mini-tablets, granules or pellets.

15. A fast disintegrating dosage form in the form of a tablet according to claim 14, wherein the tablet has a hardness in the range from 40 to 100 N and a corresponding tensile strength in the range of 0.4 to 1.3 MPa.

16. A method for producing the tablet of claim 15 by direct compression.

17. A method for producing the tablet of claim 14 or 15 by wet granulation in high-shear fluidized bed and subsequent compaction.

18. Use of functionalized natural or synthetic calcium carbonate in a fast disintegrating dosage form according to any claims 1 to 14.

19. Use of functionalized natural or synthetic calcium carbonate in a fast disintegrating dosage form wherein said fast disintegrating dosage form comprises tablet, mini-tablets, granules or pellets.

single-unit dosage forms, which instantaneous disperse or dissolve in an aqueous environment such as the saliva. However, the fast dissolving dosage forms of the present invention are not limited to intrabuccal or oral administration only. The fast disintegrating dosage forms can be also dissolved in another aqueous environment such as tap water, tea or juices. The fast dissolving dosage forms comprising functionalized natural and/or synthetic calcium carbonate (FCC) are therefore useful in pharmaceutical and confectionary fields. The functionalized natural or synthetic calcium carbonate (FCC) can be prepared from either natural ground calcium carbonate comprising mineral or from synthetic calcium carbonate, sometimes also named as precipitated calcium carbonate, or mixtures thereof.

The present invention also comprises a method for the preparation of the fast disintegrating dosage form such a tablet, mini-tablets (i.e. tablets with diameter less than 3 mm), granules or pellets by direct compression, extrusion, granulation or roller compaction.

In an aspect of the present invention, there is provided a fast disintegrating dosage form comprising functionalized natural and/or synthetic calcium carbonate, at least one active ingredient and at least one disintegrant, wherein said functionalized natural or synthetic calcium carbonate is a reaction product of natural or synthetic calcium carbonate with carbon dioxide and one or more acids, wherein the carbon dioxide is formed in situ by the acid treatment and/or is supplied from an external source, wherein the at least one distegrant is selected from the group comprising modified cellulose gums, insolulbel cross-linked polyvinylpyrrolidones, starch glycolates or mixtures thereof, and wherein the tablet disintegrates in less than or in 3 minutes, when introduced into an aqueous environment.

The present invention relates also to the use of FCC in fast disintegrating dosage form.

In another aspect of the present invention, there is provided the use of functionalized natural or synthetic calcium carbonate in a fast disintegrating dosage form wherein said fast disintegrating dosage form comprises tablet, mini-tablets, granules or pellets.

Description of the Invention

The present invention relates to intrabuccally fast disintegrating and disintegrating dosage forms tablets, mini-tablets, granules, or pellets comprising functionalized natural and/or synthetic calcium carbonate (FCC) as novel pharmaceutical excipient.

The fast disintegrating dosage forms of the present inventions comprises functionalized natural or synthetic calcium carbonate or functionalized blend of natural and synthetic calcium carbonates, at least one active or inactive ingredient and at least one disintegrant, wherein said functionalized natural or synthetic calcium carbonate is a reaction product of natural or synthetic calcium carbonate or mixtures

CLAIMS

1. A fast disintegrating dosage form comprising functionalized natural and/or synthetic calcium carbonate, at least one active ingredient and at least one disintegrant, wherein said functionalized natural or synthetic calcium carbonate is a reaction product of natural or synthetic calcium carbonate with carbon dioxide and one or more acids, wherein the carbon dioxide is formed in situ by the acid treatment and/or is supplied from an external source, wherein the at least one distegrant is selected from the group consisting of modified cellulose gums, insoluble cross-linked polyvinylpyrrolidones, starch glycolates or mixtures thereof, and wherein the tablet disintegrates in less than or in 3 minutes, when introduced into an aqueous environment.

2. A fast disintegrating dosage form according to claim 1, wherein the source of natural calcium carbonate is selected from the group of marble, calcite, chalk, limestone and dolomite and/or mixtures thereof.

3. A fast disintegrating dosage form according to claim 1, wherein the synthetic calcium carbonate is precipitated calcium carbonate (PCC) comprising aragonitic, vateritic or calcitic mineralogical crystals forms, especially prismatic, rhombohedral or scalenohedral PCC or mixtures thereof.

4. A fast disintegrating dosage form according to any of claims 1 to 3, wherein the acids are selected from the group of hydrochloric acid, sulfuric acid, sulfurous acid, hydrosulfate, phosphoric acid, phosphoric acid in combination with acetic, formic or citric acid or acid saltsthereof.

5. A fast disintegrating dosage form according to any of the claims 1 to 4, wherein the functionalized natural or synthetic calcium carbonate has BET specific surface area of from $5m^2/g$ to $200m^2/g$, measured using nitrogen and the BET method according to ISO 9277:2010.

6. A fast disintegrating dosage form according to any of claims 1 to 5, wherein the functionalized natural or synthetic calcium carbonate has a weight median grain diameter d_{50} of from 0.1 to 50 μm, measured using Malvern Mastersizer X long bed.

7. A fast disintegrating dosage form according to any of claims 1 to 6, wherein the functionalized natural or synthetic calcium carbonate has an intra-particle porosity determined as

the pore volume per unit particle volume within the range of from 20 vol.% to 99 vol.%, calculated from mercury porosimetry measurement.

8. A fast disintegrating dosage form according to any of claims 1 to 7, wherein the at least one active ingredient is selected from the group comprising pharmaceutically active ingredients, inactive pharmaceutical precursors, biologically active ingredients, inactive biological precursors and/or mixtures thereof.

9. A fast disintegrating dosage form according to any of claims 1 to 8, further comprising natural or synthetic scenting agents, natural or synthetic flavoring agents, natural or synthetic coloring agents, natural or synthetic sweeteners and/or mixtures thereof.

10. A fast disintegrating dosage form according to any of claims 1 to 9, wherein the at least one disintegrant is present in the range from about 0.3 wt% to about 10 wt%, based on the weight of functionalized natural or synthetic calcium carbonate.

11. A fast disintegrating dosage form according to any of claims 1 to 10, wherein the fast disintegrating dosage form further comprises an effervescing agent.

12. A fast disintegrating dosage forms according to claim 11, wherein the effervescing agent is selected from the group comprising acids, acid salts, or hydrogen carbonates.

13. A fast disintegrating dosage form according to any of claims 1 to 12, wherein the fast disintegrating dosage form comprises tablets, mini-tablets, granules or pellets.

14. A fast disintegrating dosage form in the form of a tablet according to claim 13, wherein the tablet has a hardness in the range from 40 to 100 N and a corresponding tensile strength in the range of 0.4 to 1.3 MPa.

15. A method for producing the tablet of claim 14 by direct compression.

16. A method for producing the tablet of claim 13 or 14 by wet granulation in high-shear fluidized bed and subsequent compaction.

17. Use of functionalized natural or synthetic calcium carbonate in a fast disintegrating dosage form according to any claims 1 to 13.

18. Use of functionalized natural or synthetic calcium carbonate in a fast disintegrating dosage form wherein said fast disintegrating dosage form comprises tablet, mini-tablets, granules or pellets.