

CLAIMS

1. A nonwoven web, comprising:
at least one first homogeneous layer consisting of a blend of at least one of defibrated natural plant based fibers, individualized natural plant based fibers and staple fibers;
wherein
the at least one homogeneous layer comprises no binder, adhesive or thermal bonding fiber,
a basis weight of the at least one homogeneous layer is from 20 g/m² to 100 g/m²,
wherein
when a weighted average fiber length of the at least one of defibrated natural plant based fibers or individualized natural plant based fibers and staple fibers is greater than about 4.0 mm, the nonwoven web is a non-dispersible product which does not meet the requirement for dispersibility in accordance with INDANA/EDANA GD4, and
when a weighted average fiber length of the at least one of defibrated natural plant based fibers or individualized natural plant based fibers and staple fibers is less than about 4.0 mm, the nonwoven web is a dispersible product as defined in accordance with INDANA/EDANA GD4.
2. The nonwoven web according to claim 1, comprising a defibrated natural plant based fiber; wherein the defibrated natural plant based fiber is at least one selected from the group consisting of a wood pulp, a cotton pulp, a pulp of a natural plant different from wood and cotton, cotton, cotton linters, cotton combers, bamboo, bast, ramie, hemp, kapok, flax, jute, sisal and abaca.
3. The nonwoven web according to claim 1, comprising an individualized natural plant based fiber; wherein the individualized natural plant based fiber is at least one selected from the group consisting of a flax fiber, a hemp fiber, a jute fiber, a ramie fiber, a nettle fiber, a Spanish broom fiber and a kenaf plant fiber.
4. The nonwoven web according to claim 1, comprising a staple fiber: wherein
the staple fiber is at least one selected from the group consisting of a regenerated cellulose fiber, cotton, polyethylene terephthalate (PET), polypropylene, polylactic acid, esters of polylactic acid, amides of polylactic acid, milk protein and nylon.

5. The nonwoven web according to claim 2, wherein a length-weighted average fiber length of the defibrated natural plant based fiber is from 0.5 mm to 8.0 mm.

6. The nonwoven web according to claim 3, wherein a length-weighted average fiber length of the individualized natural plant based fiber is from 3 mm to 100 mm.

7. The nonwoven web according to claim 4, wherein a fiber length of the staple fiber is from 3 mm to 100 mm.

8. The nonwoven web according to claim 4, wherein a fineness of the staple fiber is from 0.1 to 10 denier.

9. The nonwoven web according to claim 4, wherein a cross-sectional geometry of the staple fiber is one selected from the group of geometries consisting of flat, circular, trilobal and X-shaped.

10. The nonwoven web of claim 1, wherein
a basis weight of the nonwoven web is from 25 g/m² to 100 g/m².

11. The nonwoven web according to claim 1, wherein
a MD/CD ratio is less than about 4.

12. The nonwoven web according to claim 1,
wherein a weighted average fiber length of the defibrated natural plant based fibers or individualized natural plant based fibers and the staple fibers is less than about 4.0 mm, and
a CD wet tensile strength is at least 2.5 N/5 cm.

13. The nonwoven web according to claim 1,
wherein a weighted average fiber length of the defibrated natural plant based fibers or individualized natural plant based fibers and the staple fibers is greater than about 4.0 mm,
and
a CD wet tensile strength is at least 5 N/5 cm.

14. The nonwoven web according to claim 1, comprising:
from 10 to 90 weight % of defibrated natural plant based fibers or individualized natural plant based fibers; and
from 10 to 90 weight % of staple fibers.
15. The nonwoven web according to claim 1 which comprises at least two first homogeneous layers.
16. The nonwoven web according to claim 1 further comprising at least one second homogeneous layer consisting of a blend of at least one of defibrated natural plant based fibers or individualized natural plant based fibers and staple fibers; wherein
the at least one second homogeneous layer comprises no binder, adhesive or thermal bonding fiber,
a basis weight of the at least one second homogeneous layer is from 20 g/m² to 100 g/m², and
the at least one first homogeneous layer and the at least one second homogeneous layer have differing compositions.
17. A method to prepare the nonwoven web according to claim 1, comprising:
preparing a homogeneous dry mixture of at least one of defibrated natural plant based fibers, individualized natural plant based fibers and staple fibers;
dry laying the mixture to obtain at least one homogeneous dry laid web;
hydroentangling the dry laid web to consolidate the web on at least one side; and
drying the hydroentangled web to obtain the nonwoven web;
wherein
the dry laying and hydroentangling is conducted in a continuous operation,
no binder, adhesive or thermal bonding fibers are utilized, and
a thickness of the nonwoven web is from 0.25 mm to 2 mm.
18. The method according to claim 17, wherein the homogeneous dry mixture comprises from 10 to 90 weight % of defibrated natural plant based fibers and/or individualized natural plant based fibers; and
from 10 to 90 weight % of staple fibers.

19. The method according to claim 17, wherein the dry laying comprises passing the homogeneous dry mixture through a perforated cylinder and air laying onto the foraminous carrier.

20. The method according to claim 17, wherein the homogeneous dry laid web is hydroentangled on an upper side of the web away from the foraminous carrier.

21. The method according to claim 17, wherein the homogeneous dry laid web is hydroentangled on an upper side of the web away from the foraminous carrier and on a side on the foraminous carrier.

22. The method according to claim 17, wherein the homogeneous airlaid web is hydroentangled on an upper side of the web away from the foraminous carrier.

23. The method according to claim 17, wherein the homogeneous airlaid web is hydroentangled on an upper side of the web away from the foraminous carrier and on a side on the foraminous carrier.

24. A method to prepare the nonwoven web according to claim 1, comprising:
preparing a homogeneous dry mixture consisting of at least one of defibrated natural plant based fibers or individualized natural plant based fibers and staple fibers;
carding and dry laying the mixture to obtain at least one homogeneous dry laid web;
hydroentangling the dry laid web to consolidate the web on at least one side; and
drying the hydroentangled web to obtain the nonwoven web;
wherein
the carding, dry laying and hydroentangling is conducted in a continuous operation,
no binder, adhesive or thermal bonding fibers are utilized, and
a thickness of the nonwoven web is from 0.25 mm to 2 mm.

25. The method according to claim 24, wherein the dry laying comprises passing the carded homogeneous dry mixture onto a foraminous carrier.

26. The method according to claim 24 wherein the carded homogeneous dry laid web is hydroentangled on an upper side of the web away from the foraminous carrier.

27. The method according to claim 24 wherein the carded homogeneous dry laid web is hydroentangled on an upper side of the web away from the foraminous carrier and on a side on the foraminous carrier.