

Portion capsule for producing a beverage

The present invention relates to a portion capsule for producing a beverage, said portion capsule having a cavity in which a raw beverage material is provided, wherein, in order to produce the beverage, an opening is introducible into the portion capsule.

Such portion capsules are well known from the prior art and are available on the market for example as coffee portion capsules. In these coffee portion capsules, the cavity is filled at least partially with coffee powder and hot water flows through said cavity to produce a coffee, espresso and the like. In order to prevent the coffee located in the cavity from losing its aroma, the portion capsule is preferably hermetically sealed. Therefore, in order to produce the coffee, openings have to be able to be introduced into the portion capsule or already be present therein in advance.

In particular in the case of coffee portion capsules, there is a permanent desire on the part of a person skilled in the art to improve the quality of the resulting coffee beverage. A large role is played here, inter alia, by the displacement of the air which is located for example in the cavity in the portion capsule but also in the coffee powder, and also the residence time of the hot water in the portion capsule.

Therefore, it was the object of the present invention to provide a portion capsule with which a good coffee beverage is producible.

The object is achieved by a portion capsule for producing a beverage, said portion capsule having a cavity in which a raw beverage material is provided, wherein, in order to produce the beverage, an opening

is introducible into the portion capsule, said opening being provided at a distance from a plane of symmetry of the portion capsule.

- 5 The statements made with respect to this subject of the present invention apply in equal measure to the other subjects of the present invention and vice versa, and the features disclosed here can be combined with other subjects of the present invention and vice versa.

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The present invention relates to a portion capsule for producing a beverage, said portion capsule having a cavity in which a raw beverage material is provided. Such a portion capsule is produced for example from
15 plastics material, a natural substance and/or a biodegradable material, and usually has a basic element, in particular a thermoformed basic element, which is preferably frustoconical or cylindrical. The raw beverage material is introduced into the cavity in
20 the portion capsule and is subjected to extraction and/or dissolved, for example, using a liquid, in particular water. Following the introduction of raw beverage material, the basic element is preferably closed, in particular with a membrane, for example a
25 plastics film. The membrane is preferably provided opposite the base of the basic element. The membrane may be produced from the same material as the basic element, or a different material, and is fastened on the basic element, preferably by sealing and/or
30 adhesive bonding. Furthermore, one or more insert elements, for example a filter, a liquid distributor, a nonwoven, a barrier sheet or the like may be provided in the cavity.

- 35 In order to produce the beverage, this portion capsule now has to be opened, i.e. be provided with an inlet and an outlet. According to the invention, at least one opening, preferably the opening through which the

liquid flows into the portion capsule, is provided at a distance from a plane of symmetry. As a result, flow takes place in an asymmetrical manner through the portion capsule, resulting in advantages for the quality of the end product, for example in the extraction of the coffee and/or in the formation of crema.

According to a further or a preferred subject of the present invention, there are provided a plurality of openings, in particular in the inlet, which are distributed at least partially in an asymmetrical manner and are located with respect to a first plane that extends in an axial direction of the portion capsule and is preferably a plane of symmetry of the unopened capsule. On account of this embodiment according to the invention or preferred embodiment of the present invention, too, flow takes place through the cavity in the portion capsule in an asymmetrical manner at least in sections and/or temporarily, thereby resulting in an improved coffee quality. Preferably, the plane is a plane of symmetry of the unopened portion capsule.

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According to a further preferred embodiment of the present invention, the openings are introduced in such a way, in particular into the cover sheet, that said openings are provided in a symmetrical manner with respect to a further axis of symmetry of the unopened portion capsule.

The opening(s) is/are introduced into the portion

capsule preferably immediately prior to the production of the particular beverage. This can be carried out in any manner familiar to a person skilled in the art, for example by piercing, for example with a spike, by
5 removal of material, by material softening and/or by pressure, in particular water pressure. Preferably, the membrane has at least one, preferably a plurality of, in particular two, openings, and the base, which is preferably located opposite the membrane, preferably
10 has at least one opening. The opening in the base of the portion capsule is provided preferably centrally, but can also be arranged at a distance from a plane of symmetry. The openings can have any desired shape familiar to a person skilled in the art. Preferably,
15 however, the holes in the membrane are triangular, circular, square or rectangular. This type of openings can be introduced into the portion capsules with a particularly small force.

20 Preferably, the membrane has at least one, preferably two or more openings, preferably along a first plane of symmetry of the portion capsule, wherein these openings in an asymmetrical manner with respect to a second plane of symmetry of the portion capsule, which are
25 arranged preferably perpendicularly to the first plane of symmetry. This opening serves/these openings serve preferably for a liquid to pass into the cavity in the portion capsule. Preferably, the membrane, particularly preferably additionally, has at least one, preferably
30 two, opening(s), preferably along a second plane of symmetry, which are preferably provided in a symmetrical manner with respect to the first plane of symmetry. This additional opening serves at least temporarily for venting the cavity in the portion
35 capsule.

A further or a preferred subject of the present invention is a portion capsule for producing a

beverage, said portion capsule having a cavity in which a raw beverage material is provided and through which a liquid can flow, wherein flow takes place onto the capsule at a distance from a plane of symmetry.

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The statements made with respect to this subject of the present invention apply in equal measure to the other subjects of the present invention and vice versa, and the features disclosed here can be combined with other
10 subjects of the present invention and vice versa.

In the case of this portion capsule, it is provided according to the invention that flow takes place onto the portion capsule at a distance from a plane of
15 symmetry, i.e. the liquid is supplied to the portion capsule not centrally but outside the center. This also results, at least temporarily, in improved flow through the cavity in the portion capsule and/or, at least temporarily, a longer residence time of the liquid in
20 the portion capsule and thus a higher quality beverage.

A further or a preferred subject of the present invention is a portion capsule in which the membrane has a liquid inlet and a venting opening.

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The statements made with respect to this subject of the present invention apply in equal measure to the other subjects of the present invention and vice versa, and the features disclosed here can be combined with other
30 subjects of the present invention and vice versa.

The liquid inlet and the venting opening are preferably introduced, preferably cut, into the membrane of the portion capsule by a coffee machine. With respect to
35 the gravitational field of the Earth, the venting opening is preferably arranged above the liquid inlet. As soon as no more gas emerges from the venting opening, the venting opening is preferably used

likewise for the liquid supply. Particularly preferably, the membrane of the portion capsule has a plurality of liquid inlets and a plurality of venting openings.

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Preferably, in the base of the portion capsule the portion capsule there is provided an outlet opening, which can be arranged centrally or at a distance from a plane of symmetry. The produced beverage flows out of
10 the portion capsule through this opening.

According to a further or a preferred subject of the present invention, a venting opening is provided in the base. This opening serves for venting the cavity in the
15 portion capsule while liquid is flowing through the latter. Only a very small amount of prepared beverage, if any at all, flows through this venting opening. Preferably, this opening is introduced, preferably cut, into the portion capsule only in the coffee machine.
20 With respect to the gravitational field of the Earth, the venting opening in the base of the capsule is arranged above the outlet opening.

The statements made with respect to this subject of the
25 present invention apply in equal measure to the other subjects of the present invention and vice versa, and the features disclosed here can be combined with other subjects of the present invention and vice versa.

30 A further subject of the present invention is a method for producing a beverage, in which a liquid flows through a portion capsule, wherein the portion capsule has to be opened at two points before flow takes place therethrough, wherein at least one opening is provided
35 at a distance from a plane of symmetry of the portion capsule.

The statements made with respect to this subject of the

present invention apply in equal measure to the other subjects of the present invention and vice versa, and the features disclosed here can be combined with other subjects of the present invention and vice versa.

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Preferably, in particular in the membrane, there are provided a plurality of openings which are provided in an asymmetrical manner with respect to a plane that extends in an axial direction of the portion capsule, in particular a plane of symmetry of the unopened portion capsule.

A further subject of the present invention is a method for producing a beverage, in which a liquid flows through a portion capsule, wherein flow takes place onto the portion capsule at a distance from one of its planes of symmetry, that extends in an axial direction, of the unopened portion capsule.

The statements made with respect to this subject of the present invention apply in equal measure to the other subjects of the present invention, and the features disclosed here can be combined with other subjects of the present invention and vice versa.

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According to a preferred or a further subject of the present invention, flow takes place through the portion capsule in an asymmetrical manner at least in sections and at least temporarily with respect to at least one plane of symmetry of the unopened portion capsule.

The statements made with respect to this subject of the present invention apply in equal measure to the other subjects of the present invention and vice versa, and the features disclosed here can be combined with other subjects of the present invention and vice versa.

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Preferably, the capsule is provided in a horizontal

manner while flow takes place therethrough, i.e. its central axis extends horizontally. The plane of symmetry mentioned above or hereinbelow is preferably a plane of symmetry which extends at least substantially along the horizontal.

A further or a preferred subject of the present invention is a method in which, while the liquid flows in, the cavity in the portion capsule is vented at least temporarily via at least one opening. This opening can be located in the membrane or in the base of the portion capsule. Preferably, the venting takes place at least temporarily through both openings. Preferably, the venting takes place via one or more opening(s) which are not used for the liquid inlet or liquid outlet.

The invention is explained in the following text with reference to figures 1-7. These explanations are only by way of example and do not limit the general concept of the invention. These explanations apply in equal measure to all subjects of the present invention.

Figures 1-7 each show an embodiment of the portion capsule according to the invention or of the method according to the invention in two views in each case.

Figure 1 shows a first embodiment of the portion capsule 1 according to the invention. Said portion capsule has a basic element 2 which in the present case is frustoconical. This basic element has a cavity 13 which is filled at least partially with a raw beverage material which, for example, is extracted and/or dissolved. In the present case, the raw beverage material is coffee powder which is extracted with hot water and is used to produce for example a coffee or an espresso. Once the raw beverage material has been introduced into the cavity, the latter is closed

preferably with a membrane, in that the membrane is sealed or adhesively bonded to the basic element. According to the invention, the portion capsule has a first plane 5 which extends in the axial direction of the portion capsule. In the present case, this is a horizontal plane 5 which in the present case is also at the same time a plane of symmetry, in particular a plane of mirror symmetry, of the unopened capsule. According to the invention, it is provided that, for producing for example a beverage, the portion capsule has an opening 4, which is in particular only introduced when the portion capsule 1 is located in the respective coffee machine. The opening 4 is provided at a distance from the plane of symmetry 5. As can be seen in particular from the right-hand illustration in figure 1, the opening 4 is two openings in the membrane, which are each also provided at a distance from a vertical plane of mirror symmetry 6 of the unopened capsule but in a mirror-symmetrical manner with respect to the plane of symmetry 6. As can furthermore be seen from the right-hand illustration in figure 1, both openings 4 in the membrane are distributed in an asymmetrical manner in the membrane 3 with respect to a first plane of symmetry 5, that extends in the axial direction, of the unopened capsule, i.e. both openings are located in the lower part of the portion capsule with respect to the horizontal plane of symmetry 5, while the upper part remains unopened. As can be seen in particular in the left-hand part of figure 1, in order to produce a beverage, the capsule also has to have in its base a further opening 9, which in the present case is arranged centrally but can also be provided at a distance from one of the planes 5 or 6. This opening is required in particular for the outlet of the produced beverage. The portion capsule is preferably processed as illustrated in a coffee machine, i.e. its central axis is provided horizontally while flow takes place

through the portion capsule.

Figure 2 shows substantially the embodiment of the capsule according to figure 1, wherein in the present case an insert member 7 is provided in the vicinity of the base. This insert member is preferably a screen or a nonwoven, which is intended in particular to prevent parts of the raw beverage material, for example coffee powder, from passing into the beverage to be consumed. Preferably, the member 7 is a nonwoven which is particularly preferably sealed to the base of the portion capsule. This nonwoven can be pierced when the portion capsule is opened at the base.

Figure 3 shows substantially the embodiment according to figure 2, wherein in this case the capsule has a further insert member, which is provided in the vicinity of the membrane 3 of the portion capsule. This member can be for example a liquid distributor or a raw beverage material retention member.

Figure 4 shows a further embodiment of the present invention. Reference can be made essentially to the embodiment according to figures 1-3. However, in the present case, there is additionally illustrated a liquid supply means 10, by way of which liquid is supplied in the direction of the portion capsule. In the present case, this liquid is hot water which, as illustrated by the arrow, is supplied at a distance from the plane of symmetry 5 of the portion capsule. In the present case, the liquid is supplied centrally between the two openings 4 in the membrane 3 and then flows through the openings 4 into the capsule. There, the coffee powder is extracted and the prepared beverage leaves the portion capsule through the opening 9. The illustrated arrows are intended to symbolize the possible flow pattern in the portion capsule. It can clearly be seen that this is for example asymmetrical

- with respect to the plane of symmetry 5. The present embodiment has the advantage that air which is located in front of and/or within the capsule is pushed out of the capsule uniformly and along a predictable path.
- 5 Alternatively or additionally, the minimum residence time of the liquid in the capsule is longer than in the case of a capsule of which the membrane is opened centrally and/or symmetrically.
- 10 **Figure 5** shows substantially the embodiment according to figure 4, wherein the capsule in the present case again has an insert member 7, in this case a screen or a nonwoven.
- 15 **Figure 6** shows yet another embodiment which is based on the embodiment according to figures 4 and 5. In the present case, the portion capsule has a further insert member 8, for example a membrane or the like, which can serve as a distribution member, but which can also be
- 20 destroyed by the supply of the liquid or by the pressure built up and as a result liquid can flow in the cavity, located behind the membrane 8, in the portion capsule 1.
- 25 **Figure 7** shows a further embodiment of the present invention, wherein reference can be made essentially to the embodiments in figures 1-6. As can be seen in particular from the right-hand illustration in figure 7, four openings 4, 14 are provided in the membrane 3.
- 30 Two of these openings 4 are provided for the liquid inlet and two openings 14 are provided as venting openings, out of which for example air or other gases which are located in the portion capsule can escape at least temporarily from the portion capsule when the
- 35 portion capsule is pierced and/or when the liquid runs in. The openings 14 are in this case arranged above the openings 4 with respect to the gravitational field of the Earth. Venting is symbolized by the arrow 15. In

the present case, the openings 14 are arranged on the plane of symmetry 5 and are provided in a symmetrical manner with respect to the plane of symmetry 6. The openings 4 for the liquid inlet are in the present case
5 arranged in a vertical plane one above another and in an asymmetrical manner with respect to the plane of symmetry 5 of the unopened portion capsule, wherein in the present case the liquid inlet means 10 is arranged in the same vertical plane 6 as the two openings 4 but
10 between the two openings 4. Once the gas has escaped from the portion capsule, the openings 14 can also act as liquid inlet openings. It can be seen from the left-hand illustration in figure 7 that the portion capsule 1 can alternatively or additionally have in its base a
15 venting opening 16, which is preferably introduced into the portion capsule by the coffee machine. This venting opening 16 is provided in addition to the outlet opening 9 and serves to dissipate gas which is located in the portion capsule prior to piercing. With respect
20 to the gravitational field of the Earth, the opening 16 is located above the opening 9. The opening 9 is preferably arranged above the openings 14 with respect to the gravitational field of the Earth.

List of reference signs:

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| 1 | Capsule |
| 2 | Basic element |
| 5 3 | Membrane |
| 4 | Opening, piercing opening in cover, liquid inlet |
| 5 | First plane, plane of symmetry, horizontal plane of symmetry |
| 6 | Second plane, plane of symmetry, vertical plane of symmetry |
| 10 7 | Insert member, screen |
| 8 | Insert member, screen |
| 9 | Opening, piercing opening, outlet opening |
| 10 | Liquid supply means |
| 15 11 | Flow direction of the liquid |
| 12 | Axial direction |
| 13 | Cavity |
| 14 | Opening, piercing opening in the cover, liquid inlet, venting opening |
| 20 15 | Venting flow |
| 16 | Venting opening |

Patent claims:

1. A portion capsule (1) for producing a beverage,
said portion capsule (1) having a cavity in which
5 a raw beverage material is provided, wherein, in
order to produce the beverage, an opening (4, 14)
is introducible into the portion capsule (3),
characterized in that the opening (4, 14) is
provided at a distance from a plane of symmetry
10 (5, 6).
2. The portion capsule as claimed in claim 1 or
according to the preamble of patent claim 1,
characterized in that there are provided a
15 plurality of openings (4, 14) which are
distributed in an asymmetrical manner with respect
to a first plane (5) that extends in an axial
direction (12).
- 20 3. The portion capsule as claimed in either of the
preceding claims, characterized in that the
openings (4, 14) are distributed in a symmetrical
manner with respect to a second plane (6).
- 25 4. The portion capsule as claimed in one of the
preceding claims, characterized in that the
opening (4, 14) is provided in the form of a
triangle.
- 30 5. The portion capsule as claimed in one of the
preceding claims, characterized in that at least
two openings (4, 14) are provided along a first
plane of symmetry (6) and preferably two openings
are provided along a second plane of symmetry (5).
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6. The portion capsule (1) as claimed in one of the
preceding claims or according to the preamble of

patent claim 1, characterized in that a liquid flows through the cavity and flow takes place onto the capsule at a distance from a plane of symmetry (5, 6).

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7. The portion capsule (1) as claimed in one of the preceding claims or according to the preamble of patent claim 1, characterized in that the membrane (3) has a liquid inlet (4) and a venting opening (14).

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8. The portion capsule as claimed in one of the preceding claims, characterized in that an opening (9) is provided in the base of the portion capsule, centrally or at a distance from a plane of symmetry.

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9. The portion capsule (1) as claimed in one of the preceding claims or according to the preamble of patent claim 1, characterized in that a venting opening (16) is provided in the base.

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10. A method for producing a beverage, in which a liquid flows through a portion capsule (1), wherein the portion capsule has to be opened at two points (4, 9) before flow takes place therethrough, characterized in that at least one opening (4) is provided at a distance from a plane of symmetry (5, 6).

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11. The method as claimed in claim 10 or according to the preamble of patent claim 10, characterized in that there are provided a plurality of openings (4) which are provided in an asymmetrical manner with respect to a first plane (5) that extends in an axial direction (12).

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12. A method for producing a beverage, in which a liquid flows through the cavity (13) in a portion capsule (1), characterized in that flow takes place onto the portion capsule at a distance from one of its planes of symmetry (5, 6) that extends in an axial direction (12).
13. The method as claimed in claim 12 or according to the preamble of patent claim 12, characterized in that flow takes place through the portion capsule in an asymmetrical manner at least in sections and at least temporarily with respect to at least one plane of symmetry (5, 6).
14. The method as claimed in one of the preceding claims, characterized in that the axial direction of the portion capsule (1) is provided in a horizontal manner while flow takes place therethrough.
15. The method as claimed in one of the preceding claims or according to the preamble of patent claim 12, characterized in that, while the liquid (10) flows in, the cavity (13) in the portion capsule is vented at least temporarily via at least one, preferably both openings (14, 16).