CLAIMS

1. An exchangeable separation insert (1) for a centrifugal separator (100) comprising:

a rotor casing (2) enclosing a separation space (17) in which a stack (19) of separation discs is arranged, the rotor casing being arranged to rotate around an axis (X) of rotation,

a first stationary portion (3) and a second stationary portion (4), said rotor casing (2) being axially arranged between said first (3) and said second (4) stationary portions,

a feed inlet (20) for supply of a fluid mixture to be separated to said separation space (17),

a light phase outlet (21) for discharge of a separated phase of a first density, and a heavy phase outlet (22) for discharge of a separated phase of a second density higher than said first density, wherein said feed inlet (20) is arranged at a first axial end (5) of said rotor casing (2), and wherein one of said light phase outlet (21) and heavy phase outlet (22) is arranged at a second axial end (6), opposite the first axial end (5), of the rotor casing (2),

a first rotatable seal (15) sealing and connecting said feed inlet (20) to a stationary inlet conduit (7) in said first stationary portion (3), and

a second rotatable seal (16) for sealing and connecting one of said light phase outlet (21) and heavy phase outlet (22) to a stationary outlet conduit (8) in said second stationary portion (4),

wherein the exchangeable separation insert (1), including the rotor casing (2), the first stationary portion (3), and the second stationary portion (4), form a pre-assembled insert ready for being inserted into a centrifugal separator.

2. An exchangeable separation insert (1) according to claim 1, wherein said light phase outlet (21) is arranged at the first axial end (5) and the heavy phase outlet (22) is arranged at the second axial end (6), and wherein said second rotatable seal (16) is for sealing and connecting said heavy phase outlet (22) to a stationary outlet conduit (8) in said second stationary portion (4).

3. An exchangeable separation insert (1) according to claim 2, wherein said first rotatable seal (15) also is arranged for sealing and connecting said light phase outlet (21) to a stationary outlet conduit (9) in said first stationary portion (3).

4. An exchangeable separation insert (1) according to any previous claim, wherein the rotor casing (2) is free of any further outlets for separated phases.

5. An exchangeable separation insert (1) according to any previous claim, wherein the heavy phase collection space (17c) of the separation space (17) extends from a first axial position (17a) to a second axial position (17b), and wherein the inner diameter of the separation space (17) continuously increases from said first (17a) to said second (17b) axial position.

6. An exchangeable separation insert (1) according to any previous claim, further comprising at least one outlet conduit (23) arranged for transporting a separated heavy phase from a radially outer position of the separation space (17) to the heavy phase outlet (22).

7. An exchangeable separation insert (1) according to claim 6, wherein said at least one outlet conduit (23) is arranged at the axially upper portion of the separation space (17).

8. An exchangeable separation insert (1) according to any previous claim, wherein the first stationary portion (3) is arranged at an axial distance that is less than 20 cm from the heavy phase collection space (17c) of said separation space (17).

9. An exchangeable separation insert (1) according to any previous claim, wherein the stationary inlet conduit (7) is arranged at the rotational axis (X).

10. An exchangeable separation insert (1) according to any previous claim, wherein the stationary outlet conduit (8) for the separated heavy phase is arranged at the rotational axis (X).

11. An exchangeable separation insert (1) according to any previous claim, wherein the rotor casing (2) is arranged to be solely externally supported by external bearings.

12. An exchangeable separation insert (1) according to any previous claim, wherein the outer surface of the rotor casing (2) comprises a first (10) and second (11) frustoconical portion defining the separation space (17) therein, wherein the first (10) frustoconical portion has an opening angle that is larger than the opening angle of the second (10) frustoconical portion, and wherein the imaginary apex of the first (10) and second (11) frustoconical portions both point in the same axial direction along the rotational axis (X).

13. An exchangeable separation insert (1) according to claim 12, wherein the opening angle of the second conical portion (11) is such that the outer surface of second frustoconical portion (11) forms an angle α relative the rotational axis (X) that is less than 10 degrees.

14. An exchangeable separation insert (1) according to any previous claim, wherein the stack (19) of separation discs comprises frustoconical separation discs.

15. An exchangeable separation insert (1) according to claim 14, wherein said frustoconical separation discs are arranged with the imaginary apex pointing towards said first stationary portion (3).

16. An exchangeable separation insert (1) according to claim 15, wherein the first stationary portion (3) is arranged at an axial distance that is less than 20 cm from the heavy phase collection space (17c) of said separation space (17).

17. An exchangeable separation insert (1) according to claim 14, wherein said imaginary apex of the axially lowermost separation disc that is closest to the first end (5) of the insert is arranged less than 10 cm from the first stationary portion (3).

18. An exchangeable separation insert (1) according to any previous claim, wherein the exchangeable separation insert (1) forms a pre-assembled insert (1) configured to be handled as one unit.

19. A method for separating at least two components of a fluid mixture which are of different densities comprising the steps of:

a) providing a centrifugal separator comprising the exchangeable separation insert according to any previous claim;

b) supplying said fluid mixture to the feed inlet to said separation space;

c) discharging a separated light phase from said separation space via the light phase outlet; and

d) discharging a separated heavy phase from said separation space via the heavy phase outlet.

20. The method as claimed in claim 19, wherein the fluid mixture is a cell culture mixture, such as a mammalian cell culture mixture.