CLAIMS

1. A process for dry fractionation of a soft palm oil mid fraction (SPMF) into a final hard palm oil mid fraction (fHPMF-A), the process comprising:

providing the soft palm oil mid fraction (SPMF),

using the soft palm oil mid fraction (SPMF) as an input (IN1) to a first dry fractionation (FDF) to obtain an intermediate olein fraction (SPMF-O) and an intermediate stearin fraction (SPMF-S),

using the intermediate olein fraction (SPMF-O) as an input (IN2) to an ultrasound assisted second dry fractionation (SDF) to obtain the final hard palm oil mid fraction (fHPMF-A) and a palm oil olein fraction (POO),

wherein the ultrasound assisted second dry fractionation (SDF) comprises subjecting at least a part of the input (IN2) to ultrasonic treatment (US2).

2. The process according to claim 1, wherein said first dry fractionation (FDF) is an ultrasound assisted first dry fractionation, comprising subjecting at least part of the input (IN1) to ultrasonic treatment (US2).

3. The process according to claim 1 or 2, wherein the ultrasound assisted second dry fractionation (SDF) comprises cooling (CO2) the input (IN2) to obtain a supersaturated input (IN2), prior to the ultrasonic treatment (US2).

4. The process according to any of claims 1-3, wherein the second dry fractionation (SDF) comprises crystallization (CRY2) of the supersaturated input (IN2), at least a part of which having been subjected to ultrasound treatment (US2).

5. The process according to claim 4, wherein the crystallization (CRY2) is performed in a crystallizer, and where the ultrasonic treatment (US2) is performed external to the crystallizer.

6. The process according to claim 4, wherein the crystallization (CRY2) is performed in a crystallizer, and where the ultrasonic treatment (US2) is performed in the crystallizer.

7. The process according to any of claims 4-6, wherein the crystallization (CRY2) is performed in a crystallizer, and where the cooling (CO2) is performed in the crystallizer.

8. The process according to any of claims 4-6 wherein the crystallization (CRY2) is performed in a crystallizer, and where the cooling (CO2) is performed external to the crystallizer.

9. The process according to any of claims 1-8, wherein the first dry fractionation (FDF) comprises

melting, in a first melting step (MLT1), the soft palm oil mid fraction (SPMF) to obtain a melted soft palm oil mid fraction (mSPMF),

cooling, in a first cooling step (CO1), the melted palm oil mid fraction (SPMF) to obtain a supersaturated soft palm oil mid fraction (ssSPMF),

crystallization, in a first crystallization step (CRY1), of the supersaturated soft palm oil mid fraction (ssSPMF) to obtain a first slurry (SL1), and

filtering, in a first filtration step (FLT1), the first slurry (SL1) to obtain the intermediate olein fraction (SPMF-O) and the intermediate stearin fraction (SPMF-S).

10. The process according to claim 9, wherein the first dry fractionation (FDF) further comprises the step of

subjecting, in an ultrasonic treatment (US1), at least a part of the supersaturated soft palm oil mid fraction (ssSPMF) to ultrasound.

11. The process according to any of claims 1-10, wherein the second dry fractionation (SDF) comprises

melting, in a second melting step (MLT2), the intermediate olein fraction (SPMF-O) to obtain a melted intermediate olein fraction (mSPMF-O),

cooling, in a second cooling step (CO2), the melted intermediate olein fraction (mSPMF-O) to obtain a supersaturated intermediate olein fraction (ssSPMF-O),

subjecting, in an ultrasonic treatment (US2), at least a part of the supersaturated intermediate olein fraction (ssSPMF-O) to ultrasound,

crystallization, in a second crystallization step (CRY2), of the supersaturated intermediate olein fraction (ssSPMF-O) having at least partly been subjected to ultrasonic treatment (US2) to obtain a second slurry (SL2),

filtering, in a second filtration step (FLT2), the second slurry (SL2) to obtain the final hard palm oil mid fraction (fHPMF-A) and the palm oil olein fraction (POO).

12. The process according to any of claims 1-11, wherein the palm oil olein fraction (POO) is used for obtaining a further soft palm oil mid fraction (SPMF).

13. The process according to any of claims 1-12, wherein the process comprises a further preceding dry fractionation (PDF) of the palm oil olein (POO) to obtain a soft palm oil mid fraction (SPMF) and a super olein fraction (SOF).

14. The process according to any of claims 1-13, wherein the first dry fractionation (FDF) and the second dry fractionation (SDF) is performed using the same dry fractionation system.

15. The process according to any of claims 1-14, wherein the ultrasonic treatment (US2) has a duration of at least 5 minutes.

16. The process according to any of claims 1-15, wherein the ultrasound treatment (US2) is performed on at least 5% by weight of the intermediate olein fraction (SPMF-O).

17. The process according to any of claims 1-16, wherein the ultrasound treatment (US2) is performed at an average frequency of ultrasound of between 5 and 200 kHz, such as between 10 and 100 kHz.

18. The process according to any of claims 1-17, wherein the ultrasound treatment (US2) is performed having an acoustic energy of at least 50 Joules per Liter of the input (IN2), such as between 50 and 10.000 Joules per Liter of the input (IN2), such as between 50 and 5.000 Joules per Liter of the input (IN2).

19. The process according to any of claims 1-18, wherein the cooling (CO2) has a duration of at least 2 hours after reaching a supersaturation threshold, such as between 2 and 30 hours after reaching a supersaturation threshold.

20. The process according to any of claims 1-19, wherein the final hard palm oil mid fraction (fHPMF-A) is obtained in an amount of 15 to 50 % by weight of the soft palm oil mid fraction (SPMF).

21. The process according to any of claims 1-20, wherein the process further comprises using the intermediate stearin fraction (SPMF-S) as an input (IN3) to a third dry fractionation (TDF) obtain a second hard palm oil mid fraction (sHPMF-B) and a palm oil stearin fraction (POSt).

22. The process according to claim 21, wherein the third dry fractionation (TDF) comprises

melting, in a third melting step (MLT3), the intermediate stearin fraction (SPMF-S) to obtain a melted intermediate stearin fraction (mSPMF-S),

cooling, in a third cooling step (CO3), the melted intermediate stearin fraction (mSPMF-S) to obtain a supersaturated intermediate stearin fraction (ssSPMF-S),

crystallization, in a third crystallization step (CRY3), of the supersaturated intermediate stearin fraction (ssSPMF-S) to obtain a third slurry (SL3),

filtering the third slurry (SL3) to obtain the second hard palm oil mid fraction (sHPMF-B) and the palm oil stearin fraction (POSt).

23. A final hard palm oil mid fraction (fHPMF-A),

the final hard palm oil mid fraction (fHPMF-A) comprising POP-triglycerides in an amount of at least 62 percent by weight of the final hard palm oil mid fraction (fHPMF-A),

the final hard palm oil mid fraction (fHPMF-A) comprising PPP-triglycerides in an amount of less than 2 percent by weight of the final hard palm oil mid fraction (fHPMF-A),

the final hard palm oil mid fraction (fHPMF-A) having an iodine value (IV) below 38,

wherein the final hard palm oil mid fraction (fHPMF-A) has a weight ratio between SatOSat-triglycerides and SatSatO-triglycerides, which is above 15.

24. The final hard palm oil mid fraction (fHPMF-A) according to claim 23, wherein the final hard palm oil mid fraction (fHPMF-A) is obtained by the process according to any of claims 1-22.

25. A second hard palm oil mid fraction (sHPMF-B),

the second hard palm oil mid fraction (sHPMF-B) comprising POP-triglycerides in an amount of at least 64 percent by weight of the second hard palm oil mid fraction (sHPMF-B),

the second hard palm oil mid fraction (sHPMF-B) comprising PPP-triglycerides in an amount of less than 3 percent by weight of the second hard palm oil mid fraction (sHPMF-B),

the second hard palm oil mid fraction (sHPMF-B) having an iodine value (IV) below 35,

wherein the second hard palm oil mid fraction (sHPMF-B) has a weight ratio between SatOSat-triglycerides and SatSatO-triglycerides, which is below 10.

26. The second hard palm oil mid fraction (sHPMF-B) according to claim 25, wherein the second hard palm oil mid fraction (sHPMF-B) is obtained by the process according to any of claims 21-22.

27. A hard palm oil mid fraction mixture comprising

the final hard palm oil mid fraction (fHPMF-A) of any of claims 23-24 or obtained by the process according to any of claims 1-20, and

the second hard palm oil mid fraction (sHPMF-B) of any of claims 25-26 or obtained by the process according to any of claims 21-22,

wherein the hard palm oil mid fraction mixture has a weight ratio between the final hard palm oil mid fraction (fHPMF-A) and the second hard palm oil mid fraction (sHPMF-B) is between 0.4 and 0.6, such as 0.5.

28. Use of the final hard palm oil mid fraction (fHPMF-A) of any of claims 23-24 or obtained by the process of any of claims 1-22, the second hard palm oil mid fraction (sHPMF-B) according to any of claims 25-26 or obtained by the process of any of claims 21-22, the hard palm oil mid fraction mixture according to claim 27, or any mixture thereof in the production of an edible product or a food product.

29. Use of the final hard palm oil mid fraction (fHPMF-A) of any of claims 23-24 or obtained by the process of any of claims 1-22, the second hard palm oil mid fraction (sHPMF-B) according to any of claims 25-26 or obtained by the process of any of claims 21-22, the hard palm oil mid fraction mixture according to claim 27, or any mixture thereof in the production of confectionary products, such as chocolate.

30. Use of the final hard palm oil mid fraction (fHPMF-A) of any of claims 23-24 or obtained by the process of any of claims 1-22, the second hard palm oil mid fraction (sHPMF-B) according to any of claims 25-26 or obtained by the process of any of claims 21-22, the hard palm oil mid fraction mixture according to claim 27, or any mixture thereof in the production of cocoa butter equivalents.

CLAIMS

1. A process for dry fractionation of a soft palm oil mid fraction (SPMF) into a final hard palm oil mid fraction (fHPMF-A), the process comprising:

providing the soft palm oil mid fraction (SPMF),

using the soft palm oil mid fraction (SPMF) as an input (IN1) to a first dry fractionation (FDF) to obtain an intermediate olein fraction (SPMF-O) and an intermediate stearin fraction (SPMF-S),

using the intermediate olein fraction (SPMF-O) as an input (IN2) to an ultrasound assisted second dry fractionation (SDF) to obtain the final hard palm oil mid fraction (fHPMF-A) and a palm oil olein fraction (POO),

in which the ultrasound assisted second dry fractionation (SDF) comprises subjecting at least a part of the input (IN2) to ultrasonic treatment (US2).

2. A process according to Claim 1, in which the first dry fractionation (FDF) is an ultrasound assisted first dry fractionation, comprising subjecting at least part of the input (IN1) to ultrasonic treatment (US2).

3. A process according to Claim 1 or 2, in which the ultrasound assisted second dry fractionation (SDF) comprises cooling (CO2) the input (IN2) to obtain a supersaturated input (IN2), prior to the ultrasonic treatment (US2).

4. A process according to Claim 1, 2 or 3, in which the second dry fractionation (SDF) comprises crystallization (CRY2) of the supersaturated input (IN2), at least a part of which having been subjected to ultrasound treatment (US2).

5. A process according to Claim 4, in which the crystallization (CRY2) is performed in a crystallizer, and where the ultrasonic treatment (US2) is performed external to the crystallizer.

6. A process according to Claim 4, in which the crystallization (CRY2) is performed in a crystallizer, and where the ultrasonic treatment (US2) is performed in the crystallizer.

7. A process according to Claim 4, 5 or 6, in which the crystallization (CRY2) is performed in a crystallizer, and where the cooling (CO2) is performed in the crystallizer.

8. A process according to Claim 4, 5 or 6, in which the crystallization (CRY2) is performed in a crystallizer, and where the cooling (CO2) is performed external to the crystallizer.

9. A process according to any preceding claim, in which the first dry fractionation (FDF) comprises

melting, in a first melting step (MLT1), the soft palm oil mid fraction (SPMF) to obtain a melted soft palm oil mid fraction (mSPMF),

cooling, in a first cooling step (CO1), the melted palm oil mid fraction (SPMF) to obtain a supersaturated soft palm oil mid fraction (ssSPMF),

crystallization, in a first crystallization step (CRY1), of the supersaturated soft palm oil mid fraction (ssSPMF) to obtain a first slurry (SL1), and

filtering, in a first filtration step (FLT1), the first slurry (SL1) to obtain the intermediate olein fraction (SPMF-O) and the intermediate stearin fraction (SPMF-S).

10. A process according to Claim 9, in which the first dry fractionation (FDF) further comprises the step of

subjecting, in an ultrasonic treatment (US1), at least a part of the supersaturated soft palm oil mid fraction (ssSPMF) to ultrasound.

11. A process according to any preceding claim, in which the second dry fractionation (SDF) comprises

melting, in a second melting step (MLT2), the intermediate olein fraction (SPMF-O) to obtain a melted intermediate olein fraction (mSPMF-O),

cooling, in a second cooling step (CO2), the melted intermediate olein fraction (mSPMF-O) to obtain a supersaturated intermediate olein fraction (ssSPMF-O),

subjecting, in an ultrasonic treatment (US2), at least a part of the supersaturated intermediate olein fraction (ssSPMF-O) to ultrasound,

crystallization, in a second crystallization step (CRY2), of the supersaturated intermediate olein fraction (ssSPMF-O) having at least partly been subjected to ultrasonic treatment (US2) to obtain a second slurry (SL2),

filtering, in a second filtration step (FLT2), the second slurry (SL2) to obtain the final hard palm oil mid fraction (fHPMF-A) and the palm oil olein fraction (POO).

12. A process according to any preceding claim, in which the palm oil olein fraction (POO) is used for obtaining a further soft palm oil mid fraction (SPMF).

13. A process according to any preceding claim, in which the process comprises a further preceding dry fractionation (PDF) of the palm oil olein (POO) to obtain a soft palm oil mid fraction (SPMF) and a super olein fraction (SOF).

14. A process according to any preceding claim, in which the first dry fractionation (FDF) and the second dry fractionation (SDF) is performed using the same dry fractionation system.

15. A process according to any preceding claim, in which the ultrasonic treatment (US2) has a duration of at least 5 minutes.

16. A process according to any preceding claim, in which the ultrasound treatment (US2) is performed on at least 5% by weight of the intermediate olein fraction (SPMF-O).

17. A process according to any preceding claim, in which the ultrasound treatment (US2) is performed at an average frequency of ultrasound of between 5 and 200 kHz, such as between 10 and 100 kHz.

18. A process according to any preceding claim, in which the ultrasound treatment (US2) is performed having an acoustic energy of at least 50 Joules per Liter of the input (IN2), such as between 50 and 10.000 Joules per Liter of the input (IN2), such as between 50 and 5.000 Joules per Liter of the input (IN2).

19. A process according to any preceding claim, in which the cooling (CO2) has a duration of at least 2 hours after reaching a supersaturation threshold, such as between 2 and 30 hours after reaching a supersaturation threshold.

20. A process according to any preceding claim, in which the final hard palm oil mid fraction (fHPMF-A) is obtained in an amount of 15 to 50 % by weight of the soft palm oil mid fraction (SPMF).

21. A process according to any preceding claim, in which the process further comprises

using the intermediate stearin fraction (SPMF-S) as an input (IN3) to a third dry fractionation (TDF) obtain a second hard palm oil mid fraction (sHPMF-B) and a palm oil stearin fraction (POSt).

22. A process according to Claim 21, in which the third dry fractionation (TDF) comprises

melting, in a third melting step (MLT3), the intermediate stearin fraction (SPMF-S) to obtain a melted intermediate stearin fraction (mSPMF-S),

cooling, in a third cooling step (CO3), the melted intermediate stearin fraction (mSPMF-S) to obtain a supersaturated intermediate stearin fraction (ssSPMF-S),

crystallization, in a third crystallization step (CRY3), of the supersaturated intermediate stearin fraction (ssSPMF-S) to obtain a third slurry (SL3),

filtering the third slurry (SL3) to obtain the second hard palm oil mid fraction (sHPMF-B) and the palm oil stearin fraction (POSt).

23. A second hard palm oil mid fraction (sHPMF-B),

the second hard palm oil mid fraction (sHPMF-B) comprising POP-triglycerides in an amount of at least 64 percent by weight of the second hard palm oil mid fraction (sHPMF-B),

the second hard palm oil mid fraction (sHPMF-B) comprising PPP-triglycerides in an amount of less than 3 percent by weight of the second hard palm oil mid fraction (sHPMF-B),

the second hard palm oil mid fraction (sHPMF-B) having an iodine value (IV) below 35,

in which the second hard palm oil mid fraction (sHPMF-B) has a weight ratio between SatOSat-triglycerides and SatSatO-triglycerides, which is below 10.

24. A second hard palm oil mid fraction (sHPMF-B) according to Claim 23, in which the second hard palm oil mid fraction (sHPMF-B) is obtained by the process according to Claim 21 or 22.

25. A hard palm oil mid fraction mixture comprising

a final hard palm oil mid fraction (fHPMF-A) comprising POP-triglycerides in an amount of at least 62 percent by weight of the final hard palm oil mid fraction (fHPMF-A),

the final hard palm oil mid fraction (fHPMF-A) comprising PPP-triglycerides in an amount of less than 2 percent by weight of the final hard palm oil mid fraction (fHPMF-A),

the final hard palm oil mid fraction (fHPMF-A) having an iodine value (IV) below 38,

in which the final hard palm oil mid fraction (fHPMF-A) has a weight ratio between SatOSat-triglycerides and SatSatO-triglycerides, which is above 15.

or obtained by a process according to any of Claims 1 to 20, and

a second hard palm oil mid fraction (sHPMF-B) according to Claim 23 or 24 or obtained by a process according to Claim 21 or 22,

in which the hard palm oil mid fraction mixture has a weight ratio between the final hard palm oil mid fraction (fHPMF-A) and the second hard palm oil mid fraction (sHPMF-B) is between 0.4 and 0.6, such as 0.5.

26. Use of a second hard palm oil mid fraction (sHPMF-B) according to Claim 23 or 24 or obtained by a process according to Claim 21 or 22, a hard palm oil mid fraction mixture according to Claim 25, or any mixture thereof in the production of an edible product or a food product.

27. Use of a second hard palm oil mid fraction (sHPMF-B) according to Claim 23 or 24 or obtained by a process according to Claim 21 or 22, a hard palm oil mid fraction mixture according to Claim 25, or any mixture thereof in the production of confectionary products, such as chocolate.

28. Use of a second hard palm oil mid fraction (sHPMF-B) according to Claims 23 or 24 or obtained by a process according to Claim 21 or 22, a hard palm oil mid fraction mixture according to Claim 25, or any mixture thereof in the production of cocoa butter equivalents.