CLAIMS

1. A sequential cracking process for the thermal cracking of a hydrocarbon feedstock in a cascade of cracking units wherein said hydrocarbon feedstock is heated in a furnace to a predetermined maximum temperature and thermally cracked in said cascade of cracking units, the process comprising the following steps:

a. heating said hydrocarbon feedstock in said furnace to a cracking temperature T1;

b. introducing the heated hydrocarbon feedstock into a first cracking unit operating at a temperature T1;

c. passing the product stream from said first cracking unit to a first fractionation;

d. recovering as separate streams from said first fractionation a light fraction boiling below 370[deg.] C. and a heavy fraction boiling above 370[deg.] C.;

e. introducing said heavy fraction from said first fractionation into a second cracking unit operating at a temperature T2;

f. passing the product stream from said second cracking unit to a second fractionation;

g. recovering as separate streams from said second fractionation a light fraction boiling below 370[deg.] C. and a heavy fraction boiling above 370[deg.] C.;

h. introducing said heavy fraction from said second fractionation into a third conversion unit operating at a temperature T3, wherein temperature T1 is not equal to temperature T2, and temperature T2 is not equal to temperature T3, wherein the temperature in the first cracking unit T1, the second cracking unit T2 and the third conversion unit T3 is in the sequence of T1<T2<T3, wherein the product exiting said first cracking unit is cooled by a heat exchanger to below 370 deg C before entering said first fractionation.

2. The process according to claim 1, wherein said heavy fraction from said first fractionation is heated before introducing into said second cracking unit.

3. The process according to claim 1, wherein said heavy fraction from said second fractionation is heated before introducing into said third conversion unit.

4. The process according to any one or more of the preceding claims, wherein the product exiting said second cracking unit is cooled by a heat exchanger to below 370 deg C before entering said second fractionation.

5. The process according to any one or more of the preceding claims, wherein the temperature ranges for T1, T2, and T3 are (250[deg.] C. - 430[deg.] C.), (390[deg.] C. - 460[deg.] C.), and (300[deg.] C. - 530[deg.] C.), respectively, wherein T3 is preferably in the range of 440[deg.] C. - 530[deg.] C if said third conversion unit is of the type coker drum, wherein T3 is preferably in the range of 300[deg.] C. - 530[deg.] C if said third conversion unit is of the type hydrocracking unit.

6. The process according to any one or more of the preceding claims, wherein the conditions prevailing in said first fractionation correspond to the conditions prevailing in said second fractionation.

7. The process according to any one or more of the preceding claims, wherein the residence time of the feedstock in said third conversion unit is longer than the residence time in any one of said first and second cracking unit.

8. The process according to any one or more of the preceding claims, wherein said third conversion unit is a slurry hydrocracker.

9. The process according to any one or more of the preceding claims, wherein said hydrocarbon feedstock comprises hydrocarbons originating from a crude oil distillation unit (CDU) and /or vacuum distillation unit (VDU).

10. The process according to any one or more of the preceding claims, wherein the feed to at least one of said first cracking unit, said second cracking unit and said third conversion unit is mixed with a solvent before introducing the mixture of feed and solvent into the respective unit, wherein said solvent comprises a total concentration of aromatics plus resins in a range of 60 -95 wt. %, based on the total weight of the solvent.

11. The process according to claim 10, wherein said combined mixture of the feed and solvent prior to entering to at least one of said first cracking unit, said second cracking unit and said third conversion unit has a S value, measured as per ASTMD7157-12, of greater than 1.

12. The process according to claims 10-11, wherein said solvent is a vacuum gas oil cut boiling in the range of 350-550deg C from petroleum crude oil distillation, preferably said solvent is chosen from the group of crude oil atmospheric

tower bottoms, crude oil vacuum tower bottoms, steam cracker cracked distillate and mixed plastic pyrolysis oil, or a combination thereof.

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