

CLAIMS

1. A process for separating and recovering para-xylene from a feed which may contain meta-xylene, the process comprising an adsorption operation and a crystallisation operation in combination, characterized in that at least a portion of the feed and/or the mother liquor
5 resulting from crystallisation undergoes a clay treatment operation, said clay being selected from the group formed by activated or non-activated natural silicoaluminates, at a temperature of 100°C to 300°C, a pressure of 3 to 100 bars and an hourly space velocity of 1 to 8.
2. A process according to claim 1 comprising, in combination, in addition to the adsorption and
10 crystallisation operations, an isomerisation step delivering an isomerate, characterized in that at least a portion of the isomerate is clay treated.
3. A process according to claim 2, characterized in that at least a portion of the feed and at least a portion of the isomerate each undergo a clay treatment operation.
4. A process for separating and recovering para-xylene contained in a hydrocarbon feed
15 comprising C₈ aromatic hydrocarbons, in which process:
 - said feed (1) containing at least meta-xylene and para-xylene is brought into contact in at least one adsorption zone (8) with at least one adsorbent in the presence of at least one suitable desorption solvent under adsorption conditions such that a first fraction containing solvent, meta-xylene and possibly ethyl benzene and/or ortho-xylene is
20 obtained along with a second fraction is obtained containing solvent and substantially enriched para-xylene;
 - the first fraction is distilled (12) to recover a mixture of meta-xylene and possibly ethylbenzene, and/or ortho-xylene;

- at least a portion of said mixture is isomerised under suitable conditions in at least one isomerisation zone (21) and an isomerate (2) is recovered at least a portion of which is recycled to the adsorption zone;
- said second fraction is distilled (16) to obtain substantially enriched para-xylene and the substantially enriched para-xylene is crystallised to obtain a mother liquor at least a portion of which is recycled to the adsorption step, and para-xylene crystals;

the process being characterized in that at least a portion selected from at least a portion of the feed (1), at least a portion of the isomerate (2) and at least a portion of the mother liquor (3) is recycled (32) to at least one zone for treatment with clay or an equivalent substance (26), said clay being selected from the group formed by activated or non activated natural silicoaluminates, at a temperature of 100°C to 300°C, a pressure of 3 to 100 bars and an hourly space velocity of 1 to 8, and a first effluent (27) is recovered at least a portion of which is introduced into the adsorption zone (8) to produce said first and second fractions of the step with withdrawal from the adsorption zone.

5. A process for separating and recovering para-xylene contained in a hydrocarbon feed comprising C₈ aromatic hydrocarbons, the process comprising the following steps:
- a) bringing said feed (1) containing at least meta-xylene and para-xylene and possibly ethylbenzene into contact in at least one adsorption zone (8) with at least one adsorbent in the presence of a suitable desorption solvent under adsorption conditions such that a first fraction containing solvent, meta-xylene and possibly ethylbenzene and/or ortho-xylene is obtained along with a second fraction is obtained containing solvent and substantially enriched para-xylene;
 - b) distilling the first fraction (12) to separate the solvent from the mixture of meta-xylene and possibly ethylbenzene, and/or ortho-xylene;

c) isomerising said mixture under suitable conditions in an isomerisation zone (21) and recovering an isomerate (2) at least a portion of which is recycled to step a);

d) distilling said second fraction (16) to recover the solvent and substantially enriched para-xylene;

5 e) crystallising the para-xylene from step d) in at least one high temperature crystallisation zone (5a, 5b) advantageously between +10°C and -25°C, to obtain by separation a mother liquor (3) at least a portion of which is recycled to step a) along with para-xylene crystals saturated with mother liquor;

10 f) washing the para-xylene crystals with a suitable washing solvent in at least one washing zone and recovering very high purity para-xylene crystals;

the process being characterized in that at least a portion selected from the feed (1), the isomerate (2) and the mother liquor (3) is recycled (32) to at least one zone for treatment with clay or the like (26), said clay being selected from the group formed by activated or non activated natural silicoaluminates, at a temperature of 100°C to 300°C, a pressure of 3 to 100
15 bars and an hourly space velocity of 1 to 8, and a first effluent (27) is recovered which is introduced into the adsorption zone (8) to produce said first and second fractions of step a).

6. A process according to claim 5, in which at least a portion of the feed (1) and isomerate are circulated in at least one zone for clay treatment.

7. A process according to claim 5 or claim 6, in which at least a portion of the feed, the
20 isomerate (2) and the mother liquor are circulated in one or more zones for clay treatment.

8. A process according to any one of claims 5 to 7, characterized in that the adsorption zone is operated as a simulated moving bed.

9. A process according to any one of claims 5 to 8, in which at least a portion of the mother liquor (3), (33) is introduced into a distillation column (23) downstream of the isomerisation
25 zone (21), the isomerate and mother liquor are distilled, an overhead fraction containing light

compounds is obtained along with a fraction containing a mixture of said distilled mother liquor and isomerate which is then introduced into the zone (26) for clay treatment, and a second effluent is recovered.

10. A process according to claim 9 in which, in addition, a tail fraction containing heavy compounds is withdrawn from the distillation column (23).

11. A process according to any one of claims 5 to 10, in which a portion of the mother liquor (31) is mixed with the first or second effluent from the zone for clay treatment and a third effluent is recovered.

12. A process according to any one of claims 5 to 11, in which the first, second or third effluent from the zone for clay treatment is distilled in at least one distillation column (termed a rerun column) which delivers a tail fraction (29) containing heavy compounds and an overhead fraction (4) which is introduced into the adsorption zone (8).

13. A process according to any one of claims 1 to 12, in which the clay treatment is carried out at a temperature of 160°C to 230°C, at a pressure of 4 to 20 bar and at an hourly space velocity of 1 to 4.

14. A process according to any one of claims 5 to 13, in which at least a portion of the mother liquor is purged before being introduced into the zone for clay treatment.

15. A process according to any one of claims 5 to 14, in which the desorption solvent resulting from steps (b) and (d) is at least partially purged before being recycled and the solvent purge is compensated for by adding fresh solvent, either to the feed or upstream of the adsorption zone.

16. A process according to any one of claims 5 to 15, in which crystallisation (50) of the para-xylene of step (d) is carried out in a single step, a suspension of crystals (51) in the mother liquor is recovered, the crystals are separated from the mother liquor in a separation zone (52), the crystals obtained are washed with the washing solvent, a washing liquor is

recovered, at least a portion of the mother liquor (53) and at least a portion of the washing liquor are recycled and the para-xylene crystals are completely melted (58) to obtain a liquid stream of molten para-xylene.