Claims

1. A process for isolating pure 2-ethylhexyl acrylate or pure 2-propylheptyl acrylate from the corresponding crude alkyl acrylate by distillation, wherein the process is carried out in a dividing wall column (1) which has separation-active internals and vaporizer (7) and in which a dividing wall (8) is arranged in the longitudinal direction of the column to form an upper joint column region (9), a lower joint column region (14), an inflow section (10, 12) having a side feed point (2) and an offtake section (11, 13) having a side offtake point (3), the column has a number of theoretical plates in the range from 10 to 60, where the number of theoretical plates of the dividing wall column (1) relates to the sum of the theoretical plates in the joint upper column region (9), the joint lower column region (14) and the inflow section (10, 12), the side feed point (2) for the corresponding crude alkyl acrylate is arranged at a theoretical plate in the region commencing at least two theoretical plates above the bottommost theoretical plate and ending at least two theoretical plates below the uppermost theoretical plate, the side offtake point (3) for the pure 2-ethylhexyl or pure 2-propylheptyl acrylate is arranged at a theoretical plate in the region commencing at least two theoretical plates above the bottommost theoretical plate and ending at least two theoretical plates below the uppermost theoretical plate and the dividing wall (8) is arranged in the column in the region commencing at least one theoretical plate above the bottommost theoretical plate and ending at least one theoretical plate below the uppermost theoretical plate, where the ratio of amount of liquid at the upper end of the dividing wall (8) going to the enrichment section (10) and the stripping section (11) of the column is set in the range from 1:0.2 to 1:5 and the ratio of amounts of the vapor streams at the lower end of the dividing wall (8) going to the stripping section (12) and the enrichment section (13) of the column is set in the range from 1:0.5 to 1:2.0.

2. The process according to the preceding claim, wherein the side feed point (2) for the corresponding crude alkyl acrylate is arranged at a theoretical plate in the region commencing at least four theoretical plates above the bottommost theoretical plate and ending at least four theoretical plates below the uppermost theoretical plate, the side offtake point (3) for the pure 2-ethylhexyl acrylate or pure 2-propylheptyl acrylate is arranged at a theoretical plate in the region commencing at least four theoretical plates above the bottommost theoretical plate and ending at least four theoretical plates below the uppermost theoretical plate and the dividing wall (8) in the column is arranged in the region commencing at least two theoretical plates above the bottommost theoretical plate and ending at least two theoretical plates below the uppermost theoretical plate.

Amended claims

3. The process according to claim 1, wherein the column (1) has a number of theoretical plates in the range from 15 to 30, the side feed point (2) for the corresponding crude alkyl acrylate is arranged at a theoretical plate in the region commencing at least eight theoretical plates above the bottommost theoretical plate and ending at least six theoretical plates below the uppermost theoretical plate, the side offtake point (3) for the pure 2-ethylhexyl acrylate or pure 2-propylheptyl acrylate is arranged at a theoretical plate in the region commencing at least five theoretical plates above the lowermost theoretical plate and ending at least eight theoretical plates below the uppermost theoretical plate and the dividing wall (8) in the column is arranged in the region commencing at least three theoretical plates above the bottommost theoretical plate and ending at least three theoretical plates below the uppermost theoretical plate.

4. The process according to any of the preceding claims, wherein the opposite side offtake point (3) is located at least one theoretical plate below the side feed point (2), where in the case of different numbers of theoretical plates in the offtake section (11, 13) and the inflow section (10, 12), the side having the greatest total number of theoretical plates in the region of the dividing wall (8) is employed for counting the number of theoretical plates for determining the relative height position of feed point and offtake point.

5. The process according to any of the preceding claims, wherein random packing elements, ordered packing and/or trays are provided as separation-active internals.

6. The process according to the preceding claim, wherein dual-flow trays are used as trays.

7. The process according to the preceding claim, wherein the dual-flow trays on the inflow side and offtake side have different opening ratios for setting the optimal gas distribution over the two sides of the dividing wall (8).

8. The process according to any of the preceding claims, wherein the residence time in the vaporizer (7) and the associated piping system is limited to from 1 to 60 minutes.

9. The process according to any of the preceding claims, wherein the ratio of amounts of liquid at the upper end of the dividing wall (8) going to the enrichment section (10) and the stripping section (11) of the column is set in the range from 1:0.5 to 1:2.

Amended claims

10. The process according to any of the preceding claims, wherein the ratio of amounts of the vapor streams at the lower end of the dividing wall (8) going to the stripping section (12) and the enrichment section (13) of the column is set in the range from 1:0.9 to 1:1.5.

11. The process according to any of the preceding claims, wherein the pressure at the top of the column is in the range from 10 mbar to 5 bar.

12. The process according to any of the preceding claims, wherein there is temperature regulation in the upper joint column region (9), by means of a temperature signal below the uppermost theoretical plate, which utilizes the distillate flow, the reflux ratio or the amount of reflux as manipulated variable.

13. The process according to any of the preceding claims, wherein there is temperature regulation in the lower joint column region (14), by means of a temperature signal above the bottommost theoretical plate, which utilizes the amount taken off at the bottom as manipulated variable.

14. The process according to any of the preceding claims, wherein there is level regulation at the bottom of the column which utilizes the amount taken off at the side as manipulated variable.

15. The process according to any of the preceding claims, wherein the ratio of the cross-sectional areas of the region of the offtake section (11, 13) to the region of the inflow section (10, 12) is from 4:1 to 1:4.

16. The process according to any of preceding claims 1 to 14, wherein the ratio of the cross-sectional areas of the region of the offtake section (11, 13) to the region of the inflow section (10, 12) is from 1.5:1 to 1:1.5.

17. The process according to any of the preceding claims for isolating pure 2-ethylhexyl acrylate from crude 2-ethylhexyl acrylate having a purity of ≥ 98.5% by weight by distillation.

18. The process according to any of the preceding claims for isolating pure 2-propylheptyl acrylate from crude 2-propylheptyl acrylate having a purity of ≥ 98.5% by weight by distillation.

Amended claims

19. The process according to claim 17, wherein the crude 2-ethylhexyl acrylate has the following composition:
from 40 to 99% by weight of 2-ethylhexyl acrylate,
from 0.1 to 10% by weight of 2-ethylhexanol,
from 0.1 to 10% by weight of relatively high boilers (relative to 2-ethylhexyl acrylate),
from 0.1 to 10% by weight of further low boilers (relative to 2-ethylhexyl acrylate).

20. The process according to claim 18, wherein the crude 2-propylheptyl acrylate has the following composition:
from 40 to 99% by weight of 2-propylheptyl acrylate,
from 0.1 to 10% by weight of 2-propylheptanol,
from 0.1 to 10% by weight of relatively high boilers (relative to 2-propylheptyl acrylate),
from 0.1 to 10% by weight of further low boilers (relative to 2-propylheptyl acrylate).

21. The process according to any of the preceding claims, wherein a stabilizer 1 is introduced into the enrichment section (10) of the inflow section (10, 12).

22. The process according to the preceding claim, wherein the stabilizer 1 is phenothiazine (PTZ).

23. The process according to any of the preceding claims, wherein a stabilizer 2 is introduced into the container (20) which collects the condensate (26) and/or into the conduit of a quenching circuit (21), where this is a liquid return stream of part of the condensate into the condenser (6), and/or at the top of the condenser (6).

24. The process according to the preceding claim, wherein the stabilizer 2 is p-methoxyphenol (MeHQ).

Amended claims