BRIEF DESCRIPTION OF THE INVENTION

[0015a] In an aspect, there is provided a process for alkylating hydrocarbons wherein an alkylatable organic compound is reacted with an alkylation agent to form an alkylate in the presence of a catalyst, wherein said alkylatable organic compound is an isoalkane having 4 to 10 carbon atoms and wherein said alkylation agent is an olefin having 2 to 10 carbon atoms; wherein said catalyst comprises a hydrogenating function and a solid acid constituent, wherein the feed is processed at a reaction temperature of 55-85 °C using one or more of the following process conditions a) and b):

a) the feed is processed at whsv of the olefin at greater than 100% to less than 150% of process conditions optimized for gasoline production only,

b) an isoparaffin over olefin ratio I/O of combined olefin feed and isoparaffin recycle (I/O external) from 50% to less than 100% of process conditions optimized for gasoline production only,

wherein the conditions lead to a higher quantity of a C9+ product fraction formed than process conditions optimized for gasoline production.

[0016] The use of the SAC process of the present disclosure allows the production of a high purity kerosene fraction without the large impact on e.g. RON of the gasoline fraction. Also no waste ASO is formed and the product is free from S, N, halogens, aromatics and olefins. The process uses higher olefin space velocities (e.g. whsv of the olefin from 100% to 150% of the whsv for gasoline production only), lower isoparaffin over olefin ratio I/O of combined olefin feed and isoparaffin recycle (= I/O external e.g. from 50% to 100% of I/O external for gasoline production only), lower I/O in the feed at the inlet to the catalyst beds (=I/O internal e.g. of 50% to 100% of I/O internal for gasoline production only), separately or combinations thereof. Furthermore by using the differing conditions mentioned above it may be required to optimize the reactor temperature within -20% to +20% of the temperature required for the gasoline only mode of operation. After separation the gasoline fraction will still have a very high RON (e.g. higher than 94, preferably 95, more preferably 96), no N, no S, no halogen. Only a light distillate kerosene fraction of high purity is produced and essentially no heavy distillates.

[0017] In other embodiments when using the process with a low temperature regeneration reactor with dissolved hydrogen (see, e.g., US 5,986,158) also no olefins will be present in the alkylation products. In case of ionic liquids (US 8,487,154) the use of a hydrofinishing reactor is required to remove olefins from gasoline and heavier fractions by hydrogenation.

[0018] In summary the new SAC process of the present disclosure allows the co-production of valuable light distillate kerosene/jet fuel next to high quality alkylation gasoline without the co-production of ASO waste and/or low value heavy distillate. The new process allows the use of much more severe process conditions, e.g. much higher olefin whsv, lower I/O external and internal. This results in much lower operation costs per unit of product of the new SAC process. Surprisingly, the quality of the co-produced alkylation gasoline fraction remains very high.

DETAILED DESCRIPTION OF THE INVENTION

[0019] All weight percentages mentioned related to the catalyst composition are based on dry catalyst (heated at 600°C for 1 hour). The rare earth wt% are calculated as rare earth oxides on a dry basis (600°C, 1 hour). It should further be understood that, when describing

CLAIMS

1. A process for alkylating hydrocarbons wherein an alkylatable organic compound is reacted with an alkylation agent to form an alkylate in the presence of a catalyst, wherein said alkylatable organic compound is an isoalkane having 4 to 10 carbon atoms and wherein said alkylation agent is an olefin having 2 to 10 carbon atoms; wherein said catalyst comprises a hydrogenating function and a solid acid constituent, wherein the feed is processed at a reaction temperature of 55-85 °C using one or more of the following process conditions a) and b):

a) the feed is processed at whsv of the olefin at greater than 100% to less than 150% of process conditions optimized for gasoline production only,

b) an isoparaffin over olefin ratio I/O of combined olefin feed and isoparaffin recycle (I/O external) from 50% to less than 100% of process conditions optimized for gasoline production only,

wherein the conditions lead to a higher quantity of a C9+ product fraction formed than process conditions optimized for gasoline production.

2. A process according to Claim 1, wherein the quantity of co-produced C9+ fraction is higher than 10% of the gasoline alkylate quantity produced.

3. A process according to Claim 1, wherein the quantity of co-produced C9+ fraction is higher than 12% of the gasoline alkylate quantity produced.

4. A process according to Claim 1, wherein the quantity of co-produced C9+ fraction is higher than 15% of the gasoline alkylate quantity produced.

5. A process according to any of Claims 1-4 comprising a further step of separation of a C9+ fraction.

6. A process according to any of Claims 1-5 wherein the quantity of co-produced heavier C9+ fraction is higher than 5 wt% of the gasoline alkylate quantity produced.

7. A process according to any of Claims 1-4 wherein the quantity of co-produced heavier C9+ fraction is higher than 9 wt% of the gasoline alkylate quantity produced.

8. A process according to any of Claims 1-4 wherein the quantity of co-produced heavier C9+ fraction is higher than 11 wt% of the gasoline alkylate quantity produced.

9. A process according to Claim 5 comprising wherein the step of separation is done by distillation.

10. A process according to any one of Claims 1-9 further comprising a step of distilling a gasoline fraction.

11. A process according to Claim 9, wherein the product after distillation has a RON greater than 94 and is essentially free of nitrogen and/or sulfur.

12. A process according to Claim 9, wherein the product after distillation has a RON greater than 95.

13. A process according to Claim 9, wherein the product after distillation has a RON greater than 96.

14. A process according to Claim 1, wherein the feed is processed at whsv of the olefin at greater than 110% of the whsv for gasoline production only.

15. A process according to any one of Claims 1-14 wherein the catalyst further contains one or more rare earth elements.

16. A process according to Claim 15, wherein the one or more rare earth elements comprises cerium.

17. A process according to Claim 16, wherein the one or more rare earth elements comprise at least 0.1 wt % cerium, calculated as fraction of the total catalyst weight.

18. A process according to Claim 15, wherein the one or more rare earth elements comprise at least 0.3 wt % cerium, calculated as fraction of the total catalyst weight.

19. A process according to any one of Claims 15-18, wherein the one or more rare earth elements are comprised of cerium and lanthanum.

20. The process of any one of Claims 1-19 wherein the alkylatable organic compound comprises an isoparaffin or mixture of isoparaffins and the alkylation agent comprises C3-C5 alkenes or mixture of C3-C5 alkenes.

21. The process of Claim 20 wherein the alkylation agent is n-butene or a mixture of butenes.

22. The process of Claim 20 or 21 wherein the alkylatable organic compound is isobutane.

23. The process of any one of Claims 1-22 wherein the catalyst is prepared by a) calcining solid acid-containing particles at a temperature in the range of 400-575°C, b) incorporating a Group VIII metal into the calcined particles to form metal-containing particles, and c) calcining the metal-containing particles at a temperature in the range of 350-600°C.

24. The process of Claim 23 wherein the Group VIII metal is a noble metal.

25. A process according to Claim 23 or 24 wherein the temperature applied in step a) is in the range of 450-550°C.

26. A process according to Claim 25 wherein the temperature is in the range of 460-500°C.

27. The process according to any one of Claims 1-26 wherein the catalyst further comprises from 1.5 to 6 wt% of water (LOI600).