paraffins takes place. Gas and liquid in the reactor effluent are separated in a product separator 212. Gas 214 from the product separator 212 is recycled back, using the RGC 204, to a reaction section after adding makeup hydrogen by using a makeup gas (MUG) compressor 216. Liquid, from the product separator 212, is routed to a stabilizer 218 for stabilization by removal of gas and liquefied petroleum gas (LPG) from the liquid. The stabilized isomerate is then split in a De-Iso-Hexanizer (DIH) column 220 to produce isomerate, meeting the specification of octane etc. Isomerate, thus produced, is a blend component of the refinery gasoline pool. The isomerization process flow scheme 200 produces only isomerate as the desired product.

SUMMARY

[0004a] In a first aspect, the present disclosure refers to a method of producing hexane, the method comprising producing, as a byproduct from a C_5-C_6-isomerization unit, hexane having a benzene content of < 3 ppm wt., a sulfur content of < 0.5 ppm wt. and an n-hexane content of > 40 wt%, wherein the method comprises:

producing a stable isomerate feed in a C_5-C_6-isomerization unit,

feeding said stable isomerate feed to the first side of a dividing wall column, said dividing wall column comprising a dividing wall that divides the dividing wall column at least partially into a first side and a second side, with one side of the first and second sides configured to operate as a deisohexanizer column and the other side of the first and second side configured to operate as a hexane column to produce hexane;

producing a hexane feed from the second side of the dividing wall column; and

feeding the hexane feed and hydrogen to a mixer of a benzene hydrogenation unit connected with the dividing wall column to form a hexane-hydrogen mixture,

preheating the hexane-hydrogen mixture,

feeding the preheated hexane-hydrogen mixture to a polishing reactor of the benzene hydrogenation unit, wherein the polishing reactor hydrogenates at least a part of the benzene included in the produced hexane, and

feeding an output stream from the polishing reactor to a stripper column for separating lights from the hexane, wherein the stripper column is arranged downstream of the hexane polishing reactor.

~~[0004b] In another aspect, the present disclosure refers to a dividing wall column system disclosed herein, wherein the dividing wall of the dividing wall column does not extend over the whole height of the dividing wall column, so that the dividing wall column comprises a~~

~~portion with the first side and the second side being divided by the dividing wall arranged therebetween, and one or two further portions being not divided by the dividing wall.~~

[0005] The present disclosure relates to a dividing wall column system for producing hexane, the dividing wall column system comprising:

a dividing wall column comprising a dividing wall that divides the dividing wall column at least partially into a first side and a second side, with one of the first and second sides preferably configured to operate as a deisohexanizer column and the other side of the first and second side preferably configured to operate as a hexane column to produce hexane.

[0006] Preferably, during operating this dividing wall column system, the production of high-purity hexane involves taking a narrow cut of a hexane rich stream (32-45 wt% n-C_6). Since the feed consists of a lot of components (e.g., C_5, C_6 paraffins, C_6 isoparaffins and C_6 naphthenes) with similar relative volatility, the process to produce high-purity hexane is quite energy intensive. The use of dividing wall column ("DWC") technology significantly improves the viability of this process by allowing the separation to take place in the same column shell by avoiding back mixing of the heaviest components with the middle boiling components. Due to the segregation of the column, an adequate number of trays are available on each side to facilitate an efficient separation of the components. As compared to a two column process scheme, the DWC scheme requires less energy and less equipment for the same separation. Hence, a DWC improves profitability for high-purity hexane production. In particular, the operating costs are about 20 to 70% lower than those of a solvent extraction process, such as one shown in FIG. 1.

[0007] In accordance with a particular preferred example of the present disclosure, the dividing wall column system further comprises a hexane polishing unit connected with the dividing wall column so that the hexane produced in the dividing wall column is transferred

CLAIMS

What is claimed is:

1. A method of producing hexane, the method comprising producing, as a byproduct from a C_5-C_6-isomerization unit, hexane having a benzene content of < 3 ppm wt., a sulfur content of < 0.5 ppm wt. and an n-hexane content of > 40 wt%, wherein the method comprises:

producing a stable isomerate feed in a C_5-C_6-isomerization unit,

feeding said stable isomerate feed to the first side of a dividing wall column, said dividing wall column comprising a dividing wall that divides the dividing wall column at least partially into a first side and a second side, with one side of the first and second sides configured to operate as a deisohexanizer column and the other side of the first and second side configured to operate as a hexane column to produce hexane;

producing a hexane feed from the second side of the dividing wall column; and

feeding the hexane feed and hydrogen to a mixer of a benzene hydrogenation unit connected with the dividing wall column to form a hexane-hydrogen mixture,

preheating the hexane-hydrogen mixture,

feeding the preheated hexane-hydrogen mixture to a polishing reactor of the benzene hydrogenation unit, wherein the polishing reactor hydrogenates at least a part of the benzene included in the produced hexane, and

feeding an output stream from the polishing reactor to a stripper column for separating lights from the hexane, wherein the stripper column is arranged downstream of the hexane polishing reactor.

2. The method of claim 1, wherein the preheating comprises:

exchanging heat between the hexane-hydrogen mixture and a feed from the stripper column in a first heat exchanger; and

exchanging heat between the hexane-hydrogen mixture and the output stream from the polishing reactor in a second heat exchanger.

3. The ~~dividing wall column system~~method of claim 1 or 2, wherein the dividing wall of the dividing wall column does not extend over the whole height of the dividing wall column, so that the dividing wall column comprises a portion with the first side and the

second side being divided by the dividing wall arranged therebetween, and one or two further portions being not divided by the dividing wall.

4. The ~~dividing wall column system~~method of any of the preceding claims, wherein the dividing wall is a top dividing wall positioned in the top portion of the dividing wall column and the first side is a first fractionation section and the second side is a second fractionation section.

5. The ~~dividing wall column system~~method of claim 4, further comprising:

a first overhead condenser in fluid communication with the first fractionation section;

a second overhead condenser in fluid communication with the second fractionation section, and

a reboiler in fluid communication with a bottoms section of the dividing wall column.

6. The ~~dividing wall column system~~method of any of claims 1 to 3, wherein the dividing wall is a bottom dividing wall positioned in the bottom portion of the dividing wall column and the first side is a first fractionation section and the second side is a second fractionation section.

7. The ~~dividing wall column system~~method of claim 6, further comprising:

a first reboiler in fluid communication with the first fractionation section, preferably a thermosiphon reboiler;

a second reboiler in fluid communication with the second fractionation section, preferably a thermosiphon reboiler, and

a common rectifying section in fluid communication with the top portion of the dividing wall column.

8. The ~~dividing wall column system~~method of any of claims 1 to 3, wherein the dividing wall is a middle dividing wall positioned in the middle portion of the dividing wall column and the first side is a first fractionation section and the second side is a second fractionation section.

9. The ~~dividing wall column system~~method of claim 8, further comprising a thermosiphon reboiler configured to receive a bottoms product from the dividing wall column and an overhead system configured to receive a lights product from the dividing wall column.