esters, decreased differential pressure due to fouling of the system, increased production capacity and/or extended periods of time between maintenance clean outs.

SUMMARY

[0006] Disclosed herein is a fouling-resistant system for the manufacture of a compound from a reactant, the system comprising a reactant heating zone; and a distillation column in fluid communication with the reactant heating zone, the distillation column comprising a plurality of distillation trays for removing a by-product from the reactant and the compound; wherein at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration, where each tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a tray located above the tray and below the tray; and the baffle trays are disposed in a lower portion of the distillation column.

[0006a] In one aspect, there is provided a fouling-resistant system for the manufacture of a compound comprising:

a reactant heating zone; and

a distillation column in fluid communication with the reactant heating zone;

wherein

the distillation column comprises a plurality of distillation trays for removing by-products from the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays,

at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration,

each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, wherein a baffle tray occupies 55 to 90 percent of the cross-sectional area of the distillation column and wherein the baffle tray is not a sieve tray.

[0006b] In another aspect, there is provided a fouling-resistant system for the manufacture of a compound comprising: a reactant heating zone; and a distillation column in fluid communication with the reactant heating zone; wherein the distillation column comprises a plurality of distillation trays for removing by-products from the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays, at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered

configuration, each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, wherein the baffle tray is not a sieve tray, wherein a baffle tray occupies 55 to 90 percent of the cross-sectional area of the distillation column at its location in the distillation column, and wherein a production capacity column throughput rate reduction in the distillation column is less than 20% of the maximum production rate between maintenance intervals.

[0007] Disclosed herein too is a fouling-resistant process for the manufacture of a compound from a reactant, the process comprising reacting the starting material in a reactant heating zone to generate a vapor phase; distilling the vapor phase in a distillation column, the distillation column being in fluid communication with the reactant heating zone; wherein the distillation column is comprised of a plurality of distillation trays for removing by-products from the starting material and the compound, where at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration, where each tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a tray located above the tray and below the tray and the baffle trays are disposed in a lower portion of the distillation column; separating and removing a crude compound, water of reaction, unreacted starting materials, and by-products from the distillation column; and recovering the compound from the distillation column.

[0007a] In another aspect, there is provided a fouling-resistant process for the manufacture of a compound, the process comprising:

heating a reactant in a heating zone to generate a vapor phase;

distilling the vapor phase in a distillation column, the distillation column being in fluid communication with the heating zone; wherein

the distillation column comprises a plurality of distillation trays for removing by-products from the reactant and the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays,

at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration,

each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, wherein each baffle tray occupies 55 to 90 percent of the cross-sectional area of the distillation column at its location in the distillation column, and

wherein the baffle tray is not a sieve tray;

separating and removing a crude compound, water of reaction, unreacted raw materials, and a by-product from the distillation column; and

recovering the compound from the distillation column.

[0007b] In another aspect, there is provided a fouling-resistant process for the manufacture of a compound, the process comprising: heating a reactant in a heating zone to generate a vapor phase; distilling the vapor phase in a distillation column, the distillation column being in fluid communication with the heating zone; wherein the distillation column comprises a plurality of distillation trays for removing by-products from the reactant and the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays, at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration, each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, and wherein the baffle tray is not a sieve tray; separating and removing a crude compound, water of reaction, unreacted raw materials, and a by-product from the distillation column; and recovering the compound from the distillation column, wherein a baffle tray occupies 55 to 90 percent of the cross-sectional area of the distillation column at its location in the distillation column, and wherein a production capacity column throughput rate reduction in the distillation column is less than 20% of the maximum production rate between maintenance intervals.

BRIEF DESCRIPTION OF THE FIGURES

[0008] Figure 1 is a side view of a longitudinal cross-section of the distillation column;

[0009] Figure 2 is a top cross-sectional view of the distillation column and a baffle tray disposed therein;

Figures 3A-3D are side views, in the direction of liquid flow across the surface of the baffle tray, of a single baffle tray having (A) a serrated weir configuration, (B) a

CLAIMS

1. A fouling-resistant system for the manufacture of a compound comprising:
a reactant heating zone; and
a distillation column in fluid communication with the reactant heating zone;
wherein

the distillation column comprises a plurality of distillation trays for removing by-products from the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays,

at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration,

each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, wherein each baffle trays occupies 55 to 90 percent of the cross-sectional area of the distillation column at its location in the distillation column, and wherein the baffle tray is not a sieve tray.

2. A fouling-resistant system for the manufacture of a compound comprising:
a reactant heating zone; and
a distillation column in fluid communication with the reactant heating zone;
wherein

the distillation column comprises a plurality of distillation trays for removing by-products from the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays,

at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration,

each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, and

wherein the baffle tray is not a sieve tray,

7. The fouling-resistant system of any of claims 1-6, wherein the differential pressure in the distillation column is 6 dP units to 100 dP units.

8. A fouling-resistant process for the manufacture of a compound, the process comprising:

heating a reactant in a heating zone to generate a vapor phase;

distilling the vapor phase in a distillation column, the distillation column being in fluid communication with the heating zone; wherein

the distillation column comprises a plurality of distillation trays for removing by-products from the reactant and the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays,

at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration,

each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, wherein each baffle tray occupies 55 to 90 percent of the cross-sectional area of the distillation column at its location in the distillation column, and

wherein the baffle tray is not a sieve tray;

separating and removing a crude compound, water of reaction, unreacted raw materials, and a by-product from the distillation column; and

recovering the compound from the distillation column.

9. A fouling-resistant process for the manufacture of a compound, the process comprising:

heating a reactant in a heating zone to generate a vapor phase;

distilling the vapor phase in a distillation column, the distillation column being in fluid communication with the heating zone; wherein

the distillation column comprises a plurality of distillation trays for removing by-products from the reactant and the compound, the plurality of distillation trays comprising a plurality of sieve trays and a plurality of baffle trays,

at least 20% of the plurality of distillation trays are baffle trays arranged in a staggered configuration,

each baffle tray contacts an opposing portion of an inner wall of the distillation column from a portion contacted by a baffle tray located above the baffle tray and below the baffle tray, and

wherein the baffle tray is not a sieve tray;

separating and removing a crude compound, water of reaction, unreacted raw materials, and a by-product from the distillation column; and

recovering the compound from the distillation column,

wherein each baffle tray occupies 55 to 90 percent of the cross-sectional area of the distillation column at its location in the distillation column, and

wherein a production capacity column throughput rate reduction in the distillation column is less than 20% of the maximum production rate between maintenance intervals.

10. The fouling-resistant process of claim 8 or claim 9, wherein the differential pressure in the distillation column is less than 100 dP units.