CLAIMS:

What is claimed is:

1. A heat transfer tube comprising:

an inner surface and an outer surface; and

a first helical row comprising a plurality of mixing elements disposed on the inner surface of the tube and projecting inwardly toward a central longitudinal axis of the tube; wherein:

adjacent mixing elements are separated by a gap arc distance of about 1.52 cm or greater;

the first helical row has an angle (Θ) from about 15 degrees to about 85 degrees relative to the central longitudinal axis of the tube;

the tube has an inner diameter of about (4.7 cm or less;

the number of mixing elements along one complete turn of the first helical row is three; and

a region (Z_B) on the inner surface where no mixing elements are present extends an entire longitudinal length of the tube.

2. The tube of claim 1, further comprising a coke layer disposed on the mixing elements at a height (t) and disposed on the inner surface of the tube at a height (t'), wherein the value of (t) is from about 70% to about 100% of the value of (t').

3. The tube of claim 1, further comprising a second helical row comprising two or more mixing elements disposed on the inner surface of the tube and projecting inwardly toward a central longitudinal axis of the tube, the second helical row disposed at an angle (Θ_{II}) relative to the central longitudinal axis of the tube, (Θ_{II}) is from about 15 degrees to about 85 degrees, and the value of (Θ) is different than the value of (Θ_{II}).

4. The tube of claim 3, wherein the mixing elements of the first helical row have an element arc length different from an element arc length of the mixing elements of the second helical row.

5. The tube of claim 3, wherein a longitudinal distance between the first helical row and the second helical row is from about 20 millimeters to about 400 millimeters.

6. The tube of claim 1, wherein the height of the mixing elements is independently from about 1 millimeter to about 5 millimeters.

7. The tube of claim 1, wherein the tube is included in a steam cracking furnace.

8. The tube of claim 1, wherein the number of regions (Z_B) on the inner surface where no mixing elements are present that extend an entire longitudinal length of the tube is three.

9. A process for thermally cracking a hydrocarbon feedstock, comprising:

introducing a hydrocarbon feedstock into a heat transfer tube and cracking the hydrocarbon feedstock under thermal cracking conditions, the tube comprising a helical row comprising a plurality of mixing elements disposed on an inner surface of the tube and projecting inwardly toward a central longitudinal axis of the tube; wherein:

the tube has an inner diameter of about 4.7 cm or less;

adjacent mixing elements are separated by a gap arc distance of about 1.52 cm or greater;

the helical row has an angle (Θ) from about 15 degrees to about 85 degrees relative to the central longitudinal axis of the tube;

the number of mixing elements along one complete turn of the helical row is three; and

a region (Z_B) on the inner surface where no mixing elements are present extends an entire longitudinal length of the tube.

10. The process of claim 9, wherein a coke layer is deposited on the inner surface of the tube during cracking.

11. The process of claim 10, wherein the coke layer is disposed on at least one of the mixing elements at a height (t) and disposed on the inner surface of the tube at a height (t'), wherein the value of (t) is from about 70% to about 100% of the value of (t').

12. The process of claim 11, wherein the value of (t) is 0.635 cm or greater.

13. The process of claim 9, further comprising introducing steam into the heat transfer tube under thermal cracking conditions.

14. The process of claim 9, further comprising preheating the hydrocarbon feedstock to a temperature from about 649°C to about 760°C.

15. The process of claim 9, wherein introducing the hydrocarbon feedstock into the heat transfer tube is performed at a rate from about 76.2 meters per second to about 152 meters per second and wherein the velocity is measured at the outlet of the radiant tube with no coke present.

16. The process of claim 9, wherein a residence time of the hydrocarbon feedstock within the heat transfer tube is from about 0.1 seconds to about 0.5 seconds.

17. The process of claim 9, wherein the thermal cracking conditions include heating the hydrocarbon feedstock to a temperature from about 760°C to about 1100°C.

18. The process of claim 11, further comprising decoking the tube when the value of (t) is about 0.635 cm or greater.

19. The process of claim 9, further comprising decoking the tube using steam.

20. The process of claim 9, further comprising decoking the tube using air.

21. The process of claim 9, wherein the number of regions (Z_B) on the inner surface where no mixing elements are present that extend an entire longitudinal length of the tube is three.

22. A process for thermally cracking a hydrocarbon feedstock, comprising:

introducing a hydrocarbon feedstock into a heat transfer tube and cracking the hydrocarbon feedstock under thermal cracking conditions, the tube comprising a helical row comprising two or more mixing elements disposed on an inner surface of the tube and projecting inwardly toward a central longitudinal axis of the tube; wherein:

the tube has an inner diameter of about 4.7 cm or less;

adjacent mixing elements are separated by a gap arc distance of about 1.52 cm or greater;

the helical row has an angle (Θ) from about 15 degrees to about 85 degrees relative to the central longitudinal axis of the tube;

a coke layer is deposited on the inner surface of the tube during cracking;

the coke layer is disposed on at least one of the mixing elements at a height (t) and disposed on the inner surface of the tube at a height (t'), wherein the value of (t) is from about 70% to about 100% of the value of (t');

(t) is about 0.635 cm or greater and a pressure drop during thermal cracking along the tube is less than a pressure drop of a similar comparative tube having a coke layer deposited on the inner surface thereof,

the similar comparative tube contains a comparative coke layer having a height of about 0.635 cm or greater, and

adjacent mixing elements of the comparative tube are separated by an arc distance of less than about 1.52 cm.

23. The process of claim 22, wherein the number of mixing elements along one complete turn of the helical row is three, and wherein a region (Z_B) on the inner surface where no mixing elements are present extends an entire longitudinal length of the tube.

24. The process of claim 23, wherein the number of regions (Z_B) on the inner surface where no mixing elements are present that extend an entire longitudinal length of the tube is three.