

WHAT IS CLAIMED IS:

1. A bottoms cracking catalyst composition, comprising:
 - about 30 to about 60 wt% alumina;
 - greater than 0 to about 10 wt% of a dopant comprising ytterbium, gadolinium, cerium, lanthanum, yttrium, barium, magnesium, or a mixture of any two or more thereof, measured as the oxide;
 - about 2 to about 20 wt% reactive silica;
 - about 3 to about 20 wt% of a component comprising peptizable boehmite, colloidal silica, aluminum chlorohydrate, or a combination of any two or more thereof; and
 - about 10 to about 50 wt% of kaolin.
2. The catalyst of claim 1, comprising the dopant is present in an amount of about 0.1 to about 5 wt% of the composition, measured as the oxide.
3. The catalyst of any one of claims 1 or 2, wherein the dopant is present in an amount of about 4 wt%.
4. The catalyst of claim 1, wherein the dopant comprises lanthanum.
5. The catalyst of any one of claims 1 to 4, wherein the dopant is impregnated into the alumina, or coated onto the alumina, or the dopant is co-precipitated with the alumina.
6. The catalyst of any one of claims 1 to 5, having an average particle size of about 70-95 microns.
7. The catalyst of any one of claims 1 to 6, having a mercury pore volume of 0.3 -0.56 cc/g in a diameter range from 4 to 2,000 nm.
8. The catalyst of any one of claims 1 to 7 further comprising a zeolite in the composition.
9. The catalyst of claim 8, wherein the zeolite is Y zeolite.

10. The catalyst of any one of claims 1 to 8 which is zeolite-free.
11. The catalyst of any one of claims 1 to 10, wherein the alumina is calcined alumina.
12. A method of making bottoms cracking catalyst, comprising
forming an aqueous slurry containing on a dry weight basis,
about 30 to about 60 wt% alumina;
greater than 0 to about 10 wt% of a dopant comprising ytterbium,
gadolinium, cerium, lanthanum, yttrium, barium, magnesium, or a
mixture of any two or more thereof, measured as the oxide with
respect to the alumina;
about 2 to about 20 wt% reactive silica;
about 3 to about 20 wt% of a component comprising peptizable boehmite,
colloidal silica, aluminum chlorohydrol, or a combination of any
two or more thereof; and
about 10 to about 50 wt% of kaolin, and
spray drying the aqueous slurry to obtain microspheres.
13. The method of claim 11, further comprising calcining the microspheres.
14. The method of claim 11, wherein the alumina is calcined alumina.
15. A method of cracking a hydrocarbon feed comprising contacting said feed with a fluid
catalytic cracking (FCC) catalyst comprising a zeolitic component and a bottoms
cracking catalyst, the bottoms cracking catalyst comprising:
about 30 to about 60 wt% alumina;
greater than 0 to about 10 wt% of a dopant comprising ytterbium,
gadolinium, cerium, lanthanum, yttrium, barium, magnesium, or a
mixture of any two or more thereof, measured as the oxide;
about 2 to about 20 wt% reactive silica;
about 3 to about 20 wt% of a component comprising peptizable boehmite,
colloidal silica, aluminum chlorohydrol, or a combination of any
two or more thereof; and
about 10 to about 50 wt% of kaolin.

16. The method of claim 15, wherein the catalyst comprises the dopant in an amount of about 0.1 to about 5 wt%, measured as the oxide.
17. The method of claim 16, wherein the rare earth element comprises lanthanum.
18. The method of any one of claims 15 to 17, wherein the method results in greater than 10% lower coke yield measured at 13 wt% bottoms, when compared to contacting the feed with a catalyst having the same physical properties which does not include the bottoms cracking catalyst.
19. The method of any one of claims 15-18, wherein the zeolite comprises a Y zeolite.
20. The method of any one of claims 15-19, wherein the FCC catalyst comprises at least 15 wt% of the bottoms cracking catalyst.
21. The method of claim 20, wherein the FCC catalyst comprises at least 50 wt% of the zeolitic component.
22. The method of any one of claims 15-18, wherein the FCC catalyst comprises 15 wt% to 80 wt% of the bottoms cracking catalyst.
23. The method of claim 22, wherein the FCC catalyst comprises 50 wt% to 80 wt% of the bottoms cracking catalyst.
24. The method of any one of claims 15-18, wherein the FCC catalyst comprises 15 wt% to 50 wt% of the bottoms cracking catalyst and 85 wt% to 50 wt% of the zeolitic component and optionally other clay-based components.
25. The method of any one of claims 15-24 wherein the FCC catalyst further comprises a vanadium trap, or a crystalline boehmite nickel trap.
26. The method of any one of claims 15-25, wherein the alumina is calcined alumina.
27. A bottoms cracking catalyst composition, comprising:
about 30 to about 60 wt% alumina;

- greater than 0 to about 10 wt% of a rare earth carbonate comprising ytterbium carbonate, gadolinium carbonate, cerium carbonate, lanthanum carbonate, yttrium carbonate, or a mixture of any two or more thereof;
about 2 to about 20 wt% reactive silica;
about 3 to about 20 wt% of a component comprising peptizable boehmite, colloidal silica, aluminum chlorohydrate, or a combination of any two or more thereof; and
about 10 to about 50 wt% of kaolin.
28. The catalyst of claim 27, comprising the rare earth carbonate is present in an amount of about 0.1 to about 5 wt% of the composition, measured as the oxide.
29. The catalyst of any one of claims 27 to 28, wherein the rare earth element comprises lanthanum.
30. The catalyst of any one of claims 27 to 29, having an average particle size of about 70-95 microns.
31. The catalyst of any one of claims 27 to 30, having a mercury pore volume of 0.3 -0.56 cc/g in a diameter range from 4 to 2,000 nm.
32. The catalyst of any one of claims 27 to 31, wherein the alumina is calcined alumina.
33. A bottoms cracking catalyst composition, comprising:
about 10 to about 20 wt% of a rare earth exchanged Y zeolite;
about 10 to about 30 wt% of a binder comprising silica and boehmite;
about 30 to about 60 wt% of an active matrix comprising alumina and, optionally, crystalline boehmite; and
about 10 to about 50 wt% of kaolin.
34. The bottoms cracking catalyst composition of claim 33, wherein the rare earth exchanged Y zeolite comprises ytterbium, gadolinium, cerium, lanthanum, yttrium, or a mixture of any two or more thereof.
35. The bottoms cracking catalyst composition claims 33 or 34, wherein the rare earth exchanged Y zeolite comprises lanthanum.

36. The bottoms cracking catalyst composition claims 33, 34, or 35 having an average particle size of about 70-95 microns.
37. The bottoms cracking catalyst composition of any one of claims 33 to 36, having a mercury pore volume of 0.3 -0.56 cc/g in a diameter range from 4 to 2,000 nm.
38. A method of making bottoms cracking catalyst, the method comprising:
forming an aqueous slurry containing on a dry weight basis,
about 10 to about 20 wt% of a rare earth exchanged Y zeolite;
about 10 to about 30 wt% of a binder comprising silica and boehmite;
about 30 to about 60 wt% of an additive comprising alumina and,
optionally, crystalline boehmite; and
about 10 to about 50 wt% of kaolin; and
spray-drying the aqueous slurry to obtain microspheres.
39. The method of claim 38 further comprising calcining the microspheres.
40. The method of claim 38, wherein Y zeolite is exchanged with about 1 to 10 wt% of the rare earth.
41. A method of cracking a hydrocarbon feed comprising contacting said feed with the bottoms cracking catalyst of any one of claims 33-37.