CLAIMS:

1. An aromatics saturation process for lube oil boiling range feedstreams comprising:

a) contacting a lube oil boiling range feedstreams containing aromatics and nitrogen and organically bound sulfur contaminants with an aromatics saturation catalyst in the presence of a hydrogen-containing treat gas in a reaction stage operated under effective aromatics saturation conditions, wherein said aromatics saturation catalyst comprises:

i) an inorganic, porous, non-layered, crystalline, mesoporous support material, wherein the support material has a framework comprising at least aluminum and silica, and wherein the ratio of silica to aluminum is 10:1 to 100:1 and the average pore diameter of the support material is 15 to less than 40Å; and

ii) a hydrogenation-dehydrogenation component selected from the Group VIII noble metals and mixtures thereof.

2. An aromatics saturation process for lube oil boiling range feedstreams comprising:

a) contacting a lube oil boiling range feedstream containing aromatics, nitrogen and organically bound sulfur contaminants in a first reaction stage operated under effective hydrotreating conditions and in the presence of hydrogen-containing treat gas with a hydrotreating catalyst comprising at least one Group VIII metal oxide and at least one Group VI metal oxide thereby producing a reaction product

comprising at least a vapor product and a liquid lube oil boiling range product; and

b) contacting said reaction product with an aromatics saturation catalyst in the presence of a hydrogen-containing treat gas in a second reaction stage operated under effective aromatics saturation conditions, wherein said aromatics saturation catalyst comprises:

i) an inorganic, porous, non-layered, crystalline, mesoporous support material, wherein the support material has a framework comprising at least aluminum and silica, and wherein the ratio of silica to aluminum is 10:1 to 100:1 and the average pore diameter of the support material is 15 to less than 40Å;

ii) a binder material; and

iii) a hydrogenation-dehydrogenation component selected from the Group VIII noble metals and mixtures thereof.

3. The process according to any preceding claim wherein said process further comprises:

a) separating said vapor product from said liquid lube oil boiling range product; and

b) conducting said liquid lube oil boiling range boiling range product to the second reaction stage containing said aromatics saturation catalyst.

4. The process according to any preceding claim wherein said aromatics saturation catalyst further comprises a binder material selected from active and

inactive materials, synthetic zeolites, naturally occurring zeolites, inorganic materials, clays, alumina, and silica alumina.

5. The process according to any preceding claim wherein the support material has an average pore diameter of 15 to 35Å, is composited with said binder material, and. displays an equilibrium benzene adsorption capacity of greater than 15 grams benzene/100 grams crystal at 50 torr (6.67 kPa) and 25°C.

6. The process according to any preceding claim wherein the support material has an X-ray diffraction pattern with at least two peaks at positions greater than 10Å d-spacing (8.842° 2θ for Cu K-alpha radiation) which corresponds to the d_{100} value of the electron diffraction pattern of the support material, at least one of which is at a position greater than 18Å d-spacing, and no peaks at positions less than 10Å d-spacing with relative intensity greater than 20% of the strongest peak.

7. The process according to any preceding claim wherein the support material and the binder material are composited in a ratio of support material to binder material ranging from 80 parts support material to 20 parts binder material to 20 parts support material to 80 parts binder material, all ratios being by weight.

8. The process according to any preceding claim wherein said hydrogenation-dehydrogenation component is present in an amount ranging from 0.1 to 2.0 wt.% and is selected from palladium, platinum, rhodium, iridium, and mixtures thereof.

9. The process according to any preceding claim wherein the support material is MCM-41 and the hydrogenation-dehydrogenation component is platinum and palladium.

10. The process according to any preceding claim wherein said lube oil boiling range feedstream is derived from crude oils, shale oils and tar sands as well as synthetic feeds and is selected from lube oil boiling range feedstreams having an initial boiling points of 315°C or higher, and contains up to 0.2 wt.% of nitrogen, up to 3.0 wt.% of sulfur, and up to 50 wt.% aromatics, all based on the lube oil boiling range feedstream.

11. The process according to any preceding claim wherein said lube oil boiling range feedstream has a sulfur content below 500 wppm.

12. The process according to any preceding claim wherein said effective aromatics saturation conditions are conditions effective at removing at least a portion of said organically bound sulfur contaminants and saturating at least a portion of said aromatics present in said lube oil boiling range feedstream.

CLAIMS:

1. An aromatics saturation process for lube oil boiling range feedstreams comprising: a) contacting a lube oil boiling range feedstream having an initial boiling point of at least 315° C. and containing aromatics, and nitrogen, and organically bound sulfur contaminants with an aromatics saturation catalyst in the presence of a hydrogen-containing treat gas in a reaction stage operated under effective aromatics saturation conditions, wherein said aromatics saturation catalyst comprises: i) an inorganic, porous, non-layered, crystalline, mesoporous support material, wherein the support material has a framework comprising at least aluminum and silica, and wherein the ratio of silica to aluminum is about 25:1, to about 70:1, and the average pore diameter of the support material is about 23 to less than about 27 Å; and ii) a hydrogenation-dehydrogenation component selected from the Group VIII noble metals and mixtures thereof.

2. The process according to claim 1 wherein said aromatics saturation catalyst further comprises a binder material selected from active and inactive materials, synthetic zeolites, naturally occurring zeolites, inorganic materials, clays, alumina, and silica alumina.

3. The process according to claim 2 wherein said support material is composited with said binder material.

4. The process according to claim 3 wherein, said binder material is selected from silica-alumina, alumina and zeolites.

5. The process according to claim 1 wherein the support material has an X-ray diffraction pattern with at least two peaks at positions greater than about 10 Å d-spacing (8.8420° 20 for Cu K-alpha radiation) which corresponds to the d100 value of the electron diffraction pattern of the support material, at least one of which is at a position greater than about 18 Å d-spacing, and no peaks at positions less than about 10 Å d-spacing with relative intensity greater than about 20% of the strongest peak.

6. The process according to claim 1 wherein the support material has an X-ray diffraction pattern with at least one peak at a position greater than about, 18 Å d-spacing (4.9090° 20 for Cu K-alpha radiation) which corresponds to the dt00 value of the electron diffraction pattern of the support material and with no peaks at positions less than about 10 Å d-spacing with relative intensity greater than about 10% of the strongest peak.

7. The process according to claim 2 wherein the support material displays an equilibrium benzene adsorption capacity of greater than about 15 grams benzene/100 grams crystal at 50 torn (6.67 kPa) and 25° C.

8. The process according to claim 3 wherein the support material and the binder material are composited in a ratio of support material to binder material ranging from about 80 parts support material to 20 parts binder material to 20 parts support material to 80 parts binder material, all ratios being by weight.

9. The process according to claim 1 wherein said hydrogenation-dehydrogenation component is present in an amount ranging from about 0.1 to about 2.0 wt. %.

10. The process according to claim 9 wherein said hydrogenation-dehydrogenation component is selected from platinum, palladium, rhodium, iridium, and mixtures thereof.

11. The process according to claim 4 wherein said support material is MCM-41.

12. The process according to claim 11 wherein the hydrogenation-dehydrogenation component is platinum and palladium.

13. The process according to claim 1 wherein said lube oil boiling range feedstream is derived from crude oils, shale oils and tar sands as well as synthetic feeds and is selected from lube oil boiling range feedstreams having an initial boiling point of about 315° C. or higher.

14. The process according to claim 13 wherein said lube oil boiling range feedstream contains up to 0.2 wt. % of nitrogen, up to 3.0 wt. % of sulfur, and up to about 50 wt. % aromatics, all based on the lube oil boiling range feedstream.

15. The process according to claim 14 wherein said lube oil boiling range feedstream has a sulfur content below about 500 wppm.

16. The process according to claim 1 wherein said effective aromatics saturation conditions are conditions effective at removing at least a portion of said organically bound sulfur contaminants and saturating at least a, portion of said aromatics present in said lube oil boiling range feedstream.

17. An aromatics saturation process for lube oil boiling range feedstreams comprising: a) contacting a lube oil boiling range feedstream having an initial boiling point of at least 315° C. and containing aromatics, nitrogen and organically bound sulfur contaminants in a first reaction stage operated under effective hydrotreating conditions and in the presence of hydrogen-containing treat gas with a hydrotreating catalyst comprising about at least one Group VIII metal oxide and at least one Group VI metal oxide thereby producing a reaction product comprising at least a vapor product and a liquid lube oil boiling range product; and b) contacting said reaction product with an aromatics saturation catalyst in the presence of a hydrogen-containing treat gas in a second reaction stage operated under effective aromatics saturation conditions, wherein said aromatics saturation catalyst comprises: i) an inorganic, porous, non-layered, crystalline, mesoporous support material, wherein the support material has a framework comprising at least aluminum and silica, and wherein the ratio of silica to aluminum is about 25:1 to about 70:1 and the average pore diameter of the support material is about 23 to less than about 27 Å; ii) a binder material; and iii) a hydrogenation-dehydrogenation component selected from the Group VIII noble metals and mixtures thereof.

18. The process according to claim 17 wherein said support material is composited with said binder material.

19. The process according to claim 17 wherein said binder material is selected from active and inactive materials, synthetic zeolites, naturally occurring zeolites, inorganic materials, clays, alumina, and silica alumina.

20. The process according to claim 19 wherein said binder material is selected from such silica-alumina, alumina and zeolites.

21. The process according to claim 17 wherein the support material has an X-ray diffraction pattern with at least two peaks at positions greater than about 10 Å d-spacing (8.8420° 2θ for Cu K-alpha radiation) which corresponds to the d_{100} value of the electron diffraction pattern of the support material, at least one of which is at a position greater than about 18 Å d-spacing, and no peaks at positions less than about 10 Å d-spacing with relative intensity greater than about 20% of the strongest peak.

22. The process according to claim 17 wherein the support material has an X-ray diffraction pattern with at least one peak at a position greater than about 18 Å d-spacing (4.9090° 2θ for Cu K-

alpha radiation) which corresponds to the d_{100} value of the electron diffraction pattern of the support material and with no peaks at positions less than about 10 Å d-spacing with relative intensity greater than about 10% of the strongest peak.

23. The process according to claim 18 wherein the support material displays an equilibrium benzene adsorption capacity of greater than about 15 grams benzene/100 grams crystal at 50 torr (6.67 kPa) and 25° C.

24. The process according to claim 19 wherein the support material and the binder material are composited in a ratio of support material to binder material ranging from about 80 parts support material to 20 parts binder material to 20 parts support material to 80 parts binder material, all ratios being by weight.

25. The process according to claim 17 wherein said hydrogenation-dehydrogenation component is present in an amount ranging from about 0.1 to about 2.0 wt %.

26. The process according to claim 25 wherein said hydrogenation-dehydrogenation component is selected from platinum, palladium, rhodium, iridium, and mixtures thereof.

27. The process according to claim 20 wherein said support material is MCM-41.

28. The process according to claim 27 wherein the hydrogenation-dehydrogenation component is platinum and palladium.

29. The process according to claim 17 wherein said lube oil boiling range feedstream is derived from crude oils, shale oils and tar sands as well as synthetic feeds and is selected from lube oil boiling range feedstreams having an initial boiling point points of about 315° C. or higher.

30. The process according to claim 29 wherein said lube oil boiling range feedstream contains up to 0.2 wt. % of nitrogen, up to 3.0 wt. % of sulfur, and up to about 50 wt. % aromatics, all based on the lube oil boiling range feedstream.

31. The process according to claim 29 wherein said lube oil boiling range feedstream has a sulfur content below about 500 wppm.

32. The process according to claim 31 wherein said process further comprises: a) separating said vapor product from said liquid lube oil boiling range product; and b) conducting said liquid lube oil boiling range boiling range product to the second reaction stage containing said aromatics saturation catalyst.

33. The process according to claim 17 wherein said effective aromatics saturation conditions are conditions effective at removing at least a portion of said organically bound sulfur contaminants and saturating at least a portion of said aromatics present in said lube oil boiling range feedstream.

34. The process according to claim 20 wherein the ratio of silica to aluminum in the framework of said support material about 30:1 to about 60:1.