CLAIMS:

1. A method for producing a lubricant base oil, comprising:

contacting an input feed having an aromatics content of 50 mmol/kg to 1200 mmol/kg, with a first catalyst under first effective aromatic saturation conditions to produce a first effluent having an aromatics content of less than 200 mmol/kg, the aromatics content of the first effluent being less than the aromatics content of the input feed, the first effective aromatic saturation conditions including a temperature of at least 320ºC to 370ºC;

contacting at least a portion of the first effluent with a second catalyst under second effective aromatic saturation conditions to produce a second effluent, the second effective aromatic saturation conditions including a temperature of from 270ºC to 330ºC and a hydrogen partial pressure of at least 4.1 MPag (600 psig), the temperature of the second effective aromatic saturation conditions being at least 10ºC less than the temperature of the first effective aromatic saturation conditions; and

contacting at least a portion of the second effluent with a third catalyst, wherein the third catalyst comprises MCM-41, a binder, and from 0.1 wt% to 1.5 wt% of Pt, Pd, or a combination of Pt and Pd, under third effective aromatic saturation conditions, the third effective aromatic saturation conditions including a temperature of from 220ºC to 270ºC, the temperature of the third effective aromatic saturation conditions being at least 30ºC less than the temperature of the second effective aromatic saturation conditions.

2. The method of claim 1, wherein

a) the contacting at least a portion of the first effluent with a second catalyst comprises exposing a portion of the first effluent to a first intermediate catalyst under first effective intermediate hydroprocessing conditions to produce a first intermediate effluent, and contacting at least a portion of the first intermediate effluent with the second catalyst;

b) the contacting at least a portion of the second effluent with a third catalyst comprises exposing a portion of the second effluent to a second intermediate catalyst under second effective intermediate hydroprocessing conditions to produce a second

intermediate effluent, and contacting at least a portion of the second intermediate effluent with the third catalyst; or

c) a combination thereof.

3. The method of claim 1, wherein the second catalyst comprises a Group VIII noble metal supported on an amorphous metal oxide support, a Group VIII noble metal supported on a dewaxing catalyst that operates primarily by isomerization, or a combination thereof.

4. The method of claim 1, the method further comprising:

hydrocracking a feedstock having a T5 boiling point of at least 300ºC under effective hydrocracking conditions to form a hydrocracked feedstock having an aromatics content of 200 mmol/kg or less, wherein the input feed comprises at least a portion of the hydrocracked feedstock.

5. The method of claim 1, the method further comprising:

hydrocracking a feedstock having a T5 boiling point of at least 300ºC under effective sour hydrocracking conditions to form a first hydrocracked feedstock;

fractionating the first hydrocracked feedstock to form at least a diesel fraction and a fraction having a higher boiling range than the diesel fraction; and

hydrocracking at least a portion of the fraction having a higher boiling range than the diesel fraction under effective non-sour hydrocracking conditions to form a second hydrocracked feedstock having an aromatics content of 200 mmol/kg or less,

wherein the input feed comprises at least a portion of the second hydrocracked feedstock.

6. The method of claim 1, wherein the temperature of the second effective aromatic saturation conditions is at least 20ºC less than the temperature of the first effective aromatic saturation conditions.

7. The method of claim 1, wherein the temperature of the third effective aromatic saturation conditions is at least 40ºC less than the temperature of the second effective aromatic saturation conditions.

8. The method of claim 1, wherein the first catalyst comprises a dewaxing catalyst selected from the group consisting of ZSM-48, ZSM-23, and a combination thereof, and further comprises a binder and 0.1 wt% to 1.5 wt% Pt.

9. The method of claim 1, wherein the second catalyst comprises a molecular seieve selected from the group consisting of MCM-41, ZSM-48, ZSM-23, and a combination of ZSM-48 and ZSM-23, and further comprises a binder and 0.1 wt% to 1.5 wt% Pt, Pd or a combination of Pt and Pd.

10. The method of claim 1, wherein the second effective aromatic saturation conditions include a hydrogen partial pressure of at least 5.2 MPag (750 psig).

11. The method of claim 1, further comprising quenching the first effluent using a gas phase quench stream containing hydrogen.

12. A method for producing a lubricant base oil, comprising:

contacting an input feed having an aromatics content of at least 50 mmol/kg with a first catalyst under first effective aromatic saturation conditions to produce a first effluent having an aromatics content of less than 200 mmol/kg, the aromatics content of the first effluent being less than the aromatics content of the input feed, the first effective aromatic saturation conditions including a temperature of at least 320ºC to 370ºC;

contacting at least a portion of the first effluent with a second catalyst under second effective aromatic saturation conditions to produce a second effluent, the second effective aromatic saturation conditions including a temperature of from 280ºC to 330ºC and a hydrogen partial pressure of at least 4.1 MPag (600 psig), the temperature of the second effective aromatic saturation conditions being at least 10ºC less than the temperature of the first effective aromatic saturation conditions;

contacting at least a portion of the second effluent with a third catalyst under third effective aromatic saturation conditions to produce a third effluent, the third effective aromatic saturation conditions including a temperature of from 270ºC to 300ºC, the temperature of the third effective aromatic saturation conditions being at

least 10ºC less than the temperature of the second effective aromatic saturation conditions; and

contacting at least a portion of the third effluent with a fourth catalyst, wherein the fourth catalyst comprises MCM-41, a binder, and from 0.1 wt% to 1.5 wt% of Pt, Pd, or a combination of Pt and Pd, under fourth effective aromatic saturation conditions, the fourth effective aromatic saturation conditions including a temperature of from 220ºC to 270ºC, the temperature of the fourth effective aromatic saturation conditions being at least 10ºC less than the temperature of the third effective aromatic saturation conditions.

13. The method of claim 12, wherein the temperature of the third effective aromatic saturation conditions is at least 20ºC less than the temperature of the second effective aromatic saturation conditions.

14. The method of claim 12, wherein the temperature of the fourth effective aromatic saturation conditions is at least 20ºC less than the temperature of the third effective aromatic saturation conditions.