CLAIMS

1. A method for reducing impurities in a hydrocarbon containing feedstock, comprising:
   (i) solvent deasphalting said feedstock to produce an asphalt fraction and a deasphalted oil (DAO) fraction, in a first reaction chamber;
   (ii) processing said DAO fraction and asphalt fraction in separate, second and third reaction chambers;
   (iii) hydrocracking said DAO fraction in said second reaction chamber to remove sulfur and nitrogen therefrom and to distillate any hydrocarbons contained in said DAO which have a boiling point over 370°C; and
   (iv) gasifying said asphalt fraction via combining it with oxygen and steam, in said third reaction chamber, to produce hydrogen therefrom.

2. The method of claim 1, comprising introducing said hydrogen produced in said third reaction chamber into said second reaction chamber.

3. The method of claim 1, wherein said solvent deasphalting comprises mixing said crude oil with a solvent containing C_3-C_7 carbon atoms, at a temperature and a pressure below critical temperature and critical pressure of said solvent.

4. The method of claim 3, wherein said solvent comprises n-butane and isobutane.

5. The method of claim 1, further comprising contacting said crude oil with a solid adsorbent.

6. The method of claim 3, comprising mixing said crude oil and solvent at a temperature and pressure below the critical temperature and critical pressure of said solvent.

7. The method of claim 3, wherein said crude oil and solvent are combined at a weight ratio of from 10:1 to 200:1 w/w.

8. The method of claim 1, comprising hydrocracking said DAO at a pressure of from 100 - 200 bars, a temperature of from 350°C to 500°C, an LHSV of from 0.1 to 4.0 h^{-1}, and a hydrogen:DAO ratio of from 500 to 2,500 SLt/Lt.

9. The method of claim 1, comprising hydrocracking said DAO in a series of multiple chambers.

10. The method of claim 1, wherein said hydrocracking chamber is a fixed bed, ebullated bed, or slurry bed chamber.

11. The method of claim 1, comprising hydrocracking said DAO in the presence of a catalyst, which contains from 2-40 wt% active metal, a pore volume of from 0.33-1.50 cc/gm, a surface area of 250 - 450 m^2/g, and an average pore diameter of at least 50 Angstroms.

12. The method of claim 11, wherein said active metal is a Group VI, VII, or VIIIB metal.

13. The method of claim 11, wherein said active metal comprises Co, Ni, W, or Mo.

14. The method of claim 11, wherein said catalyst is presented on a support.

15. The method of claim 14, wherein said support comprises alumina, silica, or a zeolite.

16. The method of claim 15, wherein said support is a zeolite.

17. The method of claim 16, wherein said zeolite has been modified by treatment with at least one of steam, ammonia, or acid, and contains at least one transition metal.

18. The method of claim 17, wherein said at least one transition metal is Zn or Ti.

19. The method of claim 1, comprising gasifying said asphalt fraction at a temperature of from 900°C to 1700°C, and a pressure of from 20 bars to 100 bars.

20. The method of claim 1, further comprising adjusting the amount of asphalt and at least one of oxygen and steam in said third reaction chamber to provide a stoichiometric balance therebetween which results in partial combustion of said asphalt.

21. The method of claim 19, wherein said stoichiometric ratio based on the oxygen:carbon ratio is from 0.2:1:0 to 10:0.2 by weight.

22. The method of claim 19, comprising introducing asphalt and steam to said third reaction chamber in a ratio of from 0.1 to 1.0 to 10:0.1 based upon weight of carbon in said crude oil.

CLAIMS

1. A method for reducing impurities in a hydrocarbon containing feedstock, comprising:
   (i) solvent deasphalting said feedstock in the presence of a solid adsorbent which contacts said feedstock, to produce an asphalt fraction and deasphalted oil (DAO), in a first reaction chamber,
   (ii) processing said DAO and said asphalt fraction in separate, second and third reaction chambers;
   (iii) hydrocracking said DAO in said second reaction chamber to remove sulfur and nitrogen thereform and to distillate any hydrocarbons contained in said DAO which have a boiling point over 370°C;and
   (iv) gasifying said asphalt fraction via combining it with oxygen and steam in said third reaction chamber, to produce hydrogen therefrom.
2. The method of claim 1, comprising introducing said hydrogen produced in said third reaction chamber into said second reaction chamber.
3. The method of claim 1, wherein said solvent deasphalting comprises mixing said crude oil with a solvent containing C_3-C_7 carbon atoms, at a temperature and a pressure below critical temperature and critical pressure of said solvent.
4. The method of claim 3, wherein said solvent comprises n-butane and isobutane.
5. The method of claim 3, comprising mixing said crude oil and solvent at a temperature and pressure below the critical temperature and critical pressure of said solvent.
6. The method of claim 3, wherein said crude oil and solvent are combined at a weight ratio of from 10:1 to 200: 1 w/w.
7. The method of claim 1, comprising hydrocracking said DAO at a pressure of from 100 - 200 bars, a temperature of from 350°C to 500°C, an LHSV of from 0.1 to 4.0 h-1 , and a hydrogen:DAO ratio of from 500 to 2,500 SLt/Lt.
8. The method of claim 1, comprising hydro cracking said DAO in a series of multiple chambers.
9. The method of claim 1, wherein said hydrocracking chamber is a fixed bed, ebullated bed, or slurry bed chamber.
10. The method of claim 1, comprising hydrocracking said DAO in the presence of a catalyst, which contains from 2-40 wt% active metal, a pore volume of from 0.33-1.50 *cc/gm,* a surface area of 250 - 450 m^2/g, and an average pore diameter of at least 50 Angstroms.
11. The method of claim 10, wherein said active metal is a Group VI, VII, or VIIIB metal.
12. The method of claim 10, wherein said active metal comprises Co, Ni, W, or Mo.
13. The method of claim 10, wherein said catalyst is presented on a support.
14. The method of claim 13, wherein said support comprises alumina, silica, or a zeolite.
15. The method of claim 14, wherein said support is a zeolite.
16. The method of claim 15, wherein said zeolite has been modified by treatment with at least one of steam, ammonia, or acid, and contains at least one transition metal.

17. The method of claim 16, wherein said at least one transition metal is Zn or Ti.

18. The method of claim 1, comprising gasifying said asphalt fraction at a temperature of from 900°C to 1700°C, and a pressure of from 20 bars to 100 bars.

19. The method of claim 1, further comprising adjusting the amount of asphalt and at least one of oxygen and steam in said third reaction chamber to provide a stoichiometric balance therebetween which results in partial combustion of said asphalt.

20. The method of claim 18, wherein said stoichiometric ratio based on the oxygen:carbon ratio is from 0.2: 1:0 to 10:0.2 by weight.

21. The method of claim 18, comprising introducing asphalt and steam to said third reaction chamber in a ratio of from 0.1 to 1.0 to 10:0.1 based upon weight of carbon in said crude oil.