

INTEGRATED HYDROTREATING HYDRODEWAXING HYDROFINISHING PROCESS

FIELD

[0001] This disclosure relates to an integrated hydrotreating hydrodewaxing hydrofinishing process. More particularly, the hydrotreater operates at a higher pressure than the hydrodewaxer with interstage stripping/separating occurring between the two and without the use of a pump between the stripper/separator and the hydrodewaxer.

BACKGROUND

[0002] It has long been recognized that one of the most valuable products generated through the refining of crude mineral oils is lubricating oils. It is common practice to recover lubricating oil basestocks by solvent extracting, with a selective solvent, undesirable components such as aromatics, sulfur compounds, and nitrogen compounds from straight vacuum distillates, and then solvent dewaxing to improve low temperature properties. However, with the decline in the availability of paraffinic base crudes, and a corresponding increase in the proportion of naphthenic and asphaltic base crudes, it is becoming increasingly difficult to meet the demand for lubricating oil base stocks, or base oils. Catalytic hydroprocessing has been used to supplement or replace these conventional solvent-based processes and to enable use of poorer quality feedstocks and/or produce better quality lube basestocks.

[0003] One method of classifying lubricating oil basestocks is that used by the American Petroleum Institute (API). API Group I basestocks are the lowest quality classification. API Group II basestocks are differentiated from Group I basestocks by having a saturates content of 90 wt% or greater, a sulfur content of not more than 0.03 wt%, and a VI greater than 80 but less than 120. API Group

III basestocks are the same as Group II basestocks except that the VI is at least 120. Solvent processing alone, or in combination with mild hydrotreating, is commonly used for production of Group I basestocks. Catalytic hydroprocessing is generally required for production of Group II and Group III basestocks from an appropriate feed.

[0005] Techniques for preparing Group II and Group III basestocks such as hydrocracking or solvent extraction require severe operating conditions such as high hydrocracking pressure and temperature or high extraction temperature and solvent:oil ratio to reach these higher basestock qualities.

[0006] Unfortunately, hydroprocessing for producing a lube basestock is hindered due to differing sensitivities for the catalysts involved in the various stages. This limits the selection of feeds which are potentially suitable for use in forming Group II or higher basestocks. The catalysts used for the initial hydroprocessing of the oil fraction often have a relatively high tolerance for contaminants such as sulfur or nitrogen. By contrast, catalysts for catalytic dewaxing usually suffer from a low tolerance for contaminants. In particular, dewaxing catalysts that are intended to operate primarily by isomerization, which usually contain noble metals, are typically quite sensitive to the amount of sulfur and/or nitrogen present in a feed. If contaminants are present, the activity and selectivity of these dewaxing catalysts will be reduced, and the activity and selectivity may not recover after removal of the contaminants.

[0007] To accommodate the differing tolerances of the catalysts involved in lube basestock production, the following features are typically incorporated into the basestock production process. First, an initial hydroprocessing step (such as distillate hydrocracking or raffinate hydroconversion) is run under sufficiently severe conditions to convert most of the organic sulfur and nitrogen in the feed into H_2S and NH_3 . Second, a separation step is used between the hydroprocessing step and the dewaxing step which removes substantially all of

these gaseous contaminants prior to the dewaxing step. The separation step requires extra equipment to be used during the lube production, which increases the overall cost of the process.

[0008] A common method to remove contaminants such as NH_3 and H_2S from a hydroprocessing unit effluent is stripping -- with a clean gas stream -- to separate the gaseous effluent from the liquids. The stripping is typically conducted at low temperature and pressure. The hydrotreating step is frequently followed by a further hydroprocessing step, such as hydrodewaxing, containing a catalyst which is sensitive to the presence of sulfur and nitrogen contaminants. Stripping steps involve considerable investment and operating costs as stripping usually involves depressurization and cooling followed by pumping and heating to repressurize and reheat the feed to the next hydroprocessing step.

[0009] U.S. Patent No. 6,635,170 discloses a two stage hydroprocessing process with stripping zones between the hydroprocessing zones and following the last hydroprocessing zone. The stripping occurs at high pressure and temperature with no disengagement (significant lowering of pressure) between or following the hydroprocessing zones. There is also recycle of high temperature gaseous effluent from the last stripping zone to the first stripping zone. The second stage hydroprocessing process occurs at a higher pressure than the first stage hydroprocessing process as evidenced by the inclusion of a pump between the first stripper and the second stage hydroprocessing process. The pump adds additional capital investment cost and operating costs to the process.

[0010] It would be desirable to have an integrated hydroprocessing hydrodewaxing hydrofinishing process with an improved interstage stripping/separating process between the hydroprocessor and the hydrodewaxer in order to minimize the capital investment and operating costs.

SUMMARY

[0011] The present disclosure relates to a continuous process for producing lube base stocks including:

- a. passing a hydrocarbon feedstock to a first hydroprocessing zone and hydroprocessing the feedstock under first hydroprocessing conditions to form a first hydroprocessed product, said first hydroprocessing zone having a first hydroprocessing catalyst system, temperature and pressure;
- b. passing the first hydroprocessed product to a stripping/separating zone;
- c. stripping/separating of the first hydroprocessed product of dissolved H_2S and NH_3 to form a liquid effluent and a sour gas, and subsequently scrubbing the sour gas to remove H_2S and NH_3 to form a first gaseous effluent;
- d. passing the liquid effluent from the stripping/separating zone and at least a portion of the first gaseous effluent to a second hydroprocessing zone and hydroprocessing the liquid effluent under second hydroprocessing conditions to form a second hydroprocessed product, said second hydroprocessing zone having a second hydroprocessing catalyst system, temperature and pressure;
- e. passing the second hydroprocessed product to a third hydroprocessing zone and hydroprocessing the liquid effluent under third hydroprocessing conditions to form a third hydroprocessed product, said third hydroprocessing zone having a third hydroprocessing catalyst system, temperature and pressure;

f. passing the third hydroprocessed product to a separating zone and separating the third hydroprocessed product into a second gaseous effluent and liquid products, including one or more lube base stocks;

g. compressing the second gaseous effluent and recycling at least a portion of the compressed second gaseous effluent back to one or more of the first hydroprocessing zone, the stripping/separating zone, the second hydroprocessing zone, or the third hydroprocessing zone,

wherein the process pressure is greatest at the entrance to the first hydroprocessing zone, and with the proviso that no liquids pump exists between stripping/separating zone and the second hydroprocessing zone.

[0012] The present disclosure describes an improved method for removing nitrogen- and sulfur-containing contaminants from multi-zone hydroprocessing schemes without the need for disengagement, i.e., low-pressure stripping which involves depressurization, stripping and re-pressurization, and the attendant costs for such an operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Figure 1 is a schematic illustrating one exemplary embodiment of the integrated hydrotreating hydrodewaxing hydrofinishing process disclosed herein.

DETAILED DESCRIPTION

[0014] All numerical values within the detailed description and the claims herein are modified by “about” or “approximately” the indicated value, and take into account experimental error and variations that would be expected by a person having ordinary skill in the art.

[0015] Hydrocarbon feeds for the integrated hydrotreating hydrodewaxing hydrofinishing process disclosed herein include whole and reduced crudes and fractions thereof. Non-limiting examples include distillates such as atmospheric and vacuum gas oils, and coker gas oils, hydrocrackates, raffinates, extracts, hydrotreated oils, atmospheric and vacuum resids, deasphalted oils, dewaxed oils, slack waxes, petrolatum, Fischer-Tropsch waxes and mixtures thereof.

[0016] Hydroprocessing is used herein to denote various processes involving treatment of a feed in the presence of hydrogen and include processes which involve at least one of boiling range reduction, removal of contaminants, viscosity reduction, viscosity index (VI) increase, pour point reduction and aromatics saturation. Examples of typical hydroprocessing schemes include hydrotreating, hydrocracking, hydrofinishing (a.k.a. hydrofining), hydrodewaxing, hydroisomerization, and raffinate hydroconversion. Such hydroprocessing schemes are well known in the art and are described in standard reference works such as "Petroleum Refining" by James H. Gary and Glenn E. Handwerk, Third Edition, Marcel Dekker, New York.

[0017] Hydrocracking involves at least some conversion of the boiling range of the feed to lower boiling products. Hydrocracking catalysts are generally more acidic than hydrotreating catalysts and include Group VIA and Group VIII metals on supports such as alumina, especially fluorided alumina, silica-alumina and zeolites. Examples include Group VIA and Group VIII metal, e.g., Ni/Mo on silica-alumina, Group VIA and Group VIII metal on zeolite, e.g., Ni/Mo on zeolites such as X or Y, Pd on zeolite and Ni/W on zeolite. Hydrocracking conditions include temperatures of 260-480°C, pressures of 800-3000 psig, LHSV of 0.1-10 h⁻¹ and treat gas rates of 1000-10000 scf/bbl.

[0018] Hydrotreating is typically used to reduce the sulfur, nitrogen, and aromatic content of a feed, and is not primarily concerned with boiling point conversion of the feed. Catalysts usually contain at least one of Group VIA and

Group VIII metal on a less acidic support such as alumina or silica. Examples include Ni/Mo, Co/Mo and Ni/W catalysts. Hydrotreating conditions typically include temperatures of 315-425°C, pressures of 300-3000 psig, Liquid Hourly Space Velocities (LHSV) of 0.2-10 h⁻¹ and hydrogen treat rates of 500-10000 scf/bbl.

[0019] Hydrodewaxing is used for the removal of straight-chain, paraffinic molecules from feeds. Hydrodewaxing can be accomplished by selective hydrocracking or by hydroisomerizing these straight-chain molecules. Hydrodewaxing catalysts are suitably molecular sieves such as crystalline aluminosilicates (zeolites) or silico-aluminophosphates (SAPOs), preferably 10-ring sieves such as ZSM-5, ZSM-22, ZSM-23, ZSM-35, ZSM-48, SAPO-11, SAPO-41 and the like. These catalysts may also carry a metal hydrogenation component, preferably Group VIII metals, especially Group VIII noble metals. Hydrodewaxing conditions include temperatures of 275-425°C, pressures of 300-3000 psig, LHSV of 0.1-5.0 h⁻¹ and treat gas rates of from 500-5000 scf/bbl.

[0020] Hydrofinishing is usually concerned with product quality issues such as daylight stability, color, haze, heteroatom removal, aromatics and olefin saturation and the like. Catalysts can be those used in hydrotreating including, e.g., Ni/Mo, Ni/W or Pd and/or Pt on a support such as alumina. Group VIII and/or Group VI metals supported on a bound support from the M41S family, such as bound MCM-41 are particularly advantageous. The M41S family of catalysts are mesoporous materials having high silica contents whose preparation is further described in J. Amer. Chem. Soc., 1992, 114, 10834. Examples include MCM-41, MCM-48 and MCM-50. Hydrofinishing conditions include temperatures of 200-350°C, pressures of 200-3000psig, LHSV of 0.1-5 h⁻¹ and treat gas rates of 100-5000 scf/bbl.

[0021] Hydroprocessing involves at least one reactor having an inlet temperature and pressure and an outlet temperature and pressure, and commonly

occurs in multiple zones (or stages) involving sequences such as hydrotreating/hydrocracking, hydrotreating/ hydrodewaxing, hydrotreating/hydroisomerization, hydrocracking/ hydrodewaxing, hydrocracking/hydrofinishing, hydrodewaxing/ hydrofinishing, hydrotreating/hydrodewaxing/hydrofinishing and the like. Typical hydroprocessing configurations include hydrotreating followed by hydrocracking, hydrotreating or hydrocracking followed by hydrofinishing or hydrodewaxing, hydrotreating followed by hydrodewaxing followed by hydrofinishing, and 2-stage hydrocracking or hydrotreating in which at least two reactors are sequentially staged. One particularly advantageous 3-stage combination of hydroprocessing configurations includes hydrotreating followed by hydrodewaxing followed by hydrofinishing. This particular configuration is particularly advantageous for producing lube base stocks.

[0022] The above hydroprocessing schemes typically involve a disengagement step between hydroprocessing steps, which involves depressurization to remove contaminants, and product and/or intermediates separation. The individual hydroprocessing zones may use a single reactor or may use multiple reactors. A common practice in the art is to disengage with a significant lowering of the pressure, i.e., depressurize between hydroprocessing steps. That is, disengagement refers to a substantial lowering of the pressure between subsequent downstream and upstream hydroprocessing steps. More specifically, there is at least a 100 psi, or at least a 200 psi, or at least a 400 psi decrease in pressure between the outlet pressure of one hydroprocessing step and the inlet pressure of a subsequent downstream hydroprocessing step. No disengagement refers to no significant lowering of the pressure between subsequent downstream and upstream hydroprocessing steps, that is less than a 100 psi pressure decrease between hydroprocessing steps. The reason for such disengagement is to strip the effluent from the first hydroprocessing step (or zone), such as a hydrotreater, before passing the effluent to a second hydroprocessing step, such as a

hydrodewaxer. An interstage stripping zone is employed to remove gaseous contaminants created in the first hydroprocessing step such as H_2S and NH_3 and may also be used to strip light (low boiling) products from the effluent. Such gaseous contaminants may adversely impact the performance of catalysts in the second hydroprocessing step or zone, such as a hydrodewaxer. However, before passing the stripped effluent to the second hydroprocessing step, it is usually necessary to repressurize and reheat the effluent. A pump is typically used to repressurize the liquid effluent from the stripping zone.

[0023] The present process involves a first separation zone following the first hydroprocessing zone, a second hydroprocessing zone and a second separation zone. Unlike the common practice in the art, in the present disclosure, the first and second separation zones are conducted at nearly the same pressure of the preceding hydroprocessing zone. That is, there is little to no pressure drop (less than 100 psi) between subsequent hydroprocessing zones. There is no disengagement, i.e., depressurization between first and second hydroprocessing zones or following the third hydroprocessing zone and the second separation zone. That is, there is less than a 100 psi decrease in pressure between the first and second hydroprocessing zones or following the third hydroprocessing zone and the second separation zone in the present disclosure. Further, gases stripped from the second separation zone may be recycled to the first separation zone or recycled to the first hydroprocessing zone or recycled to the second or third hydroprocessing zones. The different hydroprocessing zones are typically operated at different temperatures. Thus it is preferred to include at least one heat exchanger (or heater) between hydroprocessing zones or between hydroprocessing zones and separation zones.

[0024] High pressure separators are known in the art. They may include flash drums, pressure strippers which include pressure separators for separating liquids and gases at high temperatures or combinations thereof. These units are designed

to operate at high temperatures such as the temperature of the preceding hydroprocessing zone. High pressure strippers generally operate in countercurrent mode with regard to the stripping gas.

[0025] In one non-limiting exemplary embodiment, the first hydroprocessing zone results in the generation of contaminants which might reduce the efficiency of a subsequent hydroprocessing zone or stage. Examples of such sequences include hydrotreating followed by hydrodewaxing, hydrotreating followed by hydrocracking, hydrocracking followed by hydrodewaxing, hydrotreating followed by hydrofinishing, and raffinate hydroconversion followed by hydrodewaxing. Typical contaminants generated in the first hydroprocessing zone include water, ammonia and hydrogen sulfide.

[0026] The process is further described with reference to a representative process shown in Figure 1. Fresh hydrocarbon feed through line 1 and compressed hydrogen-rich recycle gas through line 2 are combined through line 3 to the first hydroprocessing zone 30 which is advantageously a hydrotreater or hydrocracker operating under minimum conversion to meet both the cleanliness (hydrodesulfurization/hydrodenitrogenation) requirements of the hydrodewaxing step 33 and the viscosity index targets of the lube products portion of stream 13 under hydroprocessing conditions to produce a hydrotreated/hydrocracked product, hydrogen sulfide, ammonia, and light hydrocarbon gases.

[0027] The products from the hydrotreater/hydrocracker are passed through line 4 to heat exchanger 40 through line 5 to a first separation zone 31 which is a stripper/separator comprising a single or multiple separation stages. In one form, the stripper/separator 31 may be a flash separator including a high pressure separator drum followed by a pressure stripper. In another advantageous form, the stripper/separator 31 may be a pressure stripper followed by an amine scrubber followed by a water wash tower. In this form, liquid product comprising hydrotreated/hydrocracked product 5 is stripped with hydrogen-rich recycle gas

represented by line 19. Hydrogen, light hydrocarbons, hydrogen sulfide, and ammonia are separated from the hydrotreated or hydrocracked liquid product through line 21, pass through heat exchanger 41, through line 22, and then to a separator 32 to separate out any condensed liquids 23. The overhead gas 24 goes through gas processing steps (36 and 37) to produce a clean hydrogen-rich treat gas 26 for further utilization in the hydrodewaxing step 33 and/or hydrofinishing step 34. In particular, an amine scrubber 36 uses a countercurrent flow of amine solution 50 to remove hydrogen sulfide through line 51. In addition, a water wash tower 37 uses a countercurrent flow of water 52 to remove ammonia through line 53. The preceding gas processing steps result in a clean hydrogen-rich treat gas stream 26 that may be used in the hydrodewaxer 33 and/or hydrofinisher 34.

[0028] The stripped hydrotreated or hydrocracked liquid effluent stream 6 passes through a heat exchanger 42, through line 7, is then mixed with clean hydrogen-rich treat gas 26, and then flows through line 8 to the hydrodewaxing step 33. Unlike prior art process configurations, a liquid pump is not required to pressurize the stripped hydrotreated/hydrocracked liquid effluent stream 6 after the stripper/separator 31 and prior to the hydrodewaxer 33 because of the higher pressure at the exit 6 of the stripper/separator 31 compared to the entrance 8 of the hydrodewaxer 33. There is also no disengagement or significant lowering of the pressure (no depressurization) between any of the hydroprocessing zones (30, 33, 34), or disengagement between the stripper/separator 31 and the hydrodewaxer 33. For purposes of pressure balance, the first hydroprocessing zone 30 is operated at a higher pressure than the second hydroprocessing zone 33. In addition, the second hydroprocessing zone 33 is operated at a higher pressure than the third hydroprocessing zone 34.

[0029] The stripped hydrotreated or hydrocracked liquid effluent stream 6 that enters the hydrodewaxer zone 33 thus contains almost no hydrogen sulfide or ammonia. This may be advantageous if the catalyst used in hydrodewaxing zone

33 is sensitive to these contaminants. The equilibrium is shifted in favor of desorption of any remaining hydrogen sulfide and ammonia in the liquid product from the first hydroprocessing zone 30. Not only is greater catalyst protection afforded for the second hydroprocessing zone 33, but higher reaction rates may also occur. By not depressurizing between or after hydroprocessing zones, a considerable expense savings occurs as the need for depressurizing and repressurizing gaseous streams is also avoided. Moreover, a considerable capital investment cost and related operating costs are avoided by the elimination of a liquid pump between the stripper/separator 31 and the hydrodewaxer 33 for the liquid effluent 6 from the stripper/separator.

[0030] The hydrodewaxed product 9 is cooled in heat exchanger 43 and flows through line 10 to the hydrofinishing step 34. The hydrofinished product 11 is heated/cooled in heat exchanger 44 and flows through line 12 to the second separation step 35 for separation into liquid product 13 and a hydrogen-rich gas 14. The liquid is further separated into one or more lube base stocks and lighter products. The lube base stock products may be an API Group I, Group II or Group III lube base stock as described above, and more advantageously a Group II or Group III lube base stock. The separation step 35 may include a flash separator for separating the liquid product from the hydrogen-rich gas 14. All or a portion of the hydrogen-rich gas 14 from the separation step can be recycled through a recycle gas compressor 60 followed by flow through line 20 to the hydrotreating step 30, stripping/separating section 31, hydrodewaxing section 33, or hydrofinishing section 34. The high pressure hydrogen-rich gas 20 from recycle gas compressor 60 may be sent to one or more of the 3-zones of the integrated process described above and such high pressure hydrogen-rich gas 20 is at a high pressure than any other point in the process. Distributing to the integrated process the high pressure hydrogen-rich gas 20 facilitates ease of distribution to anywhere in the process as required.

[0031] A hydrogen-rich makeup gas stream 17 and purge gas stream 15 serve to maintain hydrogen partial pressure in the system. The hydrogen-rich makeup gas stream 17 may be at a lower pressure than the overall system pressure, and correspondingly it is input into the suction side of the recycle compressor 60. The pressure in the process disclosed herein is greatest at the hydroprocessing zone 30 and then decreases through the subsequent hydroprocessing zones (hydrodewaxing step 33 and hydrofinishing step 34). A liquids pump (not shown) may be used to pressurize the fresh feed line 1 prior to entering the hydrotreater 30, and hence the highest pressure through the process depicted in Figure 1 is at the point entering 3 the first hydroprocessing step 30. Each hydroprocessing reactor 30, 33, and 34 may include one or more quench zones within multiple beds. These quench zones may be liquid and/or gas quenched. The fresh liquid hydrocarbon feed 1 or a fraction of the liquid product 13 may be used for the liquid quench medium. Hydrogen gas (recycled 20 or make-up 17) may be used for the gas quench medium. The relative amounts of flow of gaseous product through the process may be controlled by valves (not shown).

[0032] The integrated hydroprocessing hydrodewaxing hydrofinishing process with an interstage stripping/separating process without a pump between the hydroprocessor and the hydrodewaxer results in one or more of the following advantages from the elimination of a liquid pump between the first and second hydroprocessing zones and by operating without the need for disengagement (significant lowering of the process pressure) between process steps: decreased process capital investment cost, decreased need for fresh hydrogen gas, and decreased process operating costs.

[0033] All patents and patent applications, test procedures (such as ASTM methods, UL methods, and the like), and other documents cited herein are fully incorporated by reference to the extent such disclosure is not inconsistent with this disclosure and for all jurisdictions in which such incorporation is permitted.

[0034] When numerical lower limits and numerical upper limits are listed herein, ranges from any lower limit to any upper limit are contemplated. While the illustrative embodiments of the disclosure have been described with particularity, it will be understood that various other modifications will be apparent to and can be readily made by those skilled in the art without departing from the spirit and scope of the disclosure. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the examples and descriptions set forth herein but rather that the claims be construed as encompassing all the features of patentable novelty which reside in the present disclosure, including all features which would be treated as equivalents thereof by those skilled in the art to which the disclosure pertains. The disclosure has been described above with reference to numerous embodiments and specific examples. Many variations will suggest themselves to those skilled in this art in light of the above detailed description. All such obvious variations are within the full intended scope of the appended claims.

CLAIMS:

1. A continuous process for producing lube base stocks comprising:
 - a. passing a hydrocarbon feedstock to a first hydroprocessing zone and hydroprocessing the feedstock under first hydroprocessing conditions to form a first hydroprocessed product, said first hydroprocessing zone having a first hydroprocessing catalyst system, temperature and pressure;
 - b. passing the first hydroprocessed product to a stripping/separating zone;
 - c. stripping/separating of the first hydroprocessed product of dissolved H_2S and NH_3 to form a liquid effluent and a sour gas, and subsequently scrubbing the sour gas to remove H_2S and NH_3 to form a first gaseous effluent;
 - d. passing the liquid effluent from the stripping/separating zone and at least a portion of the first gaseous effluent to a second hydroprocessing zone and hydroprocessing the liquid effluent under second hydroprocessing conditions to form a second hydroprocessed product, said second hydroprocessing zone having a second hydroprocessing catalyst system, temperature and pressure;
 - e. passing the second hydroprocessed product to a third hydroprocessing zone and hydroprocessing the liquid effluent under third hydroprocessing conditions to form a third hydroprocessed product, said third hydroprocessing zone having a third hydroprocessing catalyst system, temperature and pressure;
 - f. passing the third hydroprocessed product to a separating zone and separating the third hydroprocessed product into a second gaseous effluent and liquid products, including one or more lube base stocks;

g. compressing the second gaseous effluent and recycling at least a portion of the compressed second gaseous effluent back to one or more of the first hydroprocessing zone, the stripping/separating zone, the second hydroprocessing zone, or the third hydroprocessing zone,

wherein the process pressure is highest at the entrance to the first hydroprocessing zone, and with the proviso that no liquids pump exists between stripping/separating zone and the second hydroprocessing zone.

2. The continuous process of claim 1, wherein the hydrocarbon feed is chosen from atmospheric gas oils, vacuum gas oils, coker gas oils, hydrocrackates, raffinates, extracts, hydrotreated oils, atmospheric and vacuum resids, deasphalted oils, dewaxed oils, slack waxes, petrolatum, Fischer-Tropsch waxes and mixtures thereof.
3. The continuous process of claim 1, wherein the first hydroprocessing zone is a hydrocracker or a hydrotreater.
4. The continuous process of claim 1, further including at least one heat exchanger between the first hydroprocessing zone and the stripping/separating zone.
5. The continuous process of claim 1, wherein the stripping/separating zone includes a pressure stripper and a flash separator.
6. The continuous process of claim 1, wherein the stripping/separating zone includes a pressure stripper followed by an amine scrubber followed by a water wash tower.
7. The continuous process of claim 6, wherein the amine scrubber uses an amine solution to remove hydrogen sulfide from the sour gas.

8. The continuous process of claim 6, wherein the water wash tower uses water to remove ammonia from the sour gas.
9. The continuous process of claim 5 or 6, wherein the pressure stripper uses at least a portion of the compressed second gaseous effluent for stripping.
10. The continuous process of claim 1, further including at least one heat exchanger between the stripping/separating zone and the second hydroprocessing zone.
11. The continuous process of claim 1, wherein the second hydroprocessing zone is a hydrodewaxer or a hydrocracker.
12. The continuous process of claim 11, wherein the second hydroprocessing zone uses at least a portion of the compressed second gaseous effluent.
13. The continuous process of claim 1, wherein the third hydroprocessing zone is a hydrofinisher or a hydrodewaxer.
14. The continuous process of claim 13, wherein the hydrofinisher uses at least a portion of the compressed second gaseous effluent.
15. The continuous process of claim 1, further including at least one heat exchanger between the second hydroprocessing zone and the third hydroprocessing zone.
16. The continuous process of claim 1, further including at least one heat exchanger between the third hydroprocessing zone and the separating zone.
17. The continuous process of claim 1, wherein the separating zone includes a flash separator.

18. The continuous process of claim 1, further including purging at least a portion of the second gaseous effluent from the process.
19. The continuous process of claim 1, wherein the lube base stock is chosen from Group I, Group II and Group III.
20. The continuous process of claim 1, wherein the first hydroprocessing zone catalyst system is chosen from Ni/Mo, Co/Mo, Ni/W and combinations thereof.
21. The continuous process of claim 1, wherein the second hydroprocessing zone catalyst system includes a molecular sieve chosen from ZSM-5, ZSM-22, ZSM-23, ZSM-35, ZSM-48, SAPO-11, SAPO-41 and combinations thereof.
22. The continuous process of claim 1, wherein the third hydroprocessing zone catalyst system is chosen from Ni/Mo, Ni/W or Pd and/or Pt, MCM-41, MCM-48, MCM-50 and combinations thereof.