

CLAIMS:

1. A process for producing a hydroprocessed product, comprising:
sending to a hydroprocessing zone a combined feed comprised of a heavy hydrocarbon oil component, wherein the heavy hydrocarbon oil component has a ~~ASTM D86~~ 10% distillation point of at least 650°F (343°C), and a solvent component containing at least one single ring aromatic compound in which the solvent has an ASTM D86 10% distillation point of at least 120°C (248°F) and a 90% distillation point of not greater than 300°C (572°F), the solvent component comprising at least 50 wt% trimethylbenzene based on a total weight of the solvent component; and
contacting the combined feed with a hydroprocessing catalyst in the presence of hydrogen in the hydroprocessing zone to form a hydroprocessed product.
2. The process of claim 1, wherein the heavy hydrocarbon oil component has an initial ~~ASTM D86~~ boiling point of at least 650°F (343°C).
- ~~3. The process of claim 1, wherein the heavy hydrocarbon oil component has an ASTM D86 10% distillation point of at least 750°F (399°C).~~
- ~~4.~~3. The process of claim 1, wherein the heavy hydrocarbon oil component contains at least 0.0001 grams of Ni/V/Fe, on a total elemental basis of nickel, vanadium and iron.
- ~~5.~~4. The process of claim 1, wherein the heavy hydrocarbon oil component contains at least 50 wppm elemental nitrogen, based on total weight of the heavy hydrocarbon oil component.
- ~~6.~~5. The process of claim ~~5~~4, wherein the heavy hydrocarbon oil component contains at least 500 wppm elemental sulfur, based on total weight of the heavy hydrocarbon oil component.
- ~~7.~~6. The process of claim 1, wherein the heavy hydrocarbon oil component

contains at least 5 wt % n-pentane asphaltenes, based on total weight of the heavy hydrocarbon oil component.

8.7. The process of claim 1, wherein the combined feed is comprised of from 30 wt% to 95 wt% of the heavy hydrocarbon oil component and from 5 wt% to 70 wt% of the solvent component, based on total weight of the combined feed.

9.8. The process of claim 1, wherein the solvent component comprises more than one single-ring aromatic compound and none of the single-ring aromatic compounds has a boiling point of greater than 550°F (288°C).

10.9. The process of claim 9.8, wherein none of the single-ring aromatic compounds has a boiling point of greater than 400°F (204°C).

~~11. The process of claim 1, wherein the solvent component is comprised of at least 50 wt% of one or more single-ring aromatic compounds.~~

~~12.10. The process of claim 11.1, wherein the solvent component comprises more than one single-ring aromatic compound, and none of the single-ring aromatic compounds has a boiling point of greater than 550°F (288°C).~~

~~13. The process of claim 12, wherein the solvent component comprises trimethylbenzene and methylnaphthalene.~~

~~14. The process of claim 1, wherein the at least one single-ring aromatic compound includes one or more hydrocarbon substituents.~~

~~15. The process of claim 14, wherein the hydrocarbon substituents are selected from the group consisting of C₁-C₆-alkyl and C₁-C₆-alkenyl.~~

~~16. The process of claim 15, wherein the at least one single-ring aromatic compound is trimethylbenzene.~~

~~17. The process of claim 1, wherein the solvent component is comprised of at least 50 wt% trimethylbenzene, based on total weight of the solvent component.~~

~~18.11. The process of claim 1, wherein the heavy hydrocarbon oil component and the solvent component are combined prior to entering the hydroprocessing zone.~~

~~19.12. The process of claim 1, wherein the hydroprocessing zone contains the hydroprocessing catalyst in a fixed bed.~~

~~20.13. The process of claim 19.12, wherein the conditions in the hydroprocessing zone include a temperature of from 350°F (177°C) to 800°F (427°C), a total pressure of from 800 psig (5516 kPa-g) to 1500 psig (10342 kPa-g), and a liquid hourly space velocity (LHSV) of the combined heavy hydrocarbon oil and solvent components of from 0.1 to 30 h⁻¹.~~

~~14. The process of claim 1, wherein the solvent component is trimethylbenzene.~~