CLAIMS:

1. A method for determining feedstock quality for lubricant base oil production, comprising:

determining a wax content of a distillate feedstock fraction by differential scanning calorimetry;

obtaining a characteristic boiling point, a characteristic viscosity, and a refractive index for the distillate feedstock fraction;

calculating a distillate dewaxed viscosity index (DDVI) at a DDVI-temperature for the distillate feedstock fraction based on the determined wax content and at least two of the obtained characteristic boiling point, the obtained characteristic viscosity, and the obtained refractive index, the calculated DDVI being at least 0 at the DDVI-temperature; and

processing the feedstock to form a lubricant base oil having a viscosity index of at least 80 and a pour point of 0°C or less.

2. The method of claim 1, wherein the DDVI-temperature is -9°C.

3. The method of claim 1, wherein the wax content of the distillate feedstock fraction is determined based on the relationship $W = \Delta H / A(T)$, where W is the wax content, ΔH is a heat of fusion, T is a temperature where a freezing transition occurs, and A(T) is a scaling factor.

4. The method of claim 1, wherein obtaining at least one of the characteristic boiling point, the characteristic viscosity, and the refractive index comprises measuring the at least one of the characteristic boiling point, the characteristic viscosity, and the refractive index.

5. The method of claim 1, wherein the characteristic viscosity comprises a kinematic viscosity at 40°C.

6. The method of claim 1, wherein the characteristic viscosity comprises a kinematic viscosity at 100°C.

7. The method of claim 1, wherein the characteristic boiling point comprises a volume average boiling point.

8. The method of claim 1, wherein the refractive index comprises a refractive index at 75°C.

9. The method of claim 1, wherein the distillate dewaxed viscosity index at the DDVI temperature is calculated based on the formula:

DDVI =

$$A_{10} - A_{11} * XRI - A_{12} * e^{a121} DWX09^{a122} * (\ln(Ykv100 + 0.6))^{a123} + A_{13} * ZVABP - A_{14} * \ln(\ln(Ykv100 + 0.6)).$$

10. The method of claim 1, wherein the distillate feedstock fraction comprises a fraction having a T5 boiling point of at least 650°F, a T95 boiling point of 1100°F or less, or a combination thereof.

11. The method of claim 1, wherein processing the feedstock comprises solvent processing, hydroprocessing, or a combination thereof.

12. The method of claim 1, wherein processing the feedstock further comprises determining a suitability of the lubricant base oil for satisfying at least one of a filterability test or a flocculation test based on determining a slope of a cooling trace measured by differential scanning calorimetry.

13. The method of claim 12, wherein the suitability of the lubricant base oil is based on the determined slope of the cooling trace being at least 0.008 W/g°C.

14. The method of claim 12, wherein the suitability of the lubricant base oil is based on the determined slope of the cooling trace being at least 0.01 W/g°C.

15. A method for determining feedstock quality for lubricant base oil production, comprising:

determining a wax content of a distillate feedstock fraction by differential scanning calorimetry;

measuring at least two of a characteristic boiling point, a characteristic viscosity, and a refractive index for the distillate feedstock fraction;

calculating a distillate dewaxed viscosity index (DDVI) at -9°C for the distillate feedstock fraction based on the determined wax content and the measured at least two of the characteristic boiling point, the characteristic viscosity, and the refractive index, the calculated DDVI being at least 0 at -9°C; and

processing the feedstock to form a lubricant base oil having a viscosity index of at least 80 and a pour point of 0°C or less.

16. The method of claim 15, wherein the wax content of the distillate feedstock fraction is determined based on the relationship W = ΔH / A(T), where W is the wax content, ΔH is a heat of fusion, T is a temperature where a freezing transition occurs, and A(T) is a scaling factor.