CLAIMS

1. A process for producing deasphalted oil, the process comprising:

combining a supercritical water stream with a pressurized, heated hydrocarbon-based composition in a mixing device to create a combined feed stream;

introducing the combined feed stream into a supercritical reactor, where the supercritical reactor operates at a temperature greater than a critical temperature of water and a pressure greater than a critical pressure of water, to produce an upgraded product;

depressurizing the upgraded product;

separating the depressurized upgraded product into at least one light and at least one heavy fraction, in which the heavy fraction has a greater concentration of asphaltene than the light fraction;

passing the light fraction to a separator to separate the light fraction into at least one gas fraction, one paraffinic fraction, and one water fraction; and

combining the paraffinic fraction with the heavy fraction to remove asphaltene and thereby produce deasphalted oil.

2. The process of claim 1, where the heavy fraction has at least a 25% to 75% greater concentration of asphaltene than the light fraction.

3. The process of any of claims 1 or 2, where hydrocarbons in the light fraction have an American Petroleum Institute (API) gravity value of greater than or equal to 30° and hydrocarbons in the heavy fraction have an API gravity value of less than 30°.

4. The process of any previous claim, further comprising:

passing the water fraction to a water treatment unit to produce a feed water fraction; and

passing the gas fraction to a caustic treatment unit to produce fuel gas.

5. The process of any previous claim, where separating the depressurized upgraded product comprises passing the depressurized upgraded product to at least one distillation unit or flash drum.

6. The process of any previous claim, where:

combining the paraffinic fraction and the heavy fraction is performed using an extractor; and

the extractor comprises a temperature controller to control the temperature of an internal fluid to a temperature of from 50°C to 250°C.

7. The process of any previous claim, further comprising:

passing the paraffinic fraction to a distillation unit to produce at least a light paraffinic fraction and a heavy paraffinic fraction and

combining the light paraffinic fraction with the heavy fraction to produce the deasphalted oil fraction.

8. A process for producing deasphalted oil comprising:

combining a supercritical water stream with a pressurized, heated hydrocarbon-based composition in a mixing device to create a combined feed stream;

introducing the combined feed stream into a supercritical reactor, where the supercritical reactor operates at a temperature greater than a critical temperature of water and a pressure greater than a critical pressure of water, to produce an upgraded product;

depressurizing the upgraded product;

separating the depressurized upgraded product into at least one light and at least one heavy fraction, where the heavy fraction has a greater concentration of asphaltene than the light fraction;

passing the light fraction to an oil/water separator to produce a dewatered light fraction and a water fraction;

passing the dewatered light fraction to a distillation unit to separate the dewatered light fraction into at least one gas fraction, one dewatered paraffinic fraction, and one dewatered heavy oil fraction; and

combining the dewatered paraffinic fraction with the heavy fraction to produce at least one deasphalted oil fraction.

9. The process of claim 8, where:

hydrocarbons in the light fraction have an API gravity value that is greater than hydrocarbons in the heavy fraction; and

the heavy fraction has at least a 25% to 75% greater concentration of asphaltene than the light fraction.

10. The process of any of claims 8 or 9, where hydrocarbons in the light fraction have an API gravity value of greater than or equal to 30° and hydrocarbons in the heavy fraction have an API gravity value of less than 30°.

11. The process of any of claims 8 to 10, where:

the dewatered light fraction has a water content of less than or equal to 1 wt% water; and

the dewatered light fraction has a viscosity of less than or equal to 380 centistokes (cSt).

12. The process of any of claims 8 to 11, further comprising:

passing the water fraction to a water treatment unit to produce a feed water fraction; and

passing the gas fraction to a caustic treatment unit to produce fuel gas.

13. The process of any of claims 8 to 12, where separating the depressurized upgraded product comprises passing the depressurized upgraded product to at least one distillation unit or flash drum.

14. The process of any of claims 8 to 13, where:

the dewatered paraffinic fraction and the heavy fraction are combined in an extractor; and

the extractor comprises a temperature controller to control the temperature of an internal fluid to a temperature of from 50°C to 250°C.

15. The process of any of claims 8 to 14, where the deasphalted fraction is passed to a product tank and combined with the dewatered heavy oil fraction to produce an oil product.