CLAIMS

What is claimed is:

1. A method for deoxygenating a biomass-derived pyrolysis oil (12), the method comprising the steps of:

diluting the biomass-derived pyrolysis oil (12) with a phenolic-containing diluent (21) to form a diluted pyoil-phenolic feed (20); and

contacting the diluted pyoil-phenolic feed (20) with a deoxygenating catalyst in the presence of hydrogen at hydroprocessing conditions effective to form a low-oxygen biomass-derived pyrolysis oil (36) effluent.

2. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenolic compounds present in an amount of 25 wt. % or greater of the phenolic-containing diluent (21).

3. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenolic compounds present in an amount of from 50 to 100 wt. % of the phenolic-containing diluent (21).

4. The method of claim 1, wherein the step of diluting comprises forming the diluted pyoil-phenolic feed (20) comprising the biomass-derived pyrolysis oil (12) that is present in an amount of from 10 to 90 wt. % of the diluted pyoil-phenolic feed (20).

5. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises a phenolic mixture derived from a biorenewable source including wood creosote.

6. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenol, methylphenol, tert-butylphenol, trimethylphenol, dimethylphenol, dimethoxyphenol, cyclopentylphenol, ethylphenol, ethyl-methylphenol, methoxyphenol, methoxy-propylphenol, methyl-isopropylphenol, propylphenol, methyl-propylphenol, ethyl-methoxyphenol, methoxy-propenylphenol, dimethoxy-propenylphenol, or combinations thereof.

7. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenol, methylphenol, trimethylphenol, dimethylphenol, ethylphenol, ethyl-methylphenol, or combinations thereof.

8. The method of claim 1, wherein the step of contacting comprises contacting the diluted pyoil-phenolic feed (20) at the hydroprocessing conditions that include a reactor temperature of from 150 to 500°C.

9. The method of claim 1, wherein the step of contacting comprises contacting the diluted pyoil-phenolic feed (20) at the hydroprocessing conditions that include a reactor pressure of from 2.76 to 20.7MPa gauge.

10. The method of claim 1, further comprising the step of:

separating and recycling a phenolic-containing portion from the low-oxygen biomass-derived pyrolysis oil (36) effluent to form at least a portion of the phenolic-containing diluent (21).

CLAIMS

What is claimed is:

1. A method for deoxygenating a biomass-derived pyrolysis oil (12) in a continuous-mode operation, the method comprising the steps of:

diluting the biomass-derived pyrolysis oil (12) with a phenolic-containing diluent (21) to form a diluted pyoil-phenolic feed (20);

contacting the diluted pyoil-phenolic feed (20) with a deoxygenating catalyst in the presence of hydrogen at hydroprocessing conditions effective to form a low-oxygen biomass-derived pyrolysis oil (36) effluent; and

separating and recycling a phenolic-containing portion from the low-oxygen biomass-derived pyrolysis oil (36) effluent to form at least a portion of the phenolic-containing diluent (21).

2. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenolic compounds present in an amount of 25 wt. % or greater of the phenolic-containing diluent (21).

3. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenolic compounds present in an amount of from 50 to 100 wt. % of the phenolic-containing diluent (21).

4. The method of claim 1, wherein the step of diluting comprises forming the diluted pyoil-phenolic feed (20) comprising the biomass-derived pyrolysis oil (12) that is present in an amount of from 10 to 90 wt. % of the diluted pyoil-phenolic feed (20).

5. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises a phenolic mixture derived from a biorenewable source including wood creosote.

6. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenol, methylphenol, tert-butylphenol, trimethylphenol, dimethylphenol, dimethoxyphenol, cyclopentylphenol, ethylphenol, ethyl-methylphenol, methoxyphenol, methoxy-propylphenol, methyl-isopropylphenol, propylphenol, methyl-propylphenol, ethyl-methoxyphenol, methoxy-propenylphenol, dimethoxy-propenylphenol, or combinations thereof.

7. The method of claim 1, wherein the step of diluting comprises diluting the biomass-derived pyrolysis oil (12) with the phenolic-containing diluent (21) that comprises phenol, methylphenol, trimethylphenol, dimethylphenol, ethylphenol, ethyl-methylphenol, or combinations thereof.

8. The method of claim 1, wherein the step of contacting comprises contacting the diluted pyoil-phenolic feed (20) at the hydroprocessing conditions that include a reactor temperature of from 150 to 500°C.

9. The method of claim 1, wherein the step of contacting comprises contacting the diluted pyoil-phenolic feed (20) at the hydroprocessing conditions that include a reactor pressure of from 2.76 to 20.7MPa gauge.