CLAIMS:

1. A method for making a modified naphtha boiling range composition, comprising:

adding a modifier composition to a first naphtha boiling range composition to provide a modified naphtha boiling range composition, wherein:

the modified naphtha boiling range composition has a RON of about 75 to about 110;

an ignition delay of the modified naphtha boiling range composition in a compression ignition engine is less than an ignition delay of the first naphtha boiling range composition in a compression ignition engine by at least 1.0 milliseconds,

the modifier composition increases the combined wt% of n-paraffins and isoparaffins that include a straight-chain propyl group in the modified naphtha boiling range composition;

a combined wt% of n-paraffins and isoparaffins that include a straight-chain propyl group in the first naphtha boiling range composition is less than (-1.273 x RON + 147.8) based on a total weight of the first naphtha boiling range composition, and

a combined wt% of n-paraffins and isoparaffins that include a straight-chain propyl group in the modified naphtha boiling range composition is greater than (-1.273 x RON + 147.8) based on a total weight of the modified naphtha boiling range composition.

2. The method of claim 1, wherein the combined wt% of n-paraffins and isoparaffins that include a straight-chain propyl chain in the modified naphtha boiling range composition is greater than (-1.273 x RON + 151.8).

3. The method of claim 1, wherein the RON of the modified naphtha boiling range composition differs from the RON of the first naphtha boiling range composition by 5.0 or less.

4. The method of claim 1, wherein the first naphtha boiling range composition has a RON of about 82 to about 98; or wherein the modified naphtha boiling range composition has a RON of about 82 to about 98; or a combination thereof.

5. The method of claim 1, wherein the modified naphtha boiling range composition has a RON of about 88 to about 101; or wherein the first naphtha boiling range composition has a RON of about 88 to about 101; or a combination thereof.

6. The method of claim 1, wherein the ignition delay is defined as an initial local maximum in the dP / dt curve generated during constant volume combustion at 596°C according to the method described in ASTM D7668.

7. A method for making a modified naphtha boiling range composition, comprising:

adding a modifier composition to a first naphtha boiling range composition to provide a modified naphtha boiling range composition, wherein:

the modified naphtha boiling range composition has a RON of about 75 to about 110;

an ignition delay of the modified naphtha boiling range composition in a compression ignition engine is less than an ignition delay of the first naphtha boiling range composition in a compression ignition engine by at least 1.0 milliseconds;

the modifier composition increases the combined wt% of n-paraffins and isoparaffins that include a straight-chain propyl group in the modified naphtha boiling range composition;

a combined wt % of n-paraffins and isoparaffins that include a straight-chain propyl group in the first naphtha boiling range composition is less than (-1.273 x RON + 151.8) based on a total weight of the first naphtha boiling range composition, and

a combined wt% of n-paraffins and isoparaffins that include a straight-chain propyl group in the modified naphtha boiling range composition is greater than (-1.273 x RON + 151.8) based on a total weight of the modified naphtha boiling range composition.

8. The method of claim 7, wherein the ignition delay is defined as an initial local maximum in a dP / dt curve generated during constant volume combustion at 596°C according to the method described in ASTM D7668.

9. The method of claim 7, wherein the RON of the modified naphtha boiling range composition differs from the RON of the first naphtha boiling range composition by 5.0 or less.

10. The method of claim 7, wherein the first naphtha boiling range composition has a RON of about 82 to about 98; or wherein the modified naphtha boiling composition has a RON of about 82 to about 98; or a combination thereof.

11. The method of claim 7, wherein the modified naphtha boiling range composition has a RON of about 88 to about 101; or wherein the first naphtha boiling range composition has a RON of about 88 to about 101; or a combination thereof.