CLAIMS

1. A method of activating a self-activating hydroprocessing catalyst used for treating heavy hydrocarbon feedstocks, comprising contacting the self-activating hydroprocessing catalyst with steam, wherein

the self-activating hydroprocessing catalyst comprises a calcined particle comprising a co-mulled mixture prepared by co-mulling inorganic oxide powder, a finely divided molybdenum trioxide powder having a maximum dimension of less than 500 microns, and a nickel compound, and then forming the co-mulled mixture into a particle that is calcined to thereby provide the calcined particle; the calcined particle comprises molybdenum that is present in an amount in the range of from 1 to 10 weight percent, as metal and based on the total weight of the calcined particle, and nickel that is present in an amount such at the atomic ratio of the nickel-to-molybdenum is less than 0.4, and the calcined particle has a pore size distribution such that less than 70% of the total pore volume of the calcined particle is in the pores of the calcined particle having a diameter in the range of from 70 Å to 150 Å, at least 10% of the total pore volume of the calcined particle is in the pores of the calcined particle having a diameter in the range of from 130 Å to 300 Å, and from 1% to 10% of the total pore volume of the calcined particle is in the pores of the calcined particle having a diameter greater than 1000 Å, and

the calcination is conducted under a controlled calcination temperature in the range of from about 450° C. (842° F.) to about 900° C. (1652° F.) for a calcination time period that is effective to provide self-activating catalyst having a desired pore structure.

2. The method according to claim 1, wherein the amount of steam contacting the self-activating catalyst is in the range of from 0.01 wt.% to 10 wt.% based on the weight of the heavy hydrocarbon feedstock.

3. The method according to claim 2, wherein the steam is added to the heavy hydrocarbon feedstocks before bringing the heavy hydrocarbon feedstocks into contact with the self-activating hydroprocessing catalyst.

4. The method according to claim 2, wherein the steam is added to a reactor vessel containing the self-activating catalyst.

5. The method according to claim 1, wherein water is added to heavy hydrocarbon feedstocks, which are at a temperature sufficient to convert the water to steam, before bringing the heavy hydrocarbon feedstocks into contact with the self-activating hydroprocessing catalyst.

6. The method according to claim 1, wherein the amount of steam contacting the self-activating catalyst is in the range of 2 wt.% to 6 wt.% based on the weight of the heavy hydrocarbon feedstocks.

7. The method according to claim 2, wherein the heavy hydrocarbon feedstocks treated with the self-activating hydroprocessing catalyst have a nickel content in the range of from 1 ppmw to 250 ppmw, a vanadium content in the range of from 5 ppmw to 250 ppmw, and a sulfur content in the range of from 2 wt.% to 8 wt.%.

8. The method according to claim 1, wherein the self-activating hydroprocessing catalyst comprising a calcined particle is subjected to calcination under a controlled calcination temperature in the range of from about 700° C. (1292° F.) to about 790° C. (1454° F.) for a calcination time period that is effective to provide self-activating catalyst having a desired pore structure.