CLAIMS:

1. A method for making a catalyst suitable for the HDS of naphtha comprising:

(i) impregnating a silica support that has a silica content of at least about 85 wt.%, based on silica, and has a pore volume between about 0.6 cc/g and about 2.0 cc/g, and median pore sizes in the range of about 150Å to 2000Å with an aqueous solution of (a) a cobalt salt, (b) a molybdenum salt, and (c) at least one organic additive to form a catalyst precursor;

(ii) drying the catalyst precursor at temperatures less than about 200°C to form a dried catalyst precursor; and

(iii) sulfiding the dried catalyst precursor to form the catalyst provided that the dried catalyst precursor or catalyst is not calcined prior to sulfiding or use for HDS.

2. A method for the HDS of naphtha having an olefin content of at least about 5 wt.%, based on the weight of the naphtha comprising:

(i) contacting the naphtha with a selective HDS catalyst under hydrodesulfurization conditions, wherein the selective HDS catalyst is prepared by impregnating a silica support that has a silica content of at least about 85 wt.%, based on the weight of the silica, and has a pore volume between about 0.6 cc/g and about 2.0 cc/g, and median pore sizes in the range of about 150Å to about 2000Å with an aqueous solution of (a) a cobalt salt, (b) a molybdenum salt, and (c) at least one organic additive to form a catalyst precursor;

(ii) drying the catalyst precursor at temperatures less than about 200°C to form a dried catalyst precursor; and

(iii) sulfiding the dried catalyst precursor to form the catalyst, provided that the dried catalyst precursor or catalyst is not calcined prior to sulfiding or use for HDS.

3. The method of claims 1 or 2 wherein the silica support has a pore volume between about 1.0 cc/g and about 1.5 cc/g.

4. The method of claims 1 or 2 wherein the median pore sizes are in the range from about 150Å to about 1000Å.

5. The method of claims 1 or 2 wherein the naphtha is at least one of FCC naphtha, steam cracked naphtha or coker naphtha.

6. The method of claims 1 or 2 wherein the naphtha has an olefin content from about 5 wt.% to about 60 wt.%, nitrogen content of from about 5 ppmw to about 500 ppmw and sulfur content from about 300 ppmw to about 7000 ppmw, based on naphtha.

7. The method of claims 1 or 2 wherein the silica support contains at least about 90 wt.% silica.

8. The method of claims 1 or 2 wherein the amounts of cobalt salt and molybdenum salts are sufficient to provide a catalyst support containing from about 2 wt.% to about 8 wt.% cobalt oxide and about 8 wt.% to about 30 wt.% molybdenum oxide, based on silica support.

9. The methods of claims 1 or 2 wherein the organic additive contains oxygen atoms, nitrogen atoms or both.

10. The methods of claims 1 or 2 wherein the organic additive is an organic ligand.

11. The method of claim 10 wherein the organic ligand is a mono-dentate, bi-dentate or poly-dentate ligand.

12. The method of claim 11 wherein the organic ligand is at least one carboxylic acid, polyol, amino acid, amine, amide, amino alcohol, ketone or ester.

13. The method of claim 12 wherein the organic ligand is at least one of phenanthroline, quinolinol, salicylic acid, acetic acid, ethylenediaminetetraacetic acid (EDTA), cyclohexanediaminetetraacetic acid (CYDTA), alanine, arginine, triethanolamine (TEA), glycerol, histidine, acetylacetonate, guanidine, nitrilotriacetic acid (NTA), citric acid or urea.

14. The method of claims 1 or 2 wherein the organic additive is a metal dispersion aid.

15. The method of claims 1 or 2 wherein the catalyst precursor is dried at temperatures of from about 50°C to 200°C.

16. The method of claims 1 or 2 wherein sulfiding of catalyst precursor may be in-situ or ex-situ in the presence of at least one sulfiding agent.

17. The method of claim 16 wherein the sulfiding agent is hydrogen sulfide at concentrations of from about 0.1 vol.% to about 10. vol.%, based on total volume of gases present.

18. The method of claim 2 wherein hydrodesulfurizing conditions include temperatures of from about 150°C to about 400°C, pressures of from about 445 kPa to about 13890 kPa (50 to 2000 psig), liquid hourly space velocities of from about 0.1 to about 12 and hydrogen treat gas rates of from about 89 m^3/m^3 to about 890 m^3/m^3 (500 to 5000 scf/B).

19. The method of claims 1 or 2 wherein the dried catalyst precursor or sulfided catalyst is not heated to temperatures greater than about 300°C prior to sulfiding or use for HDS.

CLAIMS

1. A method for making a catalyst suitable for the HDS of naphtha comprising:

(i) impregnating a silica support that has a silica content of at least about 85 wt. %, based on silica, and has a pore volume between about 0.6 cc/g and about 2.0 cc/g, and median pore sizes in the range of about 200 Å to 2000 Å with an aqueous solution of (a) a cobalt salt, (b) a molybdenum salt, and (c) at least one organic additive to form a catalyst precursor;

(ii) drying the catalyst precursor at temperatures less than about 200°C to form a dried catalyst precursor; and

(iii) sulfiding the dried catalyst precursor to form the catalyst provided that the dried catalyst precursor or catalyst is not calcined prior to sulfiding or use for HDS.

2. A method for the HDS of naphtha having an olefin content of at least about 5 wt. %, based on the weight of the naphtha comprising:

(i) contacting the naphtha with a selective HDS catalyst under hydrodesulfurization conditions, wherein the selective HDS catalyst is prepared by impregnating a silica support that has a silica content of at least about 85 wt. %, based on the weight of the silica, and has a pore volume between about 0.6 cc/g and about 2.0 cc/g, and median pore sizes in the range of about 200 Å to about 2000 Å with an aqueous solution of (a) a cobalt salt, (b) a molybdenum salt, and (c) at least one organic additive to form a catalyst precursor;

(ii) drying the catalyst precursor at temperatures less than about 200°C to form a dried catalyst precursor; and

(iii) sulfiding the dried catalyst precursor to form the catalyst, provided that the dried catalyst precursor or catalyst is not calcined prior to sulfiding or use for HDS.

3. The method of claims 1 or 2 wherein the silica support has a pore volume between about 1.0 cc/g and about 1.5 cc/g.

4. The method of claims 1 or 2 wherein the naphtha is at least one of FCC naphtha, steam cracked naphtha or coker naphtha.

5. The method of claim 1 or 2 wherein the naphtha has an olefin content from about 5 wt. % to about 60 wt. %, nitrogen content of from about 5 ppmw to about 500 ppmw and sulfur content from about 300 ppmw to about 7000 ppmw, based on naphtha.

6. The method of claim 1 or 2 wherein the silica support contains at least about 90 wt. % silica.

7. The method of claim 1 or 2 wherein the amounts of cobalt salt and molybdenum salts are sufficient to provide a catalyst support containing from about 2 wt. % to about 8 wt. % cobalt oxide and about 8 wt. % to about 30 wt. % molybdenum oxide, based on silica support.

8. The methods of claim 1 or 2 wherein the organic additive contains oxygen atoms, nitrogen atoms or both.

9. The methods of claim 1 or 2 wherein the organic additive is an organic ligand.

10. The method of claim 9 wherein the organic ligand is a mono-dentate, bi-dentate or poly-dentate ligand.

11. The method of claim 10 wherein the organic ligand is at least one carboxylic acid, polyol, amino acid, amine, amide, amino alcohol, ketone or ester.

12. The method of claim 11 wherein the organic ligand is at least one of phenanthroline, quinolinol, salicylic acid, acetic acid, ethylenediaminetetraacetic acid (EDTA), cyclohexanediaminetetraacetic acid (CYDTA), alanine, arginine, triethanolamine (TEA), glycerol, histidine, acetylacetonate, guanidine, nitrilotriacetic acid (NTA), citric acid or urea.

13. The method of claim 9 wherein the organic additive is a chelating agent.

14. The method of claim 1 or 2 wherein the organic additive is a metal dispersion aid.

15. The method of claim 1 or 2 wherein the catalyst precursor is dried at temperatures of from about 50°C to 200°C.

16. The method of claim 1 or 2 wherein sulfiding of catalyst precursor may be in-situ or ex-situ in the presence of at least one sulfiding agent.

17. The method of claim 16 wherein the sulfiding agent is hydrogen sulfide at concentrations of from about 0.1 vol. % to about 10 vol. %, based on total volume of gases present.

18. The method of claim 2 wherein hydrodesulfurizing conditions include temperatures of from about 150°C to about 400°C, pressures of from about 445 kPa to about 13890 kPa (50 to 2000 psig), liquid hourly space velocities of from about 0.1 to about 12 and hydrogen treat gas rates of from about 89 m^3/m^3 to about 890 m^3/m^3 (500 to 5000 scf/B).

19. The method of claims 1 or 2 wherein the dried catalyst precursor or sulfided catalyst is not heated to temperatures greater than about 300°C prior to sulfiding or use for HDS.