WHAT IS CLAIMED IS:

1. A hydrogenolysis/hydrogenation catalyst comprising:

copper oxide;

calcium oxide;

silicon dioxide; and

sodium oxide;

wherein:

the hydrogenolysis/hydrogenation catalyst is a powder;

the hydrogenolysis/hydrogenation catalyst is substantially free of chromium; and

the hydrogenolysis/hydrogenation catalyst exhibits a crystallite phase of CuO and an additional crystallite phase selected from the group consisting of cubic SiO_2, rhombohedral calcium carbonate $CaCO_3$, anorthic calcium silicate $CaSiO_3$, calcium silicate hydroxide hydrate ($Ca_{14}Si_{24}O_{58}(OH)_8 \cdot 2H_2O$), calcium silicate hydrate $4CaO \cdot 5SiO_2 \cdot 5H_2O$, alumina, and combinations of two or more thereof;

wherein the hydrogenolysis/hydrogenation catalyst comprises CuO from 35 wt% to 85 wt%, CaO from 8 wt% to 20 wt%, SiO_2 from 10 wt% to 30 wt%, and Na_2O from 0.1 wt% to 5 wt%; and

wherein the hydrogenolysis/hydrogenation catalyst exhibits a Brunauer-Emmett-Teller ("BET") surface area of 10 m^2/g to 85 m^2/g.

2. The hydrogenolysis/hydrogenation catalyst of Claim 1, wherein the powder has a d_{10}% particle size of 1 μm to 10 μm.

3. The hydrogenolysis/hydrogenation catalyst of Claim 1 or Claim 2, wherein the powder has a d_{50}% particle size of 10 μm to 25 μm.

4. The hydrogenolysis/hydrogenation catalyst of any one of Claims 1-3, wherein the powder has a d_{90}% particle size of 30 μm to 45 μm.

5. The hydrogenolysis/hydrogenation catalyst of any one of Claims 1-4, wherein prior to activation, the hydrogenolysis/hydrogenation catalyst comprises Na_2O from 0.5 wt% to 1 wt%.

6. The hydrogenolysis/hydrogenation catalyst of any one of Claims 1-5, wherein prior to activation, the hydrogenolysis/hydrogenation catalyst is substantially free of manganese.

7. The hydrogenolysis/hydrogenation catalyst of any one of Claims 1-6, wherein the hydrogenolysis/hydrogenation catalyst exhibits a crystallite phase of CuO and an additional crystallite phase selected from the group consisting of cubic SiO_2, rhombohedral calcium carbonate $CaCO_3$, anorthic calcium silicate $CaSiO_3$, calcium silicate hydroxide hydrate ($Ca_{14}Si_{24}O_{58}(OH)_8 \cdot 2H_2O$), calcium silicate hydrate $4CaO \cdot 5SiO_2 \cdot 5H_2O$, and combinations of two or more thereof.

8. The hydrogenolysis/hydrogenation catalyst of any one of Claims 1-7, wherein the hydrogenolysis/hydrogenation catalyst exhibits a CuO crystallite size of 50 Å to less than 240 Å.

9. A method of preparing the hydrogenolysis/hydrogenation catalyst of claim 1, the method comprising:

mixing a copper-containing material and silicate-containing material in a solution;

adding a caustic material to form an aqueous slurry comprising a precipitate;

collecting the precipitate;

drying the precipitate to form a dried precipitate; and

calcining the dried precipitate to form a calcined hydrogenolysis/hydrogenation catalyst;

wherein:

the calcined hydrogenolysis/hydrogenation catalyst is a powder; and

the calcined hydrogenolysis/hydrogenation catalyst is substantially free of chromium.

10. The method of Claim 9, wherein the aqueous slurry comprises a pH of 6.0 to 9.0.

11. The method of Claim 9 or 10, wherein the collecting comprises filtering the aqueous slurry to remove the precipitate.

12. The method of any one of Claims 9-11, wherein the calcining is conducted at a temperature of 400ºC to below 800ºC.

13. The method of Claim 12, wherein the calcining is conducted at a temperature of 500ºC to 750ºC.

14. The method of any one of Claims 9-13, wherein the calcining is conducted for 10 minutes to 10 hours.

15. The method of Claim 14, wherein the calcining is conducted for 0.5 hour to 3 hours.

16. The method of any one of Claims 9-15, wherein the copper-containing material is a copper salt comprising copper nitrate, copper sulfate, copper chloride, copper bromide, copper acetate, or a combination of any two or more thereof.

17. The method of any one of Claims 9-16, wherein the silicate-containing material comprises a silicate salt comprising calcium silicate.

18. The method of any one of Claims 9-17, wherein the caustic material is Na_2CO_3, NaOH, K_2CO_3, KOH, or a combination of any two or more thereof.

19. The method of any one of Claims 9-18, wherein the powder has a d_{10}% particle size of 1 µm to 10 µm.

20. The method of Claim 19, wherein the powder has a d_{10}% particle size of 1 µm to 2 µm.

21. The method of Claim 19, wherein the powder has a d_{10}% particle size of 4 µm to 9 µm.

22. The method of any one of Claims 9-21, wherein the powder has a d_{50}% particle size of 10 µm to 25 µm.

23. The method of Claim 22, wherein the powder has a d_{50}% particle size of 16 µm to 20 µm.

24. The method of any one of Claims 9-23, wherein the powder has a d_{90}% particle size of 30 µm to 45 µm.

25. The method of Claim 24, wherein the powder has a d_{90}% particle size of 35 µm to 40 µm.

26. The method of any one of Claims 9-25, wherein prior to activation, the calcined hydrogenolysis/hydrogenation catalyst comprises CuO from 35 wt% to 85 wt%, CaO from 8 wt% to 20 wt%, SiO_2 from 10 wt% to 30 wt%, and Na_2O from 0.1 wt% to 5 wt%.

27. The method of any one of Claims 9-26, wherein prior to activation, the calcined hydrogenolysis/hydrogenation catalyst comprises CuO from 60 wt% to 70 wt%, CaO from 10 wt% to 15 wt%, SiO_2 from 15 wt% to 25 wt%, and Na_2O from 0.5 wt% to 2 wt%.

28. The method of any one of Claims 9-27, wherein prior to activation, the calcined hydrogenolysis/hydrogenation catalyst comprises Na_2O from 0.5 wt% to 1 wt%.

29. The method of any one of Claims 9-28, wherein prior to activation, the calcined hydrogenolysis/hydrogenation catalyst comprises Na_2O from 0.5 wt% to less than 1 wt%.

30. The method of any one of Claims 9-29, wherein prior to activation, the calcined hydrogenolysis/hydrogenation catalyst is substantially free of manganese.

31. The method of any one of Claims 9-30, wherein the calcined hydrogenolysis/hydrogenation catalyst exhibits a crystalline phase of CuO and an additional crystallite phase selected from the group consisting of cubic SiO_2, rhombohedral calcium carbonate $CaCO_3$,

anorthic calcium silicate $CaSiO_3$, calcium silicate hydroxide hydrate ($Ca_{14}Si_{24}O_{58}(OH)_8 \cdot 2H_2O$), calcium silicate hydrate ($4CaO \cdot 5SiO_2 \cdot 5H_2O$), alumina, and combinations of two or more thereof.

32. The method of any one of Claims 9-31, wherein the calcined hydrogenolysis/hydrogenation catalyst exhibits a CuO crystallite size of 50 Å to less than 240 Å.

33. The method of Claim 32, wherein the calcined hydrogenolysis/hydrogenation catalyst exhibits a CuO crystallite size of 50 Å to 175 Å.

34. The method of any one of Claims 9-33, wherein the calcined hydrogenolysis/hydrogenation catalyst exhibits a calcium silicate hydrate crystallite size of 550 Å to less than 673 Å.

35. The method of Claim 34, wherein the calcined hydrogenolysis/hydrogenation catalyst exhibits a calcium silicate hydrate crystallite size of 550 Å to 650 Å.

36. A calcined hydrogenolysis/hydrogenation catalyst prepared according to the method of any one of claims 9-35.

37. A method of hydrogenating a carbonyl-containing organic compound, the method comprising contacting the carbonyl-containing organic compound with the hydrogenolysis/hydrogenation catalyst of any one of claims 1-10.

38. The method of Claim 37, wherein the method is carried out in a slurry phase reactor.

39. The method of Claim 38, wherein the slurry phase reactor is selected from continuously stirred tank reactors, tower reactors, or column reactors.

40. The method of any one of Claims 37-39, wherein the carbonyl-containing organic compound comprises fatty-methyl ester, wax ester, or a combination thereof.

41. The method of Claim 40, wherein the fatty-methyl ester comprises C_8-C_{20} methyl ester.

42. The method of Claim 40 or Claim 41, wherein the wax ester comprises C_8-C_{18} wax ester.