CLAIMS

1. A process for activating a hydroalkylation catalyst, the process comprising:

(a) providing a hydroalkylation catalyst precursor comprising a solid acid component and a compound of a hydrogenation metal;

(b) heating the catalyst precursor at a heating rate of less than 50°C/hour in the presence of hydrogen to an activation temperature in a range from 100°C to 260°C; and

(c) treating the heated catalyst precursor with hydrogen in a temperature range from 50°C below the activation temperature to the activation temperature for a duration to reduce at least a portion of the metal compound to an elemental form.

2. The process of claim 1, wherein the heating rate is less than 30°C/hour.

3. The process of claim 1 or claim 2, wherein the heating rate is in a range from 1°C/hour to 10°C/hour.

4. The process of any one of the preceding claims, wherein the activation temperature is in a range from 100°C to 240°C.

5. The process of any one of the preceding claims, wherein hydrogen is supplied during steps (b) and (c) at a GHSV of less than 250 $hour^{-1}$.

6. The process of any one of the preceding claims, wherein the treating step (c) is conducted at a hydrogen partial pressure in a range from about 10 kPa to about 10,000 kPa.

7. The process of any one of the preceding claims, wherein the duration step (c) is in a range from 0.5 hour to 24 hours.

8. The process of any one of the preceding claims, wherein the hydrogenation metal comprises at least one of Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, and Pt.

9. The process of any one of the preceding claims, wherein the solid acid component comprises a molecular sieve.

10. The process of claim 9, wherein the molecular sieve comprises a molecular sieve of the MWW framework type.

11. A process for producing a phenol and/or cyclohexanone, the process comprising:

(a1) providing a hydroalkylation catalyst precursor comprising a solid acid component and a compound of a hydrogenation metal;

(a2) heating the catalyst precursor at a heating rate of less than 50°C/hour in the presence of hydrogen to an activation temperature in a range from 100°C to 260°C;

(a3) treating the heated catalyst precursor with hydrogen in a temperature range from 50°C below the activation temperature to the activation temperature for a duration to reduce at least a portion of the metal compound to an elemental form;

(a) contacting benzene and hydrogen with a catalyst prepared by a process comprising steps (a1) to (a3) in a hydroalkylation reactor under hydroalkylation conditions effective to convert at least part of the benzene to cyclohexylbenzene;

(b) oxidizing at least part of the cyclohexylbenzene produced in step (a) to produce cyclohexylbenzene hydroperoxide; and

(c) cleaving at least part of the cyclohexylbenzene hydroperoxide produced in step (b) to produce phenol and cyclohexanone.

12. The process of claim 11, wherein the heating rate in step (a2) is less than 30°C/hour.

13. The process of claim 11 or claim 12, wherein the heating rate in step (a2) is in a range from 1°C/hour to 10°C/hour.

14. The process of any one of the preceding claims 11 to 13, wherein the activation temperature is in a range from 100°C to 240°C.

15. The process of any of the preceding claims 11 to 14, wherein hydrogen is supplied during steps (a2) and (a3) at a GHSV of less than 250 $hour^{-1}$.

16. The process of any one of the preceding claims 11 to 15, wherein the duration in step (a3) is in a range from 0.5 hour to 24 hours.