CLAIMS

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

(a) contacting cyclohexylbenzene with an oxygen-containing gas in the presence of an oxidation catalyst under oxidation conditions effective to produce an oxidation effluent comprising cyclohexylbenzene hydroperoxide at a first concentration Con1 and residual cyclohexylbenzene;

(b) concentrating at least a portion of the oxidation effluent to produce a cleavage feed comprising cyclohexylbenzene hydroperoxide at a second concentration Con2, where Con2 > Con1; and

(c) contacting a cleavage reaction mixture formed from the cleavage feed with a solid acid catalyst in a cleavage reaction zone under conditions effective to produce a cleavage product comprising phenol and cyclohexanone.

2. The process of claim 1, wherein the concentrating step (b) comprises distillation to remove at least a portion of the cyclohexylbenzene in the oxidation effluent.

3. The process of claim 1 or claim 2, wherein Con2 – Con1 > 10 wt%.

4. The process of any preceding claim, wherein Con2 – Con1 > 20 wt%.

5. The process of ~~any preceding claim~~ claim 1 or claim 2, wherein Con1 is in a range from 10 wt% to 30 wt% and Con2 is in a range from 30 wt% to 80 wt%.

6. The process of any preceding claim, wherein Con1 is in a range from 15 wt% to 25 wt% and Con2 is in a range from 40 wt% to 60 wt%.

7. The process of any preceding claim, wherein the cleavage product is divided into at least a first fraction and a second fraction, and the first fraction is recycled to the cleavage reaction zone.

8. The process of claim 7, wherein the weight ratio of the first fraction to the

second fraction is in a range from 1 to 50.

9. The process of any preceding claim, wherein the solid acid catalyst comprises an acidic molecular sieve.

10. The process of claim 9, wherein the acidic molecular sieve comprises an aluminosilicate zeolite.

11. The process of claim 9 or claim 10, wherein the acidic molecular sieve comprises at least one of zeolite beta, faujasite, ZSM-12, mordenite and an MCM-22 family molecular sieve.

12. The process of any preceding claims, further comprising:
(d) regenerating at least a portion of the solid acid catalyst.

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

(a) hydroalkylating benzene with hydrogen in the presence of a hydroalkylation catalyst under conditions effective to produce a hydroalkylation reaction product comprising cyclohexylbenzene;

(b) contacting at least a portion of the cyclohexylbenzene from the hydroalkylation reaction product with an oxygen-containing gas in the presence of an oxidation catalyst under oxidation conditions effective to produce an oxidation effluent comprising cyclohexylbenzene hydroperoxide at a first concentration Con1 and residual cyclohexylbenzene;

(c) concentrating at least a portion of the oxidation effluent to produce a cleavage feed comprising cyclohexylbenzene hydroperoxide at a second concentration Con2, where Con2 > Con1; and

(d) contacting a cleavage reaction mixture formed from the cleavage feed with a solid acid catalyst in a cleavage reaction zone under conditions effective to produce a cleavage product comprising phenol and cyclohexanone.

14. The process of claim 13, wherein the concentrating step (b) comprises distillation to remove at least a portion of the residual cyclohexylbenzene in the

oxidation effluent.

15. The process of claim 13 or claim 14, wherein Con2 – Con1 > 10 wt%.

16. The process of any one of claims 13 to 15, wherein Con2 – Con1 > 20 wt%.

17. The process of ~~any one of claims 13 to 16~~ claim 13 or claim 14, wherein Con1 is in a range from 10 wt% to 30 wt%, and Con2 is in a range from 30 wt% to 80 wt%.

18. The process of any one of claims 13 to 17, wherein Con1 is in a range from 15 wt% to 25 wt%, and Con2 is in a range from 40 wt% to 60 wt%.

19. The process of any one of claims 13 to 18, wherein the cleavage product is divided into at least a first fraction and a second fraction, and the first fraction is recycled to the cleavage reaction zone.

20. The process of claim 19, wherein the weight ratio of the first fraction to the second fraction is from 1 to 50.

21. The process of any one of claims 13 to 20, wherein the solid acid catalyst comprises an acidic molecular sieve.

22. The process of claim 21, wherein the acidic molecular sieve comprises an aluminosilicate zeolite.

23. The process of claim 21 or claim 22, wherein the acidic molecular sieve comprises at least one of zeolite beta, faujasite, ZSM-12, mordenite and an MCM-22 family molecular sieve.

24. The process of any ~~preceding claims~~ one of claims 13 to 23, further comprising:

(e) regenerating at least a portion of the solid acid catalyst.