CLAIMS

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

(I) providing a first mixture comprising cyclohexylbenzene and methylcyclopentylbenzene, wherein the first mixture comprises methylcyclopentylbenzene at a concentration in a range from 100 ppm to 5.0 wt%, based on the total weight of the first mixture, and wherein the first mixture comprises trans-1-methyl-2-phenylcyclopentane at a concentration in a range from 100 ppm to 4.5 wt%, based on the total weight of the first mixture;

(II) removing at least a portion of the methylcyclopentylbenzene from the first mixture to obtain a second mixture comprising cyclohexylbenzene, wherein the second mixture comprises methylcyclopentylbenzene at a concentration in a range from 0 ppb to 2000 ppm, based on the total weight of the second mixture;

(III) oxidizing at least a portion of the cyclohexylbenzene in the second mixture in an oxidation reactor under oxidation conditions to obtain a third mixture comprising cyclohexylbenzene hydroperoxide and cyclohexylbenzene; and

(IV) reacting at least a portion of the third mixture in a cleavage reactor under cleavage reaction conditions to obtain a cleavage product mixture comprising cyclohexylbenzene, phenol and cyclohexanone.

2. The process of claim 1, wherein the first mixture comprises methylcyclopentylbenzene at a concentration of C(MCPB)1, expressed as the weight percentage of methylcyclopentylbenzene based on the total weight of the first mixture, and the second mixture comprises methylcyclopentylbenzene at a concentration of C(MCPB)2, expressed as the weight percentage of methylcyclopentylbenzene based on the total weight of the second mixture, and $2 \leqslant C(MCPB)1/C(MCPB)2 \leqslant 1000$.

3. The process of any of the preceding claims, wherein the first mixture comprises MCPB2trans at a concentration of C(MCPB2trans)1, expressed as the weight percentage of MCPB2trans based on the total weight of the first mixture, and the second mixture comprises MCPB2trans at a concentration of C(MCPB2trans)2, expressed as the weight percentage of MCPBtrans based on the total weight of the second mixture, and $2 \leqslant C(MCPBtrans2)1/C(MCPBtrans2)2 \leqslant 1000$.

4. The process of any of the preceding claims, wherein the first mixture comprises cis-1-methyl-2-phenylcyclopentane at a concentration of C(MCPB2cis)1,

expressed as the weight percentage of cis-1-methyl-2-phenylcyclopentane based on the total weight of the first mixture, and the second mixture comprises cis-1-methyl-2-phenylcyclopentane at a concentration of C(MCPB2cis)2, expressed as the weight percentage of cis-1-methyl-2-phenylcyclopentane based on the total weight of the second mixture, and $1 \leqslant C(MCPB2cis)1/C(MCPB2cis)2 \leqslant 10$.