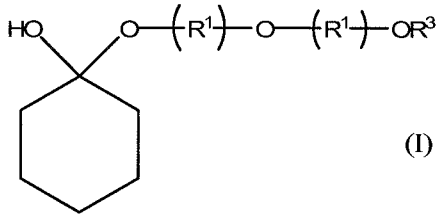
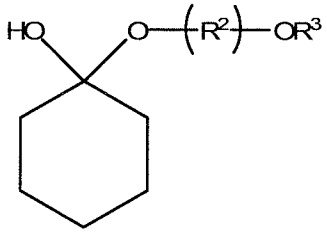
## CLAIMS

1. A process for separating ~~a mixture comprising~~ cyclohexanone and phenol, the process comprising:

(a) ~~distilling at least a portion of the~~ feeding to a distillation column a mixture ~~in the presence of~~ comprising (i) cyclohexanone, (ii) phenol, (iii) a solvent including at least two alcoholic hydroxyl groups attached to non-adjacent saturated carbon atoms and (iv) at least one hemiketal defined by the formula (I) or the formula (II), and/or at least one enol-ether derived from the hemiketal defined by the formula (I) or the formula (II):



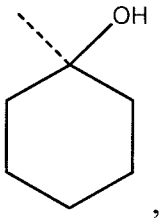
(I)



(II)

,

wherein $R^1$, the same or different at each occurrence, is independently an alkylene group having from 2 to 10 carbon atoms, $R^2$ is an alkylene group having from 4 to 10 carbon atoms, and $R^3$ is hydrogen or the following group:



,

~~and/or an enol-ether derived from the hemiketal defined by the formula (I) or the formula (II);~~

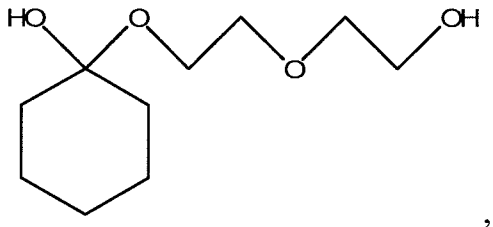
wherein the total concentration of the hemiketal and enol-ether in the mixture, expressed in terms of weight percentage on the basis of the total weight of ~~a feed to the distilling step (a)~~ the mixture, is at least 0.01%~~.~~; and

(b) distilling at least a portion of the mixture in the distillation column.

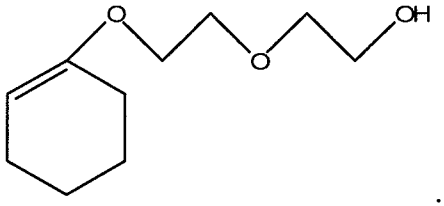
2. The process of claim 1, wherein the total concentration of the hemiketal and the enol-ether in the mixture is at least 0.10%.

3. The process of claim 1 ~~or claim 2~~, wherein said solvent is diethylene glycol and $R^1$ is an ethylene group.

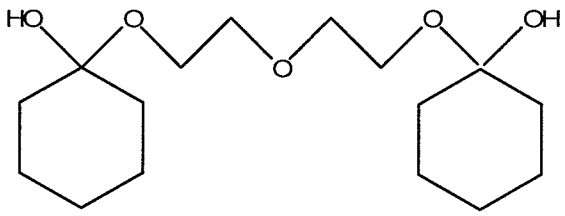
4. The process of claim 3, wherein said hemiketal is defined by the formula:



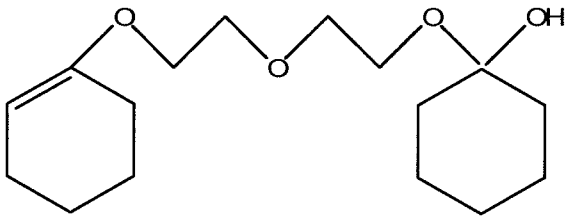
and said enol-ether thereof is defined by the formula:



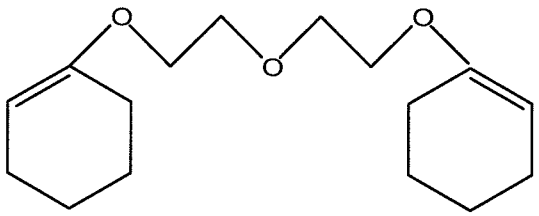
5. The process of claim 3, wherein said hemiketal is defined by the formula:



and said enol-ether thereof is defined by the formula:

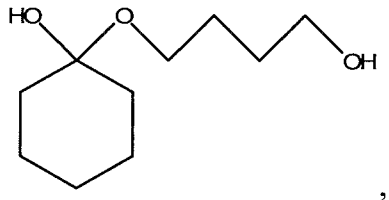


and/or by the formula:

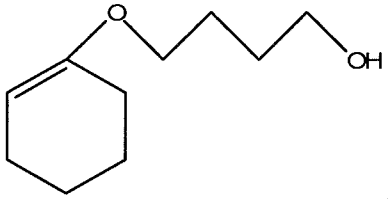


6. The process of claim 1 ~~or claim 2~~, wherein said solvent is 1,4-butanediol and $R^2$ is 1,4-butylene.

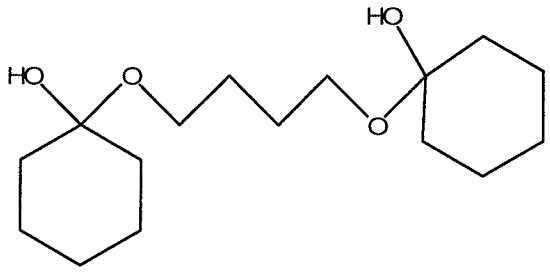
7. The process of claim 6, wherein said hemiketal is defined by the formula:



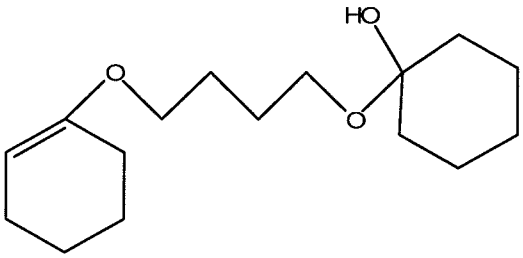
and said enol-ether thereof is defined by the formula:



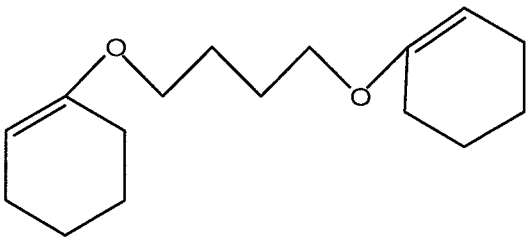
8. The process of claim 6, wherein said hemiketal is defined by the formula



and said enol-ether thereof is defined by the formula:



and/or by the formula:



~~9. The process of any of the preceding claims, wherein at least a portion of said hemiketal and/or enol-ether is formed from the reaction of cyclohexanone and said solvent during said distilling step (a).~~

~~10.~~9. The process of ~~any of the preceding claims~~ claim 1, wherein said distilling ~~step (a)~~ (b) is conducted in the presence of water.

~~11.~~10. The process of claim ~~10~~ 9, wherein water is present in an amount in the range from 0.1 wt% to 20 wt%, based on the total weight of ~~feed~~ the mixture fed to the distilling ~~step (a)~~ (b).

~~12. The process of claim 10 or claim 11, wherein water is added to the distilling step (a) in an amount sufficient to suppress the formation of said hemiketal and/or enol-ether by an amount of at least 50% of that produced by a distillation under the same condition except in the absence of added water.~~

~~13.~~11. The process of ~~any of the preceding claims~~ claim 1, wherein said distilling ~~step (a)~~ (b) separates the mixture into a first stream rich in cyclohexanone and a second stream rich in phenol, the solvent, and said hemiketal and/or enol-ether.

~~14.~~12. The process of claim ~~13~~ 11, further comprising ~~(b)~~ (c) distilling said second stream to separate at least part of the phenol therefrom and produce a recovered solvent.

~~15.~~13. The process of claim ~~14~~ 12, wherein the recovered solvent further comprises said hemiketal and/or enol-ether and provides at least a portion of said hemiketal and/or enol-ether present in ~~said distilling step (a)~~ the mixture.

~~16.~~14. A process for making phenol and cyclohexanone, the process comprising:

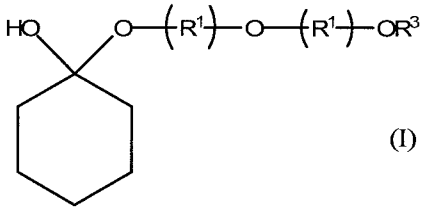
(A) contacting benzene and hydrogen with a catalyst under hydroalkylation conditions to produce a first effluent comprising cyclohexylbenzene;

(B) oxidizing at least part of the cyclohexylbenzene in the first effluent to produce a second effluent comprising cyclohexylbenzene hydroperoxide;

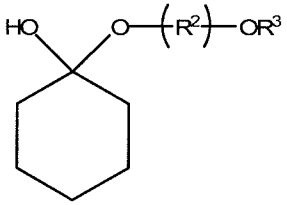
(C) cleaving at least part of the cyclohexylbenzene hydroperoxide in the second effluent stream to obtain a product mixture comprising phenol and cyclohexanone; and

(D) separating the product mixture by:

(a) ~~distilling~~ feeding to a distillation column a charge comprising (i) at least a portion of the mixture, ~~in the presence of~~ (ii) a solvent including at least two alcoholic hydroxyl groups attached to non-adjacent saturated carbon atoms, and (iii) at least one hemiketal defined by one the formulae (I), (II), and/or at least one enol-ether derived from the hemiketal defined by the formula (I) or the formula (II):

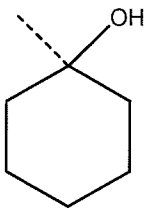


(I)



(II)

wherein $R^1$, the same or different at each occurrence, is independently a branched or straight-chain alkylene group having from 2 to 10 carbon atoms, $R^2$ is a branched or straight-chain alkylene group having from 4 to 10 carbon atoms, and $R^3$ is hydrogen or the following group:

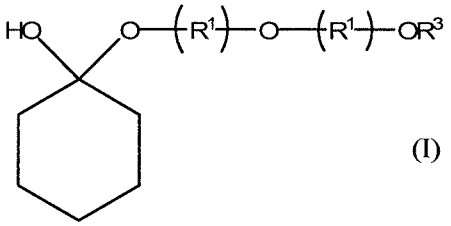


~~;~~ and

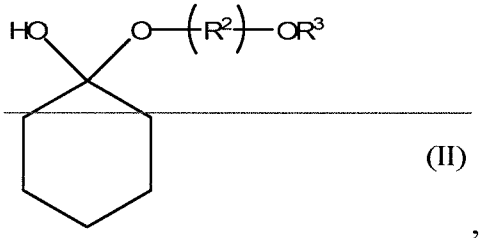
~~and/or one or more enol-ethers derived from the hemiketals defined by the formula (I) and the formula (II).~~ (b) distilling at least a portion of the charge in the distillation column.

~~17.~~15. The process of claim ~~16~~ 14, wherein $R^1$ is ethylene and $R^2$ is 1,4-butylene.

~~18.~~16. A composition of matter comprising: (i) phenol, (ii) cyclohexanone, (iii) a solvent including at least two alcoholic hydroxyl groups attached to non-adjacent saturated carbon atoms, and (iv) 0.01 wt% to 10 wt%, based on the total weight of the composition, of a hemiketal defined by the formula (I) ~~or the formula (II)~~ and/or an enol-ether derived from the hemiketal defined by the formula (I):



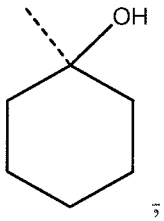
(I)



(II)

,

wherein $R^1$, the same or different at each occurrence, is independently an alkylene group having from 2 to 10 carbon atoms, $R^2$ is an alkylene group having from 4 to 10 carbon atoms, and $R^3$ is hydrogen or the following group:

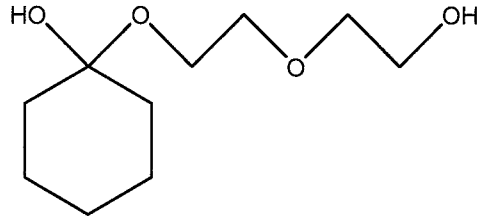


~~and/or an enol-ether derived from the hemiketal defined by the formula (I) or the formula (II)~~.

~~19.~~17. The composition of claim ~~18~~ 16, wherein $R^1$ is an ethylene group.

~~20.~~18. The composition of claim ~~18~~ 16, wherein $R^2$ is an alkylene group having 4 carbon atoms.

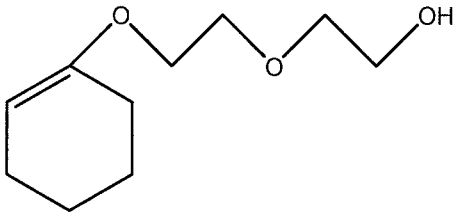
~~21.~~19. A composition of matter according to claim ~~18~~ 16, the composition comprising a hemiketal defined by the formula (III):



(III)

,

and/or an enol-ether thereof defined by the formula (IV):



(IV)

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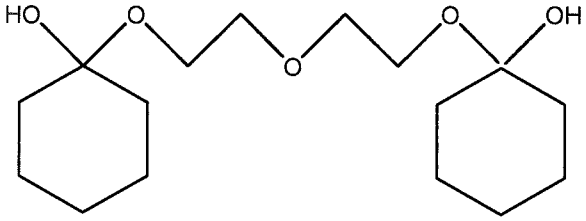
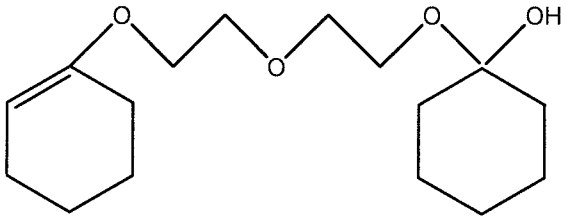
~~22.~~20. A composition of matter according to claim ~~18~~ 16, the composition comprising a hemiketal defined by the formula (V):



(V)

,

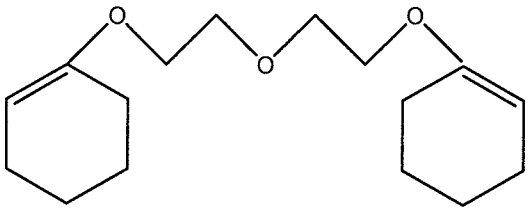
and/or an enol-ether thereof defined by the formula (VI):



(VI)

,

and/or an enol-ether thereof defined by the formula (VII):



(VII)

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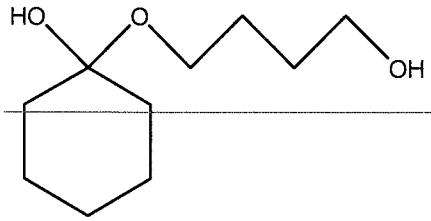
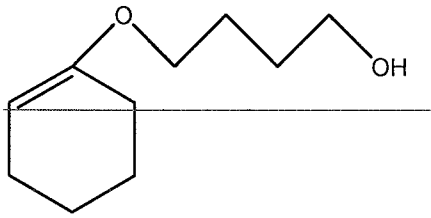
~~23. A composition of matter comprising a hemiketal defined by the formula (VIII):~~




(VIII)

;

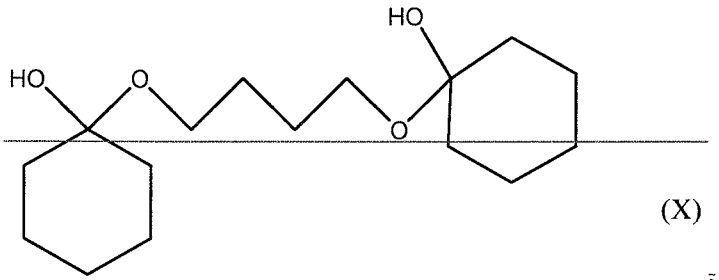
~~and/or an enol-ether thereof defined by the formula (IX):~~




(IX)

;

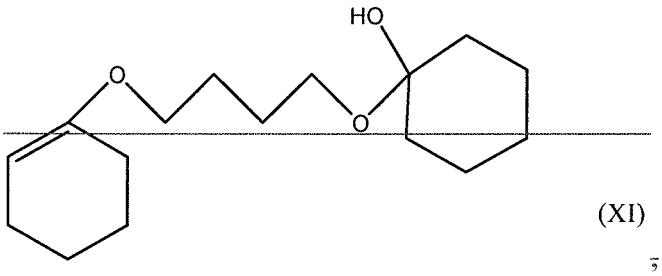
~~24. A composition of matter comprising a hemiketal defined by the formula (X):~~




(X)

;

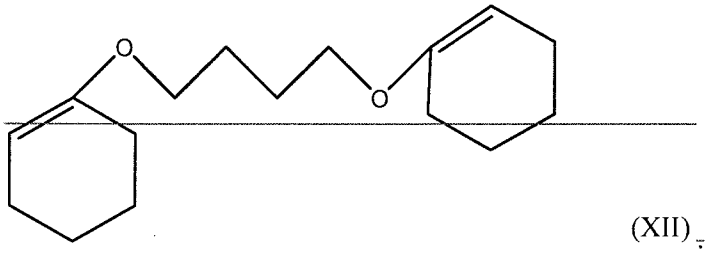
~~and/or an enol-ether thereof defined by the formula (XI):~~




(XI)

;

~~and/or an enol-ether thereof defined by the formula (XII):~~




(XII) ;