Claims

1. A process for phosphorylating a complex alcohol, comprising the steps of:

(a) mixing the complex alcohol and P_4O_{10} until its exothermic reaction temperature is achieved;

(b) allowing the reaction mixture of step (a) to react until the exothermic reaction is complete, wherein the exothermic reaction is complete when the temperature of the chemical reaction between the complex alcohol and P_4O_{10} begins to fall;

(c) cooling the reaction mixture of step (b) to at least 80°C; and

(d) hydrolysing the reaction mixture of step (c), wherein hydrolysis is conducted for 30 to 90 minutes,

wherein the complex alcohol is a cyclic complex alcohol which is carbocyclic, heterocyclic, monocyclic or polycyclic or wherein the complex alcohol is chromanol.

2. The process of claim 1 wherein the chromanol is a tocopherol or tocotrienol.

3. The process of any one of claims 1-2 wherein the complex alcohol is a pharmaceutical compound, an anaesthetic, an antioxidant, or a solvent.

4. The process of any one of claims 1-3 wherein the complex alcohol is monohydroxy or polyhydroxy.

5. The process of any one of claims 1-4 wherein step (d) involves the addition of an aqueous solution.

6. The process of any one of claims 1-5 wherein the temperature of the reaction mixture of step (b) is maintained at the temperature at least 80°C for 30 to 180 minutes, 60 to 180 minutes, 60 to 120 minutes, or 60 minutes.

7. The process of any one of claims 1-6 wherein the temperature of the reaction mixture during the hydrolysis step (d) is at least 80°C, within the range of at least 80°C to 150°C, within the range of 85°C to 120°C, within the range of 90°C to 110°C, within the range of 90°C to 100°C, or within the range of 100°C to 110°C.

8. The process of any one of claims 1-7 wherein hydrolysis is conducted for 60 to 90 minutes.

9. The process of any one of claims 1-8, wherein the product of the hydrolysis step (d) is a mixture of a phosphorylated mono-complex alcohol and a phosphorylated di-complex alcohol.

10. The process of claim 9 wherein the molar ratio of the mixture of the phosphorylated mono-complex alcohol and the phosphorylated di-complex alcohol is within a range of 6:4 to 8:2, or is 2:1.

11. The process of any one of claims 1-10 wherein the complex alcohol is tocopherol and the process further comprises the step of reacting the reaction mixture of step (d) with an amphoteric surfactant, wherein the amphoteric surfactant is a tertiary amine of the formula $NR_1R_2R_3$, wherein R_1 is selected from the group consisting of C_{6-22} alkyl, and R_2 and

R_3 are independently selected from the group consisting of H, $(CH_2)_nCOOX$, $(CH_2)_nCHOHCH_2SO_3X$, $(CH_2)_nCHOHCH_2OPO_3X$, in which X is H or forms a salt with a cation selected from the group consisting of sodium, potassium, lithium, calcium, magnesium, ammonium, alkylammonium and alkanolamine, and n is 1 or 2.

12. The process of claim 11 wherein the tertiary amine is selected from the group consisting of 3-[2-carboxyethyl(dodecyl)amino] propanoic acid, 3,3'-(dodecylimino)dipropionic acid monosodium salt, lauryliminodipropionic acid, sodium lauryliminodipropionate and N-lauryl iminodipropionate.