C6-C12 carboxylic acids were referred to as suitable for use as plasticizers. The synthesis of isosorbide di-n-octanoate (IsDO) and isosorbide di-2-ethylhexanoate (IsDEH) was exemplified.

WO2006/103338 describes a method of producing *inter alia* isosorbide esters by using a combination of two catalysts, one of which is hypophosphorous acid. This appears to give esters having better colour numbers and higher purities than described in WO2001/083488 for example. Again, only 2-ethylhexanoic acid and n-octanoic acid were explicitly referred to as carboxylic acids which can be reacted using this method.

WO 2008/095571 describes synthesis and use of mixtures of isosorbide esters obtainable by esterifying isomeric nonanoic acids (branched and linear) with isosorbide. However, plastisols based on this plasticizer have a significantly higher viscosity than that of the current standard plasticizer diisononyl phthalate (DINP), portending worse processability. Similarly, the glass transition temperatures are very significantly inferior to that of DINP.

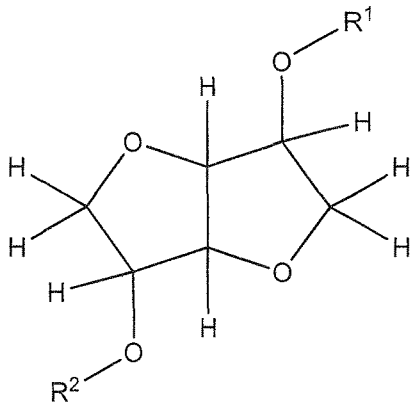
The melting point of the pure isosorbide diester of n-octanoic acid is only just below room temperature, so using the ester at lower temperatures would be uncommercial in many processing methods of PVC plastisol technology.

The corresponding pure isosorbide di-n-decanoate even has a melting point above 35°C, and is largely incompatible with PVC.

The problem addressed by the present invention was that of finding a dianhydrohexitol-based diester or diester mixture having improved performance characteristics.

The problem is solved by an ester mixture as defined in Claim 1.

~~In a first aspect, t~~There is provided an ester mixture comprising a compound conforming to formula I:



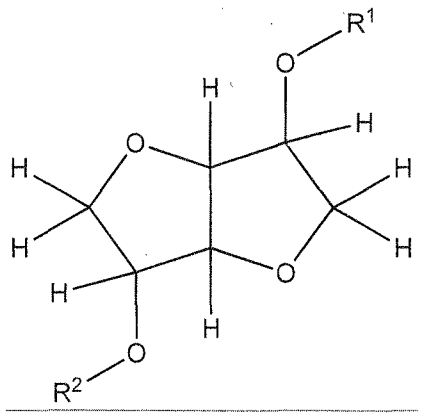
I

wherein R^1 and R^2 are each independently selected from: C8-alkyl linear, C8-alkyl branched, C8-alkene wherein said C8-alkene may be partially or completely epoxidized, C10-alkyl linear, C10-alkyl branched, C10-alkene wherein said C10-alkene may be partially or completely epoxidized, and

wherein the carbon atom which binds the particular R^1 or R^2 moiety directly to the oxygen in formula I is linked via a double bond to a further oxygen atom, and

wherein the proportion of C8 based on the sum of C8 and C10 in the entire ester mixture is in the range from 45 mol% to 85 mol%.

In a first aspect, there is provided an ester mixture comprising a compound conforming to formula I:



I

wherein R^1 and R^2 are each independently selected from: C8-alkyl linear, C8-alkyl branched, C10-alkyl linear, C10-alkyl branched, and

wherein the carbon atom which binds the particular R^1 or R^2 moiety directly to the oxygen in formula I is linked via a double bond to a further oxygen atom, and

wherein the proportion of C8 based on the sum of C8 and C10 in the entire ester mixture is in the range from 45 mol% to 85 mol%.

In a second aspect, there is provided a composition comprising:

- an ester mixture as defined above,
- a high boiler and/or a low boiler.

In a third aspect, there is provided a polymer composition comprising:

- an ester mixture as defined above,
- a polymer.

In a fourth aspect, there is provided the use of an ester mixture as defined above as a plasticizer.

In a fifth aspect, there is provided a method comprising the steps of

a) providing a dianhydrohexitol,

b) admixing n-octanoic acid and n-decanoic acid,

c) esterifying the acids of b) with the alcohol of a) in the presence of at least one catalyst,

d) terminating the esterifying reaction of c) as soon as the proportion of monoester has fallen below 2.0 area%.

C8 or as the case may be C10 refers to the number of carbon atoms in the carbon chain.

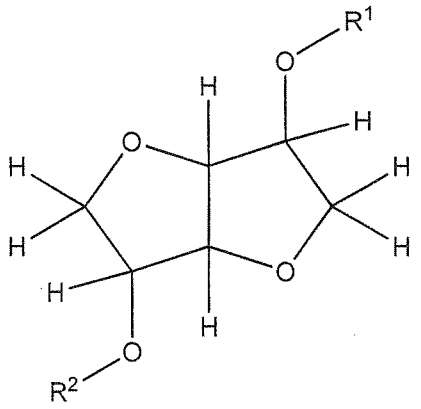
The proportion of C10 in the ester mixture computes as the sum of C8 and C10 in the ester mixture (corresponds to 100 mol%) minus the proportion of C8.

For example, a mixture consisting to equal parts of pure C8-diester and pure C10-diester has a 50 mol% proportion of C8. But, for example, a pure C8/C10-ester, i.e. an ester wherein one alcohol group is esterified with C8 and the other alcohol group is esterified with C10, similarly also has a 50 mol% proportion of C8. The latter is also an ester mixture for the purposes of this invention.

"In the entire ester mixture" is to be understood as also comprehending those esters in the ester mixture which do not conform to formula I, for example monoesters of dianhydrohexitol which are present in the ester mixture. Following saponification of the entire ester mixture, all the C8-acids and all the C10-acids are captured separately and ratioed.

Claims:

1. An ester mixture comprising a compound conforming to formula I:



I

wherein R^1 and R^2 are each independently selected from: C8-alkyl linear, C8-alkyl branched, ~~C8-alkene wherein said C8-alkene may be partially or completely epoxidized,~~ C10-alkyl linear, C10-alkyl branched, ~~C10-alkene wherein said C10-alkene may be partially or completely epoxidized,~~ and

wherein the carbon atom which binds the particular R^1 or R^2 moiety directly to the oxygen in formula I is linked via a double bond to a further oxygen atom, and

wherein the proportion of C8 based on the sum of C8 and C10 in the entire ester mixture is in the range from 45 mol% to 85 mol%.

2. An ester mixture according to Claim 1,

wherein the proportion of C8 based on the sum of C8 and C10 in the entire ester mixture is in the range from 45 mol% to 75 mol%.

3. An ester mixture according to either of Claims 1 and 2,

wherein the proportion of C8 based on the sum of C8 and C10 in the entire ester mixture is in the range from 45 mol% to 65 mol%.

4. An ester mixture according to any of Claims 1 to 3,

wherein the sum of C8 and C10 has a proportion of above 50 mol% in the entire ester mixture based on all acid chains.