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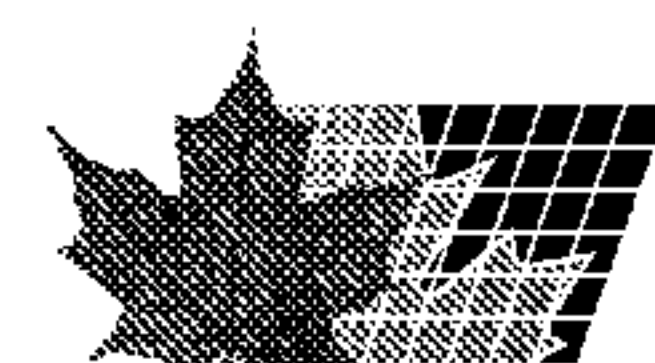
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(54) Titre : RECIPIENT COMPRENANT UNE COMPOSITION DETERGENTE CONTENANT UN ACIDE GLDA
(54) Title: CONTAINER COMPRISING A DETERGENT COMPOSITION CONTAINING GLDA

(57) **Abrégé/Abstract:**

Container comprising a single unit dose of a detergent composition containing at least one complexing agent (A) dissolved in an aqueous medium, said complexing agent (A) being a mixture of the L- and D-enantiomers of glutamic acid diacetic acid (GLDA) or its respective mono-, di-, tri- or tetraalkali metal salts or its mono-, di-, tri- or tetraammonium salts, said mixture containing predominantly the respective L-isomer with an enantiomeric excess (ee) in the range of from 5 to 90 %, wherein said container is made from a polymer.



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Container comprising a detergent composition containing GLDA

The present invention is directed towards a container comprising a single unit dose of a detergent composition containing at least one complexing agent (A) dissolved in an aqueous medium, said complexing agent (A) being a mixture of the L- and D-enantiomers of glutamic acid diacetic acid (GLDA) or its respective mono-, di-, tri- or tetraalkali metal salts or its mono-, di-, tri- or tetraammonium salts, said mixture containing predominantly the respective L-isomer with an enantiomeric excess (ee) in the range of from 5 to 90 %, wherein said container is made from a polymer.

Chelating agents such as glutamic acid diacetic acid (GLDA) and their respective alkali metal salts are useful and environmentally friendly sequestrants for alkaline earth metal ions such as Ca^{2+} and Mg^{2+} . They can replace phosphate-type sequestrants such as sodium tripolyphosphate ("STPP"), the latter being replaced now in many countries for environmental reasons.

Therefore, GLDA and related compounds are recommended and used for various purposes such as laundry detergents and for automatic dishwashing (ADW) formulations, in particular for so-called phosphate-free laundry detergents and phosphate-free ADW formulations. For shipping such chelating agents, in most cases solids such as granules are being applied or aqueous solutions.

For automatic dishwashing and laundry care, so-called single unit doses are of increased commercial importance. They are of great convenience for the end-user because such unit doses contain the right amounts of the ingredients for the washing and rinsing steps and because they can be easily placed into the automatic dishwasher or washing machine by the end-user, see, e.g., WO 2002/042400 and WO 2011/072017. Examples of unit doses are tablets and pellets and in particular pouches. Pouches in the form of multi-compartment pouches have been disclosed as well, see WO 2009/112994.

However, especially in the presence of bleaching agents on the basis of inorganic peroxides, sometimes shortcomings can be observed. Especially on long-time storing such as several months in summer, yellowing or even formation of brownish stains in the detergent compositions can be observed. Such coloring is commercially unattractive because it may suggest that the quality of the respective

element for a detergent composition that can overcome the above drawbacks, and a method for making such an element.

Accordingly, the containers comprising a single unit dose as defined at the outset have been found. They are hereinafter also being defined as containers according to the (present) invention or as inventive containers comprising a single unit dose or as inventive containers.

The inventive container is in the form of a unit dose. In the context of the present invention, the term “unit dose” refers to amounts of detergent compositions that are designed for one wash in a laundry machine or one dishwash in an automatic dishwashing machine. A unit dose may be designed for home care applications or for industrial or institutional applications, such as – but not limited to – in hospitals, canteens, restaurants, hotels, youth hostels or a commercial laundry. Preferably, unit doses in the context of the present invention are designed for home care applications. Unit doses may also be defined as single unit doses, both terms being used interchangeably in the context of the present invention.

Inventive containers comprising a single unit dose may be applied in various applications, especially for automatic dishwash or laundry applications. Depending on the application the detergent composition may contain different components besides complexing agent (A), and depending on the desired application the size may differ. It is preferred that inventive containers that are used in home care are smaller in size than inventive containers to be used in industrial or institutional applications, and it is preferred that containers used in automatic dishwash applications are smaller in size than inventive containers used in laundry cleaning applications.

In one embodiment of the present invention, inventive containers comprising a single unit dose encompass a single compartment in which all components of the respective detergent composition. In a preferred embodiment, inventive containers encompass two or more compartments, for example two, three or four compartments.

In one embodiment of the present invention inventive containers are in the form of a box with one or more compartments or in the form of a sachet with one or more compartments or in the form of a pouch with one or more compartments or in the form of a combination of a box and one or more pouches, especially in the form of the combination of a box and one pouch. In such a combination of a box and a pouch may be connected to each other, e.g., by gluing them together. A pouch with two compartments may also be referred to as two-chamber pouch. A pouch with a single compartment may also be referred to as one-chamber pouch. Thus, in particular embodiments, containers according

said container by at least 5% into one dimension the respective container is deemed mechanically flexible, otherwise it is deemed stiff.

In specific embodiments, inventive containers are tablets that have at least one cavity per tablet.

5 Per cavity there is at least one pouch, preferably there is at least one pouch placed into the cavity and attached to the tablet. In special embodiment, the volume of the pouch including the solution of complexing agent (A) corresponds to the volume of the cavity, for example they may have the same volume $\pm 10\%$, preferably $\pm 5\%$. The better shape and size of cavity and the pouch including the solution of complexing agent (A) correspond to each other the less break-
10 age during transport can be observed. Such tablets may be packaged in a film of, e.g., polyvinyl alcohol. The tablet comprises components of the respective detergent composition such as surfactants, builder(s), enzymes, and/or bleaching agent.

In another specific embodiment, inventive containers are a box that has at least one cavity per
15 box. Per cavity there is at least one pouch, preferably there is at least one pouch placed into the cavity and attached to the box. In special embodiment, the volume of the pouch including the solution of complexing agent (A) corresponds to the volume of the cavity, for example they may have the same volume $\pm 10\%$, preferably $\pm 5\%$. The better shape and size of cavity and the pouch including the solution of complexing agent (A) correspond to each other the less break-
20 age during transport can be observed. The box comprises components of the respective detergent composition such as surfactants, builder(s), enzymes, and/or bleaching agent.

In another specific embodiment, inventive containers are pouches that encompass at least two compartments, for example two, three or four compartments. One of the compartments contains
25 the solution of complexing agent (A). The other components of the respective detergent compositions are in the one or more other compartment(s).

In one embodiment of the present invention, all complexing agent (A) that is comprised in inventive containers is in the very compartment in dissolved form. In another embodiment of the
30 present invention, a share of complexing agent (A) is comprised in one compartment in dissolved form, as stated above, and more complexing agent (A) is comprised in the other

detergent composition. During the dishwashing process the contents of the pouch is removed from the pouch itself, preferably by dissolving the pouch.

Containers and especially pouches in the context of the present invention may have various shapes. For examples, containers may be in the form of a ball, an ellipsoid, a cube, a cuboid, or they may be of geometrically irregular shape. In special examples, pouches may have the shape of an envelope, of a pillow, of a flexible sleeve or flexible tube that is closed at both ends, of a ball or a cube.

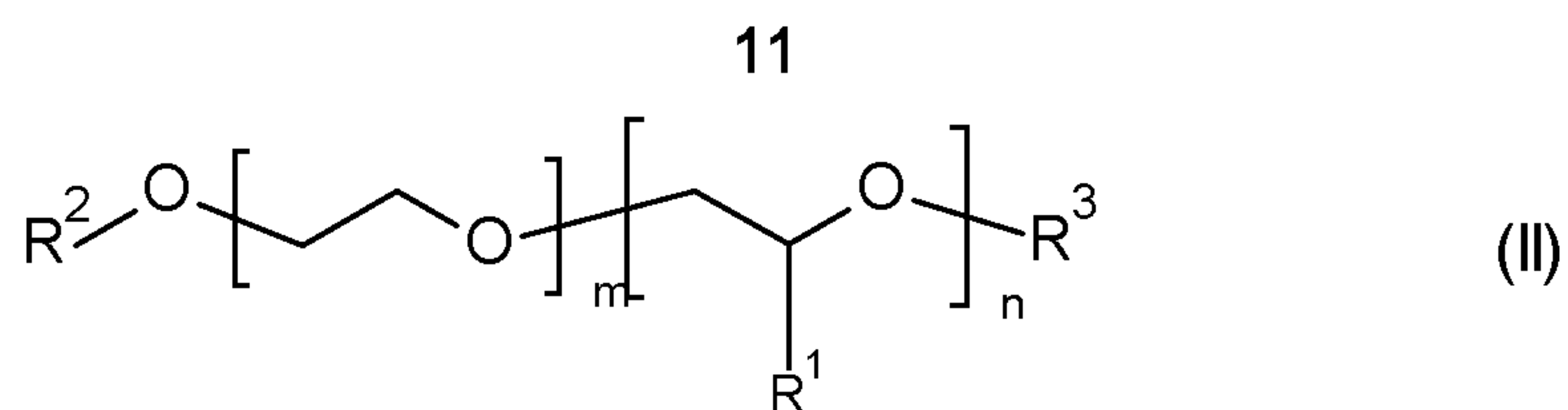
10 In one embodiment of the present invention, containers according to the present invention and especially pouches have a diameter in the range of from 0.5 to 7 cm.

In one embodiment of the present invention, containers according to the present invention and especially pouches have a volume – in the closed state – in the range of from 15 to 70 ml, preferably 18 ml to 50 ml and in particular 20 to 30 ml. Such inventive containers are particularly useful for automatic dishwash in home care application. Inventive containers particularly useful for fabric care in home care applications may have a volume in the range of from 15 to 40 ml, preferably 25 to 30 ml.

20 In one embodiment of the present invention, each compartment has a content in the range of from 0.5 to 50 ml, preferably 5 to 25 ml. In embodiments wherein inventive containers encompass two or more compartments, such compartments may have equal size or different size. Preferably, in embodiments wherein inventive containers encompass two or more compartments, such containers encompass one major compartment and one or two or three smaller compartments.

Inventive containers are made from a polymer, preferably from a water-soluble polymer. Pouches in the context of the present invention are made from a polymer film.

30 Said polymer may be selected from natural polymers, modified natural polymers, and synthetic polymers. Examples of suitable natural polymers are alginates, especially sodium alginate, furthermore xanthum, carragum, dextrin, maltodextrin, gelatine, starch, and p



in which the variables are defined as follows:

- 5 R^1 is identical or different and selected from hydrogen and linear $\text{C}_1\text{-C}_{10}$ -alkyl, preferably in each case identical and ethyl and particularly preferably hydrogen or methyl,
- 10 R^2 is selected from $\text{C}_8\text{-C}_{22}$ -alkyl, branched or linear, for example $\text{n-C}_8\text{H}_{17}$, $\text{n-C}_{10}\text{H}_{21}$, $\text{n-C}_{12}\text{H}_{25}$, $\text{n-C}_{14}\text{H}_{29}$, $\text{n-C}_{16}\text{H}_{33}$ or $\text{n-C}_{18}\text{H}_{37}$,
- 15 R^3 is selected from $\text{C}_1\text{-C}_{10}$ -alkyl, methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, n-pentyl, isopentyl, sec-pentyl, neopentyl, 1,2-dimethylpropyl, isoamyl, n-hexyl, isohexyl, sec-hexyl, n-heptyl, n-octyl, 2-ethylhexyl, n-nonyl, n-decyl or isodecyl.
- 20 The variables m and n are in the range from zero to 300, where the sum of n and m is at least one, preferably in the range of from 3 to 50. Preferably, m is in the range from 1 to 100 and n is in the range from 0 to 30.

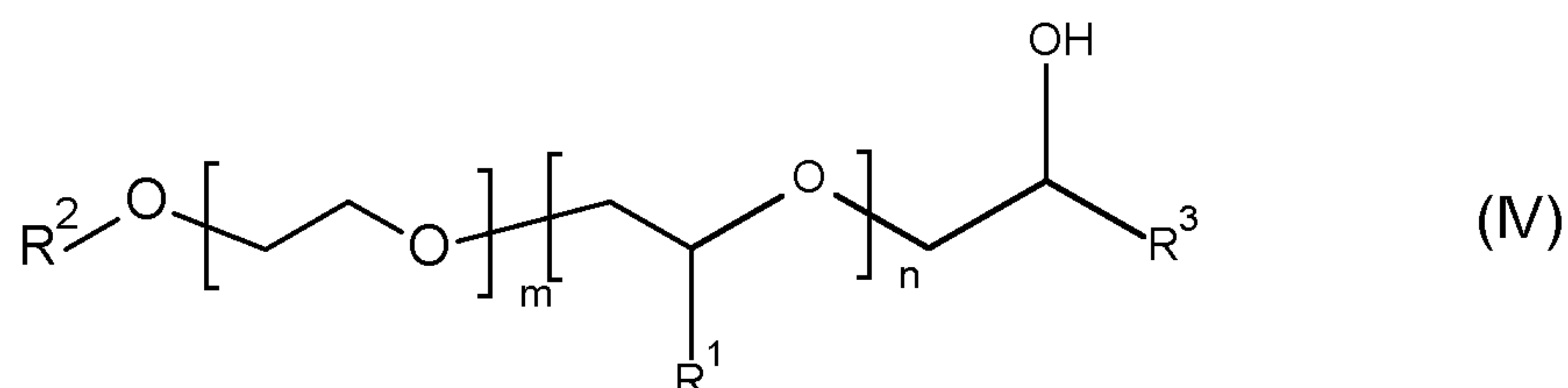
In one embodiment, compounds of the general formula (II) may be

d is a number in the range from zero to 50, preferably 4 to 25.

The sum $a + b + d$ is preferably in the range of from 5 to 100, even more preferably in the range of from 9 to 50.

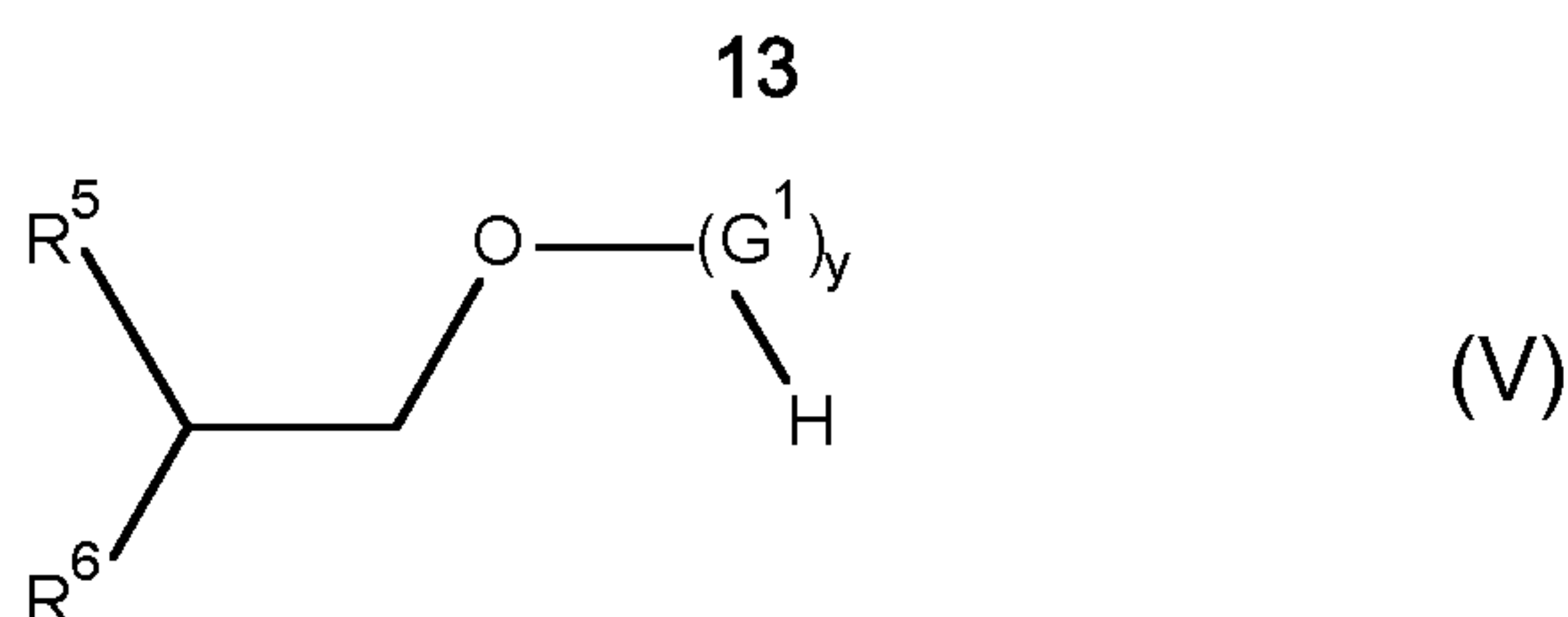
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Preferred examples for hydroxyalkyl mixed ethers are compounds of the general formula (IV)



10 in which the variables are defined as follows:

R^1 is identical or different and selected from hydrogen and linear C_1 - C_{10} -alkyl, preferably in each case identical and ethyl and particularly



wherein:

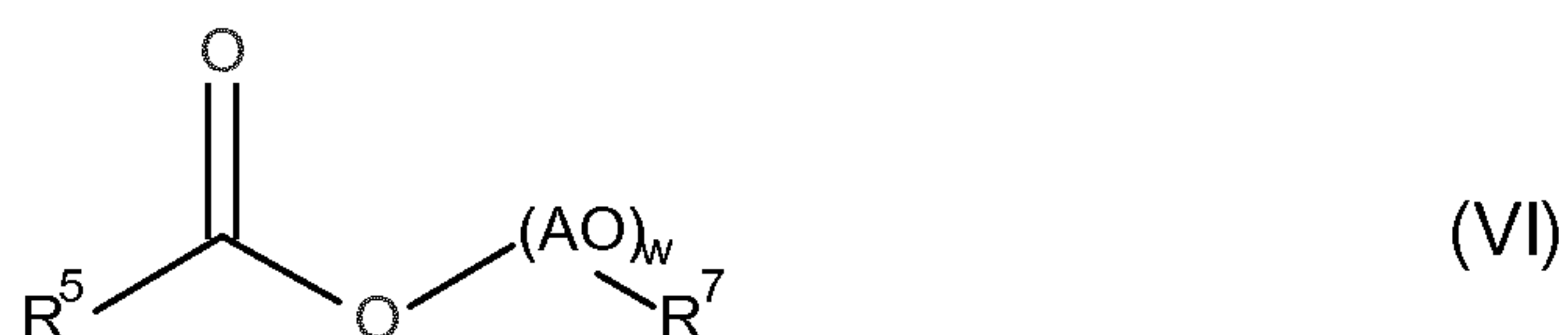
- 5 R^5 is C_1 - C_4 -alkyl, in particular ethyl, n-propyl or isopropyl,
 R^6 is $-(CH_2)_2-R^5$,

G^1 is selected from monosaccharides with 4 to 6 carbon atoms, especially from glucose and xylose,

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y in the range of from 1.1 to 4, y being an average number.

Further examples of non-ionic surfactants are compounds of general formula (VI) and (VII)



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A tablet may be formed of any of the above mixture, weight: 18 g, and one pouch from (II) may be placed on each tablet. The tablets are being packed – together with the pouch – into a film of polyvinyl alcohol, degree of saponification: 88 mole-%, thickness: 35 μm . They are being used as unit doses in an automatic dishwasher and yield excellent dishwashing results. Their use is convenient.

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