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(21) Internationales Aktenzeichen: PCT/EP98/03804 (22) Internationales Anmeldedatum: 22. Juni 1998 (22.06.98) (30) Prioritätsdaten: 197 28 833.2 5. Juli 1997 (05.07.97) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): BAYER AKTIENGESELLSCHAFT [DE/DE]; D-51368 Leverkusen (DE). TILS, Peter [DE/DE]; Am Hagedorn 14, D-52355 Düren (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): VOIGT, Michael [DE/DE]; Düsseldorf Strasse 8, D-47239 Duisburg (DE). GRIGAT, Ernst [DE/DE]; Grundermühlenweg 16, D-51381 Leverkusen (DE). SCHULZ-SCHLITTE, Wolfgang [DE/DE]; Von-Kniprode-Weg 7, D-40764 Langenfeld (DE). ESSER, Hans-Peter [DE/DE]; Werner-Erkens-Strasse 30, D-50226 Frechen (DE). (74) Gemeinsamer Vertreter: BAYER AKTIENGESELLSCHAFT; D-51368 Leverkusen (DE).		(81) Bestimmungsstaaten: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO Patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI Patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Veröffentlicht <i>Ohne internationalen Recherchenbericht und erneut zu veröffentlichen nach Erhalt des Berichts.</i>
(54) Title: METHOD FOR REMOVING POLLUTANT ORGANIC FLUIDS FROM SURFACE WATER (54) Bezeichnung: VERFAHREN ZUR BESEITIGUNG VON OBERFLÄCHENGEWÄSSER VERSCHMUTZENDEN ORGANISCHEN FLÜSSIGKEITEN (57) Abstract The invention relates to a method for removing pollutant organic fluids, especially oil, from surface waters. According to the inventive method, a suitable binding agent is applied to the water surface, said organic fluid binding with or being absorbed by said binding agent. The binding agent is then removed together with the bound or absorbed fluid. (57) Zusammenfassung Die vorliegende Erfindung betrifft ein Verfahren zur Beseitigung von Oberflächengewässer verschmutzenden organischen Flüssigkeiten, insbesondere von Öl, bei dem ein die organische Flüssigkeit bindendes Bindemittel auf die Gewässer Oberfläche aufgebracht wird und anschließend das Bindemittel mit der angebundenen bzw. absorbierten Flüssigkeit beseitigt wird.		

A method of removing organic liquids which pollute surface water

The present invention relates to a method of removing organic liquids, particularly oil, which pollute surface water, wherein a binding agent which binds the organic liquid is applied to the surface of the water and the binding agent is subsequently removed with the bound or absorbed liquid.

Oil slicks floating on water constitute a serious threat to the environment, for example. One particular problem is that even very small contents of oil poison a stretch of water and constitute a lethal hazard to fish and other forms of life. Therefore, when oil slicks such as these are removed, it is very important that the oil is removed practically completely and that the oil is eliminated very rapidly, so that the oil slick cannot spread, or can only spread to a slight extent.

The removal of oil slicks is generally effected by applying a binding agent which absorbs oil to the surface of the water, and subsequently removing the binding agent together with the bound or absorbed oil. The substances which are generally used as binding agents are those with a high affinity for oil, such as special plastics or substances which possess a macroscopic pore structure, in solid or liquid form. These substances are applied to the surface of the water, whereupon the binding agents bind the oil to themselves or suck up the oil before they form a floating slick on the surface of the water which can then easily be removed.

Moreover, since the polymer itself is not dispersed in water or seawater, so that oil droplets floating in the water cannot be removed by the polymer, it is known from JP 59-039 381 A that an aqueous dispersion can be produced which comprises the polymer on the one hand and water which contains alcohol as a solvent on the other hand, and which exhibits excellent dispersibility in water, so that the polymer is also present under the surface of the water in order to absorb oil there.

In practice, there is a multiplicity of different binding agents which are used, and which apart from the polymer may also contain other oil-absorbing constituents, such



as sawdust, peat, cork and the like. Moreover, it is known that constituents can be added to the polymer which cause the oil to form lumps or similar agglomerates (JP 54-033 887 A), which can easily be removed.

- 5 As before, however, one problem with the removal of oil slicks such as these is that the oil spreads rapidly, particularly under the effect of wind and/or vigorous wave motion in the open sea, and that even a coherent slick of oil which has already been bound is driven apart.
- 10 Accordingly, there is a need to improve the method cited at the outset for the removal of organic liquids which pollute surface water so that spreading of the organic liquid can be prevented or can at least be reduced, and so that the subsequent removal thereof, e.g. by suction, is facilitated.
- 15 In order to delimit a polluted surface area the present invention provides a solution or dispersion of a polymer or a mixture of polymers and a water-miscible and/or readily volatile solvent which has a lower density than water which is applied to the surface of the water. The present invention therefore relates to a method of removing organic liquids which pollute surface water, wherein in order to delimit a polluted surface area a
- 20 solution/dispersion of a polymer or a mixture of polymers and a water-miscible and/or readily volatile solvent which has a lower density than water is applied to the surface of the water, wherein a binding agent which binds the organic liquid is applied before or after the application of the polymer solution/dispersion, and the binding agent is subsequently removed with the bound or absorbed liquid, wherein the polymers are
- 25 biodegradable and are selected from aliphatic or partially aromatic polyester, thermoplastic aliphatic or partially aromatic polyester urethanes, aliphatic or aliphatic-aromatic polyester carbonates, or from aliphatic or partially aromatic polyester amides.
- 30 The invention is based on the concept of placing a barrier round a polluted surface area in order to hold the surface area together and thus to counteract further spreading of the pollutants. According to the invention, this ring-shaped barrier is formed by



applying a polymer solution or dispersion to the surface of the water, which solution or dispersion spreads along the pollution on the surface of the water with the formation of a closed ring due to its low density and its affinity for the organic pollutants. In the course of this process, the solvent becomes mixed with the water or
5 evaporates, which results in the polymer being precipitated on the surface of the water with the formation of the desired ring-shaped barrier, which delimits the polluted surface area and holds it together so that the pollution is scarcely still capable of spreading.

10 The extent of the ring-shaped barrier substantially depends on the amount of solution /dispersion which is applied to the surface of the water, and is limited by the evaporation of the solvent or the mixing thereof with the water.

The polymer content of the solution/dispersion generally amounts to up to 50 % by
15 weight (with respect to the total solution or dispersion). Higher concentrations are less suitable, because they are not sufficiently free-flowing. The polymer content is preferably to 30 % by weight, particularly 5 to 10 % by weight.

In order to promote uniform ring formation, it is advantageous if the solution is
20 applied as uniformly as possible to the surface of the water. This can be accomplished, for example, by spraying the solution on to the surface of the water.

The solution or dispersion preferably contains a biodegradable polymer or a mixture of biodegradable polymers, so that the solution/dispersion or the polymer contained
25 therein can be disposed of without problems.

Suitable biodegradable polymers include aliphatic or partially aromatic polyesters, thermoplastic aliphatic or partially aromatic polyester urethanes, aliphatic or aliphatic-aromatic polyester carbonates, or aliphatic or partially aromatic polyester amides or
30 mixtures thereof.

The following polymers are suitable:



Aliphatic or partially aromatic polyesters formed from

- 5 A) aliphatic bifunctional alcohols, preferably linear C₂ to C₁₀ dialcohols such as ethanediol, butanediol or hexanediol for example, most preferably butanediol, and/or optionally from cycloaliphatic bifunctional alcohols, preferably those comprising 5 or 6 C atoms in their cycloaliphatic ring such as cyclohexanedimethanol for example, and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 10 4000, preferably up to 1000, and/or optionally small amounts of branched bifunctional alcohols, preferably C₃-C₁₂ alkyl diols such as neopentyl glycol for example, and optionally small amounts of alcohols of higher functionality in addition, such as 1,2,3-propanetriol or trimethylolpropane for example, and 15 from aliphatic bifunctional acids, preferably C₂-C₁₂ alkyl dicarboxylic acids, such as, for example and preferably, succinic acid or adipic acid, and/or optionally from aromatic bifunctional acids, such as terephthalic acid, isophthalic acid or naphthalene dicarboxylic acid for example, and optionally from small amounts of acids of higher functionality in addition, such as 20 trimellitic acid for example, or
- B) from acid- and alcohol-functionalised components, preferably those comprising 2 to 12 C atoms in their alkyl chain, for example hydroxybutyric acid, hydroxyvaleric acid or lactic acid, or from derivatives thereof, for 25 example ϵ -caprolactone or dilactide,

or from a mixture and/or a copolymer of A and B,

wherein aromatic acids constitute a proportion of not more than 50 % by weight with 30 respect to all the acids;

aliphatic or partially aromatic polyester urethanes formed from



- 5 C) aliphatic bifunctional alcohols, preferably linear C₂ to C₁₀ dialcohols such as ethanediol, butanediol or hexanediol for example, most preferably butanediol, and/or optionally cycloaliphatic bifunctional alcohols, preferably those comprising 5 or 6 C atoms in their cycloaliphatic ring, such as cyclohexanedimethanol for example, and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 4000, preferably up to 1000, and/or optionally small amounts of branched bifunctional alcohols, preferably C₃-C₁₂ alkyl diols such as neopentyl glycol for example, and optionally small amounts of alcohols of higher functionality in addition, preferably C₃-C₁₂ alkyl polyols such as 1,2,3-propanetriol or trimethylolpropane for example, and from aliphatic bifunctional acids, preferably C₂-C₁₂ alkyl dicarboxylic acids, such as, for example and preferably, succinic acid or adipic acid, and/or optionally from aromatic bifunctional acids, such as terephthalic acid, isophthalic acid or naphthalene dicarboxylic acid for example, and optionally from small amounts of acids of higher functionality in addition, such as trimellitic acid for example, or
- 10
- 15
- 20 D) from acid- and alcohol-functionalised components, preferably those comprising 2 to 12 C atoms in their alkyl chain, for example hydroxybutyric acid, hydroxyvaleric acid or lactic acid, or from derivatives thereof, for example ϵ -caprolactone or dilactide,
- 25 or from a mixture and/or a copolymer of A and B,

wherein aromatic acids constitute a proportion of not more than 50 % by weight with respect to all the acids;

- 30 E) from the reaction product of C and/or D with aliphatic and/or cycloaliphatic bifunctional isocyanates and optionally with isocyanates of higher functionality in addition, which preferably comprise 1 to 12 C atoms or 5 to 8



- C atoms in the case of cycloaliphatic isocyanates, e.g. tetramethylene diisocyanate, hexamethylene diisocyanate or isophorone diisocyanate, optionally with linear and/or branched and/or cycloaliphatic bifunctional alcohols and/or alcohols of higher functionality in addition, preferably C₃-C₁₂
- 5 alkyl diols or polyols or those comprising 5 to 8 C atoms in the case of cycloaliphatic alcohols, e.g. ethanediol, hexanediol, butanediol or cyclohexane-dimethanol, and/or optionally with linear and/or branched and/or cycloaliphatic bifunctional amines and/or amino alcohols and/or with linear and/or branched and/or cycloaliphatic amines and/or amino alcohols of higher
- 10 functionality in addition, preferably those comprising 2 to 12 C atoms in their alkyl chain, e.g. ethylenediamine or aminoethanol, and/or optionally with other modified amines or alcohols such as ethylenediaminoethane-sulphonic acid for example, as the free acid or as a salt,
- 15 wherein the ester fraction represented by C) and/or D) is at least 75 % by weight with respect to the sum of C), D) and E);

aliphatic or aliphatic-aromatic polyester carbonates formed from

- 20 F) aliphatic bifunctional alcohols, preferably linear C₂ to C₁₀ dialcohols such as ethanediol, butanediol or hexanediol for example, most preferably butanediol, and/or optionally cycloaliphatic bifunctional alcohols, preferably those comprising 5 to 8 C atoms in their cycloaliphatic ring, such as cyclohexanedimethanol for example, and/or, completely or in part instead of
- 25 diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 4000, preferably up to 1000, and/or optionally small amounts of branched bifunctional alcohols, preferably with C₂-C₁₂ alkyl dicarboxylic acids, such as neopentyl glycol for example, and optionally small amounts of alcohols of
- 30 higher functionality in addition, such as 1,2,3-propanetriol or trimethylolpropane for example, and from aliphatic bifunctional acids, preferably C₂-C₁₂ alkyl dicarboxylic acids, such as, for example and preferably, succinic



acid or adipic acid, and/or optionally from aromatic bifunctional acids, such as terephthalic acid, isophthalic acid or naphthalene dicarboxylic acid for example, and optionally from small amounts of acids of higher functionality in addition, such as trimellitic acid for example, or

5

G) from acid- and alcohol-functionalised components, preferably those comprising 2 to 12 C atoms in their alkyl chain, for example hydroxybutyric acid, hydroxyvaleric acid or lactic acid, or from derivatives thereof, for example ϵ -caprolactone or dilactide,

10

or from a mixture and/or a copolymer of F and G,

wherein aromatic acids constitute a proportion of not more than 50 % by weight with respect to all the acids;

15

H) a carbonate fraction which is produced from aromatic bifunctional phenols, preferably bisphenol A, and carbonate donors, for example phosgene,

or

20

a carbonate fraction which is produced from esters of aliphatic carbonic acids or derivatives thereof, such as esters of chlorocarbonic acid for example, or from esters of aliphatic carboxylic acids or derivatives thereof, such as salts for example, and carbonate donors, for example phosgene, wherein

25

the ester fraction represented by F) and/or G) is at least 70 % by weight with respect to the sum of F), G) and H);

aliphatic or partially aromatic polyester amides formed from

30

I) aliphatic bifunctional alcohols, preferably linear C₂ to C₁₀ dialcohols such as ethanediol, butanediol or hexanediol for example, most preferably butanediol,



and/or optionally cycloaliphatic bifunctional alcohols, preferably those comprising 5 to 8 C atoms, such as cyclohexanedimethanol for example, and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 4000, preferably up to 1000, and/or optionally small amounts of branched bifunctional alcohols, preferably C₃-C₁₂ alkyl polyols such as neopentyl glycol for example, and optionally small amounts of alcohols of higher functionality in addition, preferably C₃-C₁₂ alkyl polyols such as 1,2,3-propanetriol or trimethylolpropane for example, and from aliphatic bifunctional acids, preferably C₂-C₁₂ alkyl dicarboxylic acids, such as, for example and preferably, succinic acid or adipic acid, and/or optionally from aromatic bifunctional acids, such as terephthalic acid, isophthalic acid or naphthalene dicarboxylic acid for example, and optionally from small amounts of acids of higher functionality in addition, such as trimellitic acid for example, or

K) from acid- and alcohol-functionalised components, preferably those comprising 2 to 12 C atoms in their alkyl chain, for example hydroxybutyric acid, hydroxyvaleric acid or lactic acid, or from derivatives thereof, for example ϵ -caprolactone or dilactide,

or from a mixture and/or a copolymer of I and K,

wherein aromatic acids constitute a proportion of not more than 50 % by weight with respect to all the acids;

L) an amide fraction formed from aliphatic and/or cycloaliphatic bifunctional amines and/or optionally from small amounts of branched bifunctional amines, preferably linear aliphatic C₂ to C₁₀ diamines, and optionally from small amounts of amines of higher functionality in addition, the preferred amines being hexamethylenediamine or isophorone diamine, most preferably hexamethylene-diamine, and from linear and/or cycloaliphatic bifunctional



acids, preferably those comprising 2 to 12 C atoms in their alkyl chain or comprising a C₅ or C₆ ring in the case of cycloaliphatic acids, and/or optionally from small amounts of branched bifunctional acids and/or optionally aromatic bifunctional acids, such as terephthalic acid, isophthalic acid or naphthalene dicarboxylic acid for example, and optionally from small amounts of acids of higher functionality in addition, preferably those comprising 2 to 10 C atoms, or

5 M) comprising an amide fraction formed from acid- and amine-functionalised components, preferably those comprising 4 to 20 C atoms in their cycloaliphatic chain, preferably ω -lauro lactam or ϵ -caprolactam, most preferably ϵ -caprolactam,

or comprising a mixture of L) and M) as an amide fraction, wherein

15 the ester fraction represented by I) and/or K) is at least 30 % by weight with respect to the sum of I), K), L) and M), wherein with the proportion by weight of ester structures preferably ranges from 30 to 70 % by weight and the proportion of amide structures preferably ranges from 70 to 30 % by weight.

20 All the acids can also be used in the form of derivatives, such as acid chlorides or esters for example, said esters including both monomeric and oligomeric esters.

The biodegradable polyester amides according to the invention can be synthesised either by the "polyamide method", comprising the stoichiometric mixing of the starting components, optionally with the addition of water, and subsequent removal of water from the reaction mixture, or by the "polyester method", comprising the stoichiometric mixing of the starting components and the addition of an excess of diol, with esterification of the acid groups and subsequent transesterification or transamidisation of the ester. In the second case, the excess of diol is also removed again by distillation, in addition to the removal of water by distillation. Synthesis is preferably effected by the "polyester method" described above.



The condensation polymerisation process can also be speeded up by the use of known catalysts. It is possible to employ both the known phosphorus compounds which speed up the synthesis of polyamides, and to employ acid or organometallic catalysts for the esterification process. It is also possible to use combinations of both types of catalysts to speed up the condensation polymerisation process.

It must be ensured that the catalysts do not have a negative effect either on the biodegradability or compostability or on the quality of the resulting compost.

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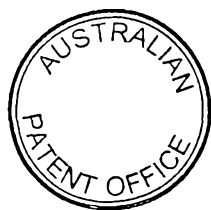
The condensation polymerisation process to form polyester amides can also be influenced by the use of lysine, lysine derivatives or other products which promote branching of amides, such as aminoethyl-aminoethanol (see DE 3831709 for example).

15

The production of polyesters, polyester carbonates and polyester urethanes is generally known or can be carried out analogously by known methods (see EP-A 304 787, WO 95/12629, WO 93/13154, EP-A 682 054, EP-A 593 975, for example).

20 The polyesters, polyester urethanes, polyester carbonates or polyester amides according to the invention may also contain 0.1 to 5 % by weight, preferably 0.1 to 1 % by weight, of branching agents (see the description of the polymers also). These branching agents may be trifunctional alcohols, such as trimethylolpropane or glycerol for example, tetrafunctional alcohols such as pentaerythritol, or trifunctional
25 carboxylic acids such as citric acid. Branching agents increase the melt viscosity of the polyester amides according to the invention to a value such that extrusion blow-moulding is possible with these polymers. The biodegradation of these materials is not impaired thereby.

30 The biodegradable/compostable polyester urethanes, polyesters, polyester carbonates and polyester amides generally have a molecular weight of at least 10,000 g/mole and generally comprise a random distribution of the starting materials in the polymer. In a



synthesis which is typical of polyurethanes, optionally from C) and D) as well as from E), a completely random distribution of the monomer components cannot always be anticipated.

- 5 Biodegradable polymers are commercially available, and are sold by Bayer AG under the product codes BAK 1095 and BAK 2195, for example.

- Alcohols, ketones, ethers, halogenated or halogen-free hydrocarbons or mixtures thereof can be used as solvents. Examples thereof include ethanol, acetone, ethyl
10 acetate, isopropanol, methanol, dichloromethane chloroform, tetrahydrofuran and toluene. Solvents which are environmentally compatible are preferably used.

- Other environmentally compatible, water-miscible solvents include dimethyl sulphoxide (DMSO) and N-methyl-2-pyrrolidinone. Solvents can also be used in
15 admixture with water, e.g. a mixture of ethanol and water. The solubility of the solvent in water can also be increased by the addition of alcohol. The alcohol used here can have different specifications. Possible examples include methanol, ethanol, (iso-, n-)propanol, (n-, iso-, tert-)butanol, or ketones (acetone, 2-butanone). It is essential that the polymer is dissolved or dispersed in the solvent but is insoluble in
20 water. A solution which has proved to be particularly suitable is a solvent mixture containing a C₁-C₄ alcohol, a C₁-C₆ ketone and/or an aromatic carboxylic acid or a salt thereof, particularly a solution which is prepared by the method described in German Patent Application 19 640 032.5, which has not been previously published and to which express reference is hereby made.

25

Customary binding agents can be used for binding the organic liquid. These binding agents can be sprayed or poured on to the surface of the water, just like the solution. Examples of binding agents such as these include powdered rubber, peat, cork and/or latices, which can be used individual or in combination.

30

The binding agent can be applied to the surface of the water before or after the solution is applied. Preferably, however, the solution is applied first, in order to



delimit and fix a defined polluted surface area, which can then be freed from the oil or other organic liquid. This results in particular in a time advantage, due to which further spreading of the organic liquid polluting the surface water can be minimised.

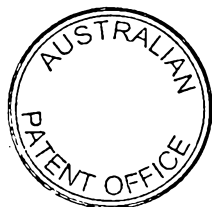
The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge in Australia.

A 7x7 grid of dots forming the number 9. The dots are arranged in a pattern that resembles a '9' when viewed from a distance.



Claims

1. A method of removing organic liquids which pollute surface water, wherein in order to delimit a polluted surface area a solution/dispersion of a polymer or a mixture of polymers and a water-miscible and/or readily volatile solvent which has a lower density than water is applied to the surface of the water, wherein a binding agent which binds the organic liquid is applied before or after the application of the polymer solution/dispersion, and the binding agent is subsequently removed with the bound or absorbed liquid, wherein the polymers are biodegradable and are selected from aliphatic or partially aromatic polyesters, thermoplastic aliphatic or partially aromatic polyester urethanes, aliphatic or aliphatic-aromatic polyester carbonates, or from aliphatic or partially aromatic polyester amides.
2. A method according to claim 1, wherein a solution having a polymer content of up to 50 % by weight is used.
3. A method according to either one of the preceding claims, wherein a solution having a polymer content of 1 to 30 % by weight is used.
4. A method according to any one of the preceding claims, wherein the following are used as polymers:
- aliphatic or partially aromatic polyesters formed from
- A) aliphatic bifunctional alcohols and/or optionally cycloaliphatic bifunctional alcohols and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol or tetrahydrofuran or copolymers thereof with molecular weights up to 4000 and/or optionally small amounts of branched bifunctional alcohols and optionally small amounts of alcohols of higher functionality in addition, and from aliphatic bifunctional acids and/or



optionally from aromatic bifunctional acids and optionally from small amounts of acids of higher functionality in addition, or

B) acid- and alcohol-functionalised components or derivatives thereof,

5

or from a mixture and/or a copolymer of A and B,

wherein aromatic acids constitute a proportion of not more than 50 % by weight with respect to all the acids;

10

aliphatic or partially aromatic polyester urethanes formed from

C) aliphatic bifunctional alcohols and/or optionally cycloaliphatic bifunctional alcohols and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 4000 and/or optionally small amounts of branched bifunctional alcohols and optionally small amounts of alcohols of higher functionality in addition, and from aliphatic bifunctional acids and/or optionally from aromatic bifunctional acids and optionally from small amounts of acids of higher functionality in addition, or

15

20

D) acid- and alcohol-functionalised components or derivatives thereof,

25

or from a mixture and/or a copolymer of C and D,

wherein aromatic acids constitute a proportion of not more than 50 % by weight with respect to all the acids;

30

E) the reaction product of C and/or D with aliphatic and/or cycloaliphatic bifunctional isocyanates and optionally with isocyanates of higher



5 functionality in addition, optionally with linear and/or branched and/or cycloaliphatic bifunctional alcohols and/or alcohols of higher functionality in addition and/or optionally with linear and/or branched and/or cycloaliphatic bifunctional amines and/or amino alcohols and/or with linear and/or branched and/or cycloaliphatic amines and/or amino alcohols of higher functionality in addition, and/or optionally with other modified amines or alcohols, as the free acid or as a salt,

10 wherein the ester fraction represented by C) and/or D) is at least 75 % by weight with respect to the sum of C), D) and E);

aliphatic or aliphatic-aromatic polyester carbonates formed from

15 F) aliphatic bifunctional alcohols and/or optionally cycloaliphatic bifunctional alcohols and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 4000 and/or optionally small amounts of branched bifunctional alcohols and optionally small amounts of alcohols of higher
20 functionality in addition, and from aliphatic bifunctional acids and/or optionally from aromatic bifunctional acids and optionally from small amounts of acids of higher functionality in addition, or

25 G) acid- and alcohol-functionalised components or derivatives thereof,

or from a mixture and/or a copolymer of F and G,

30 wherein aromatic acids constitute a proportion of not more than 50 % by weight with respect to all the acids;



H) a carbonate fraction which is produced from aromatic bifunctional phenols and carbonate donors

or

5

a carbonate fraction which is produced from esters of aliphatic carbonic acids or derivatives thereof or from aliphatic carboxylic acids or derivatives thereof and carbonate donors, wherein

10 the ester fraction represented by F) and/or G) is at least 70 % by weight with respect to the sum of F), G) and H);

aliphatic or partially aromatic polyester amides formed from

15 I) aliphatic bifunctional alcohols and/or optionally cycloaliphatic bifunctional alcohols and/or, completely or in part instead of diols, monomeric or oligomeric polyols based on ethylene glycol, propylene glycol, tetrahydrofuran or copolymers thereof with molecular weights up to 4000 and/or optionally small amounts of branched bifunctional
20 alcohols and optionally small amounts of alcohols of higher functionality in addition, and from aliphatic bifunctional acids and/or optionally from aromatic bifunctional acids and optionally from small amounts of acids of higher functionality in addition, or

25 K) acid- and alcohol-functionalised components or derivatives thereof,

or a from mixture and/or a copolymer of I and K,

wherein aromatic acids constitute a proportion of not more than 50 % by
30 weight with respect to all the acids;



- 5 L) an amide fraction formed from aliphatic and/or cycloaliphatic bifunctional amines and/or optionally from small amounts of branched bifunctional amines and optionally from small amounts of amines of higher functionality in addition, and from linear and/or cycloaliphatic bifunctional acids and/or optionally from small amounts of branched bifunctional acids and/or optionally aromatic bifunctional acids and optionally from small amounts of acids of higher functionality in addition, or
- 10 M) an amide fraction formed from acid- and amine-functionalised components,
- or comprising a mixture of L) and M) as an amide fraction, wherein
- 15 the ester fraction represented by I) and/or K) is at least 30 % by weight with respect to the sum of I), K), L) and M).
5. A method according to any one of the preceding claims, wherein alcohols, ketones, ethers, halogenated or halogen-free hydrocarbons, toluene, dimethyl sulphoxide, N-methyl-2-pyrrolidinone or mixtures thereof, optionally in admixture with water, are used as solvents.
- 20
6. A method according to any one of the preceding claims, wherein ethanol, methanol, (n-/iso-)propanol, (n-,iso-, tert.-)butanol, acetone, 2-butanone, ethyl acetate, dichloromethane, chloroform, tetrahydrofuran, toluene, dimethyl sulphoxide or N-methyl-3-pyrrolidinone, optionally in admixture with water, are used as solvents.
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7. A method according to any one of the preceding claims, wherein a solvent mixture containing a C₁-C₄ alcohol, a C₁-C₆ ketone and/or an aromatic carboxylic acid or a salt thereof is used as a solution.
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8. A method according to any one of the preceding claims, wherein the solution is sprayed on to the surface of the water.
9. A method according to any one of the preceding claims, wherein the binding agent is sprayed or poured on to the surface of the water.
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10. A method according to any one of the preceding claims, wherein powdered rubber, peat, cork and/or latices are used as binding agents.
11. A method of removing organic liquids which pollute surface water, substantially as hereinbefore described.

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