compound acts as a complexing and/or encapsulating agent forming low-toxicity highly efficient complexes with high-stability bonds. Even in low concentrations these new composite substances show high efficiency. Such composite substances comprising, for example, platinum and molybdenum complexes, demonstrate promising properties. The platinum complexes act as efficient anti-cancer agents and experimental results demonstrate their improved ability to kill cancer cells when compared to the prototypes and such known anticancer agents as Cisplatin and Carboplatin. The molybdenum complexes act as efficient agents for prophylaxis and treatment of diseases caused by cell cycle disruption, which result, for instance, from radiation exposure, cell aging or immune disorders. The pharmaceutical compositions of the present invention can also be used in reducing/minimizing side effects resulting from conventional radiotherapy or chemotherapy.

Chemical properties of the new water-soluble polymer compound of benzene polycarboxylic acids make it possible to obtain a broad range of highly stable complexes, as well as pharmaceutical, nutraceutical and cosmetic compositions for parenteral, enteral and topical administration to human beings and animals.

Summary of invention

In a first aspect the present ~~invention~~ disclosure relates to a novel water-soluble polymer compound of benzene polycarboxylic acids, which is characterized by having an elemental composition of 62-67% C, 3.8-4.2% H, 29-34% O, and less than 0.2% N per dry weight and where the sum of other elements is no more than 1% per dry weight.

In a second ~~aspect~~ embodiment the present ~~invention~~ disclosure relates to a method for preparing the novel water-soluble polymer compound of benzene polycarboxylic acids, in which a lignin-containing starting raw material is subjected to alkaline treatment, followed by acid density gradient treatment in order to obtain a crude water-soluble polymer compound of benzene polycarboxylic acids, and finally subjecting the crude compound to purification. In a second aspect, there is provided a process for preparing the water-soluble polymer compound of benzene polycarboxylic acids of the first aspect, comprising the steps of: a) providing a lignin-containing starting raw material, which is produced from conifer trees and has a pH from 5.5 to 7, a moisture content from 50 to 70% and comprises no more than 32% of polysaccharides, no less

than 66% of lignin and no more than 2% of water-soluble compounds, b) subjecting the lignin-containing starting raw material of step a to alkaline treatment by adding sodium hydroxide to obtain a solution of sodium salts of benzene polycarboxylic acids, c) subjecting the solution of sodium salts of benzene polycarboxylic acids of step b to acid density gradient treatment to obtain crude polymer of benzene polycarboxylic acids, and d) purifying the crude polymer of benzene polycarboxylic acids of step c by removing low-molecular impurities to obtain the purified water-soluble polymer compound of benzene polycarboxylic acids.

In a third aspect the present ~~invention~~ disclosure relates to the novel water-soluble polymer compound of the first aspect for use in prophylaxis, treatment and modification of human and animal diseases and to pharmaceutical compositions comprising the novel water-soluble

polymer compound of the first aspect, wherein the compound of the first aspect is present as a starting raw material, as an excipient or as a drug~~for use in prophylaxis, treatment and modification of human and animal diseases~~.

In a fourth aspect the present ~~invention~~ disclosure relates to a cosmetic composition or a nutraceutical composition comprising the novel water-soluble polymer compound of the first aspect.

In a fifth aspect the present ~~invention~~ disclosure relates to a composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids of the first aspect and a metal cation and optionally an anticancer agent and its use in a pharmaceutical composition, wherein the pharmaceutical composition further comprises an anti-cancer agent ~~for prophylaxis, treatment or modification of a human or an animal disease~~.

In a sixth aspect the present ~~invention~~ disclosure relates to a composite substance comprising the water-soluble polymer compound of benzene polycarboxylic acids of the first aspect and a platinum (II) square planar coordination compound, wherein the polymer compound of benzene polycarboxylic acids encapsulates or forms a complex with said platinum (II) compound, and a process for preparing the composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids and a platinum (II) square planar coordination compound of the sixth aspect, comprising the steps of: a1) providing a lignin-containing starting raw material, which is produced from conifer trees and has a pH from 5.5 to 7, a moisture content from 50 to 70% and comprises no more than 32% of polysaccharides, no less than 66% of lignin and no more than 2% of water-soluble compounds, b1) subjecting the lignin-containing starting raw material of step a1 to alkaline treatment by adding sodium hydroxide to obtain a solution of sodium salts of benzene polycarboxylic acids, c1) subjecting solution of sodium salts of benzene polycarboxylic acids of step b1 to acid density gradient treatment to obtain a crude polymer of benzene polycarboxylic acids, d1) purifying the crude polymer of benzene polycarboxylic acids of step c1 to obtain a purified polymer of benzene polycarboxylic acids, e1) reacting the purified polymer of benzene polycarboxylic acids obtained in step d1 with a platinum (II) square planar coordination compound to obtain a reaction mixture, f1) thermostating the reaction mixture of step e1 to obtain crude composite substance, and g1) purifying the crude composite substance of step f1 to obtain the composite substance.

In a seventh aspect the present disclosure provides a drug comprising the composite substance of the sixth aspect for use in prophylaxis, treatment or modification of a disease. In a seventh ~~aspect~~ embodiment the present ~~invention~~ disclosure relates to the composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids and a platinum (II) square planar coordination compound for use as a drug or for use in the preparation of a pharmaceutical composition.

In an eighth ~~aspect~~ embodiment the present ~~invention~~ disclosure relates to the use of the drug or pharmaceutical composition comprising the composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids and a platinum (II) square planar coordination compound in the prophylaxis, treatment or palliative care or for modifying a disease of a mammal, such as for example cancer.

In a ninth aspect the present ~~invention~~ disclosure relates to a composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids of the first aspect and a molybdenum compound in the form of a molybdenum acids salt, wherein the polymer compound of benzene polycarboxylic acids encapsulates or forms a complex with the said molybdenum compound.

In a tenth aspect the present ~~invention~~ disclosure relates to a process for preparing the composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids and a molybdenum compound of the ninth aspect, comprising the steps of: a2) providing a lignin-containing starting raw material, which is produced from conifer trees and has a pH from 5.5 to 7, a moisture content from 50 to 70% and comprises no more than 32% of polysaccharides, no less than 66% of lignin and no more than 2% of water-soluble compounds, b2) subjecting the lignin-containing starting raw material of step a2 to alkaline treatment by adding sodium hydroxide to obtain a solution of sodium salts of benzene polycarboxylic acids, c2) subjecting solution of sodium salts of benzene polycarboxylic acids of step b2 to acid density gradient treatment to obtain crude polymer of benzene polycarboxylic acids, d2) purifying the crude polymer of benzene polycarboxylic acids of step c2 to obtain a purified polymer of benzene polycarboxylic acids, e2) reacting the purified polymer of benzene polycarboxylic acids obtained in step d2 with a molybdenum compound to obtain a reaction mixture, f2) thermostating the reaction mixture of step e2 to obtain crude composite substance, g2) purifying the crude composite substance of step f2 to obtain the composite substance.

In an eleventh aspect the present disclosure provides a drug comprising the composite substance of the ninth aspect for use in prophylaxis, treatment or modification of a disease.
In an eleventh ~~aspect~~ embodiment the present ~~invention~~ disclosure relates to the composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids and a molybdenum compound for use as a drug or for use in the preparation of a pharmaceutical composition.

In a twelfth ~~aspect~~ embodiment the present ~~invention~~ disclosure relates to the use of the drug or pharmaceutical composition comprising the composite substance comprising the novel water-soluble polymer compound of benzene polycarboxylic acids and a molybdenum compound in the prophylaxis, treatment or palliative care of a mammal suffering of a disease such as for example a cell cycle disruption disease or for modifying the said disease.

In a thirteenth ~~aspect~~ embodiment the present ~~invention~~ disclosure relates to pharmaceutical compositions for use in reducing/minimizing side effects resulting from conventional radiotherapy or chemotherapy.

Description of Drawings

Figure 1. ^{13}C NMR spectrum of humic acids according to prototype RU2182482.
Figure 2. IR spectrum of the polymer compound of benzene polycarboxylic acids of the present invention.
Figure 3. ^{13}C NMR spectrum of the polymer compound of benzene polycarboxylic acids of the present invention.
Figure 4. Dimeric homo- and hetero-nuclear spectra of the polymer compound of benzene polycarboxylic acids of the present invention.
Figure 5. FTICR MS spectrum of the polymer compound of benzene polycarboxylic acids of the present invention.
Figure 6. Extended X-ray Absorption Fine Structure (m) spectra of a composite substance comprising polymer compound of benzene polycarboxylic acids of the present invention and cis-diammineplatinum(II) dichloride, the inorganic cis-diammineplatinum(II) dichloride (denoted on the figure as “Cisplatin”) and cis-diammine(cyclobutane-1,1-dicarboxylate-O,O')platinum(II) (denoted on the figure as “Carboplatin”).
Figure 7. Pictures of PBMC cells on day 15 of incubation in medium without addition of the polymer compound of benzene polycarboxylic acids (denoted as “a - control”) and in the medium containing the polymer compound of benzene polycarboxylic acids of

Claims

1. A water-soluble polymer compound of benzene polycarboxylic acids characterized by having an elemental composition of 62-67% C, 3.8-4.2% H, 29-34% O, and less than 0.2% N per dry weight and where the sum of other elements is no more than 1% per dry weight.

2. The compound according to claim 1, which is further characterized by having ^{13}C NMR characteristic peaks at 15-22% in the 0-48 ppm range, 30-42% in the 108-145 ppm range, 5-13% in the 165-187 ppm range and 2-8% in the 187-220 ppm range.

3. The compound according to any of the preceding claims, which is further characterized by comprising no more than 1% low-molecular impurities identified by ^{13}C NMR characteristic peaks at 168.5, 171, 173, 181-182 ppm.

4. The compound according to any of the preceding claims which is further characterized by having IR absorption bands at 3400-3600 cm^{-1}, 2800-3000 cm^{-1}, 1500-1700 cm^{-1}, 1410 cm^{-1}, 1250-1300 cm^{-1} and 1050 cm^{-1}.

5. The compound according to any of the preceding claims, which is further characterized by comprising at least one monomer from each of the groups: saturated aliphatic carboxylic acids, saturated aliphatic hydroxycarboxylic acids, monounsaturated aliphatic carboxylic acids, monounsaturated aliphatic hydroxycarboxylic acids, polyunsaturated aliphatic carboxylic acids and aromatic components.

~~6. The compound according to claim 5, wherein at least one of the saturated aliphatic carboxylic acids is selected from the group consisting of tetradecanoic acid, hexadecanoic acid, heptadecanoic acid, octadecanoic acid, eicosanoic acid, docosanoic acid, tricosanoic acid, tetracosanoic acid, pentacosanoic acid and hexacosanoic acid.~~

~~7. The compound according to any of claims 5-6, wherein at least one of the saturated aliphatic hydroxycarboxylic acids is selected from the group consisting of hydroxyhexadecanoic acid, hydroxyoctadecanoic acid, dihydroxyoctadecanoic acid,~~

hydroxyeicosanoic acid, trihydroxyoctadecanoic acid, hydroxydocosanoic acid, hydroxytetracosanoic acid and hydroxypentacosanoic acid.

8. The compound according to any of claims 5-7, wherein at least one of the monounsaturated aliphatic carboxylic acids is selected from the group consisting of hexadecenoic acid, heptadecenoic acid, octadecenoic acid and eicosenoic acid.

9. The compound according to any of claims 5-8, wherein at least one of the monounsaturated aliphatic hydroxycarboxylic acids is selected from the group consisting of hydroxyoctadecenoic acid, dihydroxyoctadecenoic acid, dihydroxyeicosenoic acid, tetrahydroxyoctadecenoic acid and dihydroxydocosenoic acid.

10. The compound according to any of claims 5-9, wherein at least one of the polyunsaturated aliphatic carboxylic acids is selected from the group consisting of 13-cis-retinoic acid, 6Z, 9Z,12Z,15Z-octadecatetraenoic acid, cis,cis,cis-6,9,12-octadecatrienoic acid, (9R,13R)-2-oxo-5-pentyl-3-cyclopentene-1-octanoic acid, 9S-hydroperoxy-10E,12Z,15Z-octadecatrienoic acid, C13(S)-hydroxyoctadeca-9Z,11E-dienoic acid, 10S,11S-epoxy-9S-hydroxy-12Z-octadecenoic acid, 9S,12S,13S-trihydroxy-10E,15Z-octadecadienoic acid, 5,6-dehydroarachidonic acid and 15(S)-hydroxy-(5Z,8Z,11Z,13E,17Z)-eicosapentaenoic acid.

11. The compound according to any of claims 5-10, wherein at least one of the aromatic components is selected from the group consisting of 3-benzyloxy-4,5-dihydroxy-benzoic acid methyl ester, 5-(furan-2-carbonyloxy)-2-methyl-benzofuran-3-carboxylic acid methyl ester, 2,6-dimethyl-benzo(1,2-b,4,5-b')difuran-3,7-dicarboxylic acid dimethyl ester, 5-(furan-2-carbonyloxy)-2-methyl-benzofuran-3-carboxylic acid ethyl ester, rhamnetin, methyl ((4-methyl-6-oxo-6h-benzo(c)chromen-3-yl)oxy)acetate hydrate, bis(2-(methoxycarbonyl)phenyl) carbonate, sulochrin, 2,6-diacetyl-7,9-dihydroxy-8,9b-dimethyldibenzofuran-1,3(2H,9bH)-dione, O-acetylsalicylic anhydride, 4-ho-3-((6-ho-benzo(1,3)dioxol-5-yl)-(3-methoxy-phenyl)-methyl)-5h-furan-2-one, 2,3-bis-benzoyloxy-succinic acid, methyl 5-hydroxy-7,8-dimethoxy-1,3-dioxo-1,3,10,11-tetrahydrobenzo[5,6]cycloocta[1,2-c]furan-4-carboxylate, (1-methoxycarbonylmethoxy-6-oxo-6h-benzo(c)chromen-3-yloxy)-acetic acid methyl ester, atranorin and phenylpropanoid-substituted epicatechins.

612. A process for preparing the water-soluble polymer compound of benzene polycarboxylic acids according to any of the claims 1-511 comprising the steps of

a) providing a lignin-containing starting raw material, which is produced from conifer trees and has a pH from 5.5 to 7, a moisture content from 50 to 70% and comprises no more than 32% of polysaccharides, no less than 66% of lignin and no more than 2% of water-soluble compounds,

b) subjecting the lignin-containing starting raw material of step a to alkaline treatment by adding sodium hydroxide to obtain a solution of sodium salts of benzene polycarboxylic acids,

c) subjecting the solution of sodium salts of benzene polycarboxylic acids of step b to acid density gradient treatment to obtain crude polymer of benzene polycarboxylic acids, and

d) purifying the crude polymer of benzene polycarboxylic acids of step c by removing low-molecular impurities to obtain the purified water-soluble polymer compound of benzene polycarboxylic acids.

713. The process according to claim 612, wherein the alkaline treatment of step b is performed by reacting an alkaline suspension of lignin-containing starting raw material of step a with oxygen at a pH of 13 ± 0.5 and a pressure of 2.2 ± 0.3 MPa.

814. The process according to any of claims 612 or 713, wherein the acid density gradient treatment of step c is performed by subjecting the solution of sodium salts of benzene polycarboxylic acids of step b to treatment with a mineral acid to obtain a pH of 1-2 and subsequently to action of centrifugal force.

915. The process according to any of claims 6 to 812-14, wherein the purification in step d is performed by subjecting the crude polymer of benzene polycarboxylic acids of step c to one or more purifying processes selected from extraction, flotation, distillation, filtration, precipitation, centrifugation, decantation and dialysis.

1016. The compound according to any of claims 1-511 for use in prophylaxis, treatment and modification of human and animal diseases~~, such as immune, viral, bacterial, fungal and inflammatory diseases~~.

~~17. A pharmaceutical composition comprising the compound according to any of claims 1-11.~~

1118. A~~The~~ pharmaceutical composition comprising the compound according to any one of claims 1 to 5 ~~claim 17~~, wherein the compound according to any of claims 1-511 is present as a starting raw material, as an excipient or as a drug.

~~19. The pharmaceutical composition according to any of claims 17 to 18, wherein the administration route is oral, mucosal or sublingual.~~

1220. The pharmaceutical composition according to ~~any of~~ claims 1117 ~~to 19~~, wherein the pharmaceutical composition is formulated as a tablet, a lozenge, a chewing gum, a liquid viscous paste, a firm candy or lollipop or a chewable candy or gelled drop.

1321. A cosmetic composition comprising the compound according to any of claims 1-511.

1422. The cosmetic composition according to claim 1321, wherein the composition is in the form of a cream or a gel.

~~23. The cosmetic composition according to any of claims 21 to 22, wherein the compound according to claims 1-11 is present in form of an anti-inflammatory agent and/or an antioxidant agent.~~

1524. A nutraceutical composition comprising the compound according to any of claims 1-511.

1625. The nutraceutical composition according to claim 1524, wherein the said composition further comprises nutrients.

1726. A composite substance comprising a water-soluble polymer compound of benzene polycarboxylic acids according to any of the claims 1-511 and a metal cation.

~~27. The composite substance according to claim 26, wherein the water-soluble polymer compound of benzene polycarboxylic acids acts as a complexing and/or an encapsulating agent.~~

1828. The composite substance according to ~~any of~~ claims 1726-27, wherein the metal cation is selected from the group of *2s-5s* or *3d-5d* elements.

~~29. The composite substance according to claim 27, wherein the metal cation is selected from the group of elements consisting of platinum, molybdenum, lithium, calcium, potassium, magnesium, manganese, iron, zinc, silver, palladium and copper.~~

~~30. A pharmaceutical composition comprising the composite substance according to any of claims 26-29.~~

1931. ~~The~~ A pharmaceutical composition comprising the composite substance according to any one of claims 17 to 1830, wherein said pharmaceutical composition further comprises an anti-cancer agent.

~~32. The pharmaceutical composition according to any of claims 30-31, wherein said pharmaceutical composition further comprises one or more excipients.~~

~~33. The pharmaceutical composition according to claim 32, wherein the excipient is selected from the group consisting of antiadherents, binders, coating agents, disintegrants, fillers, solvents/co-solvents, flavours, colours, lubricants, glidants, preservatives, sorbents, sweeteners, carriers, polymers for modified release of API, polymers for protection of API, buffering agents, antioxidants, wetting agents, antifoaming agents, thickening agents, humectants and mixtures thereof.~~

~~34. The pharmaceutical composition according to any of claims 30-33 for use in prophylaxis, treatment or modification of a human or an animal disease.~~

2035. A composite substance comprising the water-soluble polymer compound of benzene polycarboxylic acids according to any of the claims 1-511 and a platinum (II) square planar coordination compound, wherein the polymer compound of benzene polycarboxylic acids encapsulates or forms a complex with said platinum (II) compound.

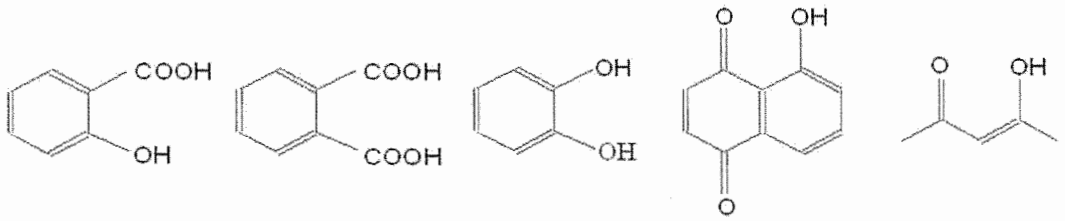
~~36. The composite substance according to claim 35, which is characterized by having characteristic IR absorption bands at 3400-3600 cm^{-1}, 2800-3000 cm^{-1}, 1500-1700 cm^{-1}~~

~~$^{-1}$, 1410 cm^{-1}, 1250-1300 cm^{-1} and 1050 cm^{-1}, and where the intensity of the peaks at 3400-3600 cm^{-1}, 1500-1700 cm^{-1}, 1410 cm^{-1} and 1250-1300 cm^{-1} is smaller than that of the polymer compound of the benzene polycarboxylic acids.~~

2137. The composite substance according to ~~any of~~ claims ~~20,35 and 36,~~ which is further characterized by having a molecular formula of $(C_3H_2O)_{x1}(C_2H_2O)_{x2}(CH_2)_{x3}(Pt(NH_3)_2)_{x4}$, where x1, x2, x3 and x4 are the coefficients representing any natural, positive, full or fractional number.

~~38. The composite substance according to claim 37, where x1 ≤ 12, x2 ≤ 9, x3 ≤ 33, and x4 = 1.~~

2239. The composite substance according to any of the claims 20 to 21~~35-38~~, which is further characterized in that the platinum compound is either encapsulated by or forms a complex with one of the following structures of the polymer compound of benzene polycarboxylic acids



(a) (b) (c) (d) (e)

where the structures a, b, c and d represent moieties of ~~the~~ aromatic components selected from the group consisting of 3-benzyloxy-4,5-dihydroxy-benzoic acid methyl ester, 5-(furan-2-carbonyloxy)-2-methyl-benzofuran-3-carboxylic acid methyl ester, 2,6-dimethyl-benzo(1,2-b,4,5-b')difuran-3,7-dicarboxylic acid dimethyl ester, 5-(furan-2-carbonyloxy)-2-methyl-benzofuran-3-carboxylic acid ethyl ester, rhamnetin, methyl ((4-methyl-6-oxo-6h-benzo(c)chromen-3-yl)oxy)acetate hydrate, bis(2-(methoxycarbonyl)phenyl) carbonate, sulochrin, 2,6-diacetyl-7,9-dihydroxy-8,9b-dimethyldibenzofuran-1,3(2H,9bH)-dione, O-acetylsalicylic anhydride, 4-ho-3-((6-ho-benzo(1,3)dioxol-5-yl)-(3-methoxy-phenyl)-methyl)-5h-furan-2-one, 2,3-bis-benzoyloxy-succinic acid, methyl 5-hydroxy-7,8-dimethoxy-1,3-dioxo-1,3,10,11-tetrahydrobenzo[5,6]cycloocta[1,2-c]furan-4-carboxylate, (1-methoxycarbonylmethoxy-6-oxo-6h-benzo(c)chromen-3-yloxy)-acetic acid methyl ester, atranorin and

phenylpropanoid-substituted epicatechins ~~mentioned in claim 11~~ and structure e represents a moiety of the acids mentioned, wherein said acid is a saturated aliphatic hydroxycarboxylic acids selected from the group consisting of hydroxyhexadecanoic acid, hydroxyoctadecanoic acid, dihydroxyoctadecanoic acid, hydroxyeicosanoic acid, trihydroxyoctadecanoic acid, hydroxydocosanoic acid, hydroxytetracosanoic acid and hydroxypentacosanoic acid; or a monounsaturated aliphatic carboxylic acid selected from the group consisting of hexadecenoic acid, heptadecenoic acid, octadecenoic acid and eicosenoic acid or a monounsaturated aliphatic hydroxycarboxylic acids selected from the group consisting of hydroxyoctadecenoic acid, dihydroxyoctadecenoic acid, dihydroxyeicosenoic acid, tetrahydroxyoctadecenoic acid and dihydroxydocosenoic acid ~~in claims 7-10~~.

23~~40~~. A process for preparing the composite substance according to any of the claims 20 to 22~~35-39~~ comprising the steps of

a1) providing a lignin-containing starting raw material, which is produced from conifer trees and has a pH from 5.5 to 7, a moisture content from 50 to 70% and comprises no more than 32% of polysaccharides, no less than 66% of lignin and no more than 2% of water-soluble compounds,

b1) subjecting the lignin-containing starting raw material of step a1 to alkaline treatment by adding sodium hydroxide to obtain a solution of sodium salts of benzene polycarboxylic acids,

c1) subjecting solution of sodium salts of benzene polycarboxylic acids of step b1 to acid density gradient treatment to obtain a crude polymer of benzene polycarboxylic acids,

d1) purifying the crude polymer of benzene polycarboxylic acids of step c1 to obtain a purified polymer of benzene polycarboxylic acids,

e1) reacting the purified polymer of benzene polycarboxylic acids obtained in step d1 with a platinum (II) square planar coordination compound to obtain a reaction mixture,

f1) thermostating the reaction mixture of step e1 to obtain crude composite substance, and

g1) purifying the crude composite substance of step f1 to obtain the composite substance.

2441. The process according to claim 4023, wherein the alkaline treatment of step b1 is performed by reacting an alkaline suspension of lignin-containing material of step a1 with oxygen at a pH of 13 ± 0.5 and a pressure of 2.2 ± 0.3 MPa.

2542. The process according to any of the claims 23 to 24 ~~40 and 41~~, wherein the acid density gradient treatment of step c1 is performed by subjecting the solution of sodium salts of benzene polycarboxylic acids of step b1 to treatment with a mineral acid to obtain a pH of 1-2 and subsequently to action of centrifugal force.

2643. The process according to any of claims 23 to 25~~40-42~~, wherein the purifying in step d1 is performed by subjecting the crude polymer of benzene polycarboxylic acids of step c1 to one or more purifying processes selected from extraction, flotation, distillation, filtration, precipitation, centrifugation, decantation and dialysis.

2744. The process according to any of the claims 23 to 26~~40-43~~, wherein the square planar coordination platinum compound is cis-diammineplatinum (II) dichloride or potassium tetrachloroplatinate or the mixture thereof.

~~45. The process according to any of the claims 40-44, wherein the reaction of step e1 is performed by exposure of the reactants to wave radiation, and more particularly to ultrasound treatment, with a power density in the range of 0.5-5 W/cm^3 and a frequency in the range of 18-66 kHz and within a period of time in the range from 1 to 30 minutes until the content of unbound platinum falls below 25% of the originally added quantity.~~

~~46. The process according to any of claims 40-45, wherein the thermostating of the reaction mixture in step f1 is performed until the content of free platinum in the crude composite substance falls below 10% of the amount of platinum (II) added in step e1.~~

~~47. The process according to any of the claims 40-46, wherein the purifying procedure of step g1 is performed by subjecting the crude composite substance of step f1 to one or more purifying processes selected from filtration, autoclaving and irradiation.~~

2848. A drug comprising the composite substance according to any of the claims 20 to 2235-39 for use in prophylaxis, treatment or modification of a disease.

2949. The drug according to claim 48-28 for use in prophylaxis, treatment or palliative care of a mammal suffering of cancer or for modifying said cancer, for example breast cancer, pancreatic cancer, urinary bladder cancer, prostate cancer, colon cancer and head and neck cancer.

~~50. The drug according to claim 48 for use in prophylaxis, treatment or palliative care or for modifying a disease of a mammal, where the administration route is parenteral, enteral, topical, oral, mucosal or sublingual.~~

~~51. The drug according to any of the claims 48 to 50 for use in prophylaxis, treatment or palliative care of a mammal suffering of cancer or modifying the cancer, where the said mammal is a non-food producing species, preferably a human being, a dog, a cat or a horse.~~

~~52. A pharmaceutical composition comprising the drug according to any of the claims 48-51.~~

~~53. The pharmaceutical composition according to claim 52 further comprising one or more excipients.~~

~~54. The pharmaceutical composition according to claim 53, where the excipient is selected from the group consisting of antiadherents, binders, coating agents, disintegrants, fillers, solvents/co-solvents, flavours, colours, lubricants, glidants, preservatives, sorbents, sweeteners, carriers, polymers for modified release of API, polymers for protection of API, buffering agents, antioxidants, wetting agents, antifoaming agents, thickening agents, humectants and mixtures thereof.~~

~~55. The pharmaceutical composition according to any of the claims 52-54 for use in prophylaxis, treatment or palliative care of a mammal suffering of cancer or for modifying the cancer, for example breast cancer, pancreatic cancer, urinary bladder cancer, prostate cancer, colon cancer and head and neck cancer.~~

~~56. The pharmaceutical composition according to any of the claims 52-54 for use in prophylaxis, treatment or palliative care or for modifying a disease of a mammal, where the administration route is parenteral, enteral or topical.~~

~~57. The pharmaceutical composition according to any of the claims 52-54 for use in prophylaxis, treatment or palliative care or for modifying a disease of a mammal, where the administration route is oral, mucosal or sublingual.~~

~~58. The pharmaceutical composition according to claim 57, wherein the pharmaceutical composition is formulated as a tablet, a lozenge, a chewing gum, a liquid viscous paste, a firm candy or lollipop or a chewable candy or gelled drop.~~

~~59. The pharmaceutical composition according to any of the claims 52-55 for use in prophylaxis, treatment or palliative care of a mammal suffering of cancer or modifying the cancer, where the said mammal is a non-food producing species, preferably a human being, a dog, a cat or a horse.~~

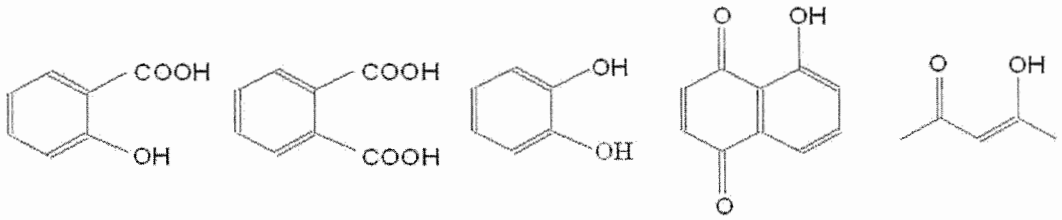
30~~60~~. A composite substance comprising the water-soluble polymer compound of benzene polycarboxylic acids according to any of the claims 1-5~~11~~ and a molybdenum compound in the form of a molybdenum acids salt, wherein the polymer compound of

benzene polycarboxylic acids encapsulates or forms a complex with the said molybdenum compound.

~~61. The composite substance according to claim 60, which is characterized by having characteristic IR absorption bands at 3400-3600 cm^{-1}, 2800-3000 cm^{-1}, 1500-1700 cm^{-1}, 1410 cm^{-1}, 1250-1300 cm^{-1} and 1050 cm^{-1}, and where the intensity of the peaks at 3400-3600 cm^{-1}, 1500-1700 cm^{-1}, 1410 cm^{-1} and 1250-1300 cm^{-1} is smaller than that of the polymer compound of the benzene polycarboxylic acids.~~

31~~62~~. The composite substance according to ~~any of~~ claim~~s~~ 30~~60 and 61~~, which is further characterized by having a molecular formula of $(C_3H_2O)_{x1}(C_2H_2O)_{x2}(CH_2)_{x3}(MoO_3)_{x4}(H_2O)_{x5}(NH_4)_{x6}$, where x_1, x_2, x_3, x_4, x_5 and x_6 are the coefficients representing any natural, positive, full or fractional number.

32~~63~~. The composite substance according to any of the claims 30 to 31~~60-62~~, which is further characterized in that the molybdenum compound is either encapsulated by or forms complex with one of the following structures of the polymer compound of benzene polycarboxylic acids



(a) (b) (c) (d) (e)

where the structures a, b, c and d represent moieties of ~~the~~ aromatic components selected from the group consisting of 3-benzyloxy-4,5-dihydroxy-benzoic acid methyl ester, 5-(furan-2-carbonyloxy)-2-methyl-benzofuran-3-carboxylic acid methyl ester, 2,6-dimethyl-benzo(1,2-b,4,5-b')difuran-3,7-dicarboxylic acid dimethyl ester, 5-(furan-2-carbonyloxy)-2-methyl-benzofuran-3-carboxylic acid ethyl ester, rhamnetin, methyl ((4-methyl-6-oxo-6h-benzo(c)chromen-3-yl)oxy)acetate hydrate, bis(2-(methoxycarbonyl)phenyl) carbonate, sulochrin, 2,6-diacetyl-7,9-dihydroxy-8,9b-dimethyldibenzofuran-1,3(2H,9bH)-dione, O-acetylsalicylic anhydride, 4-ho-3-((6-ho-benzo(1,3)dioxol-5-yl)-(3-methoxy-phenyl)-methyl)-5h-furan-2-one, 2,3-bis-benzoyloxy-succinic acid, methyl 5-hydroxy-7,8-dimethoxy-1,3-dioxo-1,3,10,11-

tetrahydrobenzo[5,6]cycloocta[1,2-c]furan-4-carboxylate, (1-methoxycarbonylmethoxy-6-oxo-6h-benzo(c)chromen-3-yloxy)-acetic acid methyl ester, atranorin and phenylpropanoid-substituted epicatechins ~~mentioned in claim 11~~ and structure e represents a moiety of the acids, wherein said acid is a saturated aliphatic hydroxycarboxylic acids selected from the group consisting of hydroxyhexadecanoic acid, hydroxyoctadecanoic acid, dihydroxyoctadecanoic acid, hydroxyeicosanoic acid, trihydroxyoctadecanoic acid, hydroxydocosanoic acid, hydroxytetracosanoic acid and hydroxypentacosanoic acid; or a monounsaturated aliphatic carboxylic acid selected from the group consisting of hexadecenoic acid, heptadecenoic acid, octadecenoic acid and eicosenoic acid or a monounsaturated aliphatic hydroxycarboxylic acids selected from the group consisting of hydroxyoctadecenoic acid, dihydroxyoctadecenoic acid, dihydroxyeicosenoic acid, tetrahydroxyoctadecenoic acid and dihydroxydocosenoic acid ~~mentioned in claims 7-10~~.

33~~64~~. A process for preparing the composite substance according to any of the claims 30 to 32~~60-63~~ comprising the steps of

a2) providing a lignin-containing starting raw material, which is produced from conifer trees and has a pH from 5.5 to 7, a moisture content from 50 to 70% and comprises no more than 32% of polysaccharides, no less than 66% of lignin and no more than 2% of water-soluble compounds

b2) subjecting the lignin-containing starting raw material of step a2 to alkaline treatment by adding sodium hydroxide to obtain a solution of sodium salts of benzene polycarboxylic acids,

c2) subjecting solution of sodium salts of benzene polycarboxylic acids of step b2 to acid density gradient treatment to obtain crude polymer of benzene polycarboxylic acids,

d2) purifying the crude polymer of benzene polycarboxylic acids of step c2 to obtain a purified polymer of benzene polycarboxylic acids,

e2) reacting the purified polymer of benzene polycarboxylic acids obtained in step d2 with a molybdenum compound to obtain a reaction mixture,

f2) thermostating the reaction mixture of step e2 to obtain crude composite substance,

g2) purifying the crude composite substance of step f2 to obtain the composite substance.

34~~65~~. The process according to claim 33~~64,~~ wherein the alkaline treatment of step b2 is performed by reacting an alkaline suspension of lignin-containing material of step a2 with oxygen at a pH of 13 ± 0.5 and a pressure of 2.2 ± 0.3 MPa.

35~~66~~. The process according to any of the claims 33 to 34~~64 and 65~~, wherein the acid density gradient treatment of step c2 is performed by subjecting the solution of sodium salts of benzene polycarboxylic acids of step b2 to treatment with a mineral acid and subsequently to action of centrifugal force.

36~~67~~. The process according to any of claims 33 to 35 ~~64-66~~, wherein the purifying in step d2 is performed by subjecting the crude polymer of benzene polycarboxylic acids of step c2 to one or more purifying processes selected from extraction, flotation, distillation, filtration, precipitation, centrifugation, decantation and dialysis.

37~~68~~. The process according to any of the claims 33 to 36~~64-67~~, wherein the molybdenum acids salt is ammonium molybdate, ammonium molybdate tetrahydrate, potassium molybdate, sodium molybdate, sodium molybdate dihydrate or a mixture thereof.

~~69. The process according to any of the claims 64-68, wherein the reaction of step e2 is performed by exposure of the reactants to wave radiation, and more particularly to~~

~~ultrasound treatment, with a power density in the range of 0.5-5 W/cm^3 and a frequency in the range of 18-66 kHz and within a period of time in the range from 1 to 30 minutes until the content of unbound molybdenum falls below 25% of the originally added quantity.~~

~~70. The process according to any of the claims 64-69, wherein the thermostating of the reaction mixture in step f2 is performed until the content of free molybdenum in the crude composite substance falls below 10% of the amount of molybdenum compound added in step e2.~~

~~71. The process according to any of the claims 64-70, wherein the purification procedure of step g2 is performed by subjecting the crude composite substance to one or more purifying processes selected from filtration, autoclaving and irradiation.~~

38~~72~~. A drug comprising the composite substance according to any of the claims 30 to 32~~60-63~~ for use in prophylaxis, treatment or modification of a disease.

39~~73~~. The drug according to claim ~~72~~ 38 for use in prophylaxis, treatment or palliative care of a mammal suffering of a cell cycle disruption disease or for modifying the said disease.

~~74. The drug according to claim 73 for use in prophylaxis, treatment or palliative care or for modifying a disease of a mammal, where the administration route is oral, mucosal or sublingual.~~

~~75. The drug according to the claim 73 for use in prophylaxis, treatment or palliative care of a mammal suffering of a cell cycle disruption disease or modifying the said disease, where the said mammal is a non-food producing species, preferably a human being, a dog, a cat or a horse.~~

~~76. A pharmaceutical composition comprising the drug according to any of the claims 72-75.~~

~~77. The pharmaceutical composition according to claim 76 further comprising one or more excipients.~~

78. The pharmaceutical composition according to claim 77, where the excipient is selected from the group consisting of antiadherents, binders, coating agents, disintegrants, fillers, solvents/co-solvents, flavours, colours, lubricants, glidants, preservatives, sorbents, sweeteners, carriers, polymers for modified release of API, polymers for protection of API, buffering agents, antioxidants, wetting agents, antifoaming agents, thickening agents, humectants and mixtures thereof.

79. The pharmaceutical composition according to any of the claims 76-78 for use in prophylaxis, treatment or palliative care of a mammal suffering of a cell cycle disruption disease or for modifying the said disease.

80. The pharmaceutical composition according to any of the claims 76-78 for use in prophylaxis, treatment or palliative care or for modifying a disease of a mammal, where the administration route is oral, mucosal or sublingual.

81. The pharmaceutical composition according to claim 80, wherein the pharmaceutical composition is formulated as a tablet, a lozenge, a chewing gum, a liquid viscous paste, a firm candy or lollipop or a chewable candy or gelled drop.

82. The pharmaceutical composition according to any of the claims 76-78 for use in prophylaxis, treatment or palliative care of a mammal suffering of a cell cycle disruption disease or modifying the said disease, where the said mammal is a non-food producing species, preferably a human being, a dog, a cat or a horse.

83. A method of treating a disease in an individual in need thereof, said method comprising administering the pharmaceutical composition according to any one of claims 17-20, 30-34, 52-59 and 76-82 to a mammal in need thereof.

84. The method according to claim 83, where the pharmaceutical composition is administered for treatment or palliative care of a mammal suffering of a cell cycle disruption disease or for modifying the said disease.

85. The method according to any of claims 83-84, where the administration route is oral, parenteral, enteral or topical.

86. The method according to any of claims 83-85, where the mammal is a non-food producing species, preferably a human being, a dog, a cat or a horse.

87. The pharmaceutical compositions according to any of claims 17-20, 30-34, 52-59 and 76-82 for use in reducing/minimising side effects resulting from conventional radiotherapy or chemotherapy.

88. The pharmaceutical composition according to claim 87, where the composition is administered orally.

89. The pharmaceutical composition according to any of claims 87 and 88, where the drug or composition is administered orally before and/or during and/or after use of conventional radio or chemotherapy.

90. The pharmaceutical composition according to any of claims 87 to 89, where the pharmaceutical composition is formulated as a tablet, a lozenge, a chewing gum, a liquid viscous paste, a firm candy or lollipop or a chewable candy or gelled drop.

91. A method for reducing/minimising side effects resulting from conventional radiotherapy or chemotherapy in an individual in need thereof, said method comprising administering the pharmaceutical composition according to any one of claims 17-20, 30-34, 52-59 and 76-82 to a mammal in need thereof.