Description

Background and Statement of the Invention

This invention relates to a liquid separating composition used for separating the components of a liquid substance under centrifugal force. More particularly, this invention relates to the separation of the relatively light normally liquid blood phase from a blood composition containing serum or plasma from a relatively heavy normally solid blood phase containing, for example, erythrocytes, platelets, etc., by subjecting the blood sample to centrifugation. Moreover, this invention relates to a blood collection assembly and to the use of the blood partitioning composition for the recovery of drugs.

Biochemical tests carried out in a clinical laboratory require use of blood serum or plasma as a sample. For preparing the sample for examination, it is necessary to separate the blood serum or plasma from the solid blood components. Prior art methods for obtaining such separation include adding to a sample of blood a substance, or an object, or a combination of the two, having a specific gravity intermediate between serum or plasma and the solid blood component. Under centrifugal forces, this substance moves intermediate between the two types of blood components thereby forming a partitioning wall between them.

Representative wall-forming separation materials include those disclosed in U.S. Patents 3,780,935 and 3,852,194, for example. These compositions are referred to as gel compositions or thixotropic compositions. Other patents which are directed to separation and/or barrier materials include, for example, U.S. Patent No. 4,230,584, issued October 28, 1980; U.S. Patent No. 4,148,764 issued April 10, 1979; U.S. Patent No. 4,534,798, issued August 13, 1985; U.S. Patent No. 4,457,782, issued July 3, 1984; U.S. Patent No. 4,172,803, issued October 30, 1979; U.S. Patent No. 4,101,422, issued July 18, 1978 and U.S. Patent No. 4,310,430, issued January 12, 1982. The '422 patent is directed to a polyester material useful in separation compositions, while the '584 patent is directed to a device for using the composition of the '803 patent. The remaining patents are directed to separation compositions of specific components for achieving specific separation results. None of them, however, are directed to a specific dual resin component as found in this invention which provides good stability of blood analytes and a wide range of groups of drugs.

EP-A-0 119 692, which reference has been used for de-limitation, discloses a method of separating lymphocytes from other leukocytes in an anticoagulated blood sample which comprises forming a mixture by introducing the blood sample into a vessel containing a hydrophobic, chemically inert barrier material as for instance n-hexadecane or n-octadecane and a high density halocarbon oil and phagocytizable inert particles wet with the hydrophilic material, said barrier material having a specific gravity greater than that of the lymphocytes but less than that of the particles and of erythrocytes in the blood; incubating said mixture, whereby at least a portion of said particles are phagocytized by phagocytic leukocytes in said sample; and centrifuging said container for a time sufficient to cause said barrier layer to migrate between said lymphocytes and said leukocytes containing phagocytized particles and erythrocytes in said sample.

EP-A-0 046 391 discloses a composition for use in partitioning blood components comprising a solid liquid mixture, characterized by being a mixture of

(1) a thixotropy-imparting agent,

(2) a first viscous liquid material as for instance vegetable oils having strong interaction with the thixotropy-imparting agent and

(3) a second viscous liquid material as for instance chlorinated hydrocarbons having no strong interaction with the thixotropy-imparting agent and having good compatibility with the first viscous liquid material,

said composition having a specific gravity at 20 °C of from 1.03 to 1.08.

DE-OS 29 17 887 discloses a method for partitioning of blood using a composition comprising a polybutadiene polymerizate comprising at least 50 % by weight of butadiene units and up to 50 % by weight units of one or more other ethylenically unsaturated monomers selected from, inter alia, vinyl chloride, vinylidene chloride, 1-chloro-2-butene, chloroprene, bromoprene, 1-chloro-3-methylbutadiene etc.

The invention here, as discussed above, discloses a new thixotropic composition which may, for example, be useful for the improved recovery of imipramine. In the ideal separation of the type employing a thixotropic gel as the phase separation barrier component, the gel is characterized as compositionally stable, and physically stable in the absence of any substantial application of centrifugal force. Moreover, it is appropriate for the gel to form a strong cohesive barrier between the components desired to be separated, that the gel be chemically inert, and have a density which is intermediate that of the blood phases to be separated.

Compositionally stable compositions mean that the components are ingredients of the separating gel which will not separate under normal storage and/or use. The composition is basically an oil or an oil-like composition compounded with an inert filler. However, the composition should be stable enough that the oil

or oil-like material does not bleed or separate from the inert filler dispersed therein. Physically stable barrier materials will not move or change shape except when subjected to the application of centrifugal force. By chemically inert, it is meant that the barrier material should not be chemically reactive with the blood sample being separated, its constituents or reagents commonly employed in carrying out diagnostic testing of blood serum.

This invention constitutes an improvement over the prior art thixotropic gel compositions in that it has been discovered that a specific hydrocarbon resin namely poly-alpha-pinene has hydrophobic properties and gives superior recoveries for drugs with higher PKa values. However, this hydrocarbon resin has a lower density of 0.99 which restricts the use of this material alone as being a possible candidate for a barrier gel. The Applicants here have discovered, quite unexpectedly, that by mixing a chlorinated hydrocarbon with this hydrocarbon to form a dual resin component, the density is increased to a level to formulate a thixotropic gel appropriate for centrifugal separation. Moreover, with this hydrocarbon and chlorinated hydrocarbon blend, adjustments can be made of the density of the final resin component as required for specific applications.

In considering generally the properties of the gel composition of the invention here, the composition contains a mixture of resin blends, as discussed above, with an adjusted specific gravity, preferably, ranging from within the range of between 1.00 and 1.04 at 25° C, a radiation stabilizer, a short chain polyfunctional material as a network stabilizer and a thixotropic agent. The composition of the invention has a specific gravity at 25° C generally within the range of between 1.03 and 1.07, and a viscosity at 25° C of within the range of between 800,000 and 1,800,000 mPa•s (centipoises) at a shearing rate of 1 second $^{-1}$.

The new gel composition is based upon hydrocarbon raw materials selected because they are more hydrophobic, in combination. Moreover, the new gel composition has a lower specific gravity and a higher viscosity. The new gel composition forms a complete and solid barrier with minimum red cell entrapment at 1,000 G force centrifugation. It provides the stability of blood analytes. Moreover, it provides good drug recovery and stability of a wide range of drugs.

In considering generally the composition for the invention here, a typical composition includes a resin blend, as discussed above, of a poly-alpha-pinene resin and a chlorinated alpha olefin. The composition includes a radiation stabilizer such as Gamma Shield 401 or 801 (Trade names), products of M. & T. Chemicals Inc., Rahway, New Jersey, or epoxidized soybean oil, a network stabilizer such as glycerine, ethylene diamine, propylene glycol, or ethylene glycol, a thixotropic agent such as silica and a pigment such as titanium dioxide.

A preferred composition, in accordance with this invention, includes admixing within the range of between 67 and 86 percent by weight poly-alpha-pinene, within the range of between 13 and 24 percent by weight chlorinated hydrocarbon, within the range of between 2 and 6 percent by weight silica, within the range of between about 0.15 and 0.8 percent a short chain polyfunctional stabilizer, within the range of between 0.015 and 0.03 percent titanium dioxide, and within the range of between 2.3 and 15 percent epoxidized soybean oil. The chlorinated hydrocarbon used in the composition is selected to have a minimum of 50 percent chlorine. A specific source of the polyterpine resin poly-alpha-pinene is a product of Arizona Chemical Company designated Zonarex Alpha 25. A specific source of chlorinated hydrocarbon is DO8618 which is chlorinated octadecene, a product of Dover Chemical Corporation.

Detailed Description of the Drawing

The single Figure shows a vertical sectional view of an evacuated container, illustrating the use of the gel composition of the invention.

As shown in the drawing, there is provided an evacuated tube 10, closed by a stopper 12, which has a gel composition 11, in accordance with the invention. A blood sample of interest can be transferred to tube 10, as known in the art, by piercing stopper 12 with a cannula. Subsequently, tube 10 is placed in a centrifuge in the usual manner and subjected to centrifugal force, as discussed in more detail below. This causes the composition 11 to become non-thixotropic and to move to a point dividing the heavier and lighter fractions of the sample introduced. For a further detailed review of this general procedure, reference is made to U.S. Patent No. 4,350,593, issued September 21, 1982.

As illustrative of a range of materials useful in the gel composition of the invention, one may note the following ranges:

	COMPONENT	WIDE RANGE WEIGHT PERCENT	PREFERRED RANGE WEIGHT PERCENT
A	Poly-Alpha-Pinene	67 - 86%	70 - 77%
B	Chlorinated Octadecene	13 - 24%	12.5 - 14.5%
C	Epoxidized Soybean Oil	2.3 - 15%	4.5 - 7%
D	Short Chain Polyfunctional Stabilizer	0.1 - 0.8%	0.4 - 0.6%
E	Fumed Silica	2 - 6%	4.0 - 5.5%
F	Titanium Dioxide	0.015 - 0.03%	0.02 - 0.03%

As purely illustrative of the enhanced results achieved, in accordance herewith, one may note the following example in which formulation, in accordance herewith is prepared as a thixotropic gel barrier medium for an evacuated blood collection tube. The composition was prepared and inserted into glass tubes which were subsequently stoppered and evacuated. Blood samples were introduced into the prepared tubes and placed under centrifugal force. Other tubes available on the market were used as the control for comparison purposes.

EXAMPLE

The following materials were admixed in percent by weight to form a representative composition according to the invention:

A.	Poly-Alpha-Pinene	75.66%
B.	Chlorinated Octadecene	13.24%
C.	Epoxidized Soybean Oil	5.67%
D.	Short Chain Polyfunctional Stabilizer	0.40%
E.	Fumed Silica	5.00%
F.	Titanium Dioxide	0.03%

The procedure for forming the composition included dispensing materials "A", "B" and "C" into a mix container, and adding "D." Thereafter, the admixture was heated and maintained at 60° C. Then, the admixture was blended under vacuum conditions. Following the blending, E and F were added and again blended under vacuum.

The gel material thus formed was dispensed into 20 conventional glass tubes used for blood sample separation procedures. In this connection, 1 to 2 g of the formed gel was dispensed into each tube, and then each tube was evacuated and stoppered in the usual manner, and sterilized by exposure to 1.5 MR of gamma irradiation.

At this point, representative blood samples were introduced into the tubes. After a dwell time of thirty minutes to simulate actual conditions, the tubes were subjected to centrifugation at 1000 G force. The gel in the tubes formed a barrier between blood cells and serum. Tubes were inverted and the gel barrier did not allow migration of cells into serum. After centrifugation, each of the tubes was examined closely and every tube indicated that the gel of the invention formed a clean barrier between the blood cell component of the introduced sample and the serum component. There was no indication of blood cells having migrated into the serum.

In order to establish drug recovery, another batch of 20 tubes were prepared as described above, and a control set of 20 non gel tubes were used, designated as Red Top VACUTAINER^{R} Brand Tubes (Becton Dickinson VACUTAINER Systems, Rutherford, New Jersey). The tubes were spiked with radiolabeled drugs including carbon 14 imipramine, carbon 14 lidocaine, carbon 14 of phenobarbitol, carbon 14 quinidine and tritium desmethylimipramine, after the introduction of the blood samples. The contents of the tubes were mixed gently. There, the tubes were subjected to centrifugation at 1000 G force. The radioactivity of the drugs present was read by a liquid scintillation counter and the percent of recovery was compared between the control tubes and the tubes containing the composition of the invention.

It was found that after the barrier formation the percent of recovery for the tubes containing the composition of the invention was 95-99 percent for the drugs tested (average of 20 tubes) as compared to the control.

Accordingly, as will be apparent from the foregoing, there is provided in accordance herewith methods and compositions for providing a new thixotropic gel composition for separating blood components which

gel composition is based upon a hydrocarbon raw material and is more hydrophobic. The composition includes a resin component which achieves superior stability of blood analytes balanced with a chlorinated hydrocarbon which provides the appropriate control density level for the composition under centrifugal force. Furthermore, because of the chemical nature of the resin blend in the gel composition and lower density and higher viscosity of the gel, a more complete and solid barrier is achieved with the minimum of red cell entrapment at the specified centrifugal force.

Claims

Claims for the following Contracting States : AT, BE, CH, DE, DK, FR, GB, GR, IT, LI, LU, NL, SE

1. A blood partitioning composition comprising an admixture forming a thixotropic gel, said gel comprising a hydrocarbon of lower density combined with a chlorinated hydrocarbon of higher density, characterized by
   (a) a dual resin component including said hydrocarbon and said chlorinated hydrocarbon wherein the lower density hydrocarbon is poly-alpha-pinene;
   (b) a radiation stabilizer;
   (c) a network stabilizer;
   (d) a thixotropic agent; and
   (e) a pigment.

2. The composition of Claim 1, wherein
   (a) said dual resin component comprises
      (1) poly-alpha-pinene; and
      (2) chlorinated octadecene.

3. The blood partitioning composition of Claim 2, wherein
   (a) said poly-alpha-pinene is present within the range of between 67 and 86 percent by weight; and
   (b) said chlorinated hydrocarbon is present within the range of between 13 and 24 percent by weight.

4. The composition of Claim 1, wherein
   (a) said chlorinated hydrocarbon has a chlorine content of at least 50 percent.

5. The blood partitioning composition as claimed in Claim 1 characterized by an admixture forming a thixotropic gel, said gel composition comprising
   (a) a resin blend of poly-alpha-pinene and chlorinated octadecene;
   (b) epoxidized soybean oil;
   (c) short chain polyfunctional network stabilizer;
   (d) silica; and
   (e) titanium dioxide.

6. The composition of Claim 5 wherein
   (a) said composition has a specific gravity of within the range of between 1.03 and 1.07 at 25° C.

7. The composition of Claim 5, wherein
   (a) said composition has a viscosity of within the range of between 800,000 and 1,800,000 mPa•S (centipoises).

8. The blood partitioning composition as claimed in Claims 1 or 5 characterized by an admixture forming a thixotropic gel, said gel comprising
   (a) a dual resin component including within the range of between 67 and 86 percent by weight of a hydrocarbon combined with within the range of between 13 and 24 percent by weight of a chlorinated hydrocarbon;
   (b) within the range of between 2 and 6 percent by weight of a thixotropic agent;
   (c) within the range of between 0.015 and 0.03 percent by weight of a pigment;
   (d) within the range of between 0.15 and 0.8 percent by weight of a network stabilizer; and
   (e) within the range of between 2.3 and 15 percent by weight of a radiation stabilizer.

gel composition is based upon a hydrocarbon raw material and is more hydrophobic. The composition includes a resin component which achieves superior stability of blood analytes balanced with a chlorinated hydrocarbon which provides the appropriate control density level for the composition under centrifugal force. Furthermore, because of the chemical nature of the resin blend in the gel composition and lower density and higher viscosity of the gel, a more complete and solid barrier is achieved with the minimum of red cell entrapment at the specified centrifugal force.

Claims

Claims for the following Contracting States : AT, BE, CH, DE, DK, FR, GB, GR, IT, LI, LU, NL, SE

1. A blood partitioning composition comprising an admixture forming a thixotropic gel, said gel comprising a hydrocarbon of lower density combined with a chlorinated hydrocarbon of higher density, characterized by
   (a) a dual resin component including said hydrocarbon and said chlorinated hydrocarbon wherein the lower density hydrocarbon is poly-alpha-pinene;
   (b) a radiation stabilizer;
   (c) a network stabilizer;
   (d) a thixotropic agent; and
   (e) a pigment.

2. The composition of Claim 1, wherein
   (a) said dual resin component comprises
      (1) poly-alpha-pinene; and
      (2) chlorinated octadecene.

3. The blood partitioning composition of Claim 2, wherein
   (a) said poly-alpha-pinene is present within the range of between 67 and 86 percent by weight; and
   (b) said chlorinated hydrocarbon is present within the range of between 13 and 24 percent by weight.

4. The composition of Claim 1, wherein
   (a) said chlorinated hydrocarbon has a chlorine content of at least 50 percent.

5. The blood partitioning composition as claimed in Claim 1 characterized by an admixture forming a thixotropic gel, said gel composition comprising
   (a) a resin blend of poly-alpha-pinene and chlorinated octadecene;
   (b) epoxidized soybean oil;
   (c) short chain polyfunctional network stabilizer;
   (d) silica; and
   (e) titanium dioxide.

6. The composition of Claim 5 wherein
   (a) said composition has a specific gravity of within the range of between 1.03 and 1.07 at 25° C.

7. The composition of Claim 5, wherein
   (a) said composition has a viscosity of within the range of between 800,000 and 1,800,000 mPa•S (centipoises).

8. The blood partitioning composition as claimed in Claims 1 or 5 characterized by an admixture forming a thixotropic gel, said gel comprising
   (a) a dual resin component including within the range of between 67 and 86 percent by weight of a hydrocarbon combined with within the range of between 13 and 24 percent by weight of a chlorinated hydrocarbon;
   (b) within the range of between 2 and 6 percent by weight of a thixotropic agent;
   (c) within the range of between 0.015 and 0.03 percent by weight of a pigment;
   (d) within the range of between 0.15 and 0.8 percent by weight of a network stabilizer; and
   (e) within the range of between 2.3 and 15 percent by weight of a radiation stabilizer.

* C L M S *

9. A blood collection assembly comprising
   (a) an evacuated tube;
   (b) said evacuated tube having a closed end and an open end;
   (c) an elastomer stopper for closing said open end and maintaining the vacuum in said evacuated tube; and
   (d) a blood partitioning composition in said evacuated tube,
   as claimed in any of Claims 1 to 8.

10. Use of the blood partitioning composition of Claims 1 to 8 for the recovery of drugs.

Claims for the following Contracting State : ES

1. A process for preparing a blood partitioning composition, which comprises admixing
   (a) a dual resin component including a hydrocarbon of lower density combined with a chlorinated hydrocarbon of higher density, wherein the lower density hydrocarbon is poly-alpha-pinene;
   (b) a radiation stabilizer;
   (c) a network stabilizer;
   (d) a thixotropic agent; and
   (e) a pigment,
   to form a thixotropic gel.

2. The process of Claim 1, wherein
   (a) said dual resin component comprises
      (1) poly-alpha-pinene; and
      (2) chlorinated octadecene.

3. The process of Claim 2, wherein
   (a) said poly-alpha-pinene is present within the range of between 67 and 86 percent by weight; and
   (b) said chlorinated hydrocarbon is present within the range of between 13 and 24 percent by weight.

4. The process of Claim 1, wherein
   (a) said chlorinated hydrocarbon has a chlorine content of at least 50 percent.

5. The process of Claim 1, wherein the prepared thixotropic gel composition comprises
   (a) a resin blend of poly-alpha-pinene and chlorinated octadecene;
   (b) epoxidized soybean oil;
   (c) short chain polyfunctional network stabilizer;
   (d) silica; and
   (e) titanium dioxide.

6. The process of Claim 5, wherein
   (a) said prepared composition has a specific gravity of within the range of between 1.03 and 1.07 at 25 °C.

7. The process of Claim 5, wherein
   (a) said prepared composition has a viscosity of within the range of between 800,000 and 1,800,000 mPa.s (centipoises).

8. The process as claimed in Claims 1 or 5, characterized in that the prepared thixotropic gel comprises
   (a) a dual resin component including within the range of between 67 and 86 percent by weight of a hydrocarbon combined with within the range of between 13 and 24 percent by weight of a chlorinated hydrocarbon;
   (b) within the range of between 2 and 6 percent by weight of a thixotropic agent;
   (c) within the range of between 0.015 and 0.03 percent by weight of a pigment;
   (d) within the range of betwen 0.15 and 0.8 percent by weight of a network stabilizer; and
   (e) within the range of between 2.3 and 15 percent by weight of a radiation stabilizer.

* C L M S *

9. A blood collection assembly comprising
   (a) an evacuated tube;
   (b) said evacuated tube having a closed end and an open end;
   (c) an elastomer stopper for closing said open end and maintaining the vacuum in said evacuated tube; and
   (d) a blood partitioning composition as prepared according to any of Claims 1-8 in said evacuated tube.

10. Use of the blood partitioning composition as prepared according to Claims 1-8 for the recovery of drugs.

Patentansprüche
Patentansprüche für folgende Vertragsstaaten : AT, BE, CH, DE, DK, FR, GB, IT, LI, LU, NL, SE

1. Zusammensetzung zum Verteilen von Blut, umfassend eine ein thixotropes Gel bildende Mischung, wobei das Gel einen Kohlenwasserstoff niedriger Dichte kombiniert mit einem chlorierten Kohlenwasserstoff höherer Dichte umfaßt, gekennzeichnet durch
   (a) eine den Kohlenwasserstoff und den chlorierten Kohlenwasserstoff enthaltende zweifache Harz-Komponente, worin der Kohlenwasserstoff niedriger Dichte Poly-α-pinen ist;
   (b) einen Strahlungs-Stabilisator;
   (c) einen Netzwerk-Stabilisator;
   (d) ein thixotropes Mittel; und
   (e) ein Pigment.

2. Zusammensetzung nach Anspruch 1, worin
   (a) die zweifache Harz-Komponente
      (1) Poly-α-pinen und
      (2) chloriertes Octadecen
   umfaßt.

3. Zusammensetzung zum Verteilen von Blut nach Anspruch 2, worin
   (a) das Poly-α-pinen innerhalb des Bereichs zwischen 67 und 86 Gew.-% vorliegt und
   (b) der chlorierte Kohlenwasserstoff innerhalb des Bereichs zwischen 13 und 24 Gew.-% vorliegt.

4. Zusammensetzung nach Anspruch 1, worin
   (a) der chlorierte Kohlenwasserstoff einen Chlor-Gehalt von wenigstens 50 % hat.

5. Zusammensetzung zum Verteilen von Blut nach Anspruch 1, gekennzeichnet durch eine ein thixotropes Gel bildende Mischung, wobei die Gel-Zusammensetzung
   (a) ein Harz-Gemisch aus Poly-α-pinen und chloriertem Octadecen;
   (b) epoxidiertes Sojabohnenöl;
   (c) einenkurzkettigen, polyfunktionellen Netzwerk-Stabilisator;
   (d) Siliciumdioxid; und
   (e) Titandioxid
   umfaßt.

6. Zusammensetzung nach Anspruch 5, worin
   (a) die Zusammensetzung ein spezifisches Gewicht zwischen 1,03 und 1,07 bei 25 °C hat.

7. Zusammensetzung nach Anspruch 5, worin
   (a) die Zusammensetzung eine Viskosität innerhalb des Bereichs zwischen 800 000 und 1 800 000 mPa•s (cP) hat.

8. Zusammensetzung zum Verteilen von Blut nach den Ansprüchen 1 oder 5, gekennzeichnet durch eine ein thixotropes Gel bildende Mischung, wobei das Gel
   (a) eine einen Kohlenwasserstoff im Bereich zwischen 67 und 86 Gew.-% kombiniert mit einem chlorierten Kohlenwasserstoff im Bereich zwischen 13 und 24 Gew.-% enthaltende zweifache Harz-Komponente;

(b) ein thixotropes Mittel im Bereich zwischen 2 und 6 Gew.-%;
(c) ein Pigment im Bereich zwischen 0,015 bis 0,03 Gew.-%;
(d) einen Netzwerk-Stabilisator im Bereich zwischen 0,15 und 0,8 Gew.-%; und
(e) einen Strahlungs-Stabilisator im Bereich zwischen 2,3 und 15 Gew.-%
umfaßt.

9. Vorrichtung zur Blutentnahme, umfassend
(a) ein evakuiertes Rohr;
(b) wobei dieses evakuierte Rohr ein geschlossenes Ende und ein offenes Ende hat;
(c) einen Elastomer-Stopfen zum Verschließen des offenen Endes und zum Aufrechterhalten des Vakuums in dem evakuierten Rohr; und
(d) eine Zusammensetzung zum Verteilen von Blut, wie sie in irgendeinem der Ansprüche 1 bis 8 beansprucht ist, in dem evakuierten Rohr.

10. Verwendung der Zusammensetzung zum Verteilen von Blut nach den Ansprüchen 1 bis 8 zur Isolierung von Medikamenten.

Patentansprüche für folgenden Vertragsstaat : ES

1. Verfahren zur Herstellung einer Zusammensetzung zum Verteilen von Blut, umfassend das Vermischen
(a) einer einen Kohlenwasserstoff und einen chlorierten Kohlenwasserstoff enthaltenden zweifachen Harz-Komponente, worin der Kohlenwasserstoff niedriger Dichte Poly-α-pinen ist;
(b) eines Strahlungs-Stabilisators;
(c) eines Netzwerk-Stabilisators;
(d) eines thixotropes Mittels; und
(e) eines Pigments
zur Bildung eines thixotropen Gels.

2. Verfahren nach Anspruch 1, worin
(a) die zweifache Harz-Komponente
(1) Poly-α-pinen und
(2) chloriertes Octadecen
umfaßt.

3. Verfahren nach Anspruch 2, worin
(a) das Poly-α-pinen innerhalb des Bereichs zwischen 67 und 86 Gew.-% vorliegt und
(b) der chlorierte Kohlenwasserstoff innerhalb des Bereichs zwischen 13 und 24 Gew.-% vorliegt.

4. Verfahren nach Anspruch 1, worin
(a) der chlorierte Kohlenwasserstoff einen Chlor-Gehalt von wenigstens 50 % hat.

5. Verfahren nach Anspruch 1, worin die hergestellte thixotrope Gel-Zusammensetzung
(a) ein Harz-Gemisch aus Poly-α-pinen und chloriertem Octadecen;
(b) epoxidiertes Sojabohnenöl;
(c) einen kurzkettigen, polyfunktionellen Netzwerk-Stabilisator;
(d) Siliciumdioxid; und
(e) Titandioxid
umfaßt.

6. Verfahren nach Anspruch 5, worin
(a) die hergestellte Zusammensetzung ein spezifisches Gewicht zwischen 1,03 und 1,07 bei 25 °C hat.

7. Verfahren nach Anspruch 5, worin
(a) die hergestellte Zusammensetzung eine Viskosität innerhalb des Bereichs zwischen 800 000 und 1 800 000 mPa•s (cP) hat.

8. Verfahren nach den Ansprüchen 1 oder 5, dadurch gekennzeichnet, daß das hergestellte thixotrope Gel

(a) eine einen Kohlenwasserstoff im Bereich zwischen 67 und 86 Gew.-% kombiniert mit einem chlorierten Kohlenwasserstoff im Bereich zwischen 13 und 24 Gew.-% enthaltende zweifache Harz-Komponente;
(b) ein thixotropes Mittel im Bereich zwischen 2 und 6 Gew.-%;
(c) ein Pigment im Bereich zwischen 0,015 bis 0,03 Gew.-%;
(d) einen Netzwerk-Stabilisator im Bereich zwischen 0,15 und 0,8 Gew.-%; und
(e) einen Strahlungs-Stabilisator im Bereich zwischen 2,3 und 15 Gew.-%
umfaßt.

9. Vorrichtung zur Blutentnahme, umfassend
(a) ein evakuiertes Rohr;
(b) wobei dieses evakuierte Rohr ein geschlossenes Ende und ein offenes Ende hat;
(c) einen Elastomer-Stopfen zum Verschließen des offenen Endes und zum Aufrechterhalten des Vakuums in dem evakuierten Rohr; und
(d) eine Zusammensetzung zum Verteilen von Blut, wie sie in irgendeinem der Ansprüche 1 bis 8 beansprucht ist, in dem evakuierten Rohr.

10. Verwendung der Zusammensetzung zum Verteilen von Blut nach den Ansprüchen 1 bis 8 zur Isolierung von Medikamenten.

Revendications

Revendications pour les Etats contractants suivants : AT, BE, CH, DE, DK, FR, GB, IT, LI, LU, NL, SE

1. Une composition pour la séparation du sang comprenant un mélange formant un gel thixotrope, ledit gel comrpenant un hydrocarbure de densité inférieure combiné à un hydrocarbure chloré de densité supérieure, caractérisée par :
(a) un composant à double résine comprenant ledit hydrocarbure et ledit hydrocarbure chloré dans lequel l'hydrocarbure de densité inférieure est le poly-alpha-pinène
(b) un stabilisateur de rayonnements,
(c) un stabilisateur de réseau,
(d) un agent thixotrope et
(e) un pigment.

2. La composition selon la revendication 1, dans laquelle :
(a) le composant à double résine comprend
(1) du poly-alpha-pinène ; et
(2) de l'octadécène chloré.

3. La composition pour la séparation du sang selon la revendication 2, dans laquelle :
(a) ledit poly-alpha-pinène est présent dans la gamme entre 67 et 86% en poids, et
(b) l'hydrocarbure chloré est présent dans la gamme entre 13 et 24% en poids.

4. La composition selon la revendication 1, dans laquelle
(a) ledit hydrocarbure chloré a une teneur en chlore d'au moins 50%.

5. La composition pour la séparation du sang selon la revendication 1, caractérisée par un mélange formant un gel thixotrope, ladite composition de gel comprenant :
(a) un mélange de résine de poly-alpha-pinène et d'octadécène chloré ;
(b) une huile de soja époxydée,
(c) un stabilisateur de réseau polyfonctionnel à chaîne courte,
(d) de la silice, et
(e) du dioxyde de titane.

6. La composition selon la revendication 5, dans laquelle :
(a) ladite composition a une densité comprise dans la gamme entre 1,03 et 1,07 à 25 °C.

7. La composition selon la revendication 5, dans laquelle

* C L M S *

(a) ladite composition a une viscosité comprise dans la gamme entre 800 000 et 1 800 000 mPa.s (centipoises).

8. La composition pour la séparation du sang selon l'une des revendications 1 ou 5, caractérisée par un mélange formant un gel thixotrope, ledit gel comprenant :
(a) un composant à double résine comprenant dans la gamme entre 67 et 86% en poids d'un hydrocarbure, combiné avec dans la gamme entre 13 et 24% en poids d'un hydrocarbure chloré ;
(b) dans la gamme entre 2 et 6% en poids d'un agent thixotrope,
(c) dans la gamme entre 0,015 et 0,03% en poids d'un pigment ;
(d) dans la gamme entre 0,15 et 0,8% en poids d'un stabilisateur de réseau et
(e) dans la gamme entre 2,3 et 15% en poids d'un stabilisateur de rayonnements.

9. Ensemble de collecteur de sang comprenant
(a) un tube sous dépression ;
(b) ledit tube sous dépression ayant une extrémité fermée et une extrémité ouverte ;
(c) un bouchon en élastomère pour fermer ladite extrémité ouverte et maintenir le vide dans ledit tube sous dépression et
(d) une composition pour la séparation du sang dans ledit tube sous dépression, selon l'une quelconque des revendications 1 à 8.

10. Utilisation de la composition pour la séparation du sang selon les revendications 1 à 8 pour la récupération de médicaments.

Revendications pour l'Etat contractant suivant : ES

1. Un procédé de préparation d'une composition pour la séparation du sang qui consiste à mélanger:
(a) un composant à double résine comprenant un hydrocarbure de densité inférieure combiné à un hydrocarbure chloré de densité supérieure dans lequel l'hydrocarbure de densité inférieure est le poly-alpha-pinène;
(b) un stabilisateur de rayonnements,
(c) un stabilisateur de réseau,
(d) un agent thixotrope, et
(e) un pigment,
pour former un gel thixotrope.

2. Le procédé selon la revendication 1, dans lequel:
(a) le composant à double résine comprend
(1) du poly-alpha-pinène; et
(2) de l'octadécène chloré.

3. Le procédé selon la revendication 2, dans lequel:
(a) ledit poly-alpha-pinène est présent dans la gamme entre 67 et 86% en poids, et
(b) ledit hydrocarbure chloré est présent dans la gamme entre 13 et 24% en poids.

4. Le procédé selon la revendication 1, dans lequel:
(a) ledit hydrocarbure chloré a une teneur en chlore d'au moins 50%.

5. Le procédé selon la revendication 1, dans lequel la composition de gel thixotrope préparée comprend:
(a) un mélange de résine de poly-alpha-pinène et d'octadécène chloré;
(b) une huile de soja époxydée,
(c) un stabilisateur de réseau polyfonctionnel à chaîne courte,
(d) de la silice, et
(e) du dioxyde de titane.

6. Le procédé selon la revendication 5, dans lequel:
(a) ladite composition préparée a une densité comprise dans la gamme entre 1,03 et 1,07 à 25 °C.

7. Le procédé selon la revendication 5, dans lequel:

* C L M S *

(a) ladite composition préparée a une viscosité comprise dans la gamme entre 800 000 et 1 800 000 mPa.s (centipoises).

8. Le procédé selon les revendications 1 ou 5, caractérisé en ce que le gel thixotrope préparé comprend:
(a) un composant à double résine comprenant dans la gamme entre 67 et 86% en poids d'un hydrocarbure, combiné avec dans la gamme entre 13 et 24% en poids d'un hydrocarbure chloré;
(b) dans la gamme entre 2 et 6% en poids d'un agent thixotrope;
(c) dans la gamme entre 0,015 et 0,03% en poids d'un pigment;
(d) dans la gamme entre 0,15 et 0,8% en poids d'un stabilisateur de réseau, et
(e) dans la gamme entre 2,3 et 15% en poids d'un stabilisateur de rayonnements.

9. Un ensemble de collecteur de sang comprenant:
(a) un tube sous dépression;
(b) ledit tube sous dépression ayant une extrémité fermée et une extrémité ouverte;
(c) un bouchon en élastomère pour fermer ladite extrémité ouverte et maintenir le vide dans ledit tube sous dépression, et
(d) une composition pour la séparation du sang telle que préparée selon l'une quelconque des revendications 1 à 8 dans ledit tube sous dépression.

10. Utilisation de la composition pour la séparation du sang telle que préparée selon les revendications 1 à 8 pour la récupération de médicaments.