

PATENT SPECIFICATION

(11)

1 464 462

1 464 462

(21) Application No. 17594/74 (22) Filed 22 April 1974

(44) Complete Specification published 16 Feb. 1977

(51) INT. CL.³ C08C 1/10 // 1/06

(52) Index at acceptance
C3E IB IC

(72) Inventor JOHN MORLEY THACKRAY CLOUGH

(19)



(54) A PROCESS FOR PRODUCING CONCENTRATED LATEX

(71) We, THE FIRESTONE TIRE & RUBBER COMPANY, a Corporation organized under the laws of the State of Ohio, United States of America, of 1200 Firestone Parkway, Akron, State of Ohio, United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the production of concentrated Hevea rubber latex by centrifuging.

Field latex of a solids content of 25 to 45 percent, which has been preserved against deterioration and coagulation by addition of ammonia and bactericides and enzyme inhibitors, has normally been concentrated by centrifuging to a solids content of 50 to 70 percent within 18 to 36 hours after tapping. Many systems for stabilizing and preserving natural latex, both before and after concentration, have been proposed over the years. One of these has been the combined use of ammonia and boric acid as proposed in U.S. 2,932,678. Here it is suggested that putrefaction of freshly tapped low ammonia latex can be avoided for extended periods of time up to some ten days by addition of boric acid. This patent further suggests that long-term preservation of low ammonia concentrate is realized by addition of boric acid to concentrate resulting from centrifuging a field latex after standing overnight and that the stability of such concentrates can be enhanced if soaps are added either before or after centrifuging.

A major difficulty with concentration of latex by centrifuging has been the relatively short centrifuge run times possible. This has become even more a difficulty with the advent of modern, more high yielding clones and the use of stimulants to increase latex yields. Normal centrifuge run times have

heretofore been as a maximum of the order of three hours, at which time it has been necessary to shut down and dismantle the centrifuge because of a build-up in it of coagulum and sludge. This situation has obtained, especially where additives are used to precipitate excess magnesium ions such as described in U.S. Patent 2,626,969.

It has been discovered in accordance with this invention that the above referred to difficulty is alleviated and further that Hevea concentrate of improved properties is obtained by:

1. adding preservatives in an amount sufficient to inhibit deterioration of latex by bacterial and enzymatic action for from 36 up to 240 hours and adding stabilizers at a level sufficient to provide a latex having a mechanical stability of 300 to 2000 seconds after aging for 36 to 240 hours to a fresh field latex of an ammonia content adjusted to 0.10 to 0.50 percent and a phosphate content adjusted to a level sufficient to precipitate any magnesium ions present.
2. allowing the preserved and stabilized latex to age from 36 to 240 hours with accompanying formation and settling of sludge from the latex, and
3. concentrating the resulting sludge-free preserved and stabilized latex by centrifuging to a solids content from 50 to 70 per cent.

The above additions of preservatives and stabilizers are made in accordance with the invention, either partially or completely at any time after tapping the rubber tree. In other words, these additions can suitably be made in the cup as well as at the collection or bulking station. In practice of the invention it may be further desirable to clarify the latex by mechanical means at some time during or after the aging period but prior to concentration by centrifuging

in order to supplement or enhance the removal of sludge which may not yet have settled out during the aging period; this may be done by any suitable clarifying technique including a non-concentrating centrifuging step. Normally, in accordance with the invention the resulting concentrate will be additionally preserved and stabilized by the preservative systems and stabilizers mentioned below, if necessary, to provide a concentrate having a mechanical stability of from 400 to 2000 seconds. For suitability of the resulting concentrate for most end-use applications it is important that the stability realized in the concentrate of the invention by the combined stabilizer addition and stabilizer formation from aging not be in excess of 2000 seconds. The term "Mechanical Stability" as used herein with reference to concentrated latex is determined in accordance with the latest ASTM issue of D-1076.

Preservative systems employed in the practice of the invention are those which inhibit bacterial and enzymatic action in latex and include without limitation ammonia, formaldehyde, zinc oxide, sodium or potassium or ammonium pentachlorophenate, boric acid or its alkali metal or ammonium salts, zinc or alkali metal or ammonium dilower (C_1-C_6) alkyl dithiocarbamates, tetra-alkali or tetra-ammonium salts of ethylene-diaminetetraacetic acid, sodium or zinc pyridinethione, zinc mercaptobenzothiazole, N t-butyl-2-benzothiazole sulfenamide, zinc dialkyldithiophosphate, either alone or in combination with each other.

Stabilizers employed in the practice of the invention are stabilizers for latex and include without limitation the various soaps including the ammonium and alkali metal soluble soaps of saturated and unsaturated fatty acids containing at least 10 carbon atoms as well as various known anionic and nonionic surfactants. The fatty acid soaps are particularly suitable for practice of the invention and are effective when added as such or when formed *in situ* by action of added fatty acid with ammonia in the latex.

Preferred preservation/stabilization systems include those which follow the percentages being percentages by weight based on the latex.

a) as preservatives 0.005 to 0.10 percent zinc oxide and from 0.002 to 0.3 percent sodium pyridinethione and as stabilizer 0.03 to 0.15 percent lauric acid.

b) as preservative from 0.05 to 0.50 percent of a zinc dialkyl dithiophosphate and as stabilizer 0.03 to 0.15 percent lauric acid.

c) as preservative 0.005 to 0.10 percent

zinc oxide and from 0.002 to 0.05 percent sodium diethyldithiocarbamate and as stabilizer 0.03 to 0.15 percent lauric acid.

d) as preservative 0.05 to 0.25 percent of boric acid or its ammonium or alkali metal salts and as stabilizer 0.03 to 0.15 percent lauric acid.

Preferred processes include those in which the ammonia content of the latex is adjusted to 0.15 to 0.25 percent by weight based on the latex and in which the preservative is selected from formaldehyde, zinc oxide, sodium or potassium or ammonium pentachlorophenate, boric acid or its alkali metal or ammonium salts, zinc or alkali metal or ammonium dilower (C_1-C_6) alkali dithiocarbamates, tetra-alkali or tetra-ammonium salts of ethylene-diamine tetraacetic acid, sodium or zinc pyridinethione, zinc mercaptobenzothiazole, N-t-butyl-2-benzothiazole sulfenamide and zinc dialkyldithiophosphate or combinations thereof.

A particularly preferred process is that in which the ammonia content of the latex is adjusted to 0.15 to 0.25 percent by weight based on the latex and the following (given as percentages by weight based on the latex) are added: 0.005 to 0.05 percent of sodium diethyldithiocarbamate, 0.01 to 0.05 percent of zinc oxide and up to 0.03 percent of sodium pentachlorophenate.

The key to effectiveness of the invention appears to reside in the careful regulation of the stability of a latex to be fed to the concentrating centrifuge by the combined effect of added stabilizer and enhanced stability resulting from aging of the latex. The preservative system employed in practice of the invention enables the latex to age sufficiently to provide the additionally necessary stability over and above that realized from the stabilizer added to the latex. The necessary stability arising from the aging in accordance with the invention is achieved in from about 36 to 240 hours and more preferably from 48 to 144 hours. Prior to this invention, field latex normally was held or aged prior to concentration only up to about 36 hours and usually for a lesser period. Mechanical stability of field latices being fed to a concentrating centrifuge has prior to this invention been normally only of the order of 150 seconds or less. The mechanical stability of field latex being fed to a concentrating centrifuge in accordance with the invention is at least 300 seconds and often preferably in the range of 400 to 1800 seconds. The term "Mechanical Stability" as used herein with reference to unconcentrated field latices is also determined in accordance with the latest ASTM issue of

D-1076 except that it is determined at the total solids and ammonia contents of the field latices being tested.

Illustrations of the practice of the invention appear in the examples which follow. All references to percentages of materials refer to percent by weight based on the latex.

EXAMPLE 1

To a series of samples of ammoniated field latex, having an ammonia content of 0.36 percent and a total solids content of 33.0 percent, were added the following:

Sodium Diethyldithiocarbamate 0.005
Zinc Oxide 0.01
Lauric Acid Shown in Table I
Sufficient phosphate was added to precipitate the magnesium ions present.
Samples containing varying amounts of lauric acid as an added stabilizer as shown in Table I were aged for varying periods of time, also shown in Table I, and concentrated by centrifuging to a total solids content of 62 percent. The mechanical stability was in each instance determined on the resulting concentrates and was as set forth in Table I.

TABLE I

MECHANICAL STABILITY OF FRESH CONCENTRATE, SECONDS

LAURIC ACID, %	DAYS STORED	SECONDS
0.06	1	60
	2	135
	3	345
	4	495
	5	735
0.08	1	135
	2	600
	3	1050
	4	1065
	5	1755
0.10	1	105
	2	935
	3	1395
	4	1350

1 464 462

As shown by the above results, the mechanical stability of fresh concentrate increases in each instance with storage time prior to concentration. From the above and other experiments, improved centrifuge operation by way of substantially reduced deposition of coagulum and sludge was realized when the mechanical stability of the fresh concentrate was at least 300 seconds and more preferably was at least about 400 seconds.

EXAMPLE 2

As an illustration of large scale practice of the invention, 26,670 gallons of field latex of a total solids content of 36.2 percent and an ammonia content of 0.35 percent were treated with an amount of diammonium phosphate sufficient to precipitate the analytically determined magnesium ion content, were diluted to a total solids content of 32.9 percent, and further treated by the addition of 0.01 percent zinc oxide, 0.005 percent sodium diethyldithiocarbamate and 0.08 percent lauric acid. The thus treated latex was aged for four days in a storage tank with a trap to collect any sludge formed. The resulting sludge-free latex

was concentrated by centrifuging. Twelve centrifuges were employed. The run times realized without the necessity for shutting down for cleaning were from 16 to 24 hours continuous operation. The centrifuge bowl D.R.C. separating efficiency for the 16 to 24 hour runs was 88.7 percent, which is at least as good as conventional centrifuge efficiencies with bowls changed every 2 to 3 hours and operating with equivalent throughput rates. The resulting concentrate was further stabilized and preserved by the addition thereto of 0.02 percent of each of sodium diethyldithiocarbamate, zinc oxide and sodium pentachlorophenate, and the ammonia content was adjusted to 0.21 percent. The properties of the resulting concentrated latex were as follows:

Total Solids, %	61.7	
VFA Number	0.007	100
KOH Number	0.44	
Mechanical Stability, seconds	1365	

EXAMPLE 3

Field latex in the amount of 22,700 gallons, having an ammonia content of 0.35 percent and a solids content of 36.7 percent, was treated with an amount of diam-

monium phosphate sufficient to precipitate its analytically determined magnesium ion content, diluted to a total solids content of 31.9 percent and was further preserved by the addition thereto of 0.01 percent zinc oxide, 0.005 percent sodium diethyldithiocarbamate and 0.06 percent lauric acid. After three days aging in a tank with a trap for collecting any sludge formed, the sludge-free latex was centrifuged. Here also, 12 centrifuges were employed and the continuous run times were 16 to 20 hours. The average centrifuge D.R.C. separating efficiency for all twelve machines after 12 hours running was 89.2 percent at the same throughput employed in Example 3. Even after these long run times the sludge compartments of the bowls were not completely full and there was very little coagulum build-up. The ammonia content of the resulting concentrate was adjusted to 0.21 percent and 0.02 percent of each of sodium diethyldithiocarbamate, zinc oxide and sodium pentachlorophenate was added. The properties of the resulting concentrate were as follows:

	Total Solids, %	61.8
	VFA Number	0.004
	KOH Number	0.41
30	Mechanical Stability, Seconds	435

EXAMPLE 4

Seventeen hundred gallons of field latex, having a total solids content of 35.8 percent and an ammonia content of 0.35 percent was further preserved and stabilized by the addition thereto of 0.01 percent zinc oxide, 0.005 percent sodium diethyldithiocarbamate, 0.09 percent lauric acid and sufficient soluble phosphate to precipitate the magnesium ion content. The latex was aged for three days in a tank. Sludge-free latex was siphoned from the tank in a manner not to disturb the sludge sediment and centrifuged. All 1700 gallons were concentrated during the continuous operation of a single centrifuge in 16 hours. The properties of the fresh concentrate were as follows:

50	Total Solids, %	63.0
	Ammonia Content, %	0.16
	VFA Number	0.005
	KOH Number	0.59
55	Mechanical Stability, Seconds	1050

On inspection of the centrifuge bowl after this 16 hour run, it was noted that there was a complete absence of sludge. Further, there was no coagulum in the inside of the distributor and there was very little coagulum on the discs. Undoubtedly if there had been more feed latex available the centrifuge would have run continuously for a much greater period of time.

EXAMPLE 5

To 2,700 gallons of field latex, having ammonia content of 0.42 percent and a total solids content of 40.4 percent, were added 0.01 percent zinc oxide, 0.006 percent sodium diethyldithiocarbamate, 0.086 percent lauric acid and sufficient diammonium phosphate to precipitate the magnesium ions. After 48 hours aging in a 3,000 gallon tank equipped with a sludge trap the latex was centrifuged. The centrifuge ran continuously without plugging for 21.5 hours. The total solids of the concentrate at the beginning of the run was 53.5 percent and at the end of the run was 52.6 percent. The D.R.C. separating efficiency of the centrifuge was 95.9 percent initially and 98.8 percent at the end of the run. The average D.R.C. separating efficiency for the run determined on a composite sample formed from samples taken each hour during the 21.5 hour running period was 97.2 percent. At the end of this running period the centrifuge bowl was neither plugged nor was the separating efficiency diminished. The resulting concentrate was further preserved by the addition of 0.03 percent zinc oxide, 0.04 percent sodium diethyldithiocarbamate and 0.03 percent sodium pentachlorophenate and the ammonia content was adjusted to 0.38 percent. The properties of the concentrate were as follows:

	Total Solids %	51.95
	KOH Number	.78
	VFA Number	.016
	Mechanical Stability, Seconds	1200

EXAMPLE 6

To 1500 gallons of field latex, having an ammonia content of 0.35 percent and a total solids of 35 percent, were added 0.005 percent sodium diethyldithiocarbamate, 0.01 percent zinc oxide, 0.075 percent lauric acid and sufficient diammonium phosphate to precipitate magnesium ions. After storage for a day this field latex was diluted to 31 percent total solids. After an additional storage of two days, a portion of the latex was concentrated in a laboratory centrifuge and it was found that the mechanical stability of the concentrate was too low, being 60 seconds. Consequently, an additional 0.01 percent lauric acid was added to the latex in the storage tank. After another day's storage, laboratory tests indicated the stability was still too low and an additional 0.01 percent lauric acid was added, bringing the total level of lauric acid to 0.095 percent. Storage was continued for a total storage time of six days, whereupon 200 gallons of the latex was centrifuged to a high solids concentrate. The ammonia content of this concentrate was adjusted to 0.15 percent and 0.005 per-

cent sodium diethyldithiocarbamate and 0.01 percent zinc oxide were added. The properties of the resulting latex were:

	Total Solids, %	68.7
5	KOH Number	0.43
	VFA Number	0.009
	Sludge Content, %	0.001

Filterability of this high solids latex through 8805 American Felt filtering surface was 560 grams total solids per square inch immediately after concentration. Further study of this latex concentrate showed that its marked improvement in filterability resulted from an absence of micro-floc. Micro-floc has been conventionally associated with previously known centrifugal concentrates and has been attributed to the shearing action of the centrifuge on previous field latices. Centrifugally concentrated high solids latices have prior to this invention had filterabilities only of 100 to 200 grams total solids per square inch. High solids latex produced by creaming normally has had a filterability of 400 to 800 grams total solids per square inch. Thus it is for the first time possible in view of this invention to produce centrifugally concentrated high solids latices having high filterabilities equivalent to creamed latices. While the high solids concentrate of this example was produced in a single stage centrifuging operation, two-stage centrifuging can of course also be employed in practice of the invention. In such a double stage operation the latex is first concentrated by centrifuging to a total solids content of about 52-58 percent and this concentrate is additionally centrifuged with or without dilution to a total solids content of the order of 66 to 70 percent. The practice of the invention in association with concentrating by double centrifuging gives not only higher separating efficiency but also even increased filterability.

EXAMPLE 7

To 3,000 gallons of field latex having an ammonia content of 0.25 percent and a solids content of 34 percent, were added 0.005 percent sodium diethyldithiocarbamate, 0.006 percent zinc oxide, 0.080 percent lauric acid and sufficient dipotassium phosphate to precipitate the magnesium ions.

After 12 hours, this latex was passed through a centrifuge modified to act as a clarifier to remove sludge. Forty-eight hours after initial preservation a clarified latex was centrifuged to produce a latex concentrate with a solids content of 62 percent. A volume of 2400 gallons of the clarified latex was concentrated over a period of 24 hours through a single centrifuge without shutting down for cleaning. There was virtually no coagulum build-up and the sludge compartment of the bowl contained sludge in an amount equal to only 5 per-

cent of its capacity.

The ammonia content of the resulting concentrate was adjusted to 0.24 percent and .02 percent each of sodium diethyldithiocarbamate, zinc oxide and sodium pentachlorophenate. Properties of the resulting concentrate were as follows:

Total Solids, %	62.1	
VFA Number	0.017	
KOH Number	0.47	75
Mechanical Stability, Seconds	1020	
Filterability through 8805 American felt, grams total solids per square inch	1200	80

WHAT WE CLAIM IS:

1. A process for producing concentrated latex from fresh Hevea rubber latex of an ammonia content adjusted to 0.10 per cent to 0.50 percent by weight based on the latex and of a soluble phosphate content adjusted to a level sufficient to precipitate any magnesium ions present in the latex comprising:

- adding to the rubber latex, preservative in an amount sufficient to inhibit deterioration of the latex by bacterial and enzymatic action for from 36 up to 240 hours and stabilizer in an amount sufficient to provide a mechanical stability in the latex of 300 to 2000 seconds after aging for from 36 to 240 hours,
- allowing the thus preserved and stabilized latex to age from 36 to 240 hours with accompanying formation and settling of sludge in the preserved and stabilized latex, and
- concentrating the resulting sludge-free preserved and stabilized latex by centrifuging to a solids content of from 50 per cent to 70 per cent by weight.

2. A process in accordance with claim 1, wherein sludge is removed from the preserved and stabilized latex by mechanical means during or after the aging of the latex and before concentrating it.

3. A process in accordance with claim 1, wherein sludge is removed from the preserved and stabilized latex by non-concentrating centrifugal means during or after the aging of the latex and before concentrating it.

4. A process in accordance with any one of claims 1 to 3, wherein the latex preservative comprises a compound selected from formaldehyde, zinc oxide, sodium or potassium or ammonium pentachlorophenate, boric acid or its alkali metal or ammonium salts, zinc or alkali metal or ammonium dilower (C_1-C_6) alkyl dithiocarbamates, tetraalkali metal or tetra-ammonium salts of ethylenediaminetetraacetic acid, sodium or zinc pyridinethione, zinc merpactobenzo-

cent sodium diethyldithiocarbamate and 0.01 percent zinc oxide were added. The properties of the resulting latex were:

5	Total Solids, %	68.7
	KOH Number	0.43
	VFA Number	0.009
	Sludge Content, %	0.001

Filterability of this high solids latex through 8805 American Felt filtering surface was 560 grams total solids per square inch immediately after concentration. Further study of this latex concentrate showed that its marked improvement in filterability resulted from an absence of micro-floc. Micro-floc has been conventionally associated with previously known centrifugal concentrates and has been attributed to the shearing action of the centrifuge on previous field latices. Centrifugally concentrated high solids latices have prior to this invention had filterabilities only of 100 to 200 grams total solids per square inch. High solids latex produced by creaming normally has had a filterability of 400 to 800 grams total solids per square inch. Thus it is for the first time possible in view of this invention to produce centrifugally concentrated high solids latices having high filterabilities equivalent to creamed latices. While the high solids concentrate of this example was produced in a single stage centrifuging operation, two-stage centrifuging can of course also be employed in practice of the invention. In such a double stage operation the latex is first concentrated by centrifuging to a total solids content of about 52-58 percent and this concentrate is additionally centrifuged with or without dilution to a total solids content of the order of 66 to 70 percent. The practice of the invention in association with concentrating by double centrifuging gives not only higher separating efficiency but also even increased filterability.

EXAMPLE 7

To 3,000 gallons of field latex having an ammonia content of 0.25 percent and a solids content of 34 percent, were added 0.005 percent sodium diethyldithiocarbamate, 0.006 percent zinc oxide, 0.080 percent lauric acid and sufficient dipotassium phosphate to precipitate the magnesium ions.

After 12 hours, this latex was passed through a centrifuge modified to act as a clarifier to remove sludge. Forty-eight hours after initial preservation a clarified latex was centrifuged to produce a latex concentrate with a solids content of 62 percent. A volume of 2400 gallons of the clarified latex was concentrated over a period of 24 hours through a single centrifuge without shutting down for cleaning. There was virtually no coagulum build-up and the sludge compartment of the bowl contained sludge in an amount equal to only 5 per-

cent of its capacity.

The ammonia content of the resulting concentrate was adjusted to 0.24 percent and .02 percent each of sodium diethyldithiocarbamate, zinc oxide and sodium pentachlorophenate. Properties of the resulting concentrate were as follows:

Total Solids, %	62.1	
VFA Number	0.017	
KOH Number	0.47	75
Mechanical Stability, Seconds	1020	
Filterability through 8805 American felt, grams total solids per square inch	1200	80

WHAT WE CLAIM IS:

1. A process for producing concentrated latex from fresh Hevea rubber latex of an ammonia content adjusted to 0.10 per cent to 0.50 percent by weight based on the latex and of a soluble phosphate content adjusted to a level sufficient to precipitate any magnesium ions present in the latex comprising:
 - A. adding to the rubber latex, preservative in an amount sufficient to inhibit deterioration of the latex by bacterial and enzymatic action for from 36 up to 240 hours and stabilizer in an amount sufficient to provide a mechanical stability in the latex of 300 to 2000 seconds after aging for from 36 to 240 hours,
 - B. allowing the thus preserved and stabilized latex to age from 36 to 240 hours with accompanying formation and settling of sludge in the preserved and stabilized latex, and
 - C. concentrating the resulting sludge-free preserved and stabilized latex by centrifuging to a solids content of from 50 per cent to 70 per cent by weight.
2. A process in accordance with claim 1, wherein sludge is removed from the preserved and stabilized latex by mechanical means during or after the aging of the latex and before concentrating it.
3. A process in accordance with claim 1, wherein sludge is removed from the preserved and stabilized latex by non-concentrating centrifugal means during or after the aging of the latex and before concentrating it.
4. A process in accordance with any one of claims 1 to 3, wherein the latex preservative comprises a compound selected from formaldehyde, zinc oxide, sodium or potassium or ammonium pentachlorophenate, boric acid or its alkali metal or ammonium salts, zinc or alkali metal or ammonium dilower (C₁-C₆) alkyl dithiocarbamates, tetra alkali metal or tetra-ammonium salts of ethylenediaminetetraacetic acid, sodium or zinc pyridinethione, zinc merpactobenzo-



thiazole, N-t-butyl-2-benzothiazole sulfenamide, and zinc dialkyldithiophosphate, either alone or in combination with each other and the stabilizer is an ammonium or alkali metal soluble soap of saturated or unsaturated fatty acids containing at least 10 carbon atoms or an anionic or nonionic surfactant.

5. A process in accordance with any one of claims 1 to 3, wherein the latex preservative comprises from 0.005 to 0.10 per cent by weight based on the latex zinc oxide and from 0.002 to 0.3 percent by weight based on the latex sodium pyridinethione and the stabilizer comprises from 0.03 to 0.15 per cent by weight based on the latex lauric acid.

6. A process in accordance with any one of claims 1 to 3, wherein the latex preservative comprises from 0.05 to 0.50 per cent by weight based on the latex of a zinc dialkyl dithiophosphate and the stabilizer comprises from 0.03 to 0.15 per cent by weight based on the latex lauric acid.

7. A process in accordance with any one of claims 1 to 3, wherein the latex preservative comprises from 0.005 to 0.10 per cent by weight based on the latex zinc oxide and from 0.002 to 0.05 per cent by weight based on the latex sodium diethyldithiocarbamate and the stabilizer comprises from 0.03 to 0.15 per cent by weight based on the latex lauric acid.

8. A process in accordance with any one of claims 1 to 3, wherein the latex preservative comprises 0.05 to 0.25 per cent by weight based on the latex of boric acid or its ammonium or alkali metal salts and the stabilizer comprises from 0.03 to 0.15 per cent by weight based on the latex

lauric acid.

9. A process for producing concentrated Hevea latex, wherein the concentrate produced in accordance with any one of claims 1 to 8 is additionally treated by adjusting its ammonia content to 0.15 to 0.25 per cent and by the addition of preservative selected from formaldehyde, zinc oxide, sodium or potassium or ammonium pentachlorophenate, boric acid or its alkali metal or ammonium salts, zinc or alkali metal or ammonium dilower (C_1-C_6) alkyl dithiocarbamates, tetra alkali metal or tetra-ammonium salts of ethylenediaminetetraacetic acid, sodium or zinc pyridinethione, zinc mercaptobenzothiazone, N-t-butyl-2-benzothiazone sulfenamide and zinc dialkyldithiophosphate or combinations thereof.

10. A process for producing concentrated Hevea latex in accordance with claim 9, wherein the ammonia content is adjusted to 0.15 to 0.25 per cent and 0.005 to 0.05 per cent by weight based on the latex of sodium diethyldithiocarbamate, 0.01 to 0.05 per cent by weight based on the latex of zinc oxide and up to 0.03 per cent by weight based on the latex of sodium pentachlorophenate is added.

11. A process for producing concentrated Hevea latex as claimed in claim 1 and substantially as described in the Examples.

12. A concentrated Hevea latex whenever produced by any one of the processes according to the preceding claims.

STEVENS, HEWLETT & PERKINS

Chartered Patent Agents,

5, Quality Court,

Chancery Lane,

London, W.C.2.

Tel. 01-405 8393

