PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to the Treatment of Natural Rubber Latex

We, NEDERLANDSCH INDISCH INSTITUUT VOOR RUBBERONDERZOEK, a Netherlands East Indian Body Corporate, of 8, Van Imhoffweg, Buitenzorg, Java, Netherlands East Indies, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to an improvement in the treatment of natural rubber latex, and may be applied in the manufacture of preserved latex, or of concentrated latex or of dry rubber with special properties, such as a low water absorption, a high plasticity and a white colour.

It is known that upon addition to fresh natural latex of a part, for example 10 to 30%, of the amount of acid which would be necessary for full coagulation, or of a solution of a salt with a polyvalent cation, a so-called pre-coagulum results. Only a part of the rubber coagulates, and it is known that this fraction after milling and drying gives a yellow rubber having a higher acetone-extract-content (mainly resins), more nitrogen, and generally, after vulcanisation, a higher modulus of elasticity in comparison with the rubber obtained from the same original latex by a full coagulation with sufficient acid. On the other hand, the part of the latex which remains liquid after the formation of a pre-coagulum will give a rubber of white colour after coagulation. This process is generally applied in the manufacture of sole-crepe.

It is also known that latex, after removal of the yellow pre-coagulum, is especially suitable for the production of concentrated latex by centrifuging or creaming methods.

The object of the present invention is, however, to provide a method of fractionating latex by means of which both the yellow and the white fraction are obtained in a stable, liquid state.

According to the invention, this method comprises adding to fresh natural, optionally diluted, rubber latex, a quantity of an alkaline substance, for example ammonia, such that the pH of the latex is brought to between 6.8 and 8.8, and thereafter adding a solution of a magnesium salt to provide in the mixture from 0.015 to 0.100 grammol Mg-ion per litre of mixture whereafter the mixture is allowed to stand until separation into two layers, which soon sets in, is complete.

These two layers are greyish-yellow and white respectively, the white layer being uppermost. Sometimes a thin layer, slightly green or sometimes orange-coloured, is apparent between the two main fractions. The various layers can be separated in manner known *per se*, for example by decantation.

The optimum value for the pH of the latex is dependent on the individual properties of the latex used. Dilution of the latex is not essential, but as a rule is desirable because the time necessary for the separation of the fractions, is thereby remarkably reduced. Since flocculation, which often sets in upon dilution of latex with water, generally impedes fractionation, it is necessary to add initially, a quantity of alkali either to the latex or to the dilution water.

Under optimum conditions the separation into two layers will become evident after about 10 or 20 minutes. The intersurface initially moves downwards, but after about 1 to 1½ hours this phenomenon ceases. By centrifuging, the separation may be accelerated.

The optimum conditions for the mode of the separation and for the amounts of the fractions obtained are dependent on the nature of the latex and on the conditions under which it is formed or tapped. The amount of the yellow fraction is generally 10—20% of the total volume, but figures up to 50% have been observed in exceptional cases.

When the pH of the fractions is not

raised after the separation, the yellow fraction will generally coagulate after some hours. The white fraction, however, is remarkably stable and may, therefore, be kept for some days before coagulation sets in. During this period, a decomposition of the non-rubber constituents takes place, whence it follows that the white fraction may be easily manufactured into pure rubber having a low water-absorption.

In the event that it is desired to maintain the yellow fraction in the liquid state it is advisable to raise the pH of the yellow fraction directly after the separation of the two fractions.

The process of this invention renders it possible for the first time to manufacture rubber articles from the yellow fraction by latex processes, such as dipping, since heretofore the yellow fraction was only known as a (solid) pre-coagulum, whereas through Applicants' process, the yellow fraction is now available in the form of a liquid.

The white fraction may be used for the manufacture of sole-crepe. Due to its low viscosity, the white fraction is also especially suitable for latex concentration processes, such as centrifuging and creaming methods. The white fraction has also a better temperature stability than the original latex, and consequently it may be applied with advantage in all processes in which latex is heated. For the manufacture of chewing gum base as well as for impregnated articles, the white fraction is also particularly suitable.

The process of the present invention is illustrated by the following Examples.

EXAMPLE I.

1. Field latex is brought to a pH of about 8.0 by the addition of dilute ammonia and is then diluted with an equal volume of water to which a small amount of concentrated ammonia has been added. With vigorous stirring, there is then added enough of a 20% aqueous solution of $MgSO_4.7H_2O$ to provide a final Mg concentration in the latex of 0.04 grammol per litre.

After about 15 minutes the separation of the latex into two liquid fractions is apparent, of which fractions the greyish-yellow underlyer contains about 30% by volume, and the white upperlayer about 70% by volume. The inter-surface first moves downwards and comes to a standstill after about 90 minutes. The volume of the yellow fraction is then 16% of the total volume.

Now the two layers can be separated in the well-known manner for example by tapping, whereby two liquid latex fractions are obtained. By coagulation a rubber may be manufactured from each of the two fractions. The yellow fraction then gives after milling a yellow crepe, whereas the white fraction gives a crepe of lighter colour than the crepe from normal latex which is made without discolouration agents, such as sodium sulphite.

EXAMPLE II.

Instead of removing the yellow fraction in the liquid state, the separation may also be effected by allowing the magnesium salt-containing latex of Example I to stand till spontaneous coagulation of the yellow fraction ensues. This generally occurs within 24 hours after the formation of the mixture. The yellow coagulum is first formed in the bottom of the container, but later rises to the surface due to gas development.

The yellow rubber can then easily be removed, leaving a white latex. The latter may be worked up into a rubber of low nitrogen content.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process for the separation of natural rubber latex into a yellow and white fraction which are both liquid, characterised in that to fresh natural, optionally diluted, rubber latex there is added a quantity of an alkaline substance, for example ammonia, sufficient to adjust the pH of the latex to from 6.8 to 8.8, whereupon an aqueous solution of a magnesium salt is added to provide a final concentration in the mixture of 0.015 to 0.100 grammol Mg-ion equivalents per litre, and the mixture is allowed to stand until it has separated into two layers.

2. A process as claimed in claim 1, characterised in that the separation layers are allowed to stand until the lower fraction has formed a coagulum which rises to the surface whereafter said coagulum is removed.

3. Process for the separation of natural rubber latex into a yellow and a white fraction substantially as hereinbefore described.

Dated this 3rd day of March, 1947.

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