Advisory Circular No.2016/10

Collection and Preservation of Latex

Rubber Research Institute
of Sri Lanka

Latex Collection and Preservation

Latex flow, after the tree is tapped, usually ceases in 3 to 4 hours time. Latex should be collected as soon as possible after the latex flow ceases. There are several important aspects one must bear in mind with regard to collection of latex, in order to supply with good quality latex as the starting material for the manufacture of raw rubber in any form, *viz.* Ribbed Smoked Sheets (RSS), latex crepe, centrifuged latex or technically specified rubber.

The *Hevea* sap (latex) is a pure whitish milky fluid as it comes from the tree. It contains several non rubber substances such as proteins, carbohydrates, lipids and metal ions. The quality of latex is affected due to subsequent human interferences or due to the environmental factors. We must have a clear understanding of the things we should do and we shouldn't, so as to maintain the quality of field latex until subsequent processing.

Things we should do:-

1. Keep all utensils, which include the spouts, latex collecting cups, buckets, divisional bulking/collecting tanks, latex transporting vessels/bowsers etc. clean.
2. Use of rainguards is a good practice, apart from increasing the tappable days, this prevents rainy water trickling along the trunk of the tree washing down bacteria and collecting them in the cups.
3. Use of preservatives if necessary at the earliest possible.
4. Keeping the cups upside down on a pole near the tree, after latex is collected into the bucket, to prevent contamination of latex with dirt and sand particles.
5. Keep the containers of latex tightly closed in the case of long term preservation with ammonia.
6. Always prepare preservatives, especially sodium sulphite, afresh.
7. Keep all the preservatives in well sealed containers in a dry environment.

Things we shouldn't do:-

1. Keeping the cups on the ground when not in use.
2. Adding plant twigs and other foreign matter into the latex bucket some tappers add these things in order to prevent agitation and spilling of latex.

3. Addition of water some people add water in order to increase the volume of latex and the quality of water may have a negative impact on the quality of latex. Also, dilution of latex will affect the efficiency of centrifuging, if latex is meant for centrifuging.
4. Keeping the latex containers in the sun this is done to increase the temperature of latex in order to get higher metrolac reading. Nevertheless, the increase of the temperature enhances the bacterial activity too leading to fermentation and precoagulation of latex.
5. Addition of preservatives in excess only the recommended levels should be added. Addition of excessive quantities unnecessarily, leads to higher acid consumption in coagulation and results in delay in drying which also leads to discolouration of pale crepe.
6. Keeping the containers open If latex is preserved with ammonia for long term preservation, ammonia could escape in open containers.

The best way to maintain the quality of latex is to ensure the cleanliness at each and every step. In certain instances, for example, when the latex is to be transported for more than two hours and also when latex is to be concentrated, preservatives are essentially added to latex.

Preservatives

- Short term preservatives known as anticoagulants are added to keep the latex stable until it is transported to the factory for processing.
- Long term preservatives are added to preserve the quality of latex in storage for a longer period.

An ideal preservative should be;

- an effective bactericide.
- able to neutralize any acids formed due to bacterial action
- able to precipitate or form complexes with heavy metal ions which may interact with natural stabilisers

Anticoagulants

(1). Ammonia as an anticoagulant

- available as liquefied ammonia in cylinders or as 25% - 30% aqueous solutions.
- stock solution is 1% (w/w).
- added at 0.01 - 0.05% on latex.

- is suitable for RSS manufacture.
- not suitable for crepe manufacture.
- should be stored in air-tight containers, since ammonia can evaporate.

(2). Sodium sulphite as an anticoagulant.

- best among the presently used anticoagulants, for crepe manufacture.
- available as a white powder.
- anhydrous undeteriorated chemical is 90-98% pure.
- not stable under tropical conditions and should be stored in a cool place in air-tight containers.
- stock solution is 3% (w/w).
- stock solution of sodium sulphite is made by dissolving 1 kg of chemical in 30 L of water.
- 300 ml of this stock solution is sufficient for 20L of latex (0.05% on latex).
- added at 0.05 - 0.15% on latex depending on the weather condition, the time of coagulation, distance between the collecting centre and the factory etc.
- prevents enzymatic discolouration to a certain extent.
- if added in excess will retard drying.
- solution should always be prepared afresh for adding into latex since the strength of the solution decreases during storage.

(3). Washing soda (Na_2CO_3) as an anti-coagulant
- Stock solution is 1.66%
- added at 0.025% on latex
- relatively cheaper
- not commonly used.

Methods of preparation of stock solutions of anti-coagulants and the method of incorporation are given in Table 1.

Long term preservatives

The most commonly used long term preservative is ammonia which is very effective for preservation of latex. Ammonia along can be used at higher concentrations on latex, but the concentration can be reduced considerably when used with secondary preservatives.

Table 1. *Preservatives and their use*

Preservative	**Strength of stock solution**	**How to prepare stock solution**	**Concentration in latex (%)**	**How to add into latex**
Ammonia - as anticoagulant	1%	Dissolve 1 kg of ammonia gas in 99 kg of pure water , or Dissolve 1 ml of 25% ammonia solution in 24 ml of pure water	0.01 – 0.05	Add 100 – 500 ml of stock solution to 10 litres of latex
- as long term preservative	10%	Dissolve 10 kg of ammonia gas in 90 kg of pure water	0.2 – 0.4	Add 2 to 4 litres of stock solution to 100 litres of field latex
Soldium sulphite	3.3%	Dissolve 1 kg of powder in 30 litres of water. Always prepare afresh	0.05 – 0.15	Add 150 – 450 ml of stock solution to 10 litres of field latex
Washing soda	1.66%	Dissolve 1 kg of powder in 60 litres of water	0.025	Add 150 ml of stock solution to 10 litres of field latex

Depending on the concentration of ammonia used, there are two types of preservative systems, viz. high ammonia and low ammonia and the latex is called high ammonia concentrate or low ammonia concentrate.

Table 2. *Preservative systems*

Type of latex	**Preservative system**
High Ammonia Concentrate	Ammonia 0.7% on latex
Low Ammonia Concentrate	
(a) LATZ – (Low Ammonia TMTD/ZnO)	Ammonia 0.2% + TMTD 0.013% + ZnO 0.013%
(b) LABA	Ammonia 0.2% + Boric acid 0.2%
(c) LAZDC	Ammonia 0.2% + ZDC 0.1%
ZnO – Zinc oxide BA – Boric acid **TMTD** – tetra methyl thiuram disulphide **ZDC** – Zinc diethyl dithiocarbomate	

Of the above preservative systems, LATZ is the most popular and widely used system for preservation of concentrated latex.

Long term preservation of field latex

If field latex is collected for the manufacture of concentrated latex, it is preserved with 0.3% (w/w) ammonia for manufacture of LA concentrate by incorporating 10% solution of ammonia. If HA latex is manufactured, field latex is preserved with 0.4% ammonia. Although the best way of incorporating ammonia into latex is by bubbling ammonia gas from a cylinder in order to prevent dilution of latex, it is not practicable to carry out in the field. Therefore, incorporation of ammonia as a 10% solution is recommended. Preparation of stock solution of anti-coagulants and the method of incorporation are given in Table 3.

Table 3. *Incorporation of ammonia into field latex for manufacture of latex concentrate*

Type of concentrate	**Strength of stock solution**	**How to prepare stock solution**	**Concentration in latex (%)**	**How to add into latex**
Low Ammonia	10%	Bubbling of 10 kg of ammonia gas into 90 kg of pure water or, Mixing of 10 parts of 25% ammonia solution with 15 parts pure water	0.3	3kg of stock solution to 97 kg of field latex
High Ammonia	10%		0.4	4 kg of stock solution to 96 kg of field latex

Transportation of latex

Ideal material for fabrication of tanks for transport of latex is aluminium. Since aluminium is expensive and can easily go out of shape, mild steel is also recommended for fabrication of transportation tanks but they should be adequately protected against corrosion by applying the interior with an inert paint such as epoxy paint or chlorinated paint which also prevents the latex coming into contact with the metal.

Straining of latex:-

On arrival at the factory, latex is strained through a 40 mesh stainless steel sieve to remove sand, dirt and pieces of coagulum before weighing.

Weighing of latex:-

Latex is poured to a standard bucket and the volume is measured in litres by using a dip stick. The dry rubber content is determined by the use of metrolac.

Correct method of DRC estimation by the use of metrolac:-

- Remove froth from latex.
- Take one measure of latex into the measuring vessel. (Use a separate cup for taking latex from the latex container).
- Empty the measuring vessel by pouring the latex in it into the mixing vessel.
- Fill the measuring vessel with water using a separate cup.
- Empty the measuring vessel by pouring the contents into the mixing vessel so that latex adhered to the inner surface will also come to the mixing vessel.
- Repeat the previous step.
- Mix the contents in the mixing vessel carefully taking precautions to prevent the formation of air bubbles in the mixture. Make sure that the temperature of the latex/water mixture is 29^{o}C.

- Transfer latex/water mixture carefully into the cylindrical vessel and insert the metrolac. Make sure that the cylinder is in vertical position.

- Allow the instrument to go up and down freely.

- Take the reading when the instrument comes to rest after floating.

- Verify the reading by pushing the instrument down in latex and reading the point again.

- Using the standard metrolac chart recommended by RRISL, read and calculate the weight of rubber in the given volume latex.

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