Contributions from the Ceylon Rubber Research Scheme.

Notes on Rubber Manufacture.

Effect of Disinfectants on Scrap Rubber.

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A SAMPLE of scrap rubber was received recently which showed distinct signs of tackiness. On the estate from which the sample was sent, disinfectant is applied to the tapping cut on the day after tapping, but the scrap is not removed until the next tapping. It was suggested that the tackiness was due to the action of disinfectant on the scrap.

In order to test this point some fresh scrap rubber was divided into 4 portions, two of which were dipped in 10% Brunolinum Plantarium and hung to dry. The treated portions became distinctly darker in colour during the night. One treated and one untreated sample were kept in a shady place, and one treated and one untreated sample were placed in the sun for 12 hours. On examination of the portions exposed to sunlight it was found that the sample treated with disinfectant showed very considerably more tackiness than the untreated sample. The two samples which were kept away from sunlight were free from tackiness after several weeks. The test was repeated with a number of different disinfectants and in each case it was found that the scrap when exposed to sunlight became more tacky than untreated scrap.

It is concluded that scrap should be removed before applying disinfectant to the tapping cut, otherwise tackiness is liable to occur.

Tacky Spots in Crepe.

A sample of crepe containing red tacky spots was recently received. It was suggested by the sender that the spots were due to fungal infection, but chemical examination revealed the presence of copper in the rubber. Presumably this originated from oil spots or minute chips of metal from worn bearings in the creping rollers.

Such cases of tackiness due to contamination with copper are not infrequently met with, showing that the danger of worn bearings is not always realised. Apart from actual tackiness it has been shown that 1 part of copper in a million of rubber causes distinct deterioration.

Enquiries are being made with regard to the feasibility of replacing bronze bearings in rubber rollers by cast iron or some other non-copper bearing metal.

Aluminium Coagulating Pans.

In June, 1925, 6 aluminium pans imported by the Research Scheme were put into use on an estate together with 6 new enamelled dishes, in order to compare the wearing qualities of the two. The dishes were recently examined and it was found that whereas the aluminium dishes were equal to new, all the enamelled dishes were chipped at the inside corners. Once this stage is reached corrosion of the exposed iron takes place rapidly and it can be prophesied that the useful life of the enamelled dishes will be finished in another year. The aluminium dishes referred to were of heavier gauge than those which are at present available in Colombo, but about 100 of the latter have been in use on the same estate for the past year and show no signs of wear except slight dents.

On an estate where formic acid is used as coagulant aluminium dishes have been used during the past year and show only slight dents and pitting of the metal. It was suggested by a writer in Sumatra that aluminium dishes would corrode rapidly with formic acid, but a test carried out here using acid of twice the strength necessary for coagulation, indicates that it would take about 15 years for a dish to corrode through.

The aluminium dishes at present available locally are of low price and correspondingly light construction in order to compete with enamelled dishes. They can be expected to give considerably better service than enamel but in the long run it would amply repay the Planter to demand heavier gauge dishes.

Methods of Using Para Nitrophenol.

In a report on the use of p.n.p. as a mould preventive (R.R.S. 4th Quarterly Circular for 1925) it was explained that it can be used in two ways.

1. An appropriate quantity can be dissolved in the acid used for coagulation and thus introduced into the latex,

2. The sheets after rolling and washing can be soaked in a dilute solution of the chemical.

It was pointed out that the first method is usually adopted in Malaya where coagulation is carried out in tanks. In Ceylon, however, after addition of acid, the latex has to be transferred to pans or troughs, and there is a danger that clotting might set in before this is complete, thereby spoiling the appearance of some of the sheets. The second method was therefore recommended for adoption in Ceylon.

Experience has shown that the Malayan method can be used successfully on certain Ceylon estates where coagulation takes place slowly. In dry districts, such as Kegalle and Matale, coagulation is rapid and it is unlikely to be satisfactory. It has the advantage of being more "fool-proof" than the soaking method. Once the p.n.p. has been added to the acid there is no fear that some of the sheets have escaped treatment. It is suggested that estates should experiment with this method of treatment and adopt it if satisfactory.

The simplest procedure is to dissolve p.n.p. in undiluted acid (acetic) in the proportion 1 lb. p.n.p. to $4\frac{1}{2}$ lb. strong acid. The p.n.p. dissolves freely but it is advisable to crush it thoroughly before mixing. The acid is then used in the ordinary way but it must be remembered that by addition of p.n.p. the acid has become diluted, its strength being approximately 85%. Thus if the dose of acid used for coagulation was previously 6 oz. per Shanghai jar, the dose of mixture will be 7 oz. There is no objection to a carboy of acid being mixed at one time, as the p.n.p. does not deteriorate in the acid mixture.

If formic acid is used for coagulation the proportion is 1 lb. p.n.p. to $2\frac{1}{4}$ lb. 90% formic acid. Some difficulty will be found in dissolving this large amount of p.n.p. in the acid, and it will probably be found simpler in the case of formic acid to dissolve the requisite amount of p.n.p. (1 part p.n.p. to 800 parts dry rubber) in the water used for diluting the acid. If p.n.p. is dissolved in the strong formic acid it should be noted that the strength is thereby reduced from 90% to 67%.

Ventilation of Air-Drying Sheds.

Successful air-drying of crepe depends on efficient ventilation of the drying shed, but it is the writer's experience that this point does not always receive the attention it deserves. Every thousand pounds of wet crepe contains approximately two hundred pounds of water. In order to dry the rubber, *i.e.*, remove this amount of water, it is calculated that a minimum of one and a half million cubic feet of air is required.* This is the

* On the assumption of an average temperature of 85°F. and an average relative humidity of 85 %.

theoretical figure assuming that every particle of air comes into contact with the rubber and takes up the full amount of moisture which it is capable of holding. In practice the amount of air required is many times the figures mentioned above, and the problem of air-drying resolves itself into a question of passing the requisite amount of air through the drying sheds in the shortest possible time; in other words efficient ventilation.

S. Morgan, dealing with manufacture in Malaya (*Preparation of Plantation Rubber*, Morgan and Stevens, p. 180) sums up the position as follows: "It is an elementary point in the study of ventilation problems that the best system of natural ventilation is obtained by admitting cool air near or through the floor and providing an exit for the warmer air at the highest point in the building. It is not often that such a rule is infringed in the ventilation of rubber drying houses..........."

"It has already been shown in a previous chapter that one type of drying house, viz., that over a factory—stands condemned, except for the drying of low grade rubbers."

It must be admitted that very few Ceylon drying-sheds conform to the above standards. Our drying rooms are frequently situated over the factory, and it is exceptional to see a roof provided with a ventilating ridge. Fortunately we have a comparatively good climate and on most estates good quality crepe can be prepared without serious difficulties. It is safe to say however that if an average Ceylon drying-house could be transported to the more humid atmosphere of Malaya there would very soon be complaints of off-coloured and spotted crepe.

The first requisite of a drying room is good top ventilation and this is best provided by means of a "jack" roof. The ridge should be raised about 12 inches above the main roof and should have an overlap of 18-24 inches to prevent rain from driving in. Bottom ventilation depends on circumstances. In the case of a loft situated over a packing room or other dry portion of the factory, the windows of the lower room should be kept open, and the floor of the drying room opened up in some way such as replacing floor boards by spaced slats of wood, inserting a number of expanded metal gratings in the floor, etc. It will probably be objected that water will drip into the packing room from the wet crepe but this can be avoided by allowing the piles of crepe to drain before removal to the drying room. As a further precaution hessian can be hung over the part used for packing.

If the loft is situated over the factory proper, air cannot be brought up through the floor as the factory air is saturated with moisture. In the case of a corrugated iron building the walls for

2 ft. above the floor of the drying room should be cut out and replaced by expanded metal, and fitted on the outside with hinged shades to prevent rain from driving in. This cannot be done in the case of a brick or stone building but large ventilators can be inserted at intervals. Air thus introduced at floor level is more useful than that which enters through the windows as it passes up through the rubber from the bottom instead of having to penetrate from the sides. The windows however should be retained in order to get the full benefit of any breeze. In the case of a two-storied drying shed the upper floor should be opened up as described above.

The Writer will be pleased to advise on alterations to existing drying sheds and designs for new ones.

Bulking of Latex.

In the 1st Quarterly Circular for 1927 an account is given of an Experiment dealing with bulking of latex (R. R. S. 1st Quarterly Circular for 1927, p. 10—"Report from the Imperial Institute on samples of Plantation Rubber").

The experiment was carried out at a factory where the latex is coagulated in 10 Shanghai jars. Rubber samples were prepared from latex from each of the jars, and the vulcanising properties of the samples were examined. The various samples were found to be remarkably uniform in properties and the conclusion might hastily be drawn that large scale bulking of latex is proved to be unnecessary.

It should be pointed out however that in this experiment there were certain factors which tend to promote uniformity and that such uniform results could not always be expected.

In the first place, as mentioned in the report, each jar was filled in turn, no attempt being made to separate the latex from different fields. Each jar would therefore contain latex from a number of different fields and this would tend to even up differences in properties of the rubber from different parts of the estate. On some estates latex from different fields is coagulated separately which is very undersirable.

Secondly the estate in question is very uniform in age. All the trees are over 20 years old and it might be expeeted that the properties of the rubber would be fairly uniform. A similar experiment carried out on an estate composed of fields of varying age would doubtless disclose greater variability of properties.

Further experiments which are now in hand will indicate more clearly whether large scale bulking of latex is necessary in the interests of uniformity.