THE FILM TEST FOR CRUDE RUBBER.*

CHAS. P. FOX.

Buyers of Crude Rubber are sometimes perplexed in their efforts to determine the origin of new or uncommon varieties of rubber by their usual physical characters. Consequently an easy reliable method of determination of variety of crude rubber would be of definite value to the trade. Mr. Herbert Wright, page 163, 3rd edition of his book, HEVEA BRAZILIENSIS, in discussing the structure of crude rubber quotes the experiments of Dr. Joseph Torrey (India Rubber Journal, Nov. 1907) as follows: "Some years ago Torrey observed that petroleum naptha solution of a number of crude rubbers unwashed gave characteristic figures when a few drops were allowed to evaporate on a *white* surface. The solution consisted of 5 grams of rubber dissolved in 100 c.c. of petroleum naptha (6. p 60° to 90° c)."

"I recall that Fine Para and Matto Grosso were the two South American grades, and among the Africans were Lapori; Red Kasai, Upper Congo Ball, Ikalomba and Bussira."

Fine Para gave always a fine, lace like pattern, Matto Grosso gave a similar one, but not so fine and not so regular. Some of the Africans gave the same general type of figure but much coarser. Others deposited the rubber in a general form of one or two nebulous spots shading away very gradually towards the edges and connected by a few faint filaments, which were usually deposed between two spots in form of a coarse network the mesh being approximately circular in form.

"The most characteristic case of this kind was Lapori. On the whole the difference was so great that even an untrained observer could without difficulty, identify almost any one of the varieties under examination by its figure."

The inference to be drawn from the foregoing is that either from the method of coagulation or from some other influence a certain kind of crude rubber will give a figure peculiar to that rubber, and that this figure will serve to identify this rubber. If such be the case we have before us an easy, rapid test for determining the variety of rubber.

We gave the "test" a try out. It was soon evident that the directions given were somewhat indefinite and the original experiments lacked the earmarks of good laboratory technique.

We finally performed the test by preparing the solution of given concentration and using the ordinary microscope slide for the film receptacle. We used special care in preparing the solution. In many cases it was necessary to use a small spoon

*Presented at the Nov. meeting of the Ohio Acad. of Sci.

in transferring from container to slide. The term "figure" is rather indefinite. In the experiment quoted it is not made clear whether shape or color or character of film is to determine. We assumed that a combination of both character of film and its color was to be used. Shape of film is mere matter of accident. Draft of air, declivity of table, skill of the operator, all help to modify shape.

"The viscosity of the solution will determine the thickness of the film and will control the size, shape and number of vesicles. The most important factors to be reckoned with are colour and dirt (suspended matter)."

We made the test very thorough, and examined in all, about twenty-five kinds of crude rubber. Each test was made in duplicate. The dry film was held for a moment in the fumes of sulphur chlorid. This treatment did not alter the film but removed the tackiness. Slides prepared in this way keep indefinitely, do not stick together and are free from dust. In this way definite comparisons between a large number of films could be easily and quickly made.

We found that it was not a difficult matter to obtain similar duplicates from the same solution when made at same time. Exactness was an impossibility. In some cases the difference between duplicates were great enough to assign different names to the same samples. We used much care in getting authentic samples and in each case have compared the crude physical characters with the descriptions given by reliable authorities: Pearson, Brandt, Falconette, and Clouth.

Throughout the entire work we could not definitely determine a film peculiar to any one brand of crude rubber. Considerable stress was put upon the "Lapori film." We found this figure to be common to many kinds of rubber. Rubbers of different botanical and geographical origin often gave this same type of film.

Throughout the experiment there was an indication that the character of the film was determined by the viscosity of the solution. To test out this idea we made up a series of solutions of these rubbers, varying from thin to very thick.

The table proves the point in question. It clearly shows the influence of viscosity:

TABLE

Concentration	Kind of Rubber		
Grams	Para Tribe	African Tribe	Castilloa Tribe.
Grams in 100 cc.	Ceylon Black. Film given.	Mongalla. Film given.	Conche Ball. Film given.
" 1.25 cc.	Greasespot film.	Greasespot film.	Network film.
" 2.50 "	Network film. Faintly.	Network film. Faintly.	Wafer film. Thin.
" 5.00 "	Network film. Plain.	Network film. Destinct.	Wafer film. Heavy.
" 10. "	Wafer film. Vesicles.	Wafer film.	Wafer film. Heavy vesicles.
" 20. "	Honey Comb Film.	Wafer film. Vesicles.	Honey Comb Film.

After a close examination and comparison of the films given, in duplicate, by samples representing thirty-three commercial brands of crude rubber belonging to ten distinct groups, we fail to find any indication pointing towards a definite film peculiar to any particular brand of rubber.

Viscosity seems to be the controlling factor in the formation of a film. Viscosity depends a great deal upon the amount and freshness of the rubber content. With a crude unwashed and dirty rubber, the amount of the rubber will vary, the viscosity will be influenced and the character of the film will be modified according to the purity of the sample.

Tenacious heavy Para solution gave the honey comb film. Lapori (old) gave a thin transparent film. By adding more rubber to the latter and by diluting the former with solvent, we were able to transpose the character of the films.

Akron, Ohio, November 2, 1909.