# NOTE

ON

# PRESERVATION OF LATEX BY ACIDS

BY

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## Introduction

This note describes the results of some purely empirical attempts to preserve field latex by the simple addition of acid. The common knowledge of the process of coagulation, and published researches thereon, do not encourage the view that acids might be used to maintain field latex in a fluid condition over long periods. Fullerton (1), in coagulation experiments, found that when latex containing 20 per cent by weight of rubber is treated with progressively increasing amounts of acid, the second liquid zone—which, with latex containing 4 per cent of dry rubber, occurs between the pH values 3.52 and 1.00—is barely if at all apparent. With undiluted field latex containing 35 per cent dry rubber, this second liquid zone is entirely absent; between the pH values 4.49 and 0.83 which represent amounts of added acid corresponding to 2 cc. and 30 cc. of NHCl per 100 cc. latex, coagulation is either complete or almost complete and no zone of complete dispersion is found. From these experiments it would appear very unlikely that by the addition of any acid to field latex, fluidity could be maintained. The results obtained in some such experiments with large amounts of acid are described below.

## Experimental

### TRIALS WITH ACETIC ACID

Experiments were first made with latex diluted to a dry-rubber-content of 15 per cent. In Fullerton's *(loc. cit.)* experiments with such latex, the greatest amount of acetic acid applied was 8 cc. of the 2.5 per cent acid or roughly 1/5 cc. of the pure substance per 100 cc. of latex. With amounts of acid of this order, complete coagulation resulted. In the present experiments it was found that if the amount was increased to between 10 cc. and 20 cc. of pure acid per 100 cc. latex, no coagulation occurred and fluidity was maintained during an observation period of over three weeks.

When similar experiments were made with latices containing over 30 per cent dry rubber, however, coagulation or clotting resulted over a wide range of acid concentrations. Nowhere in the range which extended to 25 cc. of pure acid per 100 cc. of field latex was a zone of satisfactory fluidity observed.

### Trials with Formic Acid

With this acid, fluidity zones were found both for diluted and undiluted field latex.

It was found that with latex diluted to a dry rubber content of 15 per cent, a fluid condition was maintained for over six weeks by the addition of amounts of 90 per cent formic acid lying in the zone 5—25 cc. per 100 cc. of latex.

With undiluted field latex, fluidity was maintained for the same period on treatment with between 7 and 25 cc. of 90 per cent acid per 100 cc. latex. The fluidity zone appeared however to be narrower with some latex samples than with others. In certain cases the upper limit beyond which coagulation occurred either immediately or in less than three days was found to be 15 cc. of acid per 100 cc. of latex. The amount giving the best general results was the equivalent of 10 cc. of 90 per cent acid per 100 cc. latex. Samples of field latex preserved with this amount of acid were found after six weeks storage to have no putrefactive odour; the latex also passed through a sieve having 100 meshes per inch without leaving measurable clots. There was, however, a noticeable lack of stability; when heavy frothing was induced by vigorous agitation the froth coagulated. Similarly, rapid stirring quickly induced coagulation in the body of the latex. After approximately eight weeks' storage in glass, a clear yellow serum began to appear in the lower layers of latex; shaking restored homogeneity but partial separation occurred again in approximately one week's time. This indicated almost beyond doubt that the acid-preserved latex was in a micro-flocculated condition, which would account in great measure for its comparative instability. It was found that the stability of the latex could be improved slightly by the addition of 1 per cent of saponin, calculated on the rubber phase of the latex. Curiously enough, casein had little if any stabilising effect. The saponin-"stabilised" latex, although less sensitive to added compounding solids such as sulphur and zinc oxide than the parent unstabilised acid latex, was nevertheless decidedly unstable.

Trial shipments to England of the simple and saponin-"stabilised" formic acid-preserved field latex in four-gallon lots were received and reported upon by the technical officers of the London Advisory Committee for Rubber Research. It was found

by these officers that with the simple formic acid latex, an appreciable amount of clotting took place on the walls of the containers during transit and that in the case of the saponin-"stabilised" latex the amount of clotting was almost negligible. Further confirmation of the Malayan observations on stability was forthcoming in the fact that the acid latices proved much too unstable for normal compounding in England.

TRIALS WITH HYDROCHLORIC, NITRIC AND TRI-CHLORACETIC ACIDS

Preliminary trials with abnormally large amounts of these acids on undiluted field latex have so far not resulted in the finding of zones of permanent fluidity for latices treated with them.

## Discussion and Summary

It is shown that by the application to field latex of amounts of formic acid of the order of 9 per cent by weight of the latex, or 10 per cent by volume of the 90 per cent commercial acid, a product results which will retain its fluidity for long periods. It is, however, apparently micro-flocculated, and unstable. Because of their instability it seems unlikely that acid latices of this kind will find technical applications. The findings are in no way contradictory to those of Fullerton whose experiments on coagulation did not include trials with such large amounts of acid.

It is regretted that fuller experimental data cannot be given because most of the relevant records were destroyed recently by fire at the Institute. It is probable that a further study will be made, from which additional experimental data together with a possible explanation of the empirical observations given here may emerge.

## Acknowledgment

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## Literature Cited

(1) FULLERTON, R. G. *Q.J.R.R.I.M.* **2** (1930—1931) 156

Kuala Lumpur,
15th March, 1937.