THE SPECIFIC GRAVITY OF PRESERVED LATEX

BY

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Introduction

The literature on latex contains a number of references to the specific gravity of fresh latex but published information on the specific gravity of preserved latex in the condition in which it reaches the consumer appears to be practically non-existent. De Vries (1 & 2) and Scholtz and Klotz (3) investigated the specific gravity of undiluted fresh latices of various dry rubber contents and, from their results, each deduced the specific gravity of the disperse or rubber phase. The average specific gravity of the rubber globule as deduced by De Vries is 0.914. Scholtz and Klotz's value for the disperse phase is 0.901 which is appreciably lower than that of De Vries.

Although the published literature contains no references to the specific gravity of commercial preserved latex, the Rubber Trade Association of London gives a table of values in its latex contract forms, but details are lacking as to the total number of experimental observations which the table represents. A significant feature is that, by extrapolation of the dry rubber content values to 100 per cent., after the manner of Scholtz and Klotz, the figures obtained for the specific gravity of the rubber disperse phase is 0.912, which agrees fairly well with that of De Vries for fresh latex and which is considerably higher than that of Scholtz and Klotz.

In view of the paucity of information available on the specific gravity of preserved latex it seemed desirable to obtain additional data and incidentally to make a further check on the published values for the specific gravity of the rubber disperse phase.

The primary object was to construct, after the manner of the Rubber Trade Association, a specific gravity table which might reasonably be said to be representative of average commercial preserved latex over a fairly wide range of dry rubber contents. De Vries and Scholtz and Klotz have both shown that, with fresh latices of any given dry rubber content, appreciable variation in specific gravity is found. Seasonal variations in the amount of serum constituents and similar variations due to the nature and severity of the tapping system employed, together with accidental or deliberate dilution of latex with water in the field, combine to produce specific gravity variations in latices of the same dry rubber content. In working with preserved latex there is an additional variable, in the amount of ammonia present and in the form in which the ammonia is added. In attempting to prepare a table for average commercial preserved latices it is obviously important therefore to examine a large number of samples from a reasonable number of different sources.

The findings of Scholtz and Klotz are based upon an examination of 85 samples, all of which were taken from the same estate source and a number of them from individual trees on the experimental area. In the present work individual tree samples have been rigidly excluded, the latex has been drawn from a number of different estates and the total number of samples examined is ten times that of Scholtz and Klotz.

Section A

Experimental

Sources of Latex

In Table I below the various sources of latex are set out while column 3 of Table II indicates the sources of the samples in various zones of dry rubber content.

TABLE I

Sources of Latex

Estate No.	District	Latex from
1	Negri Sembilan	Seedling trees
2	Selangor	" "
3	"	" "
4	"	Seedling trees and four clones
5	"	Seedling trees
6	Johore	" "
7	Selangor	" "
8	"	" "
9	"	" "

The samples were collected as opportunity offered over a period of approximately six months, and the attempt was made to cover the approximate normal range of dry rubber contents, 28—50 per cent. It is unlikely that commercial preserved latex will ever be required at a dry rubber content less than 28 per cent. while the tree itself fixes the dry rubber content of 48—50 per cent. as the richest latex which can be shipped in any quantity without artificial concentration. The majority of the samples having dry rubber contents in the range 28—32 per cent. were obtained from an area on Estate No. 2 which is being tapped on a fairly drastic system as a preliminary to re-planting. On this estate the chances of deliberate dilution of latex by the tappers in the field were small and samples were not drawn for test on wet days. Latex of high dry rubber content, in the zone 46—50 per cent. is difficult to obtain in quantity, and a large proportion of the samples in this zone were of necessity obtained from Estates Nos. 2 and 7 which happen to be two of the few Malayan estates which export unconcentrated latex of high dry rubber content.

Sampling and Preservation

It was not possible, except in a few cases, to draw samples from daily bulks of latex from a whole estate or estate division, chiefly because the time required for the accumulation of a sufficiently large number of separate test samples would have been far too long. In order to make possible the collection of a suitable number of samples in a reasonable time, the yield from a tapper's task of 250—300 trees was taken as a suitable bulk from which a sample might be drawn. By this means it was possible to collect from any estate on a given day a number of samples, each of which represented the mixed product from a fair tree population. The adoption of this procedure introduced, in nearly all cases, the necessity of preservation with liquid rather than with gaseous ammonia. The addition of liquid ammonia as a preservative has the two-fold effect upon the specific gravity of slight aqueous dilution, together with a reduction due to the ammonia itself. The dilution effect is however by no means so great as the accidental or deliberate dilution which is very common in commercial practice, as for instance when rich latex of 42—43 per cent. dry rubber content is deliberately diluted with water at the factory to 38—39 per cent. before shipment, and the use of liquid ammonia in the preservation of the test samples is not therefore unwarranted. The permissible range of ammonia content was taken as 0.5—0.7 per cent. and any sample containing an amount of ammonia within this range was accepted for test.

Dry Rubber Content and Specific Gravity Determination

Dry rubber contents were determined in duplicate on each sample after thorough shaking, by the method described by Bishop and Fullerton (4). Values for dry rubber content were thus obtained as weight percentages or in other words as the weight of dry rubber contained in a given weight of latex.

Specific gravity determinations were also made in duplicate on each sample by the specific gravity bottle method, after very thoroughly shaking each sample to re-disperse settled solids. No temperature refinements were introduced. These were scarcely warranted by the very nature of the investigation and its uncontrollable variations. In any case, room temperature at the Institute is always very constant in the region 29°—30°C.

Results

In all, 852 samples were examined for dry rubber content and specific gravity; the dry rubber content range covered was 28—50 per cent. approximately. The results were then tabulated according to dry rubber content into groups of two units after the manner of the Rubber Trade Association in the presentation of its values. In this way, the total dry rubber content range was divided arbitrarily into eleven groups. The number of individual samples falling into each group naturally varied, the most populous group containing 117 individuals and the least populous 38 only. This unequal distribution was unavoidable. For each group of two dry rubber content units, the mean dry rubber content and the mean specific gravity was then calculated. Columns 1, 2, 4 and 5 of Table II present the values so obtained.

Analysis of Results

It was expected that the eleven values for mean specific gravity at the corresponding mean dry rubber content values, set out in columns 4 and 5 of Table II, would not lie exactly in a straight line and a mathematical analysis of the spread of the individual specific gravity values in each group, about the mean for that group, was made in order to determine the significance of each of the means. The standard deviation of the individual values from the mean was calculated for each group, together with the corresponding probable error. Similarly, the standard deviation and probable error of the mean itself were obtained; these are set out in columns 6, 7, 8 and 9 of Table II. In examining the values for the standard deviation and probable error of a single determination, it is seen that, even in the two worst groups, the chances are even that a single determination falls

TABLE II

Specific Gravity and Dry Rubber Content for 852 samples of preserved latex

Group D.R.C. per cent. by weight	Total Samples in Group	Sources (see Table I)	Mean D.R.C.	Mean Specific Gravity	Specific Gravity Distribution: About the arithmetic Mean: Standard Deviation	Specific Gravity Distribution: About the arithmetic Mean: Probable Error	Standard Deviation of Arith. Mean	Probable Error of Arith. Mean	About the Line s = — 0.001158 t + 1.0177: Standard Deviation	About the Line s = — 0.001158 t + 1.0177: Probable Error
			(t)	(s)	σ	0.6745 x σ	σm	0.6745 x σm	σ	0.6745 x σ
1	2	3	4	5	6	7	8	9	10	11
28.1 — 30.0	97	1,2,3,	29.3	0.9831	±0.0012	±0.0008	±0.00012	±0.00008	±0.0014	±0.0009
30.1 — 32.0	116	1,2,4	31.0	0.9820	±0.0012	±0.0008	±0.00011	±0.00008	±0.0011	±0.0008
32.1 — 34.0	47	1,2,3, 4,5	33.0	0.9796	±0.0019	±0.0013	±0.00028	±0.00019	±0.0017	±0.0012
34.1 — 36.0	59	1,2,3, 4,5	35.2	0.9773	±0.0022	±0.0015	±0.00029	±0.00019	±0.0021	±0.0014
36.1 — 38.0	117	1,2,3 4,5,6,7,8,9	37.3	0.9744	±0.0022	±0.0015	±0.00020	±0.00013	±0.0020	±0.0013
38.1 — 40.0	102	1,2,3,4, 6,7,8,9	39.1	0.9725	±0.0015	±0.0010	±0.00015	±0.00010	±0.0014	±0.0009
40.1 — 42.0	104	2,4,6,7	40.9	0.9706	±0.0014	±0.0009	±0.00014	±0.00010	±0.0015	±0.0010
42.1 — 44.0	39	2,4,5,6,7	43.0	0.9682	±0.0020	±0.0014	±0.00032	±0.00022	±0.0018	±0.0012
44.1 — 46.0	38	2,4,5,7	45.2	0.9650	±0.0017	±0.0011	±0.00028	±0.00019	±0.0014	±0.0009
46.1 — 48.0	85	2,4,7	47.1	0.9626	±0.0012	±0.0008	±0.00013	±0.00009	±0.0012	±0.0008
48.1 — 50.0	48	2,6,7	48.8	0.9614	±0.0009	±0.0006	±0.00013	±0.00009	±0.0010	±0.0006
	852								±0.0015	±0.0010

within ± 0.0015 of the corresponding mean specific gravities for these groups. The standard deviation of the means themselves about the true mean, which would result from an infinite number of determinations, is in the worst case ± 0.00032, while in six of the eleven groups it is ± 0.00015 or less. Even in the worst case the chances are even that the arithmetic mean lies within ± 0.00022 of the true value, while in seven of the eleven groups the probable error does not exceed ± 0.00013.

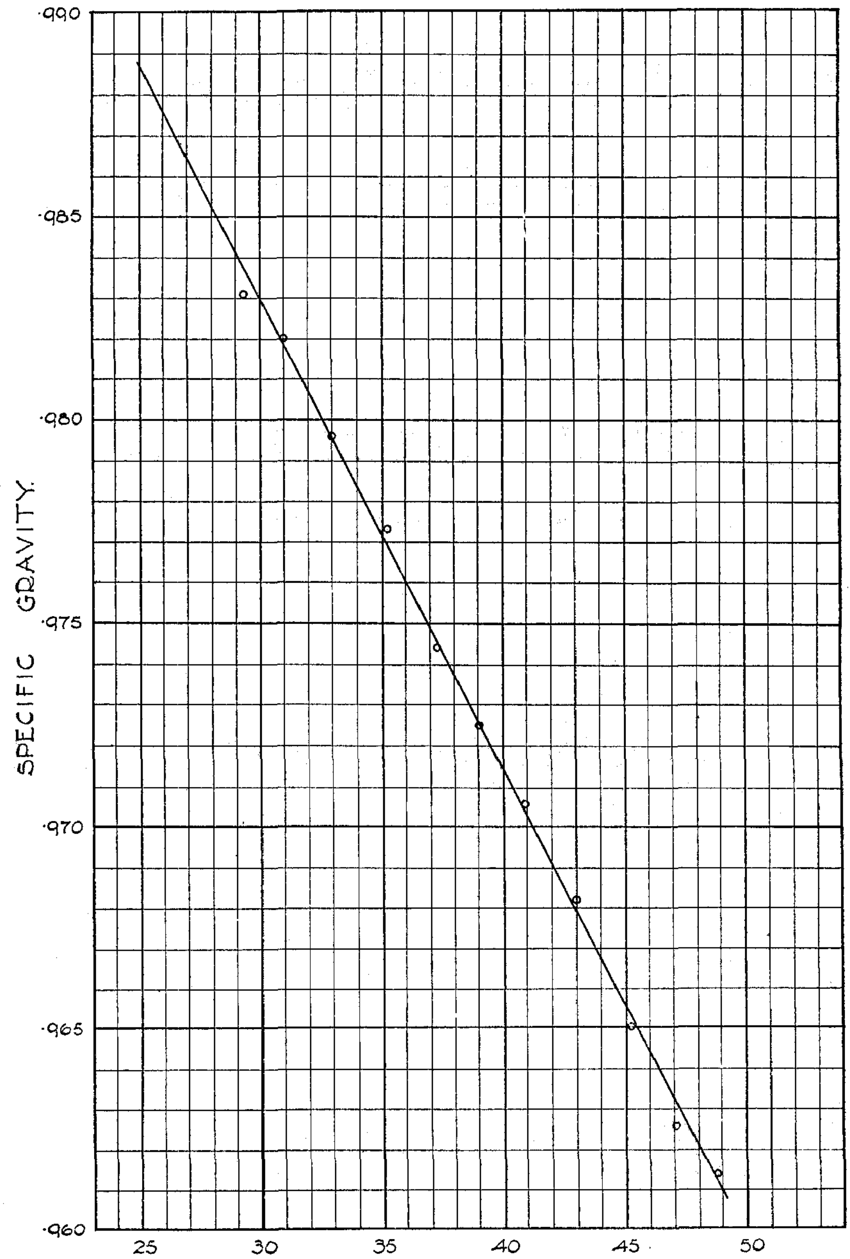
These calculations led to the broad conclusion that no great advantage could accrue from a multiplication of the already large number of observations and that, if the eleven values in columns 4 and 5 of Table II for mean dry rubber content and mean specific gravity were plotted, the most probable line through these points would have significance.

It is common in the preparation of a graph to plot the various points and to decide by simple visual inspection the position of the line or curve which best fits them. In the work of Scholtz and Klotz the position of the most probable line was decided by plotting each of the 85 individual experimental points and drawing a line by inspection more or less centrally through the rather widely-scattered point mass. The line so obtained for a range of dry rubber contents of 28 to 56 per cent. was then extrapolated in one direction to 100 per cent. rubber, so that in other words, the extrapolation zone in one direction was much greater than the experimental zone itself. A very slight error in the slope of the line in the experimental zone, must lead to a considerably magnified error in the deduced value for the specific gravity of the rubber disperse phase. Extensive extrapolation can in any case be criticised on many grounds, but where, as in this case, it is unavoidable, it is obviously important to fix the position of the experimental line not by simple visual inspection and personal judgment, but by mathematical calculation. The criticism that the investigator might have chosen by inspection a slightly different but apparently equally satisfactory line through the experimental points, and so obtained a different value at the extrapolation limit, can only be avoided if the position of the most probable line is determined mathematically.

In the present work the 852 values had been reduced, by the initial grouping, to the eleven mean points set out in columns 4 and 5 of Table II, and it had been shown that each of the mean points had statistical significance. They lie nearly on a straight line (see Fig. I) and, although the difficulty of fixing by inspection the line which best fits them is thereby rendered much less than in the case of Scholtz and Klotz, whose experimental points were ungrouped and therefore widely scattered,

FIGURE 1.

Specific Gravity and Dry Rubber Content of Preserved Latex.



D. R. C. Per Cent.

it was decided to calculate the position of the line which best satisfied the eleven points.

The equation of the most probable line through the eleven mean points was calculated by the application of the "theorem of least squares" described by Feldman (5). It is required to calculate the most probable values of "m" and "b" in the equation

$$s = mt + b$$

where s = specific gravity and t = dry rubber content. The value for "m" is given by the equation

$$m = \frac{\Sigma t \times \Sigma s - n \Sigma (st)}{(\Sigma t)^2 - n \Sigma t^2}$$

and the value for "b" by

$$b = \frac{\Sigma t \times \Sigma (st) - \Sigma t^2 \times \Sigma s}{(\Sigma t)^2 - n \Sigma t^2}$$

where n = number of specific gravity—dry rubber content pairs.

Table III shows the arithmetical operations from which the values of "m" and "b" were derived by simple algebraical substitution in the above equations.

TABLE III

Mean D.R.C. (t)	(t^2)	Mean Specific Gravity (s)	(st)
29.3	858.49	.9831	28.80483
31.0	961.00	.9820	30.44200
33.0	1089.00	.9796	32.32680
35.2	1239.04	.9773	34.40096
37.3	1391.29	.9744	36.34512
39.1	1528.81	.9725	38.02475
40.9	1672.81	.9706	39.69754
43.0	1849.00	.9682	41.63260
45.2	2043.04	.9650	43.61800
47.1	2218.41	.9626	45.33846
48.8	2381.44	.9614	46.91632
$\Sigma t = 429.9$	$\Sigma t^2 = 17232.33$	$\Sigma s = 10.6967$	$\Sigma (st) = 417.54738$
n = 11			

The values derived for m and b are as under:—

$$m = -0.001158$$
$$b = 1.0177$$

and the equation of the most probable specific gravity—dry rubber content line, is thus

$$s = -0.001158\,t + 1.0177.$$

From this one may calculate the specific gravity "s" for any known dry rubber content "t" and, by calculating the specific gravity for each of the eleven dry rubber content means and comparing it with the experimental specific gravity mean itself, a picture is obtained of the closeness of approach of the experimental points to the line which represents them most fairly as a group. Table IV presents this comparison.

TABLE IV

Closeness of Approach of the Group-mean Points to the Line $s = -0.001158t + 1.0177$

1	2	3	4
Mean D.R.C.	Mean S.G. Experimental	S.G. Calc.	Deviation from experimental Group mean Specific Gravity
29.3	0.9831	0.9838	+ 0.0007
31.0	0.9820	0.9818	+ 0.0002
33.0	0.9796	0.9795	— 0.0001
35.2	0.9773	0.9769	— 0.0004
37.3	0.9744	0.9745	+ 0.0001
39.1	0.9725	0.9724	— 0.0001
40.9	0.9706	0.9703	— 0.0003
43.0	0.9682	0.9679	— 0.0003
45.2	0.9650	0.9554	+ 0.0004
47.1	0.9626	0.9632	+ 0.0006
48.8	0.9614	0.9612	— 0.0002

It is observed that, at nine of the eleven dry rubber content values, the closeness of the specific gravity group-mean to the value shown by the line itself is 0.0004 or less. In Fig. 1, this is demonstrated graphically.

It will be remembered that, in the initial mathematical treatment, standard deviations of specific gravity were calculated about the mean specific gravity for a group which covered two units of dry rubber content. Within that group the deviation of all individual specific gravities were computed from the mean specific gravity for that group without regard to the dry rubber content associated with the specific gravity of any particular individual in the group. The variation of specific gravity with dry rubber content within groups was not taken fully into account. It remained therefore to make certain that the dispersion of individual values within any group *about their own section of the chosen line* was not distinctly greater than that already derived about the single point which represents the group-mean specific gravity. It was necessary to compute the deviation of every experimental specific gravity value within a group from the specific gravity indicated by the line at the exact dry rubber content of that sample. Specific gravities were calculated along the chosen line at intervals of 0.1 units of dry rubber content over the whole experimental range. The individual experimental specific gravities within each group were then related to the calculated specific gravity at their respective dry rubber contents. In this way it was possible to derive values for the standard deviation of group members about the line rather than about the group-mean point. The data so obtained are presented in columns 10 and 11 of Table II. When these values are compared with the corresponding values, in columns 6 and 7 respectively, for standard deviation about the group means, it is seen that for seven of the eleven groups the dispersion about the line is slightly less than that about the corresponding group-mean; in one group the degree of dispersion is the same about the line and group-mean, and in the remaining three groups, the dispersion about the line is slightly greater than that about the corresponding group-mean. This indicates that, taking into account the dry rubber content of each of the experimental points, the grouping of their specific gravities is better about the chosen line than about the specific gravity group-means, upon which the line is based; the line $s = -0.001158t + 1.0177$ was therefore accepted as representing the relation between specific gravity and dry rubber content in preserved latex. By determining the standard deviation of the whole of the 852 samples from the line (see Table II column 11 bottom) it may be concluded that, if a single sample only were available for test, the chances would be even that the specific gravity obtained would lie within $\pm$ 0.0010 of the value shown by the line at that dry rubber content.

It was now possible to prepare the desired table for specific gravity and dry rubber content and this is presented as Table V. In order to check the values of De Vries (1 & 2) and Scholtz and Klotz (3) for the specific gravity of the rubber disperse phase, extrapolated values up to 100 per cent. rubber content have been included in the table and it is seen that the results lead to a

TABLE V

Specific Gravity Table for normal preserved Latex

from the Line $s = -0.001158t + 1.0177$

D.R.C. (t)	S.G. (s)	lb. per gallon Water = 10 lb.	oz.
0	1.0177	—	—
10	1.0061	—	—
15	1.0003	—	—
20	0.9945	—	—
25	0.9887	2	7½
26	0.9875	2	9
27	0.9864	2	10½
28	**0.9853**	**2**	**12¼**
29	**0.9841**	**2**	**13¾**
30	**0.9830**	**2**	**15¼**
31	**0.9818**	**3**	**0¾**
32	**0.9806**	**3**	**2¼**
33	**0.9795**	**3**	**3¾**
34	**0.9783**	**3**	**5¼**
35	**0.9772**	**3**	**6¾**
36	**0.9760**	**3**	**8¼**
37	**0.9749**	**3**	**9¾**
38	**0.9737**	**3**	**11½**
39	**0.9725**	**3**	**12¾**
40	**0.9714**	**3**	**14¼**
41	**0.9702**	**3**	**15¾**
42	**0.9691**	**4**	**1**
43	**0.9679**	**4**	**2½**
44	**0.9667**	**4**	**4**
45	**0.9656**	**4**	**5½**
46	**0.9644**	**4**	**7**
47	**0.9633**	**4**	**8½**
48	**0.9621**	**4**	**10**
49	**0.9610**	**4**	**11¼**
50	**0.9598**	**4**	**12¾**
51	0.9586	4	14¼
52	0.9575	4	15¾
53	0.9563	5	1
54	0.9552	5	2½
55	0.9540	5	4
56	0.9529	5	5¼
57	0.9517	5	6¾
58	0.9505	5	8¼
59	0.9494	5	9½
60	0.9482	5	11
61	0.9471	5	12½
62	0.9459	5	13¾
65	0.9424	—	—
70	0.9366	—	—
75	0.9308	—	—
80	0.9251	—	—
90	0.9135	—	—
100	0.9019	—	—

The figures in lighter type are obtained by extrapolation beyond the experimental zone.

specific gravity for the rubber disperse phase of 0.9019 which is in good agreement with, and confirmatory of the value of 0.901 derived by Scholtz and Klotz for fresh latex. There is therefore some reason to believe that the value of 0.914 found by De Vries (*loc. cit.*) and the value of 0.912 derived by extrapolation from the Rubber Trade Association specific gravity table are high.

It has already been explained that all values for specific gravity and dry rubber content were determined on the various samples of preserved latex after thorough shaking to re-disperse insoluble heavy solids. It is also the fact that the values for dry rubber content were obtained of necessity by coagulation and the weight of the dry coagulum was taken as representing the rubber disperse phase. It is obvious that a dry rubber content obtained in this way, while quite satisfactory for commercial purposes, does not give a coagulum consisting simply and solely of pure caoutchouc in the strictly scientific sense. It is well known that, when preserved latex is allowed to stand, an appreciable amount of heavy solids settles out, and it would be expected that the specific gravity of a latex from which the solids had been allowed to settle, would be less than that shown by the same latex after thorough shaking. Similarly, where preserved latex has been subjected to simple centrifugal clarification which removes solids, not only would it be expected that the specific gravity of the clarified latex would be less than that of the original latex, but also that, in carrying out a determination of dry rubber content, the coagulum obtained might be more free from adventitious heavy non-rubber solids and thus more closely represent pure rubber (caoutchouc). It follows therefore that specific gravity—dry rubber content values for centrifugally clarified latex, and also for latex which has been concentrated centrifugally might be expected to lie a little below those for preserved latex, and to lead to a specific gravity for the rubber disperse phase itself, which might be slightly less than that derived from the examination of normal preserved latex. It was felt that, without entering upon a systematic study of centrifuged latices, a few observations might afford some additional confirmation of the indication that the values of 0.914 and 0.912 for the specific gravity of the rubber phase of latex are probably on the high side. Some additional experiments were therefore made and these are described in Section B which follows:—

Section B
Experimental

Specific gravity variations in normal preserved latex after simple gravitational settlement were obtained by drawing samples from tappers' buckets, sieving, ammoniating and allowing to stand for 48 hours. After sludge deposition had taken place, a sample of the supernatant latex was carefully withdrawn and its specific gravity was determined. The test sample was then returned to the bulk and, after thorough shaking, the specific gravity was again determined. In Table VI results are presented for seven random samples drawn on two occasions from different tappers' buckets.

TABLE VI

Specific Gravity Variations caused in normal preserved Latex by a gravitational Settlement of 48 hours

Sample	Specific Gravity after usual shaking	Specific Gravity of supernatant Latex after deposition of Solids	Difference due to deposition of Solids
1	0.9761	0.9727	— 0.0034
2	0.9802	0.9770	— 0.0032
3	0.9740	0.9709	— 0.0031
4	0.9681	0.9634	— 0.0047
5	0.9670	0.9658	— 0.0012
6	0.9712	0.9692	— 0.0020
7	0.9685	0.9674	— 0.0011

It is seen from Table VI that the specific gravity differences obtained after settlement for 48 hours, while by no means uniform, can be appreciable and in some cases of the order of – 0.004.

It was next sought to obtain some information on the closeness of approach of specific gravities of centrifugal concentrates to those presented for normal preserved latex in Table V. Sixty eight samples of centrifugal concentrate, most of them supplied by courtesy of Dunlop Plantations Ltd, were examined for dry rubber content and specific gravity. The results were arranged in groups according to dry rubber content and the mean specific gravity and mean dry rubber content were calculated for each group. The values so obtained were then compared with the specific gravities indicated in Table V for normal preserved latex at the appropriate dry rubber contents. The data so obtained are presented in Table VII.

TABLE VII

Individual Samples of Centrifugal Concentrate

Group D.R.C.	No. of Samples examined	Mean D.R.C.	Mean S.G.	Deviation from Value for normal Latex (see Table IX)
1	2	3	4	5
56.1 — 58.0	6	57.2	0.9476	— 0.0039
58.1 — 59.0	10	58.6	0.9458	— 0.0040
59.1 — 60.0	21	59.6	0.9442	— 0.0045
60.1 — 61.0	31	60.4	0.9426	— 0.0052

It is seen that in each group the specific gravity lies as was expected below the corresponding value for normal latex. The extent of the deviation approximates to − 0.004 to − 0.005 from the value derived from Table V for normal latex, and is seen to be in general greater but of the same order as that observed in Table VI when normal preserved latices are allowed to deposit solids by settling. If the specific gravity values for centrifugal concentrate are related, not to the values set out in Table V, but to those obtained by extrapolation of the figures of the Rubber Trade Association, which are themselves similar to those of De Vries (1 & 2), the deviations are much greater than those obtained when normal preserved latex is allowed to settle and are of the order of − 0.01. The inference is therefore again possible that, in the higher zones of dry rubber content, the values of De Vries and the Rubber Trade Association are high.

Further confirmation was next sought in a somewhat different manner. A single small bulk of latex was centrifuged and the skim latex and centrifugal concentrate from it were collected separately. By mixing the skim and cream fractions in varying proportions, clarified latices were obtained having dry rubber contents over a range from 16 to 57 per cent. approximately, and specific gravity and dry rubber content values were obtained over this range. The results are set out in Table VIII.

By the same procedure as that outlined in the calculation of the equation of the most probable line for normal latex, the equation of the line best representing the values in Table VIII was calculated. The equation was found to be $s = -0.001187t + 1.0153$, and from it a dry rubber content—specific gravity relationship can be calculated and compared with that set out in Table V for normal latex. This comparison is made in Table IX.

TABLE VIII

Specific Gravity and Dry Rubber Content of Mixtures of centrifugal Concentrate and skim Latex from a single parent Latex

D.R.C. t	S.G. s
56.7	0.9480
55.2	0.9497
54.0	0.9513
52.7	0.9523
51.0	0.9548
48.1	0.9582
45.0	0.9626
41.1	0.9668
37.4	0.9705
34.2	0.9743
30.5	0.9788
23.5	0.9870
19.6	0.9922
15.7	0.9970

TABLE IX

Specific Gravity of a single Series of skim-concentrate Mixtures compared with Specific Gravities for normal preserved Latex

D.R.C.	Centrifugal Cream-Skim Mixtures	Specific Gravity of normal preserved Latex	Deviation from Specific Gravity of normal preserved Latex
35	0.9738	0.9772	— 0.0034
40	0.9678	0.9714	— 0.0036
50	0.9559	0.9598	— 0.0039
55	0.9500	0.9540	— 0.0040
56	0.9488	0.9529	— 0.0041
57	0.9476	0.9517	— 0.0041
57.2	0.9474	0.9515	— 0.0041
58	0.9465	0.9505	— 0.0040
58.6	0.9457	0.9498	— 0.0041
59	0.9453	0.9494	— 0.0041
59.6	0.9446	0.9487	— 0.0041
60	0.9441	0.9482	— 0.0041
60.4	0.9436	0.9478	— 0.0042
61	0.9429	0.9471	— 0.0042
62	0.9417	0.9459	— 0.0042
65	0.9381	0.9424	— 0.0043
80	0.9203	0.9251	— 0.0048
100	0.8966	0.9019	— 0.0053

Little or no importance can be attached to the fact that the deviations of the specific gravities of the artificial clarified latices, from those for normal preserved latices, are throughout the whole dry rubber content range of Table IX of the same order as the deviations shown by the 68 individual samples of centrifuged latex in Table VII; it must be remembered that the whole series of skim-cream mixtures represents only one single parent latex and that, by virtue of inherent differences in the specific gravity of the serum phase, different parent latices must yield slightly different lines for the skim-cream mixtures derived from them. The fact that, in this particular instance, the deviations at various dry rubber content values are all of the right order, amounts in all probability to little more than a coincidence. Some importance may however reasonably be attached to the single value for the specific gravity of the rubber phase at a dry rubber content of 100 per cent. because, while skim-cream mixtures derived from different parent latices would be expected to give lines of slightly different slope, these lines would all be expected to give approximately the same value for specific gravity at dry rubber content of 100 per cent. This figure is therefore one upon which comparison may be made with that obtained for normal latex. The value actually derived is seen from Table IX to be 0.8966 which deviates by − 0.0053 from the value of 0.9019 found in the present work for the rubber disperse phase in normal preserved latex. This deviation is again of the same order as those presented in Tables VI and VII but, if the value of De Vries and that derived from the Rubber Trade Association table for the specific gravity of the rubber disperse phase had been taken as the criterion from which to judge the deviation, it would then have been of the order of − 0.017 which is much greater than would be expected from the experiments which are summarised in Table VI. These results lead also to the inference that a value of the order of 0.912 − 0.914 for the specific gravity of the rubber disperse phase in preserved latex is probably high.

Discussion and Summary

A specific gravity—dry rubber content table (Table V) has been obtained from the examination of a large number of samples of preserved latex. This table differs slightly from that adopted by the Rubber Trade Association, London.

A value of approximately 0.902 has been derived for the specific gravity of the rubber disperse phase in normal preserved latex and this value is in good agreement with the value of 0.901 obtained by Scholtz and Klotz (3) working with fresh latex.

Experiments with individual samples of commercial centrifugal concentrate have indicated that, as a result of the removal of heavy solids, specific gravities of centrifugal concentrates may be expected to lie from 0.004 to 0.005 below the corresponding values for normal preserved latex.

Preliminary experiments with mixtures of the centrifugal concentrate and the skim latex obtained from a single parent latex have indicated that the value for the specific gravity of the true rubber phase in latex probably lies even below the value of 0.902 deduced from the examination of normal preserved latex.

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