tration is great. When the concentration is lessened, marked hydrolysis takes place and the efficiency rapidly falls off, but with mixed soaps this low efficiency of the palmitate and stearate is supplemented by the relatively high efficiency of the oleate in dilute solutions, which will sustain the detergent effect until all impurities are washed away, including the acid palmitate and stearate which might otherwise be retained by the fabric. When the temperature is low, palmitate and stearate are so little soluble as to be of no practical value, since the only effect of water on them is to hydrolyze them and set free a small quantity of alkali which, according to the hypothesis here favored, has no detergent effect on neutral oils.

Rosin soap is usually regarded as a comparatively undesirable ingredient of soaps. By a test with decinormal solution, it is of about the same efficiency according to the dropping test in kerosene as sodium oleate. But when the dilution curves are studied, it is seen that dilute solutions, especially in the heat, show marked hydrolysis which is necessarily accompanied by separation of the rosin acids. Here the acid product of hydrolysis separates in a cloud and does not stay in solution as with the palmitate and stearate in the heat. The separated rosin acids may well settle on the fabric being washed and impart to it the odor of rosin, cause it to be yellow and make it ready to easily take up dust. This effect may be partially offset in using mixed soaps, by the other ingredients whose detergent action will tend to remove the rosin acids, but the evil effect will still, to some extent, remain.

In this work, when kerosene is used as the test substance, it is, of course, true that we are really measuring the detergent effect of the various soaps toward kerosene only. Some few observations show that toward other fats and oils the relative efficiency of the different soaps is different. It may be necessary to take this into account when judging the value of a soap for some special purpose.

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OF WISCONSIN, March 17, 1902.

## NOTES.

*Note on the Bromination of Heptane.*—Venable[1] found that the bromination of normal heptane from the *Pinus Sabiniana* yielded

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[1] *Am. Chem. J.*, **10**, 237.

a mixture of bromides which varied in amount with the temperature and the time. Theoretical amounts of heptane and bromine were used but a large percentage of heptane was unattacked in every case. The secondary heptyl bromide was the main product when the heptane was kept boiling, and the bromine was added during a course of five hours, which was as rapidly as the bromine was taken up. The yield was 30 per cent. of the theory. This bromide is best obtained from heptane of the *Pinus Sabiniana* of California which was formerly on the market under the name "*abietine*," a patent remedy. Small quantities only can now be obtained under great difficulties, as Blasdale[1] reports. The stock on hand in our laboratory is small and hence valuable. In view of this I thought it possible to increase the yield of the secondary bromide by carrying out the reaction under increased pressure. By means of air-pressure the liquid bromine was forced into the flask containing the boiling heptane. A compact reflux condenser within the neck of the flask completely condensed the heptane. A side tube of the condenser led into a long glass jar, set horizontally, filled with stick potash to absorb the hydrobromic acid evolved. To the further end of the jar was fitted a tube which, entering a jar of mercury vertically, opened at a point 190 mm. below the surface. Several attempts were made to increase the yield of the secondary bromide with this apparatus but without success. I wish here to express my thanks to Mr. M. R. Glenn for his kind assistance in this work.

I then turned my attention to the possibility of accomplishing the result by employing an excess of bromine. The method employed by Venable was followed. Where he used 180 grams bromine for 100 grams heptane I used 240 grams bromine. The table shows the results after six complete fractionations, the first two being under diminished pressure.

| | | Theoretical amount of bromine. Grams. | Excess of bromine. Grams. |
|---|---|---|---|
| I | 100°–120° | 30 | 8 |
| II | 120°–162° | 6 | 2 |
| III | 162°–168° | 55 | 65 |
| IV | 168°–173° | 2 | 1.5 |
| V | 173°–183° | 8 | 2 |
| VI | 183°–210° | 10 | 45 |

I consists principally of unattacked heptane and III of the

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[1] This Journal, **23**, 162.

secondary heptyl bromide. The excess of bromine, then, considerably diminishes the amount of unchanged heptane; increases the secondary bromide by 18 per cent. but causes a much greater increase in the bromides of higher boiling-points. A further consideration of the table shows that 22 grams less of heptane are recovered, but as a compensation there is a gain of 10 grams of the secondary bromide. Now if 22 grams of the heptane were treated with the theoretical amount of bromine only 6.6 grams of this bromide would be obtained. Hence there is actually a net gain in the yield of the secondary bromide as well as a reasonably good gain in time. The process is a very long one and these gains are worth consideration. ALVIN S. WHEELER.

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*New Apparatus for the Examination of Choke-damp and Nitrogenous Mine Inflammatory Gases.*—The apparatus is composed of two burettes which are connected with a 3-way stop-cock capillary, and this with the gas-bottle for filling the burettes. Both burettes are filled at the same time with the gas which is to be examined, and this makes it possible for the apparatus to give an exact determination of oxygen, methane, and carbon dioxide. On the right side, at first, carbon dioxide is absorbed in the caustic potash receiver and then methane is burned in the pear-shaped receiver by a platinum spiral which is glowing from an accumulator.

During the absorption of the carbon dioxide and the cooling of the pear, the oxygen is determined on the left side, so that a complete choke-damp examination of methane, carbon dioxide and oxygen is finished in about twenty-five minutes.

The fluctuation of the temperature which has occurred during the examination of the gas is found on a special thermometer, divided in 1/10° C., and arranged in the cooling-receiver; the variation of the volume of the gas brought about by the fluctuation of the temperature is equalized by the lifting and sinking of the manometer-receivers on each side. The gas is put into the burettes by means of mercury and can be read from the mercury. The apparatus is very sensitive and works exactly to 0.05 per cent. The apparatus solves the problem of the examination of choke-damp in