In a discussion of polymerization and depolymerization as an explanation of the composition of petroleum lubricants, Thorpe[2] suggested that such changes may result from a condition of unsaturation in the crude oil. But a comparison of the residual hydrocarbons with the composition of the corresponding crude oils as shown by their comprehensive study during the last few years in this Laboratory, precludes the possibility of such decomposition during the process of refining. Thorpe's allusion to the relative ease with which the lubricant loses its oiliness in the engine is not supported by the data of the numerous frictional tests made in this Laboratory, which indicate, in my opinion, that lubricants properly refined from the best crude oils lose very little of their oiliness under strenuous use. Furthermore, the action of bromine on commercial lubricants disproves unsaturation, provided they are properly refined.

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## NOTES

**The Effect of Ethylene on the Enzymes of Pineapples.**—While tasting pineapples which had been ripened with ethylene to improve the flavor and texture, it was noticed that not only were the treated pineapples sweeter but that they seemed to dissolve the mucosa of the mouth more readily than the untreated fruits. Since pineapples are known to be high in proteoclastic enzymes, it was deemed advisable to see if any difference in the activity of these enzymes could be measured quantitatively.

Four pineapples of the same size and degree of ripeness, as judged from external appearances, were selected for each treatment. They were given ethylene or propylene (1:1000) once a day for four days. On the fifth day they were sampled for texture and flavor by a tasting squad. To avoid prejudiced opinions the members of the squad were not told in advance of the treatments administered, but each one was required to give first an opinion of the acidity, sweetness and aroma of the pineapples. There was agreement that the ethylene-treated fruits were much superior to the untreated fruits, and that propylene produced a better flavor than ethylene.

Samples for chemical analysis and for enzyme activity were taken by placing all the fruits of one treatment together, cutting them up in cubes and then, after thorough mixing, removing 100g. samples for chemical analysis and 200g. samples for enzyme study. The samples for enzyme study were immediately ground fine through a Russwin food chopper and the juice pressed out through cheese cloth. The quantity of juice in both cases was 110 cc. out of 200 g. of material so that the juice was not more concentrated in one case than the other, since moisture determinations showed the same total solid content in each sample.

[2] Thorpe, *Science*, **64**, 236 (1926).

The substrate for proteoclastic enzymes consisted of a 10% suspension of repurified casein dispersed in $2 \times 10^{-3}$ g. equivalent of ammonium hydroxide. This concentration of ammonium hydroxide is supposed to combine completely with the casein, forming ammonium caseinate. Other protein substrates were used, but the results were not so reliable as with casein, owing to the foaming of the solutions in the Van Slyke apparatus.

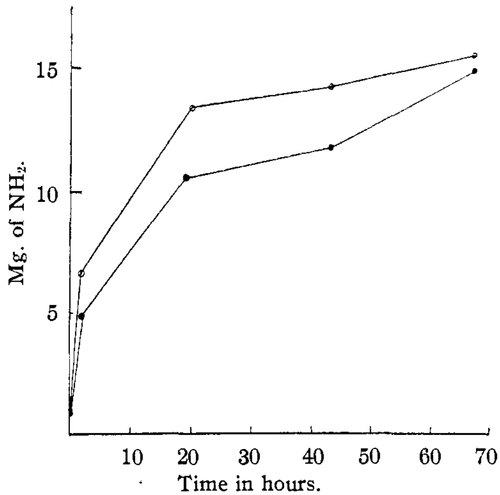


Fig. 1.—Activity of the proteoclastic enzymes of pineapple. Circles, ethylene; dots, check.

Ten cc. of the pressed juice was added to 90 cc. of the substrate, thoroughly mixed, and allowed to act at about 25°. At intervals, 10cc. portions were removed and the proteoclastic activity was determined by the amount of $\alpha$-amino nitrogen given off in six minutes by shaking in the Van Slyke amino nitrogen apparatus. Each point was the average of two determinations which checked very closely. As will be seen from the graph (Fig. 1), although they both started together, the ethylene-treated sample soon took the lead and maintained it until the close of the experiment.

Chemical analyses of the samples from the same lot show that the total sugars are decreased and the direct-reducing sugars are increased by the treatment with ethylene and with propylene also (Table I). The quantity of starch in pineapples is so low that most of the increase of direct-reducing sugars must come from the non-reducing sucrose rather than from starch.

Table I

Effect of Ethylene and Propylene upon the Sugars of Pineapple

| | Check | Ethylene | Propylene |
|---|---|---|---|
| Total sugars, % | 11.8 | 10.4 | 9.0 |
| Direct-reducing sugars, % | 5.0 | 5.4 | 7.0 |

In conclusion, it seems that the activity of both the proteolytic enzymes and invertase of pineapples is increased by treatment with ethylene or propylene.

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**A Chemical Investigation of Chaulmoogra Oil. I. Correction.**—Shortly after the publication of my paper on Chaulmoogra oil,[1] Dr. F. B. Power called my attention to certain errors contained therein. Some of these errors are due to the fact that, on account of illness, I was unable to attend to the proofs personally.

From the formula given, the calculated iodine value of taraktogenic acid would be 43.17 instead of 42.7. The weight of substance given, 0.1519 g. is wrong and should be 0.1419 g. When this correction is made the value is found to be 42.56, in fairly good agreement with theory.

In the data for the iodine number for isogadoleic acid the weight of iodine absorbed is given as 0.01356 g. This is, as a matter of fact, the iodine equivalent of 1 cc. of the thiosulfate solution used. It should be multiplied by 7.97. When this is done the iodine number as given, 78.13, is correct.

The iodine values for the lactone are unfortunately reported in grams and the "g.'s" should be deleted.

The appearance (p. 2330, line 20) of $C_6H_{10}O_3$ for $C_6H_{10}O$ is an inadvertence.

Dr. Power has called my attention to the fact that it is not stated that the unsaponifiable material was removed from the saponified oil before the acids were set free with a mineral acid. I had regarded this as so much the established routine in such investigations, that I neglected to mention it, as I probably should have done.

Through no direct fault of mine the name Smith, Stainistreet and Company appeared incorrectly spelled. I am, however, unfortunately responsible for the misspelling of "Taraktogenos."

Dr. Power objects to the calculation of the analysis of the silver salt of isogadoleic acid on the assumption that it had absorbed one molecule of oxygen as speculative and unwarranted. There was no intention on my part that this interpretation should stand as more than a suggestion, which is, however, quite strongly supported by the general conduct of the acid and its salts.

Dr. Power also calls attention to the danger of using any water vapor to assist the distillation of the esters, on account of the probability of hydrolysis. On general principles the criticism is doubtless justified, but in the particular procedure of the investigation, the amount of water vapor used was extremely small, and it was used only intermittently. There was no evidence of any appreciable amount of hydrolysis although it is possible that the small amount of "brown resinous substance" is to be accounted for as due to slight hydrolysis.

I take this occasion to express to Dr. Power my sincere thanks for the

[1] Hashimoto, This Journal, **47**, 2325 (1925).

interest he has shown in my work, as well as for his detailed and careful criticism of it.

CONTRIBUTION FROM
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STANFORD UNIVERSITY, CALIFORNIA T. HASHIMOTO
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## NEW BOOKS

**Müller-Pouillets Lehrbuch der Physik. Lehre von der strahlenden Energie. (Müller-Pouillet's Textbook of Physics. The Science of Radiant Energy.)** Vol. II, first half. Edited by Dr. OTTO LUMMER, with H. ERGGELET, F. JÜTTNER, A. KÖNIG, M. v. ROHR, E. SCHRÖDINGER. Friedrich Vieweg and Son, Braunschweig, 1926. xviii + 928 pp. 624 figs. and 7 plates. 24.5 × 16 cm. Price, unbound, R. M. 50; bound, R. M. 54.

Although Otto Lummer died before the publication of this book, his work had been so thorough, so the preface states, that no subsequent changes were required. His mastery of the subject, evident throughout, becomes most conspicuous in his discussion of interference. Associated with him in the preparation of certain sections were the collaborators mentioned above.

First comes a concise and stimulating review of theories of light and ether. Each main division following is similarly prefaced. The subjects include velocity of light, reflection, refraction, dispersion, geometrical optics, images, the structure and defects of the eye, optical instruments, interference and diffraction, spectrometry and microscopy. The other topics treated in the corresponding volume of the tenth edition are reserved for a second part. This shows the extent of the additions made to bring the treatment up to date.

The sections of spectroscopy, interferometry, refractometry, the camera and the ultramicroscope bear the most directly upon the chemist's problems, and are invaluable for reference. But he will find it hard to pass over the highly readable accounts of such subjects as color sensation and color blindness (by the versatile Schrödinger!), spectacles, photographic lenses, range finders and periscopes. The mathematical treatment, while apparently adequate, will seldom be beyond his comprehension. The bibliography is extensive and includes a reasonable proportion of non-German publications. A greater profusion of cuts depicting modern optical instruments would doubtless add to the value of the book.

Appearing at a time of exceptional activity in the publication of large works on physics, this book maintains and adds to the prestige of the Müller-Pouillet Lehrbuch. By its frequent use the chemist can improve his own experimentation and also add to his appreciation of a vast domain which overlaps his own at many points.

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