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.

CONGRESS SQUARE HOTEL,
PORTLAND, MAINE

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 2×10^{-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.

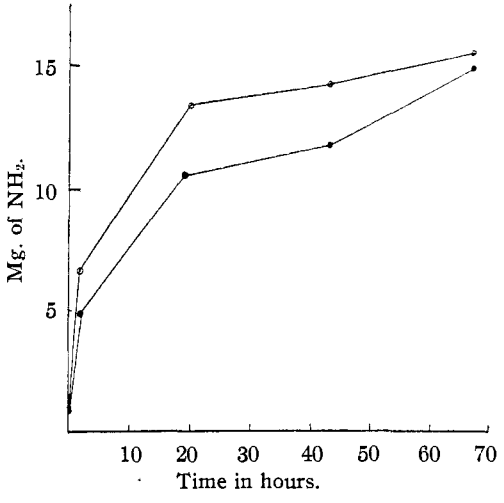

Fig. 1.—Activity of the proteoclastic enzymes of pineapple. Circles, ethylene; dots, check.

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 α-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.

L. O. REGEIMBAL
R. B. HARVEY

CONTRIBUTION FROM THE
LABORATORY OF PLANT PHYSIOLOGY,
DIVISION OF PLANT PATHOLOGY AND BOTANY,
MINNESOTA AGRICULTURAL EXPERIMENT STATION,
ST. PAUL, MINNESOTA

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