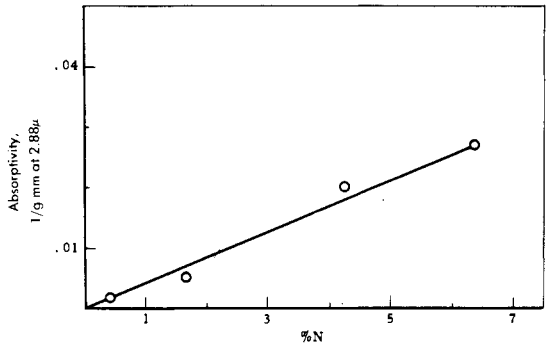

Figure 11. The infrared absorptivity for pyrrolic concentrates of various cat. cracked gas oil fractions increases with nitrogen content

with *p*-dimethylaminobenzaldehyde, which is believed to be sensitive to all pyrrolic constituents of aromaticity lower than carbazoles, a supposition supported by the results of the present investigation.

Thus the nitrogen picture is a fairly simple one with at least 80% of the nitrogen in this fraction accountable as nitrogen bases and pyrroles as shown in Figure 7 and tabulated below.

Distribution of Nitrogen in 480/540° F. Fraction

Basic	0.044
Pyrrolic	0.045
Unaccountable	0.016
Total	0.105

Agreement between the nitrogen content of the gas oil remaining after removal of pyrroles (0.045%) and the basic nitrogen content (0.044%) of the untreated gas oil is also excellent. It is therefore improbable that nitrogen basic to perchloric acid in this boiling range includes any appreciable quantities of basic pyrroles.

That all the pyrrolic constituents have unsubstituted nitrogen atoms can also be shown graphically by plotting $E_{2.88}$ *vs.* Kjeldahl nitrogen content for a number of pyrrolic concentrates from the various fractions. As shown in Figure 11 this curve is a straight line passing through the origin, thereby indicating that all the nitrogen is accounted for by N-H stretching frequencies.

Oxygen Compounds. We now have a fairly complete picture of the sulfur and nitrogen composition of the catalytically cracked gas oil but no systematic investigation has yet been made of the oxygen components. However, it is probable that cyclic oxygen systems similar to the sulfur and nitrogen systems are present at very low concentrations. The most abundant oxygen compounds found, however, were phenols. There is some evidence that these tend to be concentrated in the lower boiling catalytically cracked fractions. They occur to the extent of 0.26 weight % in the 340/430° F. fraction. Extraction with 20 volume % aqueous NaOH of the 340/430° F. hydrocarbon phase remaining after acid extraction to isolate the nitrogen bases gave practically quantitative yields of water-white phenols upon distillation. The crude phenolic aggregate possesses a molecular weight of 123, refractive index of 1.5325^{20}, and an oxygen content of 13.2 (theory for xylenol = 13.1). About 1% sulfur compounds were present in this product. The ultraviolet spectrum of the sulfur-free distilled phenols (properties shown in Table III) indicates phenols of high purity which contain about two alkyl substituents on the average. The purity of the phenols also suggests that the concentration of carboxylic acids must be quite low. The thermally cracked gas oil contained larger amounts of phenols than did the catalytically cracked whilst the straight run contained less.

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CORRECTION

The article, "Vapor-Liquid Equilibria for the Ethane-Propane System," by D.E. Matschke and George Thodos [J. CHEM. ENG. DATA **7**, No. 2, 232 (1962)], should be changed as follows:

In Table I, last column, there should be no values under propane for the sixth item at 0° and the last item at 50° F.

In Table III, last column, there should be no values for the fourth and last items.

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In revised Figure 3, corrected curves for propane at 0° and 50° F. are shown.