A specific test for dicyanogen was described recently\textsuperscript{1}, which is based on the fact that a red color develops when this gaseous compound comes into contact with an alkali cyanide solution containing 8-hydroxyquinoline. This test may be conducted within the methodology of spot testing and has an identification limit of 1 \( \mu \text{g} \) dicyanogen. The colored reaction product is the same as that formed in the spot test for copper described by Komarowsky and Poluektov\textsuperscript{2}. The chemistry of the color reaction between dicyanogen and 8-hydroxyquinoline had not been cleared up, but it is known that it is essential to employ concentrated alkali cyanide solution, probably because the hydrolysis of dicyanogen to hydrogen cyanide is thus prevented or hindered.

The new test demonstrated that dicyanogen is split off in the pyrolysis of certain organic nitrogenous compounds, i.e., when they are heated to incipient redness in a small glass tube. Another fact, hitherto unknown, was shown, namely that surprisingly many of these compounds yield hydrogen cyanide in copious amounts when pyrolyzed\textsuperscript{*}. It is probable that dicyanogen appears here as primary fission product, but is transformed into hydrogen cyanide by the action of the water split out at the same time. This hypothesis is supported by the behavior of oxamide. The pyrolysis of this compound might be expected to yield dicyanogen:

\[
\begin{align*}
\text{CONH}_2 & \rightarrow (\text{CN})_2 + \text{H}_2\text{O} \\
\text{CONH}_2 & \rightarrow (\text{CN})_2 + \text{H}_2\text{O} \\
\end{align*}
\]

* The pyrolytic production of dicyanogen and hydrogen cyanide may well play a role in the Beilstein test and also the Lassaigne test. This point has recently been studied by Kainz and associates\textsuperscript{3} with respect to important partial processes (compare Feigl and Hainberger\textsuperscript{4}).
but instead hydrogen cyanide is the only detectable product. Obviously, the pyrolytic fission products of (1) react in the gas phase:

\[(\text{CN})_2 + \text{H}_2\text{O} \rightarrow \text{HCN} + \text{HCNO}\] (2)

and the dicyanogen is thus removed completely.

A procedure for preparing dicyanogen is based on the heating of oxamide with phosphorus pentoxide to 160°. In this, the oxide functions as dehydrant and thus prevents the irreversible hydrolysis (2). A specific test for ether-insoluble oxamide is based on this action, since, with the exception of ether-soluble glyoxime (an isomer of oxamide), no other organic nitrogenous compound yields dicyanogen or hydrogen cyanide under these conditions. The dicyanogen liberated from oxamide can be detected by its action on moist copper-acetate benzidine paper, with which it yields a blue due to the occurrence of the hydrogen cyanide reaction, or it may be revealed by means of the color reaction with oxine. This latter test has an identification limit of about 3.5 μg oxamide if conducted as a spot reaction*.

The behavior of oxamide permits the drawing of the following conclusions: In the case of compounds which yield dicyanogen as the primary product on dry heating, it cannot be detected if water is produced at the same time because hydrolysis to hydrogen cyanide is inevitable. Some hope of detecting the dicyanogen exists if the compound being pyrolyzed is rich in oxygen and yields no water, or if the oxygen-rich compound does not supply sufficient water to hydrolyze all of the dicyanogen, or if the production of water by pyrolysis precedes the splitting out of dicyanogen. It is evident that these limitations — entirely apart from constitutive factors that play a part in the thermal splitting of organic compounds — are met but seldom. However, if they should obtain, the detection of dicyanogen will make possible the detection in selective manner of certain nitrogenous organic compounds.

The experimental findings to date do not permit any certain statements regarding the types of compounds from which pyrolysis will yield detectable dicyanogen. However, it has been found that purine derivatives (uric acid, xanthine, adenine, caffeine, theobromine, theophylline) and also dimethylglyoxime and furildioxime on dry heating yield dicyanogen only after distinct caramelization. This observation conforms to the assumption that in the case of oxygen-bearing compounds an eventual splitting off

* Because of the insolubility of oxamide, the detection limits of the test could not be determined experimentally. The value given here was computed from the detection limits of the dicyanogen test, on the assumption that the dehydration of the oxamide on heating with phosphorus pentoxide gives a 50% yield of dicyanogen. According to Ott4, the yield on warming under reduced pressure is 86%.