

**THE STABILIZATION OF THE INITIAL PRODUCT OF THE
PENTACYANIDONITROSYLFERRATE(II)-SULPHIDE REACTION AND ITS
SPECTROPHOTOMETRIC APPLICATION**

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ABSTRACT

The effect of the cyanide ion on the reaction between the sulphide anion and excess nitroprusside both in the presence and absence of potassium chloride (KCl) as the ionic strength buffer is described. In the presence of KCl the cyanide ion stabilizes the initial product of the reaction, and directs its decomposition through a single pathway to the nitritopentacyanidoferrate(II). First order plots for the decomposition of the reaction product reveal an observed rate constant which varies linearly with the sulphide anion concentration.

In the absence of KCl, the cyanide ion dramatically stabilizes the red-violet initial product of the nitroprusside-sulphide reaction, for a record period of up to 30 minutes and also enhances the absorbance of its solution.

A modified nitroprusside method for the determination of the sulphide ion in the presence of the cyanide ion by manual spectrophotometry is described. The limit of detection is $0.2 \mu\text{g mL}^{-1}$, relative standard deviation of 2.4% for a $2.0 \mu\text{g mL}^{-1}$ sulphide ion and a working range of $0.3\text{-}5 \mu\text{g mL}^{-1}$ sulphide ion.

Other sulphur anions, such as the sulphite ion, that react with the nitroprusside in a similar way, do not interfere. The method was successfully applied to the determination of the sulphide anion in selected Uganda environmental systems: Kitagata hot springs water in south western part of the country, bathroom waste water, kitchen wastewater and boiled eggs.