ABSTRACT

The Use of Flow Injection Analysis and Immobilized Linamarase in the Determination of Cyanide Levels in Plant Tissue

Dave Anand Jaipersad

The quantitative determination of cyanide using alkaline picrate reagent has been examined. Under batch reaction conditions equilibrium-like absorbance measurements are achievable by heating followed by standing at room temperature for one hour. The λ_{max} of the cyanide-alkaline picrate has been shown to be 490 nm. However, the unreacted alkaline picrate also absorbs strongly at 490 nm and necessitated that measurements be made at wavelengths away from this λ_{max}. An alkaline picrate solution of pH 10 with measurements at 525 nm in 1 cm curvettes gave detection limits of 0.7 ppm.

Subsequent use of the alkaline picrate reagent in flow injection analysis (FIA) under compromise manifold configurations gave a detection limit of 2.5 ppm cyanide.

After immobilization of the enzyme linamarase under mild conditions to an activated 2-fluoro-1-methylpyridinium Fractogel support the enzyme showed a pH optimum of 7.2 and temperature optimum of 44^{o}C. The immobilized enzyme

also showed good operational stability when maintained at 25 and 35^{o}C and retained 96% of its original activity after 80 days storage at 4^{o}C.

The linamarase bioreactor was incorporated into the FIA manifold using the alkaline picrate reagent to determine releasable cyanide levels in plant material. This method of analysis was sensitive and rapid with detection limits of 29.5 ppm linamarin, handling between 60 - 70 samples per working day.

For cassava samples the results indicate that the levels of releasable cyanide are greater in the cortex and leaves of the plant when compared to the levels in the parenchyma of the varieties studied.