DEVELOPMENT OF A RAPID METHOD

FOR ANALYSIS OF ETHYLENE GLYCOL,

USING THE DU PONT aca

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ABSTRACT

It has been previously determined that ethylene glycol can function as a substrate for the enzyme glycerol dehydrogenase. This enzyme is used as an analytical reagent in the Du Pont Automated Clinical Analyzer (aca^{R}) triglycerides test pack. I have optimized a technique for the aca in which endogenous triglycerides are made nonreactive, leaving the glycerol dehydrogenase enzyme free to react with any ethylene glycol present in the sample. This inactivation of triglycerides occurs by reacting the serum with lipase, then converting the liberated glycerol to glycerol-1-phosphate before the addition of the glycerol dehydrogenase. Glycerol-1-phosphate is not a substrate for glycerol dehydrogenase, therefore triglycerides and glycerol are no longer reactive in the reagent system. This optimized method is presented which accomplishes

the above steps and permits the rapid quantitation of ethylene glycol in patients.

Two reagents are used for the triglycerides inactivation step. The first reagent, adjusted to pH 7.0, consists of 0.08 moles per liter of adenosine triphosphate, 0.049 moles per liter of magnesium sulfate (heptahydrate) and 0.1 moles per liter of dibasic potassium phosphate. The second reagent consists of approximately 7.5 to 15 units of glycerokinase (Boehringer Mannheim Biochemicals, Indianapolis, Indiana), depending on the initial triglycerides level.

These reagents may be combined in the correct proportions, and lyophilized in appropriate sample containers. The patient's serum is added to the prepared sample container, mixed, and then placed directly onto the aca analyzer; no serum protein removal and no incubation period are required. This method may be used to inactivate serum triglycerides at concentrations equal to or less than 1000 mg/dL.

TABLE OF CONTENTS