

AN EVALUATION OF HAEMOGLOBIN DETERMINATION USING SODIUM LAURYL SULFATE

Saad Sh. Mansoor¹ *FRCPATH*, Raad J. Musa¹ *MSc, FICMS*,
Mohammad J. Kudher² *FICMS*

Abstract

Introduction: Various methods for the quantitative determination of Hb have been developed during the last decade, based on chemical and physical principles of Hb, gasometry or spectrophotometry.

Methods: Spectrophotometric measurement of Hb as HiCN was carried out by the ICSH recommended reference method and by cyanide free (sodium lauryl sulfate) reagent. Measurements were carried out in 347 venous blood collected into K₂EDTA anticoagulant. Normal samples were obtained from volunteers and other samples were obtained from patient specimens in routine diagnostic service. The latter included Leukaemia with high WBC count, Lipaemia, Cord blood, other abnormalities (uraemia, jaundice, thalassemia minor and major) and methaemoglobinemia. The Hb value then determined by using HiCN method and SLS method.

Results: Maximum absorbance is at 535 nm, the conversion time of Hb to SLS-Hb was rapid of less than 15 seconds. The freshly prepared SLS-Hb was stable in the first 120 minutes after dilution. Haemoglobin converts almost instantaneously and there is a direct relationship of absorbance to Hb concentration over a wide range of measurements ($r = 0.999$).

Conclusion: its reliability is equal to that of HiCN method with routine blood specimens, but slightly more reliable than HiCN method when there is interference by lipaemia. There is no significant difference in measurements on samples containing HbF ($r = 0.995$). It measures methaemoglobin with correlation coefficient (r) of 0.999. It has a major advantage in that the reagent is non-hazardous compound.

Keywords: Haemoglobin, Sodium lauryl sulphate

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Introduction

Haemoglobin is a chromoprotein^[1]. It is calculated to have a molecular weight of 64 458^[2]. Each red cell contains approximately 640-million haemoglobin molecule^[3]. Haemoglobin possess certain chemical and physical properties, which may be used in estimating its concentration in blood^[4].

The depth of red color of blood is directly proportional to the concentration of iron and the concentration of Hb present. The red color of blood, therefore may be compared with that of various preparation used as standards and the concentration of Hb determined^[4].

Various methods for the quantitative determination of Hb have been developed during the last decade, based on chemical and physical principles of Hb, gasometry or spectrophotometer.

The cyanmethaemoglobin (HiCN) has been accepted worldwide during 1953-1963^[5]. In addition, it's recommended by the International Committee of Standardization in Haematology (ICSH) in 1965 and 1967, due to the accuracy and stability of result^[6-9]. However, the presence of potassium cyanide (KCN) and potassium ferricyanide ($K_3\text{-Fe (CN)}_6$) in the reagents has raised problems of laboratory and environmental pollution, and may constitute a potential toxic hazard^[8].

Oshiro et al. (1982) developed cyanide free method of Hb determination that it based on a low toxicity compound sodium lauryl sulfate (SLS), a surfactant^[10]. Haemoglobin is rapidly converted into SLS-Hb (10 seconds). The majority of Hb

¹Dept. of Pathology, College of Medicine, AL Nahrain University, ²Al Kindy General Hospital, Ministry of Health.

Address correspondence to Dr. Raad Jaber Musa
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