RESEARCH ARTICLE OPEN ACCESS

Estimation of Serum Electrolytes for examination between Flame photometry and Ion Selective Electrodes

Hayder Yahya Ahmed
Assist.lect. / Msc. Analytical Chemistry / Department of Community Health/ College of Health and Medical Technology /kufa /Foundation of Technical Education, techniques University of Al- Furat al- Awsat,

ABSTRACT
Flame photometry is appropriate for qualitative and quantitative estimation of few cations, particularly for metals, Ion-selective electrodes (ISEs) which react generally particularly to different particles (both anions and cations) work on the same principle, The purposes of present study is to estimation of serum electrolytes by method of BWB - XP Flame Photometer were compared and estimations made by HACH HQ440d multi-ion selective electrodes to decide the proficiency of instrument.
Key Words: Flame photometry, Ion Selective Electrode (ISE), Sodium ion, Potassium ion.

I. INTRODUCTION

Flame photometry is appropriate for qualitative and quantitative estimation of few cations, particularly for metals that are effortlessly excited to higher vitality levels at a generally low flame temperature (mainly Na, K, Rb, Cs, Ca, Ba)[1].

Ion-selective electrodes (ISEs) which react generally particularly to different particles (both anions and cations) work on the same principle. In clinical research facilities they can be utilized to quantify Na^+, K^+,$Ca^2$and Cl^- in body fluids (blood, plasma, serum, sweat) and F^- in skeletal and dental studies. They are likewise used to gauge wide assortment of different particles in, for example, ecological studies[2]

Sodium (Na) is the major extracellular cation and it assume a part in body fluid appropriation. Concentration of sodium particles inside the plasma (extracellular) is 130-145 mmol/l. Higher and lower concentrations are alluded to as hypernatremia and hyponatremia, individually.

Potassium (K) is the main cation found within cells. The best possible level of potassium is fundmental for ordinary cell function. A strange increment of potassium (hyperkalemia) or diminishing of potassium (hypokalemia) can can significantly influence the sensory system and heart, and when extreme, can be lethal. The typical blood potassium level is 3.5 - 5.0 millimoles/liter (mmol/l)[3].

The goal of present study is to estimation of serum electrolytes by method of BWB - XP Flame Photometer were contrasted and estimations made by HACH HQ440d multi-ion selective electrodes to decide the proficiency of instrument.

II. MATERIAL

Sodium Chloride, Potassium Chloride, De-ionized water.

Standardized using standard solution:

(sodium = 140mEq/L , potassium = 5.0mEq/L).

ISE Low serum Std (Na^+ =130 mEq/L, K^+= 3.5 mEq/L)

ISE High serum Std (Na^+ =160 mEq/L ,K^+= 6.0 mEq/L)

III. METHODS

5 ml venous blood gathered from 80 patients who came for standard examination in central laboratory, Al-Sadder hospital, al-najaf city, Iraq

Serum got after centrifugation of samples was analyzed for sodium and potassium on BWB - XP Flame Photometer and HACH HQ440d multi-ion selective electrodes with auto calibration.

Note: samples with hemolysis were excluded from the study.

BWB - XP Flame Photometer

This endeavors the way that compounds of the alkali and alkaline earth metals are thermally separated into atoms at the temperature of a Bunsen burner flame and that some of the atoms delivered are further eager to a higher vitality level. When these 'energized' atoms come back to the ground state, they transmit radiation, which for the component of these two groups lies principally in the visible region of the electromagnetic range.

HACH HQ440d multi-ion selective electrodes

Taking into account the standard of ion selective electrodes which utilizes standard electrodes for sodium and potassium. An electrical potential is produced by Nernst equation for a specific ion[2].

In order to quantify the alter in the difference of potential over the ion-selective membrane as the ionic concentration changes, it is important to incorporate into the circuit a reference electrode which goes about as a half-cell from which to quantify the relative deviations.

IV. RESULT AND DISCUSSION

Flame photometer			Ion Selective Electrode		P Value
Serum Electrolytes Ion	Mean ±SD	STD Error	Mean ±SD	STD Error	
Sodium	137.8 ± 6.40	1.03	133.4 ± 7.52	1.41	0.0002
Potassium	4.46 ± 0.68	0.13	4.12± 0.91	0.91	<0.001

SD: standard deviation, Std error: standard error, P Value <0.01 is considered statistically significance

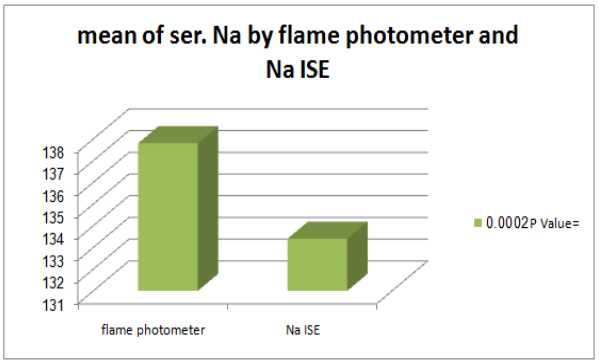

Figure 1: Comparison of mean of serum sodium by Flame photometer and Na^+ Ion Selective Electrode

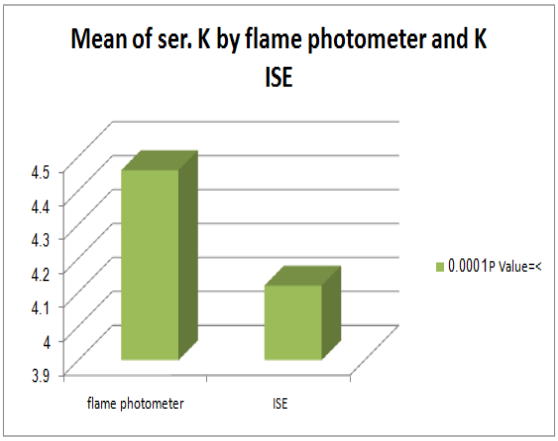

Figure 2: Comparison of mean of serum potassium by Flame photometer and K^+ Ion Selective Electrode

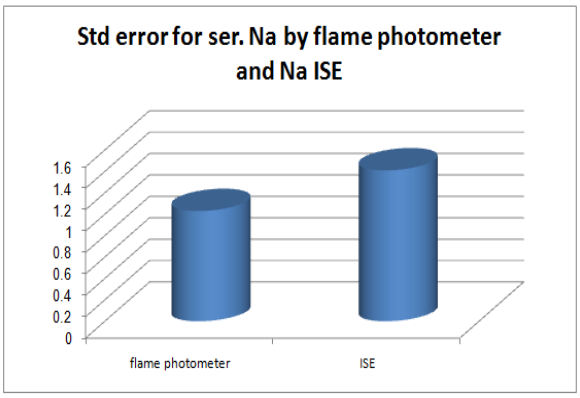

Figure 3: Standard error for serum sodium by Flame photometer and Na^+ Ion Selective Electrode

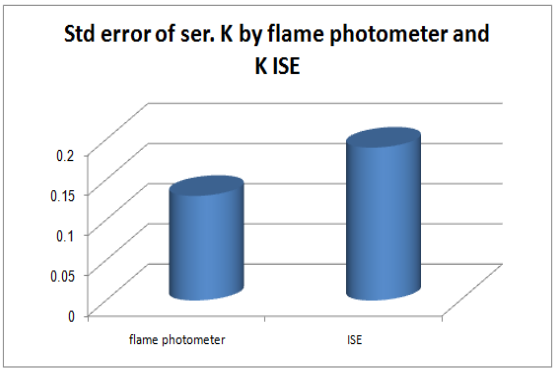

Figure 4: Standard error for serum potassium by Flame photometer and K^+ Ion Selective Electrode

V. DISCUSSION

Estimation of serum electrolytes by BWB - XP Flame Photometer was speedier and with less amount of serum sample when contrasted to HACH HQ440d multi-ion selective electrodes which requires weakened serum sample, which may present manual error[4].

A lot of them are not entirely ion-specific. For instance, the sodium electrode you will utilize likewise reacts to potassium ions , despite the fact that not with the same affectability. This implies Na^+ will be overestimated if a high concentration of K^+ is available, Moreover, they underestimate high concentrations because of "crowding" of the particles at the membrane[5].

VI. CONCLUSION

The got statistical factual data for estimation of serum electrolytes by BWB - XP Flame Photometer was more effective, delicate and precise than HACH HQ440d multi-ion selective electrodes.

REFERENCES

REFERENCES

[1]. Thube, A. and S. Kulkarni, Determination of Sodium and Potassium Content Present in Water Sample Collected from Girna and Godavari River by Flamephotometry. 2013.

[2]. Fogh-Andersen, N., et al., Determination of sodium and potassium with ion-selective electrodes. Clin Chem, 1984. 30(3): p. 433-6.

[3]. P, G., Determination of ions and automation. Clinical Biochemistry :principles and practices, ed. n. edition. 2004, Bhalani publishing house.

[4]. K, M., The application of autoanalyser to routine laboratory. . Clinical Chemistry, 1980. 3(3) p. 191 -201.

[5]. Harrisons, Principle of Internal Medicine chapter 45,Fluids and electrolyte disturbance ed. t. edition. 2012, Mc graw Hill.