

ELECTROLYTE STANDARDS

(SODIUM & POTASSIUM) For Flame - Photometry



PRINCIPLE

At a higher temperature atoms of various elements dissociate from their salts to become higher energy state and emit specific spectral bands which absorb through proper interference filters or spectral barriers in a photodetector. The absorbance is proportional to the element's concentration. The emitted light of sodium absorbs maximum at 589 mμ, potassium at 404.5 and 766.5 mμ and calcium at 620, 554 and 422.7 mμ. The presence of various other elements as contaminants make it difficult to trace out each individual analyte. However, by suitable multiplication of photodetector satisfactory results comparable to Ion Sensing Electrometry (ISE) are observed.

REAGENTS SUPPLIED

Ready to use standards are diluted 1 to 100. Therefore, the values are comparable only when test sample is similarly diluted 1 to 100 with distilled water or 1 mMol/L Lithium base.

REAGENTS COMPOSITION

Cat. No. SC 405	500 mL
I. Sodium	120 mMol/L
Potassium	2 mMol/L
Cat. No. SC 409	500 mL
II. Sodium	140 mMol/L
Potassium	4 mMol/L
Cat. No. SC 413	500 mL
III. Sodium	160 mMol/L
Potassium	6 mMol/L

Preparation of Working Reagent

All Standards are ready to use.

STORAGE AND STABILITY

When stored at 25-35°C and protected from light, the reagents are stable until the expiry date stated on the label. Store tight capped. Discard if there is any evidence of bacterial or fungal contamination.

SAMPLE

Serum or plasma free of haemolysis. Blood collected in heparinised sterile plastic vials using electrolyte free syringe is advised. (All samples should be handled as potential infective agents as no laboratory methods make conclusive findings for its safety. Therefore, adequate protective laboratory measures should be taken while handling such materials).

GENERAL PROCEDURE

1. Dilute sample 1 to 100 in glass distilled water (BIOLAB Cat No. AR 556/AR 557) or 1 mMol/L lithium base.
2. Start the machine.
3. Adjust to required pressure.
4. Release gas from cylinder.
5. Release gas knob of the machine and light the burner and adjust the flame about 5 to 6 cm in size.
6. Feed electrolyte - free glass distilled water.
7. Feed standard 120/2 and adjust the DPM reading Na+120, K+20 using appropriate knob. Record this reading as PRE SET READING (PSR 120/2).
8. Then feed successively 140/4 and 160/6 standards. Record the DPM read out.
9. Feed sample diluted 1 to 100 in glass distilled water or 1 mMol/L Lithium base and note the DPM read out. Compare with standard graph given overleaf.

Note: Flame photometer having 2 point calibration facility may set 120/2 and 160/6 and read the sample directly.

EXPECTED VALUES

Sodium 135 to 146 mMol/L
Potassium 3.8 to 5.4 mMol/L
As with all diagnostic methods, the final diagnosis should not be made on the result of a single test as well as laboratory diagnosis must be confirmed with clinical manifestations.

LIMITATIONS

Sodium does not obey Beer's Law by Flame photometry. Therefore, each analysis should be carefully calibrated with a set of standards. Results of common flame photometers are greatly affected by excessive humidity, air, gas pressure and flame size etc. Therefore, constant reproducibility checks must be performed periodically. Distilled water used for sample dilution must be free from any electrolyte contamination.

WARNING

This reagent system is for *in vitro* use only. This reagent system is containing preservatives and components that have not established for safety if contacted on broken skin or eye or taken orally. In case of such incidents wash off with plenty of water, or consult a physician.

INSTRUCTIONS

Read the result from Scale No. 1 (extreme left) against observed Digital Panel Meter (DPM). Read out the respective preset standard scale.

Example I (Single point calibration)

Using Standard Sodium 120 mMol/L, Potassium 2 mMol/L Digital Panel Meter (DPM) is adjusted to Na+120 K+20 using appropriate knob. An unknown sample is diluted 1 to 100 with glass distilled water and introduced. Observe DPM reading of unknown, for example Na+143 K+6.6. To find out correct result of unknown plot a line from No.2 (PSR Na+120 K+2.0) to line graph No.1 (Result) which shows 166 mMol/L Sodium. Potassium is linear therefore, DPM reading can be given as a correct value (6.6 mMol/L).

Example II (Single point calibration)

The machine is set with Standard Sodium 160 mMol/L and Potassium 6 mMol/L and observed DPM reading Na+143 K+2.6. In this case select the line graph No.6 (PSR Na + 160 K+6) and plot a straight line to line graph No.1 (Result). The result is 126 mMol/L Sodium and 2.6 mMol/L Potassium.

QUALITY CONTROL

To ensure adequate quality control, each concentration of standard should be tested against a standard control sera. It should be realised that the use of quality control material checks both instrument and reagent function together. Factors which might affect the performance of this test include proper instrument function, temperature control, cleanliness of glasswares and accuracy of pipetting. It is appropriate to establish each laboratory's accuracy constant and interpret values accordingly. Similarly, laboratory findings should be established by clinical manifestations.

Bibliography

1. John D. Baur (Ed) Acid Base Regulation Laboratory Methods. The C.V. Mosby Company. St. Louis. Toronto London (1982).
2. Nobert Tietz (Ed) Analytical procedures and instrumentation, Fundamentals of Clinical Chemistry (1976). W.B.C. Saunders & Co. Philadelphia PA. NY.

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Example I

Pre Set Reading (PSR) with 120/2 STD			
Std	Value	Observed DPM readout	
Na+	K+	Na+	K+
120	2.0	120	2.0 (PSR)
130	3.0	125	3.0
140	4.0	130	4.0
150	5.0	135	5.0
160	6.0	140	6.0

Example II

Pre Set Reading (PSR) with 140/4 STD			
Std	Value	Observed DPM readout	
Na+	K+	Na+	K+
120	2.0	130	2.0
130	3.0	135	3.0
140	4.0	140	4.0 (PSR)
150	5.0	145	5.0
160	6.0	150	6.0

Example III

Pre Set Reading (PSR) with 160/6 STD			
Std	Value	Observed DPM readout	
Na+	K+	Na+	K+
160	6.0 (PSR)	160	6.0 (PSR)
150	5.0	155	5.0
140	4.0	150	4.0
130	3.0	145	3.0
120	2.0	140	2.0

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RESULT	
Na ⁺	K ⁺
In mMol/L	
170	7.0
165	6.5
160	6.0
155	5.5
150	5.0
145	4.5
140	4.0
135	3.5
130	3.0
125	2.5
120	2.0
115	1.5
110	0

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DPM Reading	
Na ⁺	K ⁺
145	7.0
140	6.0
135	5.0
130	4.0
125	3.0
120	2.0
115	0

PSR	
Na ⁺	- 120
K ⁺	- 2.0

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DPM Reading	
Na ⁺	K ⁺
155	7.0
150	6.0
145	5.0
140	4.0
135	3.0
130	2.0
125	0

PSR	
Na ⁺	- 140
K ⁺	- 4.0

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DPM Reading	
Na ⁺	K ⁺
165	7.0
160	6.0
155	5.0
150	4.0
145	3.0
140	2.0
135	0

PSR	
Na ⁺	- 160
K ⁺	- 6.0