VetScan® Critical Care Plus

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For Veterinary use only
Customer and Technical Service 1-800-822-2947

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1. Intended Use

The VetScan® Critical Care Plus Reagent Rotor, used with the VetScan Chemistry Analyzer, is intended to be used for veterinary *in vitro* quantitative determination of alanine aminotransferase, chloride, creatinine, glucose, potassium, sodium, total carbon dioxide, and urea nitrogen in heparinized whole blood, heparinized plasma, or serum.

2. Summary and Explanation of Tests

The VetScan Critical Care Plus Reagent Rotor and the VetScan Chemistry Analyzer comprise an *in vitro* diagnostic system that that aids the veterinarian in diagnosing the following disorders:

Alanine Aminotransferase	Liver diseases; including viral hepatitis and cirrhosis; heart diseases.
Chloride	Chronic diarrhea, chronic vomiting, renal disease, parathyroid disease, chronic respiratory acidosis or alkalosis, hyperadrenocorticism, hypoadrenocorticism, and thiazide therapy.
Creatinine	Renal disease and monitoring of renal dialysis.
Glucose	Carbohydrate metabolism disorders, including adult and juvenile diabetes mellitus and hypoglycemia.
Potassium	Renal glomerular or tubular disease, adrenocortical insufficiency, diabetic ketacidosis, excessive intravenous potassium therapy, sepsis, panhypopituitarism, in vitro hemolysis, hyperaldosteronism, malnutrition, hyperinsulinism, metabolic alkalosis and gastrointestinal loss.
Sodium	Dehydration, diabetes insipidus, loss of hypotonic gastrointestinal fluids, salt poisoning, selective depression of sense of thirst, skin losses, burns, sweating, hyperaldosteronism, CNS disorders, dilutional, depletional and delusional hyponatremia and syndrome of inappropriate ADH secretion.
Total Carbon Dioxide	Primary metabolic alkalosis and acidosis and primary respiratory alkalosis and acidosis.
Urea Nitrogen	Renal and metabolic diseases.

As with any diagnostic test procedure, all other test procedures including the clinical status of the patient, should be considered prior to final diagnosis.

3. Principle of Procedure

Alanine Aminotransferase (ALT)
Alanine aminotransferase (ALT) has been measured by three methods. Two of these methods—the colorimetric dinitrophenylhydrazine coupling technique[1,2] and the fluorescent enzymatic assay—are rarely used.[3] An enzymatic method based on the work of Wróblewski and LaDue[4] is the most common technique for determining ALT concentrations in serum. A modified Wróblewski and LaDue procedure has been proposed as the recommended procedure of the International Federation of Clinical Chemistry (IFCC).[5]

The method developed for use on the VetScan Analyzer is a modification of the IFCC-recommended procedure. In this reaction, ALT catalyzes the transfer of an amino group from L-alanine to α-ketoglutarate to form L-glutamate and pyruvate. Lactate dehydrogenase catalyzes the conversion of pyruvate to lactate. Concomitantly, NADH is oxidized to NAD^+, as illustrated in the following reaction scheme.

$$\text{L-Alanine} + \alpha\text{-Ketoglutarate} \xrightarrow{\text{ALT}} \text{L-Glutamate} + \text{Pyruvate}$$

$$\text{Pyruvate} + \text{NADH} + H^+ \xrightarrow{\text{LDH}} \text{Lactate} + NAD^+$$

The rate of change of the absorbance difference between 340 nm and 405 nm is due to the conversion of NADH to NAD^+ and is directly proportional to the amount of ALT present in the sample.

Chloride (Cl^-)

The method is based on the determination of chloride-dependent activation of α-amylase activity. Deactivated α-amylase is reactivated by addition of the chloride ion, allowing the calcium to re-associate with the enzyme. The reactivation of α-amylase activity is proportional to the concentration of chloride ions in the sample. The reactivated α-amylase converts the substrate, 2-chloro-*p*-nitrophenyl-α-D-maltotrioside (CNPG3) to 2-chloro-*p*-nitrophenol (CNP) producing color and α-maltotriose (G3). The reaction is measured bichromatically and the increase in absorbance is directly proportional to the reactivated α-amylase activity and the concentration of chloride ion in the sample.[6]

$$\text{CNPG3} \xrightarrow[Cl^-,\ Ca^{2+}]{\alpha\text{-Amylase}} \text{CNP} + \text{G3}$$

Creatinine (CRE)

The Jaffe method, first introduced in 1886, is still a commonly used method of determining creatinine levels in blood. The current reference method combines the use of Fuller's earth (floridin) with the Jaffe technique to increase the specificity of the reaction.[7, 8] Enzymatic methods have been developed that are more specific for creatinine than the various modifications of the Jaffe technique.[9, 10, 11] Methods using the enzyme creatinine amidohydrolase eliminate the problem of ammonium ion interference found in techniques using creatinine iminohydrolase.[12]

$$\text{Creatinine} + H_2O \xrightarrow{\text{Creatinine Amidohydrolase}} \text{Creatine}$$

$$\text{Creatine} + H_2O \xrightarrow{\text{Creatine Amidinohydrolase}} \text{Sarcosine} + \text{Urea}$$

$$\text{Sarcosine} + H_2O + O_2 \xrightarrow{\text{Sarcosine Oxidase}} \text{Glycine} + \text{Formaldehyde} + H_2O_2$$

$$H_2O_2 + \text{TBHBA} + \text{4-AAP} \xrightarrow{\text{Peroxidase}} \text{Red Quinoneimine Dye} + H_2O$$

Two cuvettes are used to determine the concentration of creatinine in the sample. Endogenous creatine is measured in the blank cuvette, which is subtracted from the combined endogenous creatine and the creatine formed from the enzyme reactions in the test cuvette. Once the endogenous creatine is eliminated from the calculations, the concentration of creatinine is proportional to the intensity of the red color produced. The endpoint reaction is measured as the difference in absorbance between 550 nm and 600 nm.

Glucose (GLU)

Measurements of glucose concentration were first performed using copper-reduction methods (such as Folin-Wu[13] and Somogyi-Nelson[14, 15]). The lack of specificity in copper-reduction techniques led to the development of quantitative procedures using the enzymes hexokinase and glucose oxidase. The glucose test incorporated into the Critical Care Plus Reagent Rotor is a modified version of the hexokinase method, which has been proposed as the basis of the glucose reference method.[16]

The reaction of glucose with adenosine triphosphate (ATP), catalyzed by hexokinase (HK), produces glucose-6-phosphate (G-6-P) and adenosine diphosphate (ADP). Glucose-6-phosphate dehydrogenase (G-6-PDH) catalyzes the reaction of G-6-P into 6-phosphogluconate and the reduction of nicotinamide adenine dinucleotide (NAD^+) to NADH.

$$\text{Glucose + ATP} \xrightarrow{\text{HK}} \text{G-6-P + ADP}$$

$$\text{G-6-P + NAD}^+ \xrightarrow{\text{G-6-PDH}} \text{6-Phosphogluconate + NADH + H}^+$$

Potassium (K^+)

Spectrophotometric methods have been developed that allow the measurement of potassium concentration on standard clinical chemistry instrumentation. An enzymatic method based on the activation of pyruvate kinase with potassium show excellent linearity and negligible susceptibility to endogenous substances.[17, 18, 19] Interference from sodium and ammonium ion are minimized with the addition of Kryptofix and glutamine synthetase, respectively.[17]

In the coupled-enzyme reaction, pyruvate kinase (PK) dephoshorylates phosphoenolpyruvate (PEP) to form pyruvate. Lactate dehydrogenase (LDH) catalyzes conversion of pyruvate to lactate. Concomitantly, NADH is oxidized to NAD^+.

$$\text{ADP + PEP} \xrightarrow{K^+,\ \text{PK}} \text{Pyruvate + ATP}$$

$$\text{Pyruvate + NADH + H}^+ \xrightarrow{\text{LDH}} \text{Lactate + NAD}^+$$

The rate of change in absorbance difference between 340 nm and 405 nm is due to the conversion of NADH to NAD^+ and is directly proportional to the amount of potassium in the sample.

Sodium (Na^+)

Colorimetric and enzymatic methods have been developed that allow the measurement of sodium concentration on standard clinical chemistry instrumentation. [20, 21, 22] In the Abaxis enzymatic reaction, β-galactosidase is activated by the sodium in the sample. The activated enzyme catalyzes the reaction of o-nitrophenyl-β-D-galactopyranoside (ONPG) to o-nitrophenol and galactose.

$$\text{ONPG} \xrightarrow[\beta\text{-Galactosidase}]{\text{Na}^+} \text{o-Nitrophenol + Galactose}$$

Total Carbon Dioxide (tCO_2)

Total carbon dioxide in serum or plasma exists as dissolved carbon dioxide, carbamino derivatives of proteins, bicarbonate and carbonate ions and carbonic acid. Total carbon dioxide can be measured by pH indicator, CO_2 electrode and spectrophotometric enzymatic methods, which all produce accurate and precise results.[23, 24] The enzymatic method is well suited for use on a routine blood chemistry analyzer without adding complexity.

In the enzymatic method, the specimen is first made alkaline to convert all forms of carbon dioxide (CO_2) toward bicarbonate (HCO_3^-). Phosphoenolpyruvate (PEP) and HCO_3^- then react to form oxaloacetate and phosphate in the presence of phosphoenolpyruvate carboxylase (PEPC). Malate dehydrogenase (MDH) catalyzes the reaction of oxaloacetate and reduced nicotinamide adenine dinucleotide (NADH) to NAD^+ and malate. The rate of change in absorbance due to the conversion of NADH to NAD^+ is directly proportional to the amount of tCO_2 in the sample.

$$\text{PEP + HCO}_3 \xrightarrow{\text{PEPC}} \text{Oxaloacetate + Phosphate}$$

$$\text{Oxaloacetate + NADH + H}^+ \xrightarrow{\text{MDH}} \text{NAD}^+ \text{ + Malate}$$

Urea Nitrogen (BUN)
Urea can be measured both directly and indirectly. The diacetyl monoxime reaction, the only direct method to measure urea, is commonly used but employs dangerous reagents.[25] Indirect methods measure ammonia created from the urea; the use of the enzyme urease has increased the specificity of these tests.[26] The ammonia is quantitated by a variety of methods, including nesslerization (acid titration), the Berthelot technique[27, 28] and coupled enzymatic reactions.[29, 30] Catalyzed Berthelot procedures, however, are erratic when measuring ammonia.[31] Coupled-enzyme reactions are rapid, have a high specificity for ammonia, and are commonly used. One such reaction has been proposed as a candidate reference method.[32]

In the coupled-enzyme reaction, urease hydrolyzes urea into ammonia and carbon dioxide. Upon combining ammonia with α-ketoglutarate and reduced nicotinamide adenine dinucleotide (NADH), the enzyme glutamate dehydrogenase (GLDH) oxidizes NADH to NAD^+.

$$\text{Urea} + H_2O \xrightarrow{\text{Urease}} 2NH_3 + CO_2$$

$$NH_3 + \alpha\text{-Ketoglutarate} + \text{NADH} \xrightarrow{\text{GLDH}} \text{L-Glutamate} + H_2O + NAD^+$$

The rate of change of the absorbance difference between 340 nm and 405 nm is caused by the conversion of NADH to NAD^+ and is directly proportional to the amount of urea present in the sample.

4. Principle of Operation

See the VetScan Chemistry Analyzer Operator's Manual, for the Principles and Limitations of the Procedure**.**

5. Description of Reagents

Reagents
Each VetScan Critical Care Plus Reagent Rotor contains dry test-specific reagent beads (described below). A dry sample blank reagent (comprised of buffer, surfactants, excipients, and preservatives) is included in each rotor for use in calculating concentrations of alanine aminotransferase (ALT), chloride, glucose, potassium, sodium, total carbon dioxide, and urea nitrogen. A dedicated sample blank is included in the rotor for creatinine (CRE). Each rotor also contains a diluent consisting of surfactants and preservatives.

Warnings and Precautions

- **For *In vitro* Diagnostic Use**

- The diluent container in the reagent rotor is automatically opened when the analyzer drawer closes. A rotor with an opened diluent container cannot be re-used. Ensure that the sample or control has been placed into the rotor before closing the drawer.

- Used reagent rotors contain animal body fluids. Follow good laboratory safety practices when handling and disposing of used rotors.[33] See the VetScan Chemistry Analyzer Operator's Manual for instructions on cleaning biohazardous spills.

- The reagent rotors are plastic and may crack or chip if dropped. **Never** use a dropped rotor as it may spray biohazardous material throughout the interior of the analyzer.

- Reagent beads may contain acids or caustic substances. The operator does not come into contact with the reagent beads when following the recommended procedures. In the event that the beads are handled (e.g., cleaning up after dropping and cracking a reagent rotor), avoid ingestion, skin contact, or inhalation of the reagent beads.

- Samples with high amylase concentrations may give falsely elevated chloride readings.

- All reagents contained in the reagent rotor, when stored as described above, are stable until the expiration date printed on the rotor pouch. Do **not** use a rotor after the expiration date. The expiration date is also encoded in the bar code printed on the bar code ring. An error message will appear on the VetScan Whole Blood Analyzer display if the reagents have expired.

Instructions for Reagent Handling
Reagent rotors may be used directly from the refrigerator without warming. Do not allow rotors sealed in their foil pouches to remain at room temperature longer than 48 hours prior to use. Open the sealed foil pouch, remove the rotor and use according to the instructions provided in the VetScan Chemistry Analyzer Operator's Manual. **A rotor not used within 20 minutes of opening the pouch should be discarded.**

Storage
Store reagent rotors in their sealed pouches at 2-8°C (36-46°F). Do not expose opened or unopened rotors to direct sunlight or temperatures above 32°C (90°F). Reagent rotors may be used until the expiration date included on the package. The expiration date is also encoded in the bar code printed on the bar code ring. An error message will appear on the VetScan Chemistry Analyzer Display if the reagents have expired.

Indications of Reagent Rotor Instability/Deterioration
A torn or otherwise damaged pouch may allow moisture to reach the unused rotor and adversely affect reagent performance. Do not use a rotor from a damaged pouch.

6. Instrument

See the VetScan Chemistry Analyzer Operator's Manual for complete information on use of the analyzer.

7. Sample Collection and Preparation

Sample collection techniques are described in the "Sample Collection" section of the VetScan Chemistry Analyzer Operator's Manual.

- The minimum required sample size is ~100 µL of heparinized whole blood, heparinized plasma, serum or control material. The reagent rotor sample chamber can contain up to 120 µL of sample.
- Whole blood samples obtained by venipuncture must be homogeneous before transferring a sample to the reagent rotor. Gently invert the collection tube several times just prior to sample transfer. Do not shake the collection tube; shaking may cause hemolysis.
- Hemolysis may cause erroneously high results in potassium assays. This problem may go undetected when analyzing whole blood (release of potassium from as few as 0.5% of the erythrocytes can increase the potassium serum level by 0.5 mmol/L). In addition, even unhemolyzed specimens that are not promptly processed may have increased potassium levels due to intracellular potassium leakage.[34]
- Whole blood venipuncture samples should be run within 60 minutes of collection.[35] **Glucose** concentrations are affected by the length of time since the patient has eaten and by the type of sample collected from the patient. To accurately determine glucose results, samples should be obtained from a patient who has been fasting for at least 12 hours. The glucose concentration decreases approximately 5-12 mg/dL in 1 hour in uncentrifuged samples stored at room temperature.[36]
- Refrigerating whole blood samples can cause significant changes in concentrations of **creatinine** and **glucose**.[37] The sample may be separated into plasma or serum and stored in capped sample tubes at 2-8°C (36-46°F) if the sample cannot be run within 60 minutes.
- Use only lithium heparin (green stopper) evacuated specimen collection tubes for whole blood or plasma samples. Use no-additive (red stopper) evacuated specimen collection tubes or serum separator tubes (red or red/black stopper) for serum samples.
- Start the test within 10 minutes of transferring the sample into the reagent rotor.
- Samples with amylase concentrations >4000 U/L will give falsely high chloride readings.
- The concentration of total carbon dioxide is most accurately determined when the assay is done immediately after opening the tube and as promptly as possible after collection and processing of the blood in the unopened tube. Ambient air contains far less carbon dioxide than does plasma, and gaseous dissolved carbon dioxide will escape from the specimen into the air, with a consequent decrease in carbon dioxide value of up to 6 mmol/L in the course of 1 hour.[38]

8. Procedure

Materials Provided
- One VetScan Critical Care Plus Reagent Rotor PN: 500-1042 (a box of 12 rotors PN: 500-0042-12)

Materials Required but not Provided
- VetScan Chemistry Analyzer

Test Parameters
The VetScan Chemistry Analyzer operates at ambient temperatures between 15°C and 32°C (59-90°F). The analysis time for each VetScan Critical Care Plus Reagent Rotor is less than 14 minutes. The analyzer maintains the reagent rotor at a temperature of 37°C (98.6°F) over the measurement interval.

Test Procedure
The complete sample collection and step-by-step operating procedures are detailed in the VetScan Chemistry Analyzer Operator's Manual.

Calibration
The VetScan Chemistry Analyzer is calibrated by the manufacturer before shipment. The bar code printed on the bar code ring provides the analyzer with rotor-specific calibration data. See the VetScan Chemistry Analyzer Operator's Manual.

Quality Control
Performance of the VetScan Chemistry Analyzer can be verified by running controls.

See the VetScan Chemistry Analyzer Operator's Manual, for a detailed discussion on running, recording, interpreting, and plotting control results.

9. Results

The VetScan Chemistry Analyzer automatically calculates and prints the analyte concentrations in the sample. Details of the endpoint and rate reaction calculations are found in the VetScan Chemistry Analyzer Operator's Manual.

Interpretation of results is detailed in the Operator's Manual. Results are printed onto result cards supplied by Abaxis. The result cards have an adhesive backing for easy placement in the patient's files.

10. Limitations of Procedure

General procedural limitations are discussed in the VetScan Chemistry Analyzer Operator's Manual.

- The only anticoagulant **recommended for use** with the VetScan Chemistry System is **lithium heparin**. Abaxis has performed studies demonstrating that EDTA, fluoride, oxalate, and any anticoagulant containing ammonium ions will interfere with at least one chemistry contained in the VetScan Critical Care Plus Reagent Rotor.

- Samples with hematocrits in excess of 62% packed red cell volume may give inaccurate results. Samples with high hematocrits may be reported as hemolyzed. These samples may be spun down to get plasma then re-run in a new reagent rotor.

- **Any result for a particular test that exceeds the assay range should be analyzed by another approved test method or sent to a referral laboratory. Do not dilute the sample and run it again on the VetScan Chemistry Analyzer.**

  Warning: Extensive testing of the VetScan Chemistry System has shown that, in very rare instances, sample dispensed into the reagent rotor may not flow smoothly into the sample chamber. Due to the uneven flow, an inadequate quantity of sample may be analyzed and several results may fall outside the reference ranges. The sample may be re-run using a new reagent rotor.

Interference
Substances were tested as interferents with the analytes. Human serum pools were prepared. The concentration at which each potential interferent was tested was based on the testing levels in NCCLS EP7-P.[39]

Effects of Endogenous Substances

- Physiological interferents (hemolysis, icterus and lipemia) cause changes in the reported concentrations of some analytes. The sample indices are printed on the bottom of each result card to inform the operator about the levels of interferents present in each sample. The VetScan Chemistry System suppresses any results that are affected by >10% interference from hemolysis, lipemia or icterus. "HEM", "LIP", or "ICT" respectively, is printed on the result card in place of the result.

- Extremely elevated amylase levels (>9,000 U/L) will have a significant effect, >10% increase, on the chloride result. The concentration of amylase is not evaluated by the VetScan system for each specimen.

- The potassium assay in the VetScan system is a coupled pyruvate kinase (PK) / lactate dehydrogenase (LDH) assay. Therefore, in cases of extreme muscle trauma or highly elevated levels of creatine kinase (CK), the VetScan may recover a falsely elevated potassium (K+) value. In such cases, unexpected high potassium recoveries need to be confirmed utilizing a different methodology.

11. Expected Values

These reference ranges are provided as a guideline. The most definitive reference ranges are those established for the patient population. These results should be interpreted in conjunction with the patient's clinical signs. Potassium and total protein levels determined in plasma may differ from the ranges given below.

Table 1: VetScan Reference Intervals

Analyte	Canine	Feline	Equine
Alanine AminoTransferase (ALT)	10 – 118 U/L	20 – 100 U/L	5 – 20 U/L
Chloride (CL^-)	106 – 120 mmol /L	112 – 126 mmol /L*	92 – 104 mmol /L
Creatinine (CRE)	0.3 – 1.4 mg/dL (27 – 124 µmol/L)	0.3 – 2.1 mg/dL (27 – 186 µmol/L)	0.6 – 2.2 mg/dL (53 – 194 µmol/L)
Glucose (GLU)	60 – 110 mg/dL (3.3 – 6.1 mmol/L)	70 – 150 mg/dL (3.9 – 8.3 mmol/L)	65 – 110 mg/dL (3.6 – 6.1 mmol/L)
Potassium (K^+)	3.7 – 5.8 mmol/L	3.7 – 5.8 mmol/L	2.5 – 5.2 mmol/L
Sodium (Na^+)	138 – 160 mmol/L	142 – 164 mmol/L	126 – 146 mmol/L
Total Carbon Dioxide (tCO_2)	12 – 27 mmol/L	15 – 24 mmol/L	20 – 33 mmol/L
Urea Nitrogen (BUN)	7 – 25 mg/dL (2.0 – 9.0 mmol/urea/L)	10 – 30 mg/dL (4.0 – 11.0 mmol/urea/L)	7 – 25 mg/dL (2.0 – 9.0 mmol/urea/L)

**Feline reference interval is for adult cats only; kittens (cats younger than 6 months) may have lower chloride levels.*

12. Performance Characteristics

Linearity

The chemistry for each analyte is linear over the dynamic range listed below when the VetScan Chemistry Analyzer is operated according to the recommended procedure (refer to the VetScan Chemistry Analyzer Operator's Manual).

Table 2: VetScan Dynamic Ranges

Analyte	Common Units	SI Units
Alanine Aminotransferase	5 – 2000 U/L	5 – 2000 U/L
Chloride	80 – 135 mmol/L	80 – 135 mmol/L
Creatinine	0.2 – 20 mg/dL	18 – 1768 µmol/L
Glucose	10 – 700 mg/dL	0.56 – 38.9 mmol/L
Potassium	1.5 – 8.5 mmol/L	1.5 – 8.5 mmol/L
Sodium	110 – 170 mmol/L	110 – 170 mmol/L
Total Carbon Dioxide	5 – 40 mmol/L	5 – 40 mmol/L
Urea Nitrogen	2 – 180 mg/dL	0.7 – 64.3 mmol/urea/L

Sensitivity (Limits of Detection)
The lower limit of the reportable (dynamic) range for each analyte is: alanine aminotransferase 5 U/L; chloride 80 mmol/L; creatinine 0.2 mg/dL (18 µmol/L); glucose 10 mg/dL (0.56 mmol/L) potassium 1.5 mmol/L; sodium 110 mmol/L; total carbon dioxide 5 mmol/L and urea nitrogen 2.0mg/dL (0.7 mmol urea/L).

Precision
Precision studies were conducted using NCCLS (CLSI) EP5-A guidelines[40] with modifications based on NCCLS (CLSI) EP18-P[41] for unit-use devices. Results for within-run and total precision were determined using two levels of commercially available control materials. The studies made use of multiple instruments and two reagent rotor lots. Calcium, creatinine, glucose, sodium and urea nitrogen testing was performed at one site; potassium and total carbon dioxide testing was performed at two sites over 20 days; chloride testing was done at two sites over a period of five days.

Results of precision studies are shown in Table 3.

Table 3: Precision

Analyte	Sample Size	Within-Run	Total
Alanine Aminotransferase (U/L)			
Control 1	N = 80		
Mean		21	21
SD		2.76	2.79
%CV		13.4	13.5
Control 2			
Mean		52	52
SD		2.7	3.25
%CV		5.2	6.2
Chloride (mmol/L)			
Control 1	N = 160		
Mean		97.8	97.8
SD		1.63	1.74
%CV		1.7	1.7
Control 2			
Mean		113.6	113.6
SD		1.97	2.22
%CV		1.7	2.0
Creatinine (mg/dL)			
Control 1	N=80		
Mean		1.1	1.1
SD		0.14	0.14
%CV		12.5	13.1
Control 2			
Mean		5.2	5.2
SD		0.23	0.27
%CV		4.4	5.2
Glucose (mg/dL)			
Control 1	N=80		
Mean		66	66
SD		0.76	1.03
%CV		1.1	1.6
Control 2			
Mean		278	278
SD		2.47	3.84
%CV		0.9	1.4

Table 3: Precision (continued)

Analyte	Sample Size	Within-Run	Total
Potassium (mmol/L)			
Control 1	N = 80		
Mean		6.7	6.7
SD		0.26	0.26
%CV		3.9	3.9
Control 2			
Mean		4.3	4.3
SD		0.22	0.22
%CV		5.1	5.1
Sodium (mmol/L)			
Control 1	N = 80		
Mean		148	148
SD		5.1	5.1
%CV		3.4	3.4
Control 2			
Mean		118	118
SD		3.2	3.2
%CV		2.7	2.7
Total Carbon Dioxide (mmol/L)			
Control 1	N = 80		
Mean		19	19
SD		1.39	1.39
%CV		7.3	7.3
Control 2			
Mean		9	9
SD		0.60	0.60
%CV		6.8	6.8
Urea Nitrogen (mg/dL)			
Control 1	N = 80		
Mean		19	19
SD		0.35	0.40
%CV		1.9	2.1
Control 2			
Mean		65	65
SD		1.06	1.18
%CV		1.6	1.8

Correlation

Heparinized whole blood and serum samples were collected and assayed on the VetScan Chemistry Analyzer and by a comparative method(s). The whole blood samples were analyzed by the VetScan Chemistry Analyzer at the field sites and the serum samples were analyzed by the VetScan Chemistry Analyzer and by comparative methods. In some cases, high and low supplemented samples were used to cover the dynamic range. The samples were chosen to meet the distribution values in NCCLS EP9-A guideline.[42] Representative correlation statistics are shown in Table 4.

Table 4: Correlation of VetScan Chemistry Analyzer with Comparative Method(s)

		Correlation Coefficient	Slope	Intercept	N	Sample Range
Alanine Aminotransferase (U/L)	Canine	1.00	0.95	0	22 – 180	10 – 1549
	Feline	0.98	0.92	0	21 – 55	27 – 99
	Equine	0.97	0.94	6	7 – 101	11 – 30
Chloride (mmol/L)	Canine	0.935	0.875	15	38	78 – 132
	Feline	0.979	0.882	12	20	86 – 123
	Equine	NA	NA	NA	NA	NA
Creatinine (mg/dL)	Canine	0.99	1.00	0.0	22 – 180	0.6 – 10.6
	Feline	1.00	1.01	-0.1	21 – 55	0.3 – 13.6
	Equine	0.95	1.00	-0.4	7 – 101	0.3 – 6.2
Glucose (mg/dL)	Canine	0.96	1.01	-6	22 – 180	28 – 348
	Feline	1.00	0.97	3	21 – 55	52 – 607
	Equine	0.97	0.94	16	7 – 101	36 – 353
Potassium (mmol/L)	Canine	0.96	0.92	0.4	22 – 180	3.2 – 6.9
	Feline	0.91	0.92	0.5	21 – 55	2.7 – 5.3
	Equine	0.84	0.97	0.1	7 – 101	1.8 – 4.6
Sodium (mmol/L)	Canine	0.89	0.97	4.8	22 – 180	118 – 183
	Feline	0.86	1.08	-12.2	21 – 55	122 – 166
	Equine	0.86	1.00	-0.01	7 – 101	110 – 166
Total Carbon Dioxide (mmol/L)	Canine	0.81	0.86	3.5	22 – 180	6 – 23
	Feline	0.93	0.90	2.4	21 – 55	7 – 31
	Equine	0.97	0.93	2.1	7 – 101	9 – 39
Urea Nitrogen (mg/dL)	Canine	1.00	0.98	-2	22 – 180	4 – 117
	Feline	1.00	1.07	-5	21 – 55	14 – 165
	Equine	1.00	0.95	-1	7 – 101	3 – 64

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