BRISK NEWS

Towards Excellent Customer Service Utas Maju Sdn Bhd Newsletter

CAPILLARY ELECTROPHORESIS

Sebia Capillary 3 The Future of Electrophoresis

WATER QUALITY

VOLUME NO.38

EDITOR'S NOTES

Assalamualaikum w.b.t.

Welcome to our latest Brisk News! This will be our 38th edition of Brisk News which is designed for our customer in gaining more knowledge on any related topics.

Our highlight this time is the Capillary Electrophoresis (CE) and water quality. CE is a high resolutive separation technique for proteins. On the other hand, water quality is a crucial part in maintaining a good quality of any laboratory equipment. We hope you enjoy reading it!

On this occasion as well, we in Utas Maju Sdn Bhd would like to wish all Muslims "Selamat Hari Raya". May this month be filled with happiness and blessings.

DARI
PEJABAT PENGARAH URUSAN

بسم الله الرحمن الرحيم

Assalamualaikum dan Salam Sejahtera.

Alhamdulillah. Mari kita panjatkan kesyukuran kepada Allah S.W.T diatas kesempatan untuk menyempurnakan puasa di bulan Ramadhan. Saya doakan moga kesemua amal kebaikan kita di bulan Ramadhan diterima Allah dan menjadikan kita insan yang hebat di sisi-Nya.

Tahun 2021, negara kita masih lagi dalam tempoh Perintah Kawalan Pergerakan (PKP) untuk memerangi wabak Covid-19. Walaupun proses pemberian vaksin sedang berjalan, matlamat untuk membentuk *herd immunity* dijangka akan mengambil masa. Norma baharu masih lagi perlu diamalkan seperti pemakaian *face mask* dan mengelak berada di tempat yang sesak. Kami di Utas Maju sentiasa mendoakan kesejahteraan dan kesihatan yang baik kepada semua terutamanya para frontliners.

Sokongan dan kerjasama yang diberi para pelanggan selama lebih 20 tahun amat kami hargai. Berkat dari itu, kami akan berusaha dengan lebih bersungguh-sungguh untuk memberikan *customer support* yang terbaik kepada para pelanggan.

Saya secara peribadi amat mengalukan-alukan jika ada kerjasama strategik dari sudut perkongsian, perkembangan teknologi dan penyelidikan atau pembangunan sumber manusia bagi menyelesaikan segala permasalahan dan keperluan di makmal diagnostik.

Akhir kalam, saya mewakili Utas Maju ingin memohon maaf jika ada kekurangan atau salah silap sepanjang berurusan dan berhubungan selama ini. Tidak lupa juga, saya ingin mengucapkan **"Selamat Hari Raya Aidilfitri, Maaf Zahir dan Batin"**. Moga Aidilfitri tahun ini penuh dengan barakah dari Allah S.W.T.

Haji Adnan bin Md Noh
Pengarah Urusan

"TOWARDS EXCELLENT CUSTOMER SERVICE"

Do you have any article you would like to share with us? Even your feedback about this newsletter is greatly appreciated. Simply send your articles, letters or feedback to: **Muhammad Aiman Abdul Halim, Brisk News Editor, Utas Maju Sdn Bhd, No 15, Blok H, Jalan PJU 1A/3, Taipan 2 Damansara, Ara Damansara, 47301 Petaling Jaya, Selangor. • Tel: +603- 7839 1000 • Fax: +603- 7842 9940 Or email at aiman.h@utasmaju.com • website: www.utasmaju.com**

CAPILLARY ELECTROPHORESIS (CE) TECHNOLOGY

by: MOHD KHAIRUL ANWAR BIN MOHD NOOR | APPLICATION SPECIALIST

Protein electrophoresis is a well-established technique routinely used in clinical laboratories for screening of serum and other fluids for protein abnormalities. The Sebia capillary electrophoresis (CE) instruments, CAPILLARYS and MINICAP, have been developed to provide complete automation, with fast separation and high resolution.

CE PRINCIPLE

The Sebia systems use the principle of capillary electrophoresis in free solution. Charged molecules are separated by their electrophoretic mobility at a specific pH in an alkaline buffer. Separation occurs according to the electrolyte pH and electroosmotic flow. The Sebia capillary electrophoresis instruments are equipped with several parallel capillaries enabling multiple simultaneous analyses:

- CAPILLARYS 3 TERA (12 capillaries)
- CAPILLARYS 3 OCTA (8 capillaries)
- MINICAP (2 capillaries)

Each sample is diluted in a dilution buffer and the capillaries are filled with the separation buffer; samples are then injected by aspiration into the anodic end of the capillary. A high voltage protein separation is then done; direct detection and quantification of the different protein fractions is performed at a specific wavelength at the cathodic end of the capillary.
Post analysis, the capillaries are immediately cleaned with a wash solution and then refilled with buffer in preparation for the next samples.

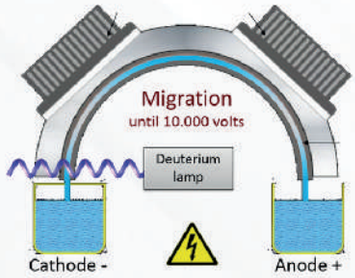


Figure 1 Capillary in silicate and thermo-conductive resin

CAPILLARYS 3 OCTA/TERA

CAPILLARYS 3, THE CAPILLARYS THAT REINVENTS CAPILLARYS

CAPILLARYS 3 is much more than a new instrument. It is a unique and exclusive automation program, designed to address the current and future needs of all laboratories.

CAPILLARYS 3 OCTA/TERA, offers the enhanced throughput of a 8 or 12 capillaries system, lateral access for a tube loader or a workcell configuration, and a platform to process dry blood spot assays.

Several CAPILLARYS 3 OCTA/TERA configurations are offered.The standalone instrument can be further upgraded with:
- A high-capacity tubes loader (up to 500 tubes).
- A work cell configuration, with up to 3 instruments. CAPILLARYS 3 TERA MC is able to process either very high volumes of the same test, or batches of different tests, providing full walk-away flexibility.
- Another option of CAPILLARYS 3 TERA is the analytical track compatibility, with CAPILLARYS 3 TERA TLA.

The CAPILLARYS 3 program offers a broad assay menu:

- Proteins
- Immunotyping
- Haemoglobin analysis
- HbA1c capillary blood
- Haemoglobin Neonatal Guthrie
- Urine
- Urine IT.
- CDT IFCC.
- HbA1c.

In the future: Haemoglobin Neonatal cord blood ,Haemoglobin Adult Guthrie and Protein HR

The CAPILLARYS 3 technology is developed to fulfill all laboratories' requirements in total confidence in a fast-changing environment.

TECHNICAL CHARACTERISTICS

Throughput

	CAPILLARYS 3 OCTA stand alone	CAPILLARYS 3 TERA stand alone	CAPILLARYS 3 TERA MC configuration
Proteins	80 test/hour	130 test/hour	390 test/hour
HbA1c	43 test/hour	70 test/hour	210 test/hour

Tube capacity: from 120 samples with the onboard loading to 600 samples with the additional tube loader

24/7 accessibility

Automatic maintenance

Smart LCD coloured touch screen with user friendly interface

Main reagents compartment with 4 flexible positions for multiple buffers

Walk-away/ autonomy

Test autonomy: HbA1c > 5 hours and Proteins > 2.5 hours

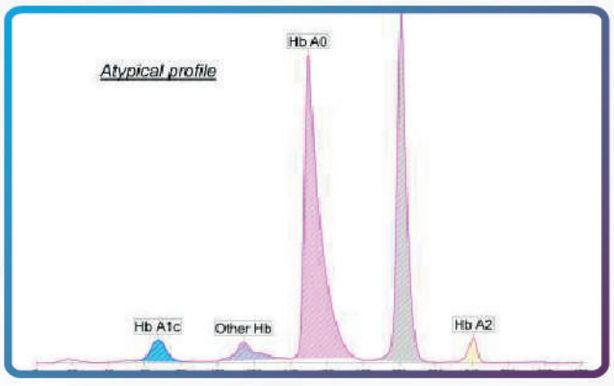
Automatic start-up / shut down

Cooled section in the secondary reagent deck

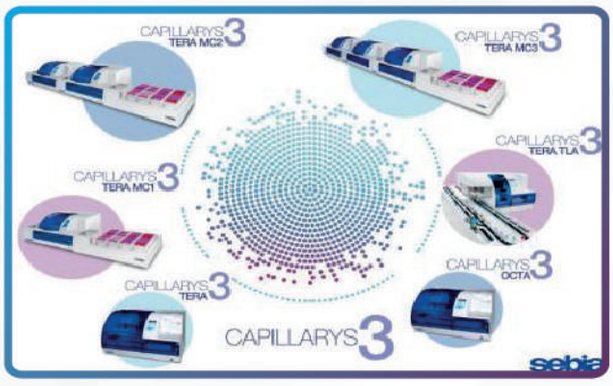
Color-coded back lighted reagent containers

Secondary reagent deck with 13 flexible positions for additional reagents

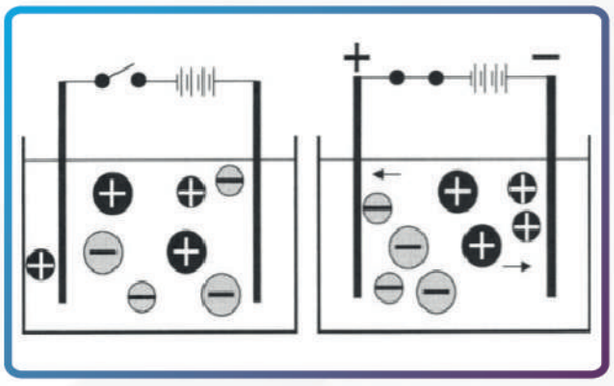
Reagent inside Capillary 3



Example of HBA1C profile from Capillary 3



C3 Product Range



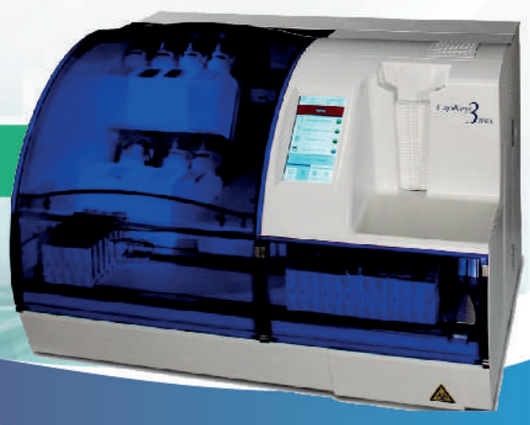
Simple Electrophoresis

Reference

1. Whatley H. (2001) Basic Principles and Modes of Capillary Electrophoresis. In: Petersen J.R., Mohammad A.A. (eds) Clinical and Forensic Applications of Capillary Electrophoresis. Pathology and Laboratory Medicine. Humana Press, Totowa, NJ. https://doi.org/10.1007/978-1-59259-120-6_2

2. Source: www.sebia.com.my

CAPILLARYS-3



EVALUATION STUDY FOR GASTAT 720 AQC WITH GASTAT 620

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Abstract

Arterial Blood Gas (ABG) is a simple, popular and inexpensive laboratory non-specific clinical test for assessing and monitoring patients with respiratory problems. An ABG test measures the acidity (pH) and the levels of carbon dioxide and oxygen in the blood from an artery. This evaluation was done to access the performance of the new introduced Gastat 720AQC and its peer, Gastat 620. From the study conducted, it shows that Gastat 720AQC gave a really good performance and is correlated well with the existing Gastat 620

Introduction

An Arterial Blood Gas (ABG) analysis instrument, GASTAT 700 series (Techno Medica, Yokohama, Japan) analyzer measures the value of acidity, gases and ionized values using a specific electrode for each kind of gases (pO2, pCO2). In this analyzer, a small sample volume 80 µL for capillary and 195 µL for syringe is aspirated to go through into each electrode and has short analysis time within 60 seconds. While GASTAT-730/735AQC uses sample of 100 µL for capillary and 195 µL for syringe is aspirated within 70 seconds and 90 seconds for GASTAT-735AQC. Each sample, the value of acidity, gases and ionized in blood are obtained. The principle of measurement is the study of basic electrical principles and changes with chemical measurements. Blood gas electrodes are electrochemical devices that measure either electrical current or voltage.

This evaluation started with device familiarization. Demonstration sessions were carried out in with all aspects of set up, operation, maintenance, and quality control of Techno Medica GASTAT-700. A judgment on the performance of the method and the basis of errors that have been observed is needed. The statistics are used to make reliable estimation of errors from the data that have been collected.

Objectives

1. To analyze and evaluate the performance of GASTAT 700 blood gas analyzer.
2. To determine the performance of GASTAT 700 against the acceptable standard base on Biological Variation Standard.
3. To verify the performance of the instrument.

Methodology

Precision Study

The study was done using Automatic Quality Control (Level 1, 2 and 3) where one (1) run is performed per day and for each run, five(5) replicates are made. The study was performed for five(5) days. A total of 25 results were recorded for each level. Mean, SD and CV were calculated.

Carry over

For this study, a sequence analysis of 21 aliquot of high and low concentration samples were used. The acceptable limit of error is 3 times the standard deviation (SD) of the mean obtained from sequential measurement of (low-low) samples.

Correlation

At least 20 fresh patient samples were collected and analyzed using both methodologies. The GASTAT 600 was used as the reference method while the new GASTAT 700 was used as comparison method. Correlation graph was plotted and calculated.

Reference range

At least 20 blood samples of healthy adults were collected and analyzed with GASTAT 700. Gaussian distribution was calculated for validating reference range.

Statistical Analysis

Calculation of mean, SD, coefficient of variation, linear regression, Pearson's correlation, error rate & Analysis of variance (ANOVA) were done. All calculations were made using statistical packages MedCalc. The acceptance of the performance was statistically tested.

Result

Precision

Parameter	Mean (Level 1)	SD	CV (%)	Mean (Level 2)	SD	CV (%)	Mean (Level 3)	SD	CV (%)	Acceptable CV (%)
pH	7.155	0.01	0.09	7.396	0.04	0.05	7.57	0.002	0.036	2.63
pCO2	67.5	0.64	0.95	43.5	0.72	1.67	23.5	0.19	0.83	3.6
pO2	64.4	2.53	3.93	96.1	3.20	3.33	133.9	1.46	1.09	10
Ca2+	1.51	0.02	1.00	1.13	0.02	1.41	0.54	0.01	1.52	3.6
Na+	118.2	0.04	1.18	136.9	2.17	1.58	156.9	0.91	0.58	1.9
K+	2.94	0.04	0.59	4.7	0.09	1.8	7.0	0.1	0.35	3.6
Cl-	82.2	82.2	0.59	100.5	0.94	0.94	121.2	1.13	0.93	2.21

TABLE 1- results obtained for assessment of Intra-assay (n=25) precision of G720AQC analyzer

Parameter	Mean (Level 1)	SD	CV (%)	Mean (Level 2)	SD	CV (%)	Mean (Level 3)	SD	CV (%)	Acceptable CV (%)
pH	7.162	0.01	0.13	7.413	0.014	0.19	7.569	0.01	0.09	2.63
pCO2	67.0	0.96	1.43	42.7	0.49	1.14	22.5	0.31	1.4	3.6
pO2	64.5	2.19	3.39	96.2	2.38	2.47	133.0	2.17	1.63	10
Ca2+	1.51	0.01	0.6	1.13	0.01	0.55	0.54	0.006	1.09	3.6
Na+	118.2	0.1	0.85	137.0	0.85	0.39	157.5	0.85	0.54	1.9
K+	2.89	1.2	1.2	4.71	0.02	0.44	7.01	0.04	0.51	3.6
Cl-	83.9	1.13	1.13	100.3	0.69	0.69	121.2	2.89	2.38	2.21

TABLE 2- results obtained for assessment of Inter-assay (n=25) precision of G720AQC analyzer

Carry Over

	pH	pO2 (mmHg)	pCO2 (mmHg)	Ca2+ (mmol/L)	Na+ (mmol/L)	K+ (mmol/L)	Cl- (mmol/L)
Mean high-low concentration	7.18	75.4	23.6	2.55	121	2.9	74
Mean low-low concentration	7.17	75.7	23.2	2.55	121	2.9	74
Error limit (3SD of mean low-low concentration	0.0075	3.5	1.8	0.05	2.1	0.1	1.3
Carry Over	0.003	-0.24	0.36	-0.002	0.4	-0.02	-0.4

TABLE 3- Carry Over Study

Results

Correlation

Parameter	Mean of G720	Mean of G620	Tea (%)	Correlation (r2)
pH	7.375	7.392	3.9	0.9876
pCO2	43.3	44.4	10.0	0.9901
pO2	102.2	101.5	8.0	0.9898
Ca2+	0.997	0.976	2.1	0.9876
Na+	135.8	136.7	5.0	0.9742
K+	3.7	3.84	5.8	0.9876
Cl-	98.6	99.2	5.0	0.9441

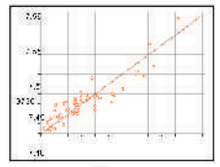
TABLE 4- Correlation obtained from GASTAT 700 & reference method (n=40)

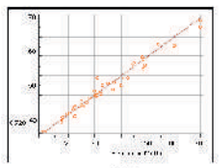
Verification of Reference Value

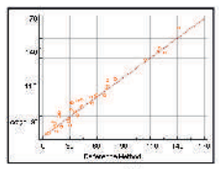
Parameter	Range by Manufacturer	Range Obtained	Obtained Mean	Obtained Median	Verification
pH	7.38 – 7.46	7.38 – 7.46	7.4	7.41	Verified
pCO2	74 – 108	74.6 – 108	91.7	91.8	Verified
pO2	32 – 46	32.4 – 46	40.23	40.3	Verified
Ca2+	1.20 – 1.26	1.35 – 2.2	1.79	1.74	Verified
Na+	139 – 147	140 – 145	140.17	140	Verified
K+	3.3 – 4.7	3.3 – 4.7	3.96	3.9	Verified
Cl-	102 – 110	102 – 110	104.43	106	Verified

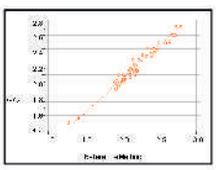
TABLE 5- Verification of reference values (n=20)

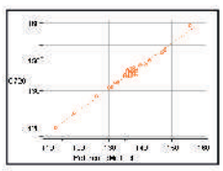
Correlation Plot for Each Parameter

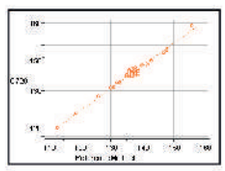

pH

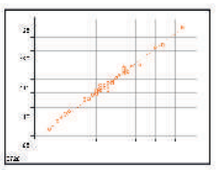

pCO2


pO2


Ca2+


Na+


K+


Cl-

Discussion

This study is done based on EP15-A2 which is intended for use by laboratories to verify that a method operates in accordance with the manufacturer's claims for repeatability and within laboratory precisions. Repeatability can be defined as closeness of agreement between results of successive measurements of the same measure and carried out under the same operating conditions. Within laboratory precision is a precision over a defined time and operators, calibration and reagents may vary within the same facility and using the same instruments. Formerly known as Total Imprecision. The laboratory's observed SD should be lower than the verification below for verification of manufacturer's claim.

Based on the result obtained on **Table 1 & 2**, all the analytes show respectable SD below verification value when compared to manufacturer CV. EP15-A2 was done by performing 5 replicates run for each test per day for 5 days using Blood Gas Control. EP15 recommends verifying both repeatability, within and between laboratory precision.

Due to sample instability and difficulty to run dilutions, especially for pC02 and pO2, sensitivity and linearity tests were unable to be done and it is recommended to study sensitivity and linearity from samples provided by External Quality Control (EQA) such as RCPA or CAP instead in the future.

Table 3 results indicate that there is no significant carry over value during the study. Since GASTAT analyzer has automatic calibration and cleaning solution after each sample is run. It is advisable to use lithium heparin syringe and follow proper pre-analytical process before running the sample in the analyzer. **Table 4** shows GASTAT 720AQC correlates with the reference method used in the laboratory. The challenges in the study were analysis of patient's samples within the reference range and difficulty in obtaining enough sample volume although the manufacturers indicate that for 1ml syringe minimum 195 microliters is used. Reference value suggested by the manufacturer were verified as shown in **Table 5.** It is recommended for each laboratory to develop or verify the reference range for different population.

Conclusion

As a conclusion, the study was successful, and manufacturer's claim has been verified for all the analytes using Techno Medica GASTAT 720AQC blood gas analyzer. This shows that the analyzer gives a reproducible and precise result claim by manufacturer and comply with Desirable Specification of Biological Variation by Westgard. The analyzer Techno Medica GASTAT 720AQC results correlate with the existing analyzer which is GASTAT 600 with no significant different and bias are acceptable compared to CLIA.

REFERENCES:

1. CLSI EP15-A2. 2008. *User Verification of Performance for Precision and Trueness; Approved Guideline- Second Edition.*
1. *Basic Method Validation 3rd Edition Training in Analytical Quality Management for Healthcare Laboratories – James O. Westgard 2008.*

Q&A WATER QUALITY

by: AZRUL AMREE BIN ANUWAR | SERVICE ENGINEER

Water quality is estimated by several elements e.g. the grouping of dissolved oxygen, microscopic organism levels, the measure of salt or the measure of material suspended in the water. In certain waterways, the convergence of microscopic algae and amounts of pesticides, herbicides, substantial metals and different pollutants may likewise be estimated to decide water quality. Numerous regular components can influence ground-water quality; in any case, the essential elements incorporate the source and substance structure of re-energize water, the lithological and hydrological properties of the geologic unit, the different synthetic cycles happening inside the geologic unit, and the measure of time the water has stayed in contact with the geologic unit.

These variables can influence the sort and amounts of broke down constituents in ground water. The most bountiful broke up constituents estimated are the significant particles, which can be both positively charged (cations) and negatively charged (anions).

In view of the prerequisites of electroneutrality, cations and anions are available at equivalent focuses in water and contain the vast majority of the broke down solids in ground water. The most bountiful cations present in water are calcium (Ca), magnesium (Mg), sodium (Na), and potassium (K); the most plentiful anions are bicarbonate (HCO3), chloride (Cl), and sulfate (SO4). By estimating the centralizations of these particles in ground-water tests, the ionic sythesis of the water is resolved and the compound nature of the water can be portrayed and depicted.

How Ions Affect the Structure of Water?

The main idea captured here is that charge density controls the interaction of ions with water and that the balance of forces determines the structure of water, in electrostatics (water dipoles interact with ions) and hydrogen bonding (water interacts with surrounding water bodies.). Small (cosmotropic) ions have a high charge density, which causes strong electrostatic regulation in neighboring waters and destroys hydrogen bonds. In contrast, large (chaotropic) ions have a low charge density and the surrounding water molecules are mostly hydrogen.

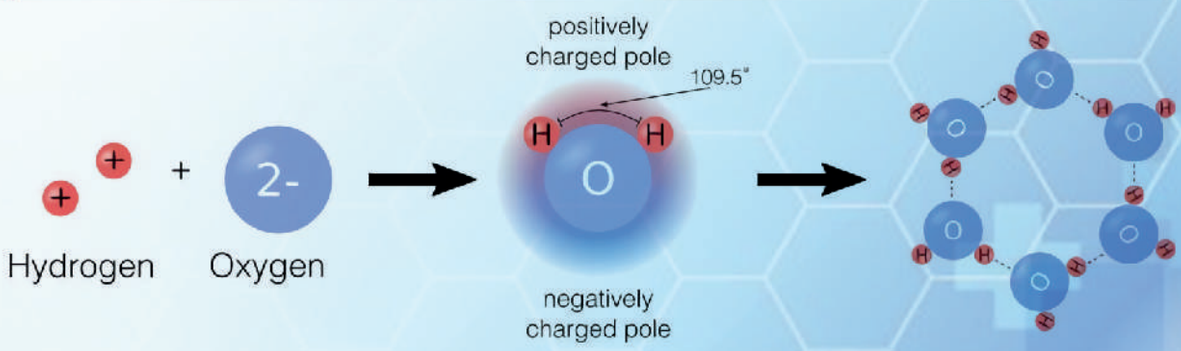


Figure 1 Water Structure

What is Deionized Water?

Ions are electrically charged atoms or molecules in water that have a net negative or positive charge. For many applications where water is used as a rinse or ingredient, these ions are considered contaminants and must be removed from the water. Positively charged ions are called "cations" and negatively charged ions are called anions. Ion exchange resins are used respectively to exchange unwanted cations and anions for hydrogen or hydroxyl, and to form pure water (H2O), which is not an ion.

What is Deionized Water System?

The deionized water system resides in the DI tank and other components that are used to make ultrapure water. DI tanks are typically made of fiberglass and come in a variety of sizes to accommodate different feed levels. Deionized water systems can be as simple as setting up a single tank or as complex as a multi-tank system with supporting equipment such as reverse osmosis, UV disinfection, and sophisticated water quality monitoring equipment. The DI tank contains ion exchange resin which selectively removes ions from water. Finally, the DI tank must be replaced by the service provider and replaced with a new tank. DI tank replacement is required to ensure that deionized water continues to flow. The frequency of replacing the DI tank depends on the quality of the incoming water and the amount of water used. The higher the ion load in the incoming feed water, the lower the gallonation generated by the DI tank.

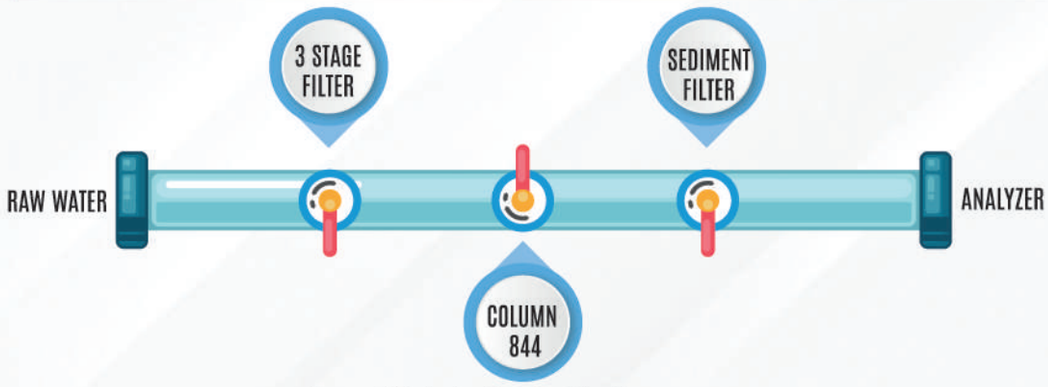


Figure 3 Deionized water filtration process

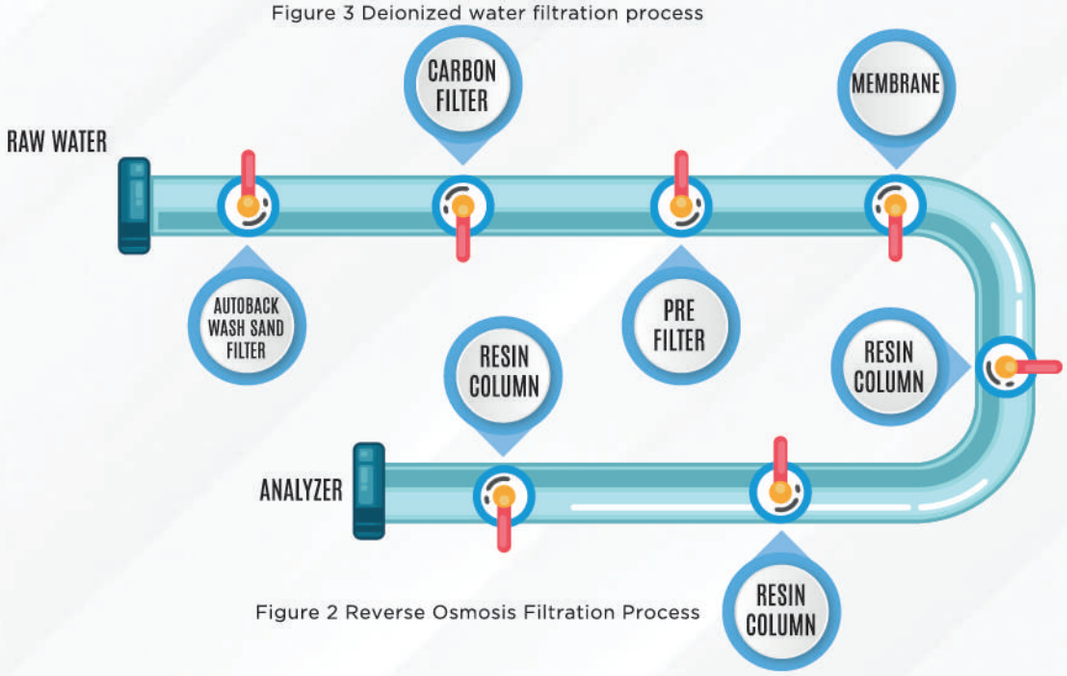


Figure 2 Reverse Osmosis Filtration Process

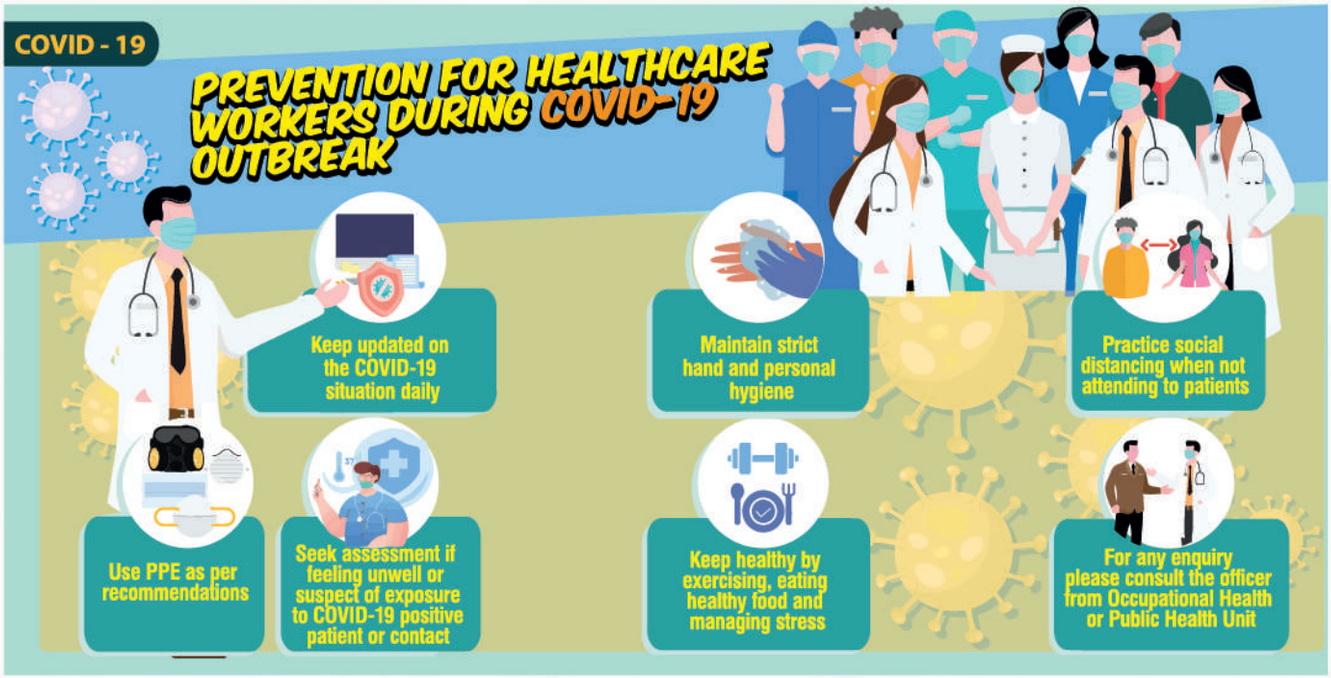
What Type of Water That Can Be Used for Beckman Coulter Analyzer?

Large laboratories such as universities or pharmaceutical research buildings often require large water treatment equipment. To meet the diverse needs of researchers using a multi-functional laboratory room, the main water treatment system can produce RO or DI which is then stored in a tank for a certain period of time until needed. There are two types of water that can be used for our product which is Deionized CAP Type II and Bacteria Free water filtration which is also known as the RO water. Water is used in almost all processes in the clinical analyzer where the uses are for washing reaction cuvettes, feeding wash stations for probes and mixing bar, diluting reagents, samples and detergents, incubator baths as well as an interface between syringe and sample. Poor water quality affects not only the test itself, but also the overall performance of the analyzer and the reliability of the test results.

Reference

1. Infographic: The rundown-What water type should I use in my application? - Labconco
2. Puretec Industrial Water | What is Reverse Osmosis? (puretecwater.com)
3. Puretec Industrial Water | What is Deionized Water? (puretecwater.com)

4. Hribar, Barbara; Southall, Noel T.; Vlachy, Vojko; Dill, Ken A. (2002). How Ions Affect the Structure of Water. Journal of the American Chemical Society, 124(41), 12302–12311. doi:10.1021/ja026014h



Reference from: http://covid-19.moh.gov.my/infografik

En Mohd Zulasyraf B. Mohd Zaki

STAFF PROFILE

Place of Birth	*: Sg. Bayor, Selama, Perak*
Position	*: Sales Executive*
Role and Responsibilities	*: Managing Southern and Central region's accounts*
Year Of Service	*: 5 years*
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