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June 21, 2023

Increase Efficiency and Production in your Lab with the

YSI Biochemistry Analyzer 2900/2950

NOBU WU

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Today's Topics

1. Background
2. What is lab productivity?
3. What is the Life Science YSI 2500/2900 series
4. Application review
5. Q&A Session

House Keeping

- We are recording!
- A link to the recording & a pdf version of this presentation will be shared in a follow up email
- Ask your question at any time in the "question" section of your Zoom screen
- All questions will be answered at the end of the webinar

Profiles

Presenter: Nobu Wu

SEA, N.Asia Sales Manager·Xylem

Nobu has over 15 years with YSI life science products since 2008. Bsc of Chemistry from the university of Hong Kong

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What is lab productivity?

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What is lab productivity?

Common understanding:

Laboratory productivity is the efficiency
and effectiveness of a laboratory at producing results.
It measures how much work a laboratory
can complete in a given period.

What is lab productivity?

More Specific:
Maximizing Output with Minimal Time for workflow.
Process Optimization via certain technology
or automation enables the streamlining of operations,leading to increased efficiency
and lab productivity.

Reducing mundane manual labor for staff
and put idle time for better use in daily work.

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What is the Life Science YSI 2500/2900 Series?

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How the YSI 2500/2900 series Biochemistry Analyzer can meet your requirements?

1. Improve workflow management
2. Put spare time to good use
3. Utilize laboratory space
4. Ensure a well-kept laboratory
5. Share workloads between staff

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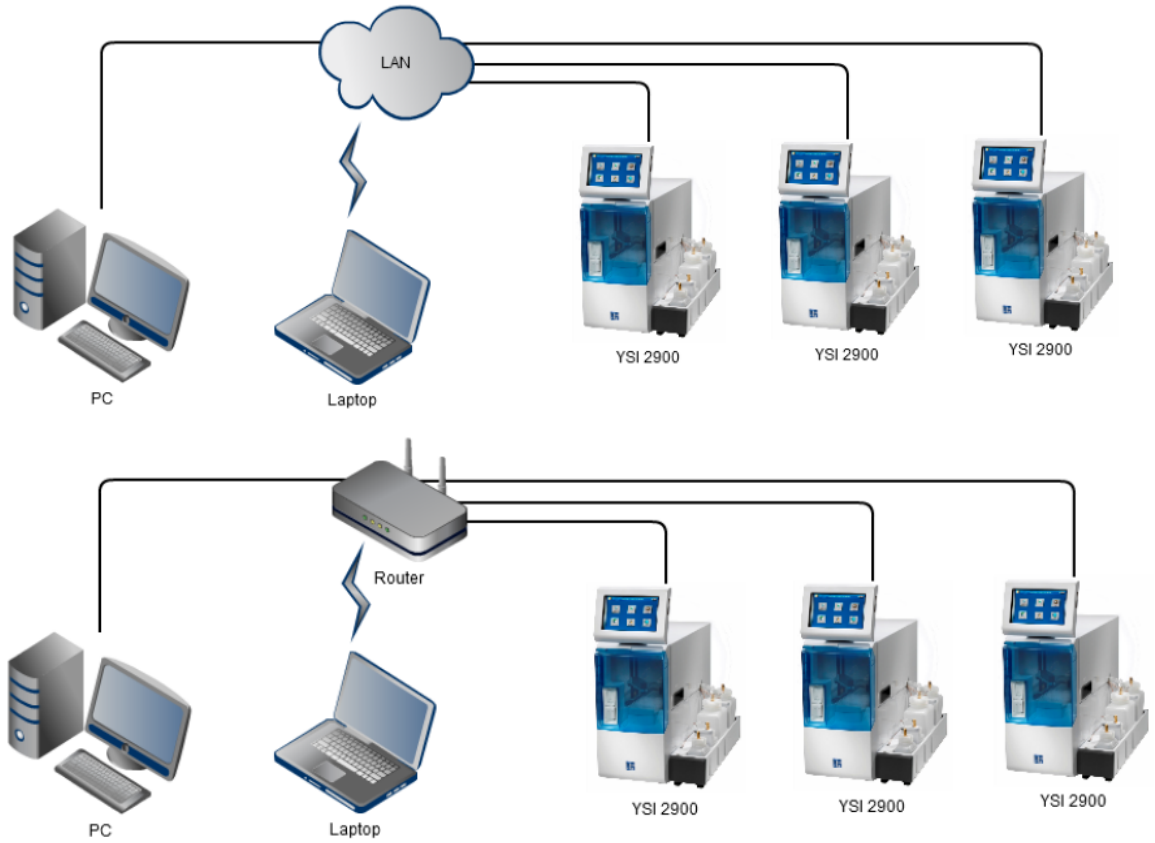
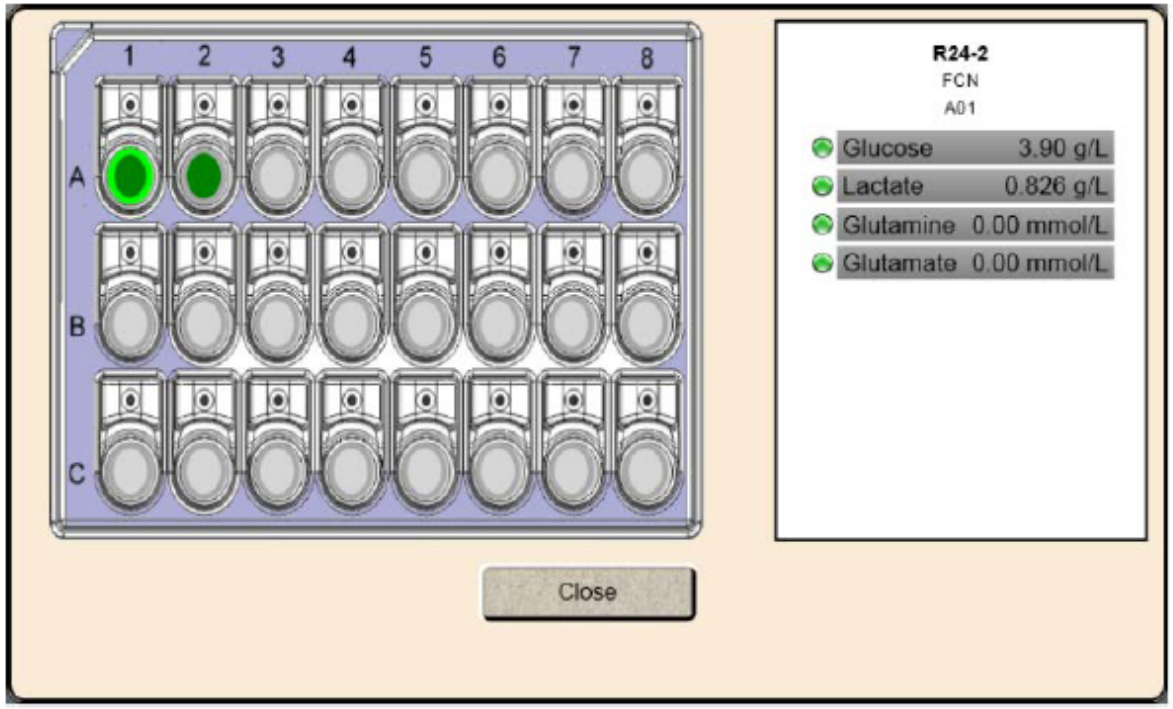
1. Improve workflow management



Connectivity options for Network, SCADA, DAS, LIMS and feed-control systems & OPC Server Options

2. Put spare time to good use



Automation & Scheduler function of 2500/2900→Utilise time spent waiting for instruments to finish processes by initiating the next batch or experiment to eliminate idle time.

3. Utilize laboratory space

Instrument dimensions:

YSI 2950: 25.5” wide x 20.5” deep x 15.75” high (65cm x 52.1cm x 40cm)

YSI 2900: 12” wide x 20.5” deep x 15.75” high (30.5cm x 52.1cm x 40cm)

Instrument weight:

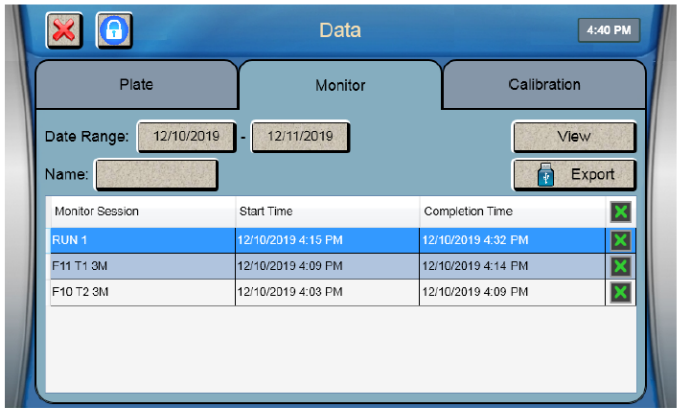
YSI 2950 : 46 pounds (20.9 Kilograms)

YSI 2900 : 30.5 pounds (13.9 Kilograms)

Keep workflow-related equipment in the same space to minimise transit time, plus small foot-print allows easier placement of instrument to get experimental result in a shorter time

5. Share workloads between staff

Data Export and acquisition allows easier result sharing for further modelling. Many hands make light work!



Local Completion Time				Chemistry	Probe Id	Concentration	Units	Endpoint (s)	Sample Size (µl)	Initial Baseline (nA)	Plateau (nA)	Final Baseline (nA)	Net Plateau (nA)		Cross Net Plateau (nA)	Plateau Slope (nA/min)	Temperature (C)	Errors
12/12/2019 13:11				Glucose	1A	2.5	g/L	30	25	2.9905	14.9612	3.0258	11.9707		NaN	0.1442	21.92	(No previous calibration-Probe1A)
12/12/2019 13:11				Lactate	1B	0.5	g/L	30	25	3.2762	29.3721	3.3032	26.0959		NaN	-0.1724	21.92	(No previous calibration-Probe1B)
12/12/2019 13:13				Glucose	1A	2.5	g/L	30	25	0.9606	15.992	1.1777	15.0314		NaN	0.3379	27.01	(Cal Shift-Probe1A)
12/12/2019 13:13				Lactate	1B	0.5	g/L	30	25	2.2744	30.9102	2.5932	28.6358		NaN	0.1664	27.01	(Cal Shift-Probe1B)
12/12/2019 13:15				Glucose	1A	2.5	g/L	30	25	0.9971	15.6327	1.175	14.6356		NaN	0.6005	26.84	
12/12/2019 13:15				Lactate	1B	0.5	g/L	30	25	2.241	30.2067	2.5655	27.9657		NaN	1.0046	26.84	
12/12/2019 13:08				Glutamate	2A	5	mmol/L	30	20	4.2451	20.1511	4.2504	15.906		14.9872	0.5142	21.96	
12/12/2019 13:11				Glutamine	2B	5	mmol/L	30	20	3.7581	20.7332	3.7445	16.9762		NaN	0.0315	21.96	
12/14/2019 16:42				Ascorbic Acid	1B	1	g/L	45	25	2.2676	23.8498	1.6895	21.5822		11.0659	4.9728	27.99	(No previous calibration-Probe1B)
12/14/2019 16:45				Ascorbic Acid	1B	1	g/L	45	25	1.5976	23.3035	1.6564	21.7059		11.0883	2.54	27.77	
12/14/2019 16:48				Fructose	1A	10	g/L	45	25	0.4497	82.6217	0.9934	82.172		NaN	12.0484	27.62	(No previous calibration-Probe1A)
12/14/2019 16:52				Fructose	1A	10	g/L	45	25	0.7571	82.8973	1.4755	82.1402		NaN	13.2981	27.57	

YSI 2500/ 2900 continues as Gold Standard

- YSI Life Science is the first one to commercialize and released the world 1st blood glucose analyzer utilizing innovative enzyme membrane technology, legacy model 2300D STAT Plus, 2700S/D has been widely adopted in different industries and application areas.

- YSI biochemistry analyzers are widely regarded as the gold standard in the field because of high Accuracy, Reliability, Ease of use, Versatility, innovation software.

YSI 2500/2900 Series Outline

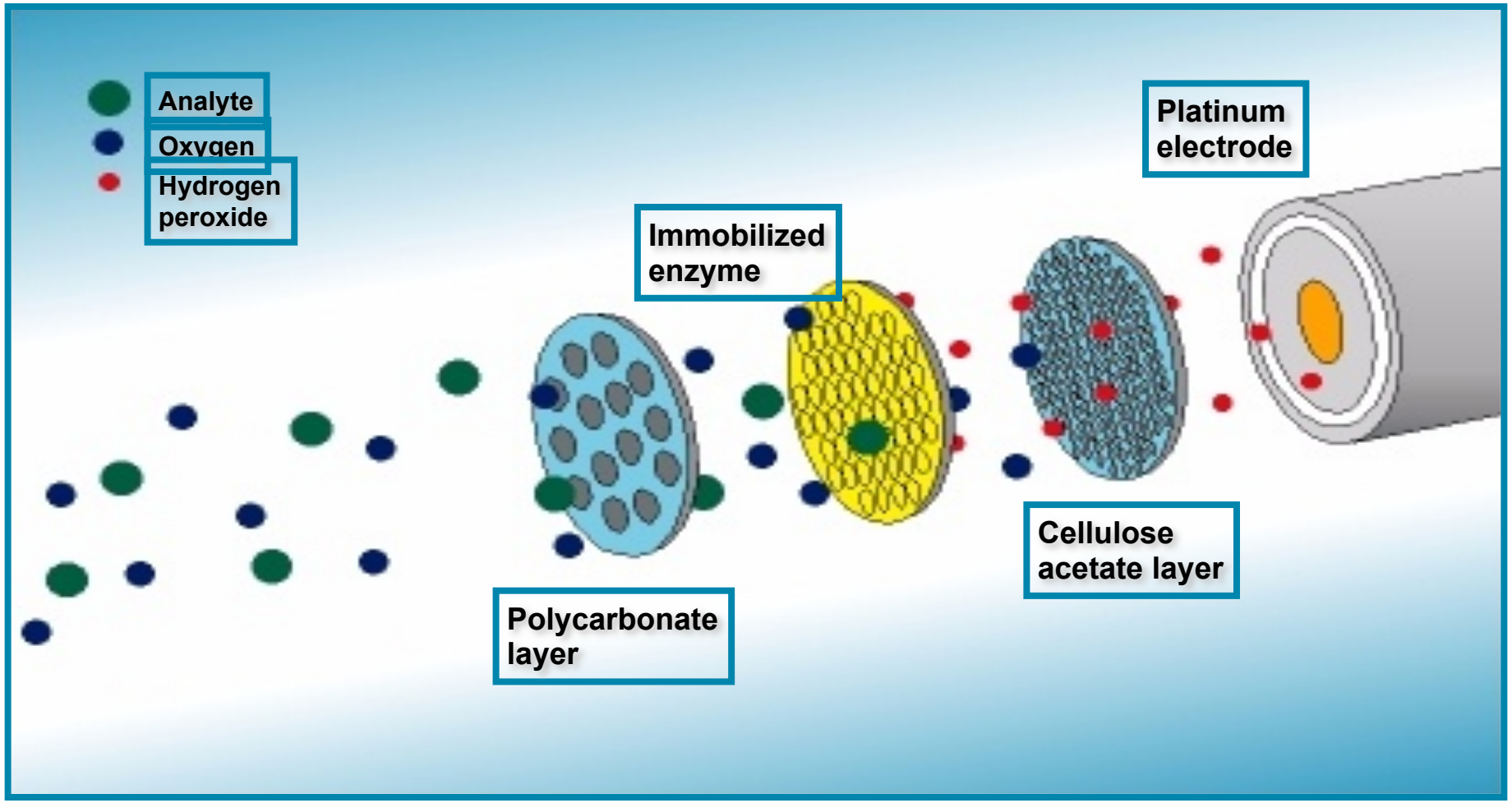
- Sensor Technology
- Features and Benefits
- YSI 2500/2900 Overview
- Possible Chemistry Combination
- The YSI 2500/2900 enhances the efficiency & productivity for Laboratory

YSI Unique Sensor Technologies

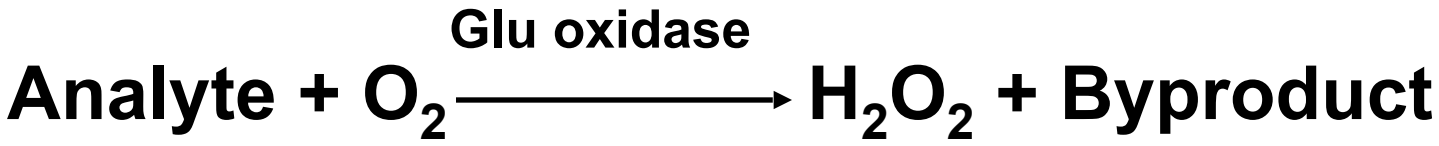
- Oxygen Electrode (Clark-style) – 1960s
- **Biosensor (Enzyme Electrode) – 1975**
- Opto-chemical (Fluorescence) – 1999
- Ammonium & Potassium (ISE*) – 2002

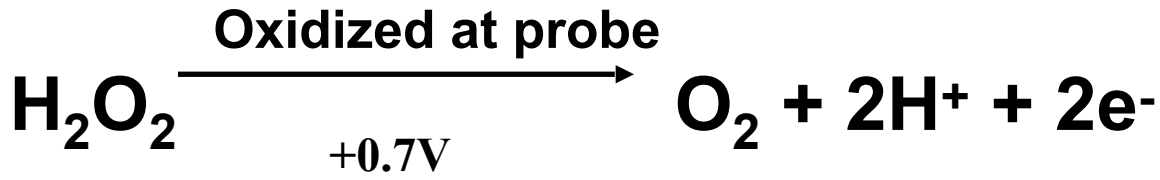
* ISE – ion selective electrode (YSI 2950)

YSI Biosensor Technology

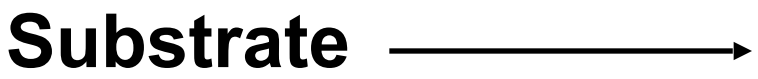


YSI Biosensor Reactions





Substrate proportional to electron flow...



YSI Biosensor Features/Benefits

Rapid

- Little or no sample preparation, small sample volume 10-50uL
- Sensor response is fast (60 seconds)

Accurate

- Immobilized enzymes are specific for analytes

Economical

- Enzyme not used up with test
- Less labor without sample preparations

YSI 2500*/2900/2950**

Measures 1 or 2 analytes (** 6 analytes) at a time:

Glucose*, Lactate*, Glutamate, Glutamine (with Glutamate), Xylose (with Glucose), Ethanol, Methanol, Sucrose (with Glucose), Choline, Galactose (if no Lactose), Glycerol, Ammonium, Potassium

Customers:

→ Biotech / Bioprocessing

→ Biofuels

→ Food & Beverage

→ Clinical Market

GOLD Standard measurement

- Fast AND Accurate (1 min)
- Small sample size, **little prep**
- User friendly touch screen
- **Up to 96 samples**
- **Automation included**
- Flexible data handling options
- On Board Help/Training, incl. videos
- Clogging resistant

Diabetes Research

- Diabetes research & diabetic evaluation studies
- Use YSI Analyzers for ‘clamp studies’
- Insulin resistance vs. decreased insulin production
- Infuse insulin and glucose over 3 hours.
- Check glucose every 5 minutes!

Legacy Model YSI 2300D STAT PLUS

Food & Beverage

Food Manufacturers

1. Preprocessing
2. During Processing
3. Post processing

Beverage Manufacturers

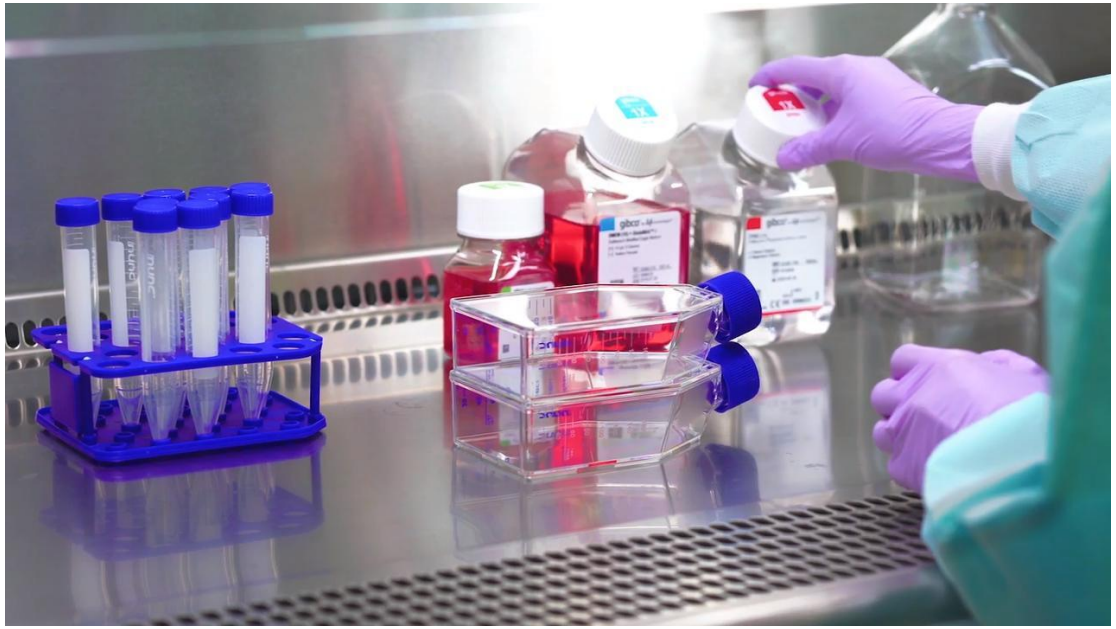
1. Soft Drinks
2. Juices
3. Beer and wine

Sugar Processors

1. Effluent Discharge

Biopharma Research

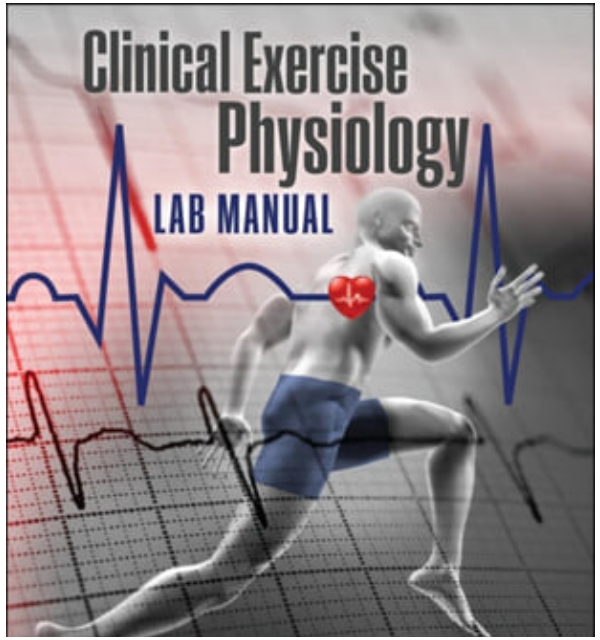
- Cell culture and fermentation
- Viability of cells
- Drugs Development
- Monitoring stability and efficacy
- Side effects



Clinical & Physiology

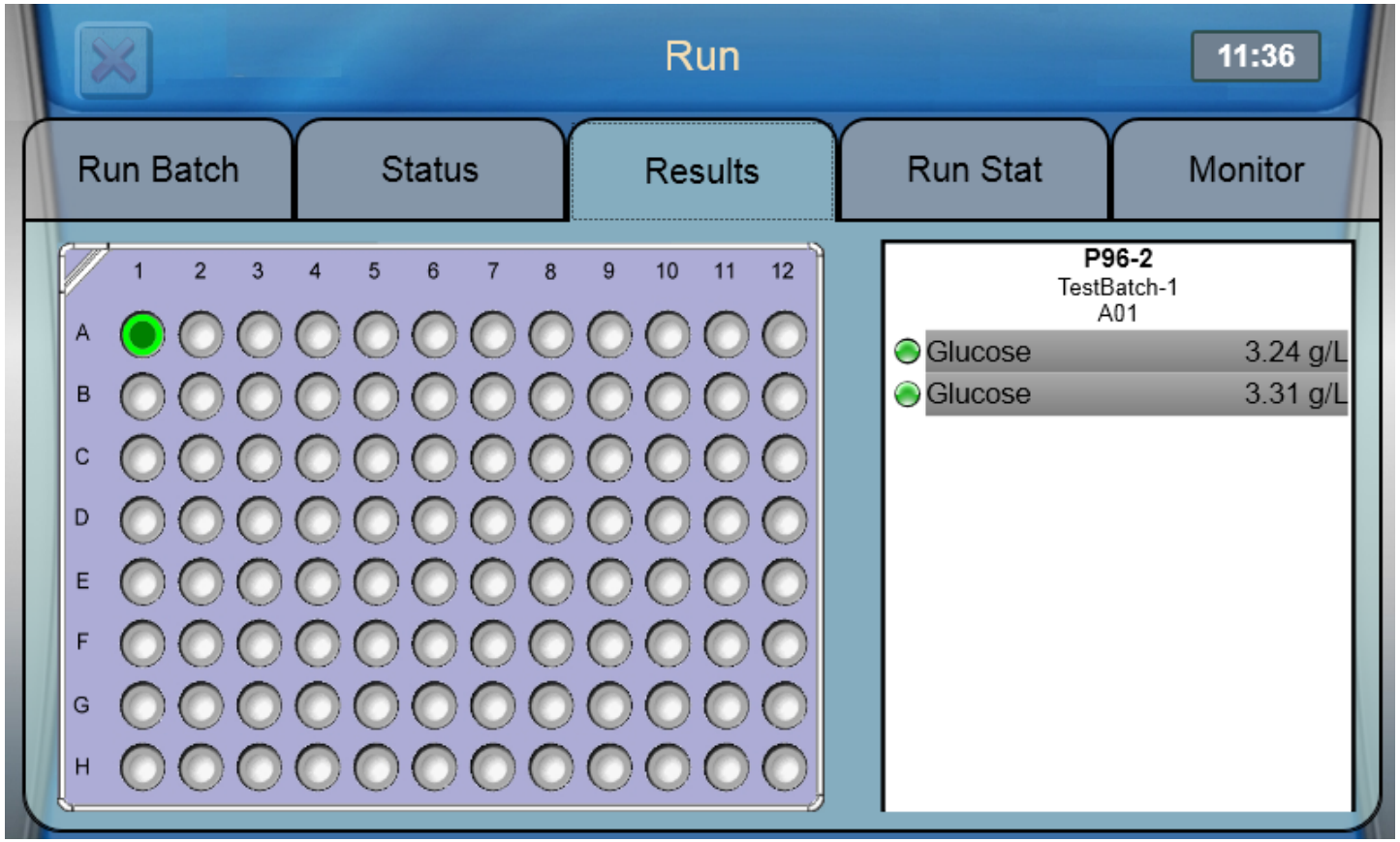
Body chemistry levels that affect athlete's or subjects' ability to perform/ recover:

- Glucose – provides energy to cells
- Lactate – evidence of fatigue, stress, and depletion
- Glycerol – indicator of fat breakdown



Automation

- Automation is included
- Up to 96 positions - well plates
- Batch based data entry



Sampling Stations

- **Automated Sampling**
  Station 1

- **Manual Sampling**
  Station 2

Hardware

Sample Holders and Racks

Chemistry Capabilities

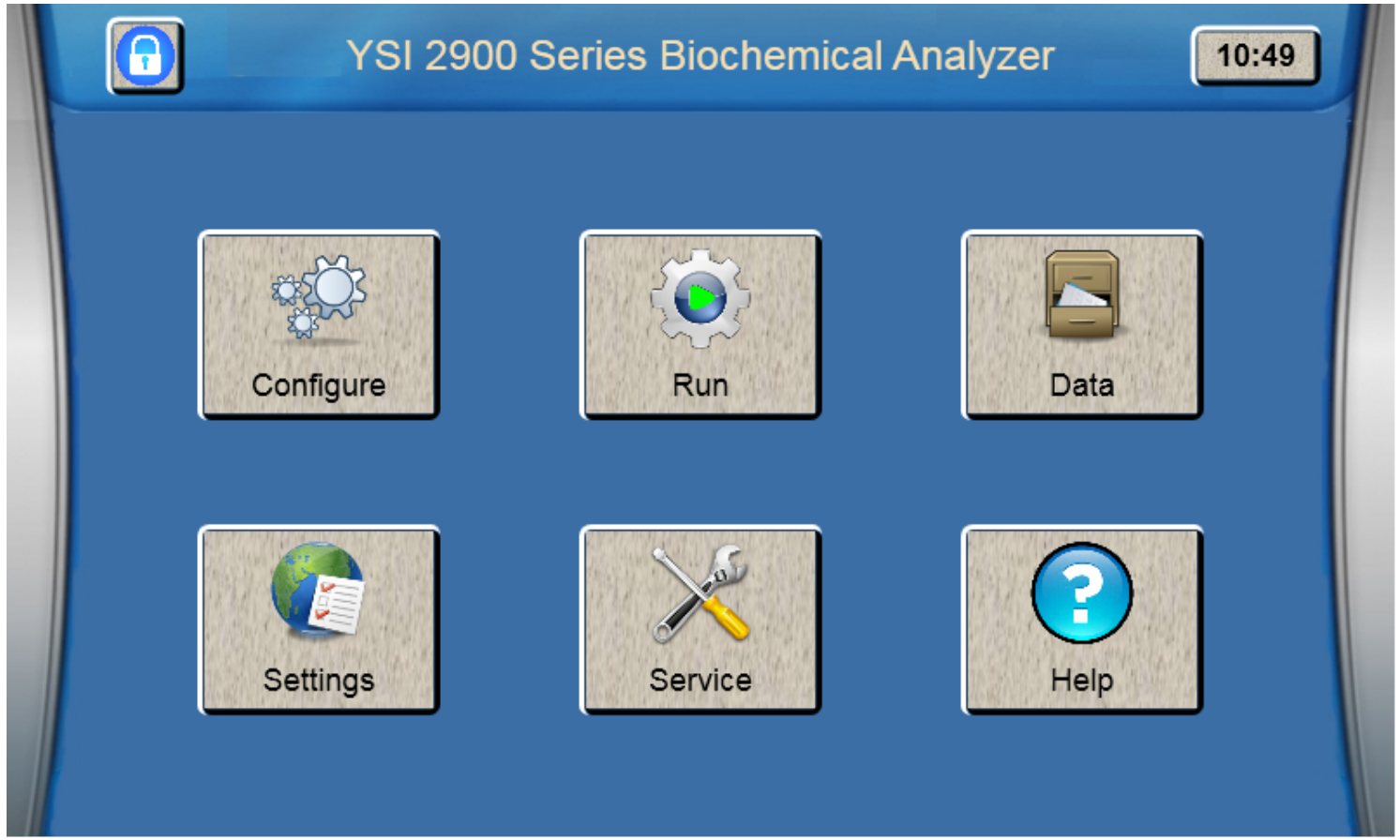
Measures up to 2 chemistries at a time (2500*/2900)

- Glucose*
- Lactate*
- Glutamine (and Glutamate)
- Glutamate
- Ethanol
- Lactose (if no Galactose)
- Sucrose
- Ammonium
- Galactose (if no Lactose)
- Hydrogen Peroxide
- Methanol
- Starch (with sample prep)
- Choline
- Xylose (and Glucose)
- Glycerol
- Potassium

in less than 1 minute

Software Features (2500/2900)

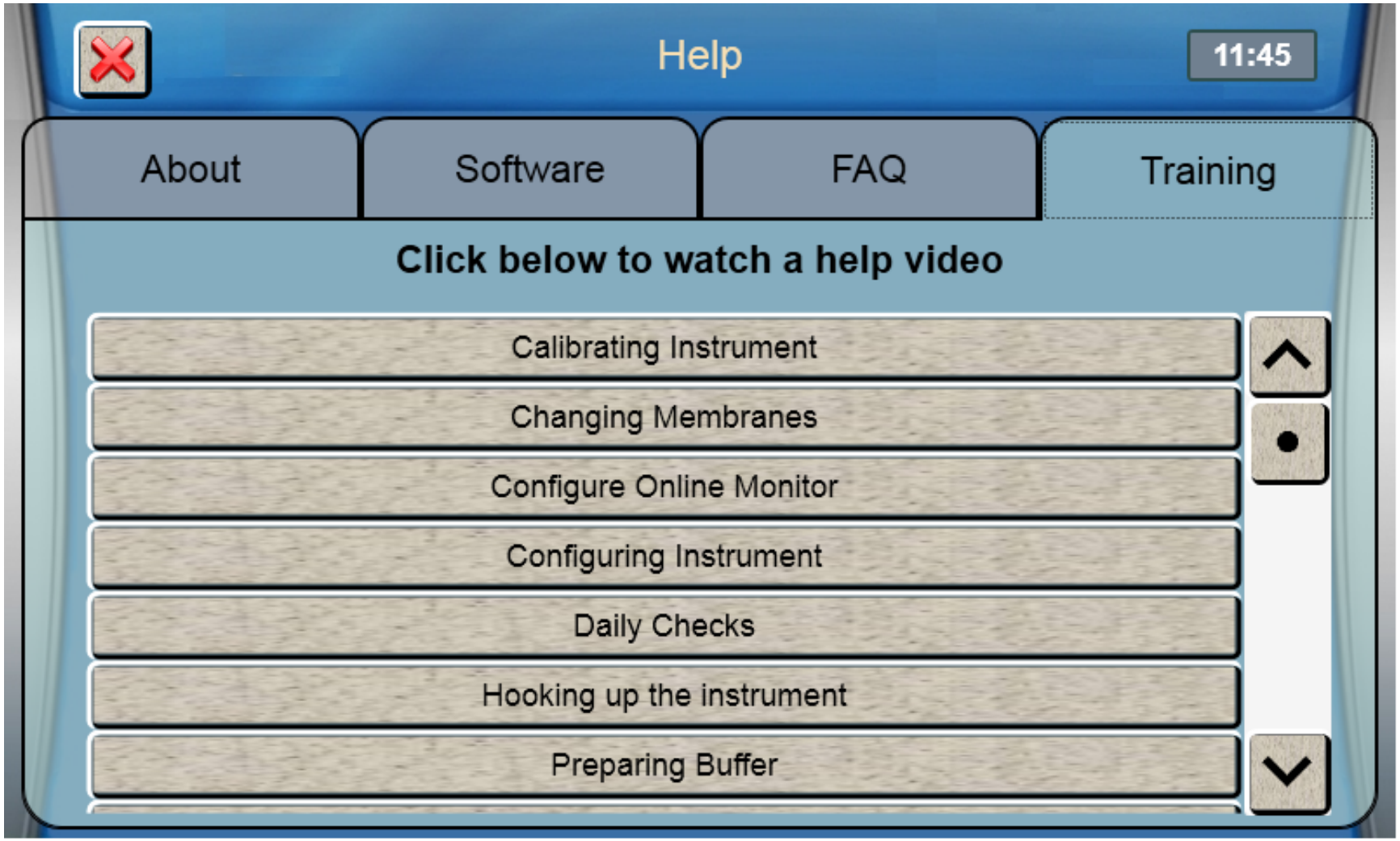
- Touch Screen
- Intuitive
- Organized by Workflow
- 21 CFR part 11 Compliant (user management)



AutoCal

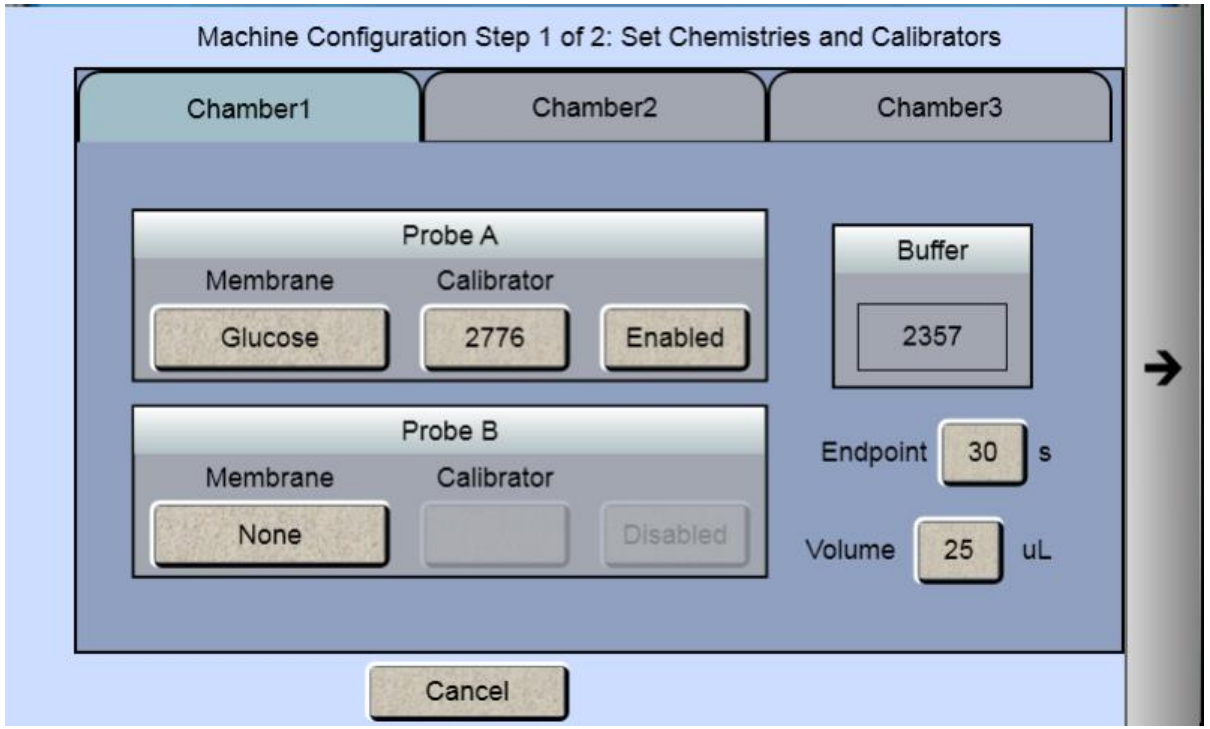
New setting, AutoCal: [Off] calibrate only while running samples/plates
[On] calibrate while idle in Run screen

Help – Onboard Training materials for new comers

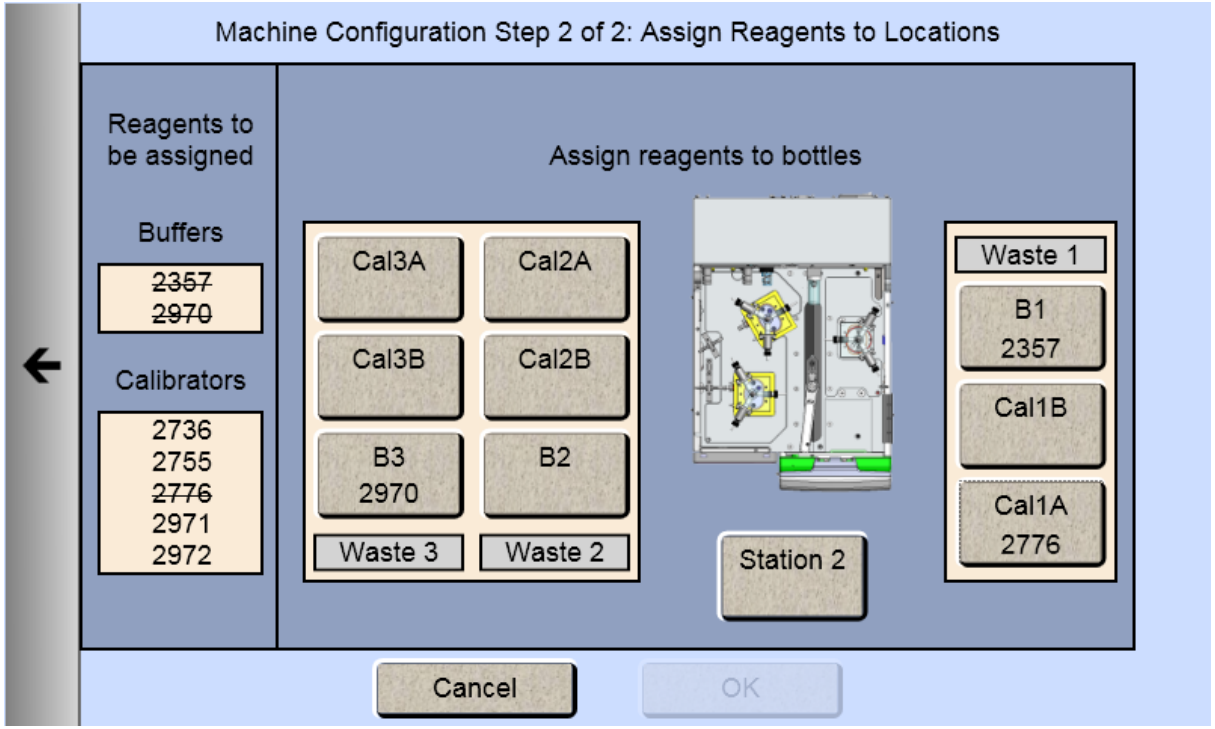


Instrument Configuration

Straight Forward→ Saving times



Choose chemistries for each chamber



Assign locations for required reagents

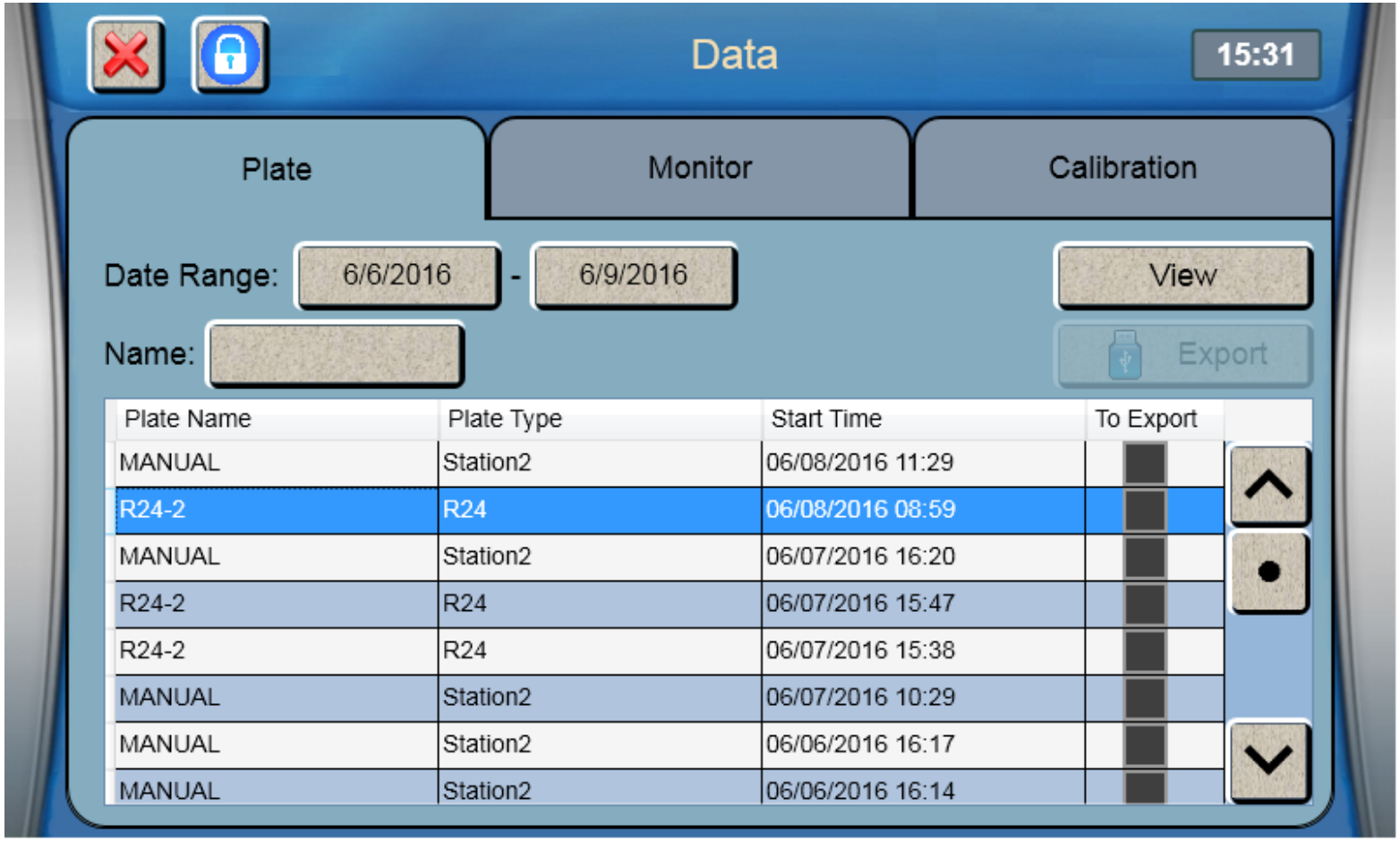
Connectivity

Data Output by

- USB Flash drive
- Network Connection (Ethernet cable)

File Menu (Sharing data)

- View Data
- Export Data
- Searchable database

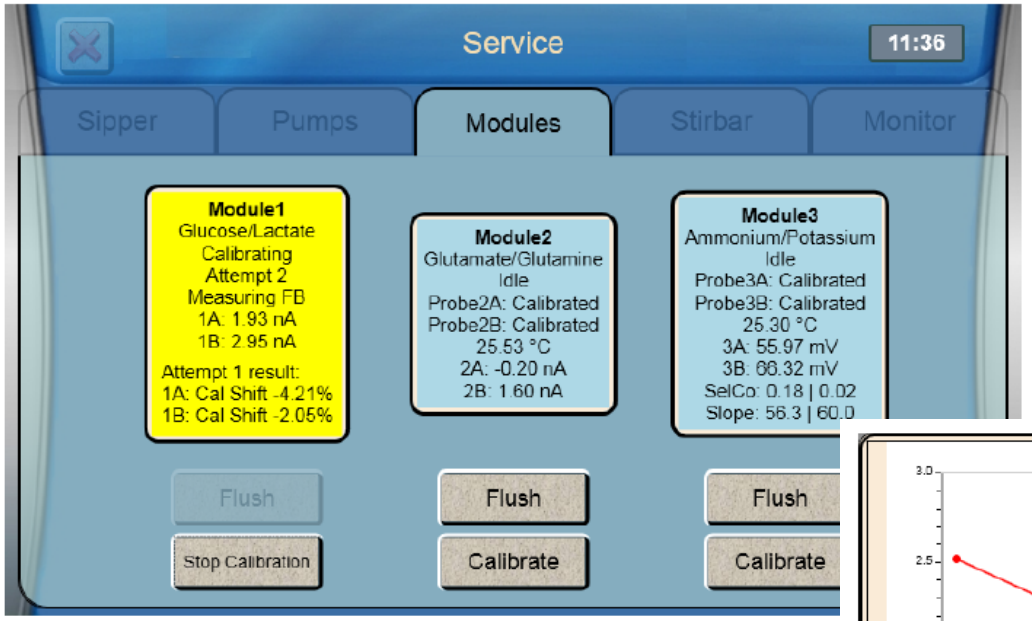


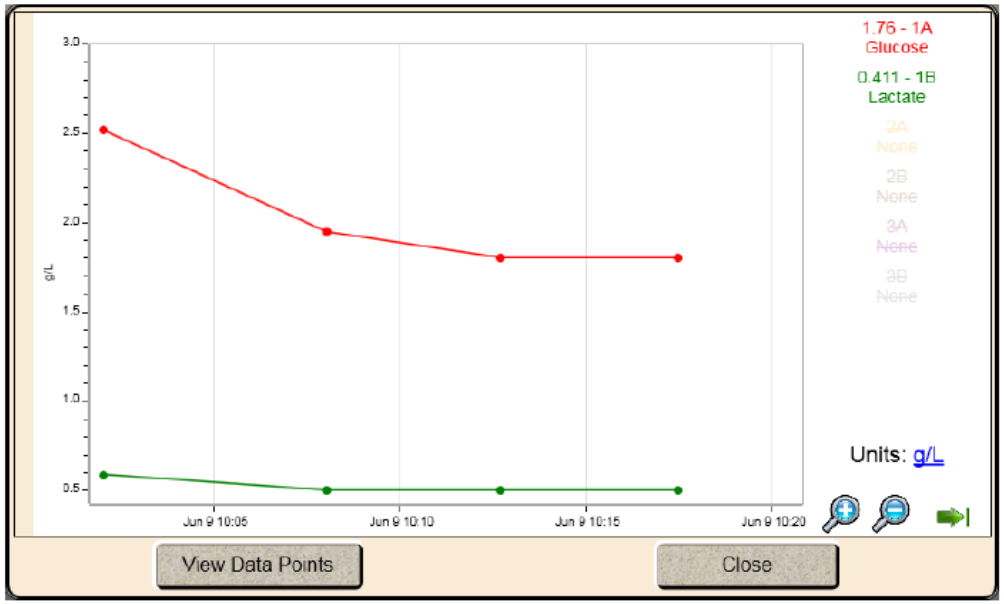
Remote Access to Stored Data

Via LAN or router utilizing the RJ45 Ethernet port

- DHCP Server assigns IP address
- Using ftp protocol search IP address via web browser
- Files in .txt format, can be exported into spreadsheet format

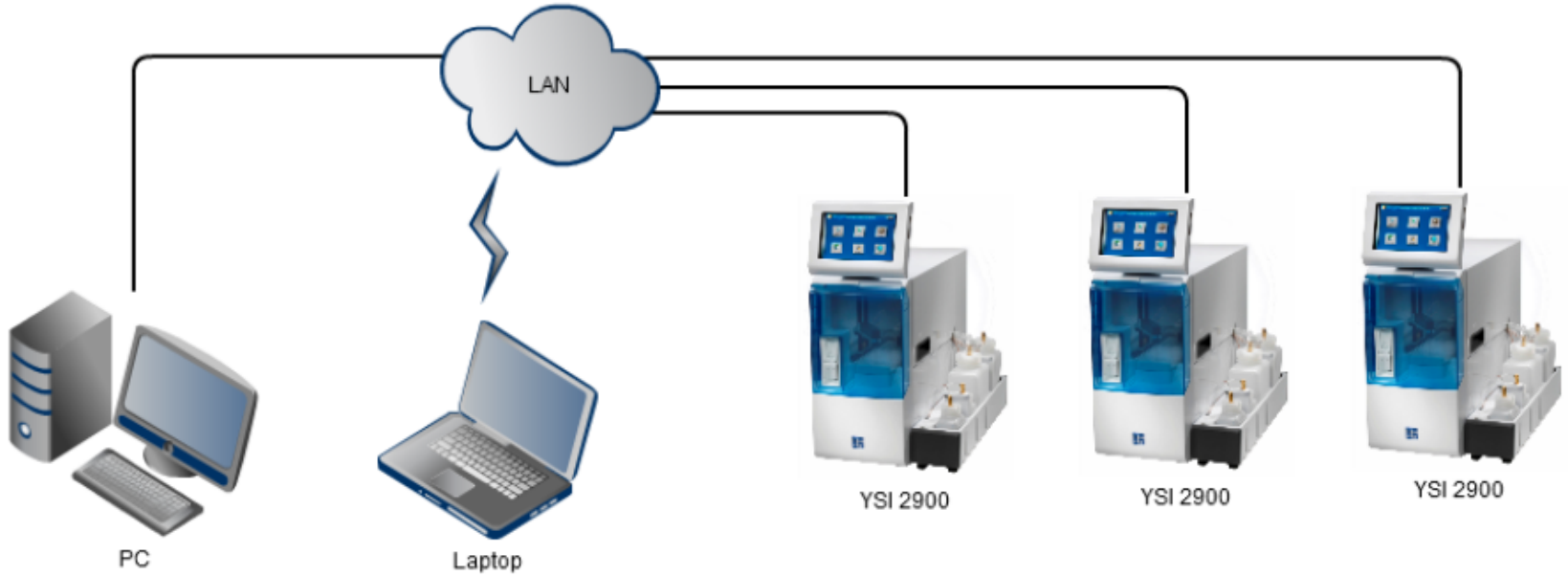
Modules Condition Display (Comprehensive Ideas)





Data Output

- Virtual Printer
- YSI 2901Thermal Printer - via RS232 Serial port
- Transfer onto USB stick
- Remote Access via Ethernet port



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Application Review

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Successful Applications

YSI Life Sciences
Data for Life
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Long-Term Reliability of an Aseptic On-line Glucose Monitoring & Control System for Perfusion CHO Cell Culture

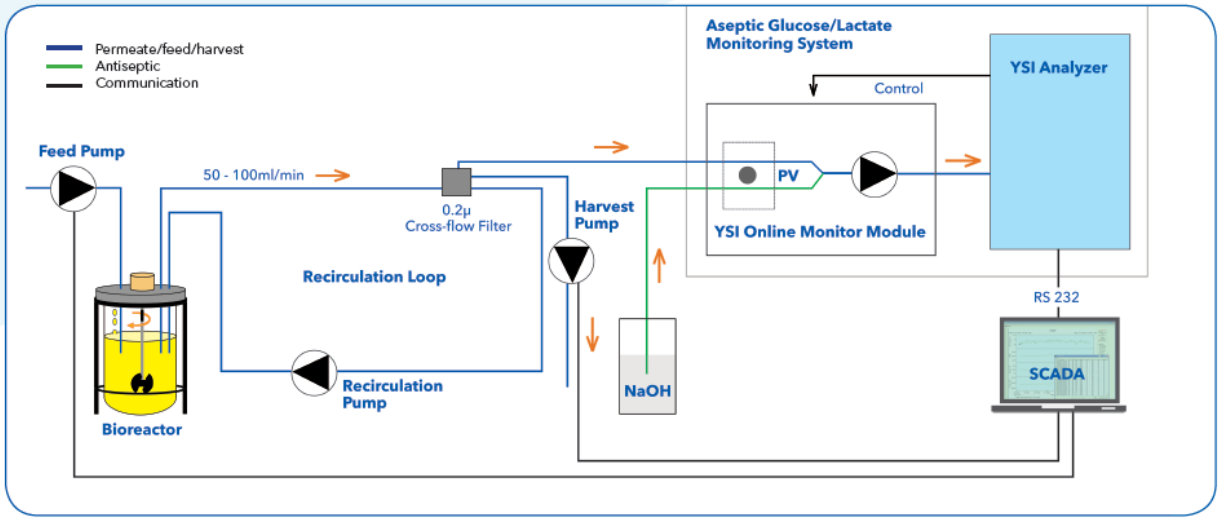
Konstantin B. Konstantinov[1], Yeong-shou Tsai[1], Donald Moles[2], Ricardedo Matanguihan[1], William Miller[2]
[1] Bayer Corporation, Berkeley, CA
[2] YSI Life Sciences, Yellow Springs, OH

BAYER

Abstract

Among the variables that are appropriate for direct feedback control of the perfusion rate in mammalian cell cultures, high priority should be given to the glucose concentration. Here we describe the application of a closed-loop control scheme for the long-term cultivation of CHO cells in a high cell density (35 – 40 million cells/ml) perfusion process. The monitoring and control system worked successfully for 2.5 months without any signs of performance degradation. In targeting industrial applications, issues such as reliability, sterility and accuracy are given high priority. The implementation of the glucose monitoring system, which is the main part of the control complex, is addressed. The performance of the perfusion culture was evaluated at four different glucose set points, providing essential information about process optimization. The on-line glucose concentration was used by an embedded expert system which drove the process through the batch and the perfusion phases, achieving total SCADA control of the feed rate. In summary, the proposed glucose monitoring and control technique proved to be a reliable tool which can be applied with confidence at an industrial scale for either microbial or mammalian cell cultures.

On-line Glucose Monitoring and Control: Closed-loop System



- Real-time data used for direct feedback control of the perfusion rate
- No signs of performance degradation during cultivation period

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F&B Applications

1 – 3	Introduction	Food Analysis Simplified
4 – 6	Application Note 200	Simultaneous Measurement of L-Lactate and Ethanol in Tomato-Based Products
7 – 8	Application Note 201	Ethanol Determination in Beer
9	Application Note 202	J. Lohr Winery Utilizes YSI Instruments in Managing Dissolved Oxygen
10 – 11	Application Note 203	Choline Determination
12 – 14	Application Note 204	Simultaneous Measurement of Glucose and Sucrose Utilizing External Hydrolysis
15 – 16	Application Note 205	Simultaneous Measurement of Glucose and Sucrose in Peanut Butter
17	Application Note 206	Lactose Measurement in Cheese
18 – 19	Application Note 207	L-Glutamate Determination
20	Application Note 208	Determination of Hydrogen Peroxide
21 – 22	Application Note 209	Simultaneous Measurement of Glucose and Sucrose in Frozen Ice Cream Bars
23 – 24	Application Note 210	Glucose Measurement in Canned Green Beans
25 – 26	Application Note 211	Glucose Measurement in Frozen Green Beans
27 – 28	Application Note 212	L-Lactate in Lunch Meats
29 - 30	Application Note 213	Simultaneous Measurement of Glucose and Sucrose in Corn and Peas
31 – 32	Application Note 214	Simultaneous Measurement of Glucose and Sucrose in Cereal Products
33 – 34	Application Note 215	Simultaneous Measurement of Glucose and Sucrose in Baked Goods
35 – 36	Application Note 216	Simultaneous Measurement of Glucose and Sucrose in Sweetened Condensed Milk
37 – 38	Application Note 217	Glucose Measurement in Corn Syrup and Other Syrup Products
39 – 40	Application Note 218	Measurement of Glucose and Sucrose in Potatoes
41 – 42	Application Note 219	Dextrose Measurement in Potatoes
43 – 44	Application Note 220	Simultaneous Measurement of Dextrose and Sucrose in Molasses
45 – 46	Application Note 221	Sucrose Measurement in Molasses
47 – 48	Application Note 222	Determination of % Cook in Extruded Cereal Products
49 – 51	Application Note 223	Determination of % Cook in Extruded Cereal Products Using Chemical Solubilization

F&B Applications

	YSI	Sigma
Beer A	4.40%	4.39%
Beer B	3.75	3.76
Beer C	3.89	3.87
Beer D	3.74	3.79

	Sucrose (%)		Glucose (%)		
Sample	YSI	HPLC	YSI	HPLC	Label (%)*
A	35.0	36.0	1.24	0.96	38.8
B	21.4	22.2	0.85	0.50	21.1
C	22.4	23.1	1.52	1.52	24.6
D	17.4	18.3	0.27	0.07	28.0
E	25.2	25.4	1.61	1.33	28.2
F	29.8	27.9	3.51	4.14	35.2
G	32.2	31.1	3.01	2.42	38.7
H	32.9	30.4	0.71	0.43	38.7
I	5.40	6.70	1.03	0.70	7.0

Examples of YSI End-User Current and Emerging Applications

Analytical Application	Function
Choline in infant formula	R&D, In-process
Choline in animal feeds	Final product
Dextrose, Sucrose & Lactose in candy	Final product
Dextrose & Sucrose in cereal	R&D, In-process
Dextrose - starch-to-glucose conversion	R&D, In-process
Dextrose & Sucrose in potatoes/french fries	Raw materials, In-process
Dextrose & Lactate in wine production	In-process
Glutamate (MSG) in broth & food bases	Final product
Lactose in cheese filtration	R&D
Lactose in low lactose milk product	In-process
Lactate in tomato-based products	In-process, Final product
Sucrose content in soft drinks	In-process

Bioprocess Applications

Simultaneous Measurement of Glutamine and Glutamate

BIOPROCESS SERIES

Bioprocess Applications

I. Materials & Setup

A. YSI Series Biochemistry Analyzer - equipped with a 2735 Glutamine Membrane, a 2754 Glutamate Membrane and 2357 Buffer.

B. Glutamine (5.00 mmol/L, 8.00 mmol/L) and Glutamate (5.00 mmol/L, 10.0 mmol/L) standard solutions. Refer to III Method C of this note.

C. Connect the YSI Series Biochemistry Anayzer to a suitable power source.

D. Perform the instrument and membrane daily checks described in the Operations Manual (Section 5).

E. Volumetric glassware (Class A recommended).

F. The following instrument set up is recommended: Sample size: 20 µL.*

Probe A Parameters

Chemistry	Glutamate
Unit	mmol/L
Calibrator	5.00 mmol/L
End Point	30 Sec

Probe B Parameters

Chemistry	Glutamine
Unit	mmol/L
Calibrator	5.00 mmol/L
End Point	30 Sec

Autocal Parameters

Temperature	1 °C
Time	30 Min
Sample	5 Samples
Cal Shift	2%

* can be changed to improve linearity (see manual).

Bioprocess Applications

II. Method

A. The combined concentration of glutamine and glutamate should not exceed 10.0 mmol/L. If sum of the values reported exceeds this, further dilution of the sample is required.

B. To make the 5 mmol/L standard, transfer one container of glutamine powder into a bottle of 2736 buffer solution (250 mL). For the 8 mmol/L standard, transfer one container of the glutamine powder into a bottle of 2737 buffer solution (156.25 mL).

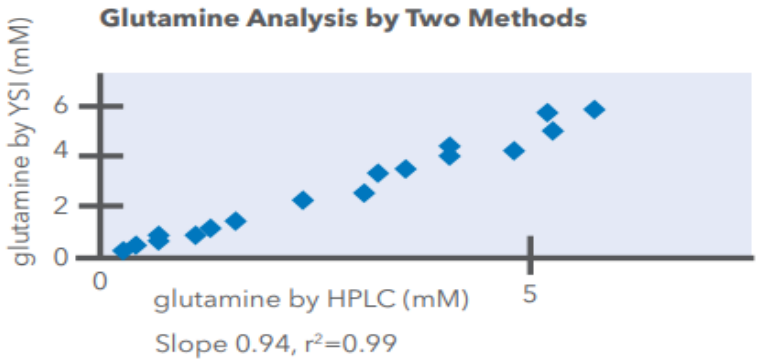
C. Calibrate the YSI Series Biochemistry Analyzer with 5.00 mmol/L glutamate and 5.00 mmol/L glutamine calibration standards.

D. Check the linearity of the membranes at least once a day by injection of glutamate (10 mmol/L) and glutamine (8 mmol/L) linearity check solutions. Refer to the Operations Manual (Section 5) for specifications.

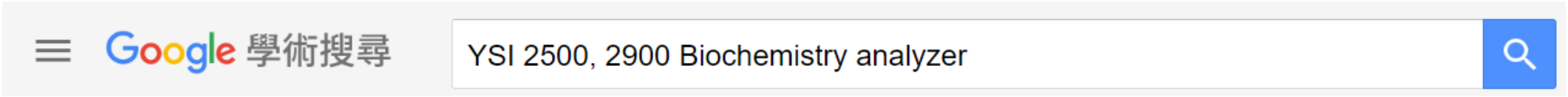
E. Assay the sample by aspiration into the YSI Series Biochemistry Analyzer. The linear range of the system is 0.2 to 8.0 mmol/L glutamine, and 0.1 to 10mmol/L glutamate, with an absolute error of approximately 0.3 mmol/L. If the value exceeds this further dilution is required.

III. Results

The graph below is the result of testing the YSI Series Biochemistry Analyzer vs. an HPLC for glutamine concentration, in cell culture media. (Data courtesy of a well established Biotechnology company.)



Wide applications and white paper



[HTML] Evidence for high-elevation salar recharge and interbasin groundwater flow in the Western Cordillera of the Peruvian Andes — **[HTML]** copernicus.org

O Alvarez-Campos, EJ Olson, LR Welp… - Hydrology and Earth …, 2022 - hess.copernicus.org

… and mid-elevations (2500 to 2900 m asl) point towards a mix … stable isotope and general chemistry analysis respectively. If … a YSI Professional Plus (Quatro) multi-parameter probe. The …

☆ 儲存 99 引用 被引用 2 次 相關文章 全部共 9 個版本 »

[HTML] Protocol for assessing the effects of exogenous hormone administration on human postprandial glucose metabolism, appetite sensations, and food intake — **[HTML]** sciencedirect.com

CA Hagemann, LS Gasbjerg, MB Christensen… - STAR protocols, 2023 - Elsevier

… Optional: Plasma glucose can be measured bedside by the glucose oxidase method (YSI 2900 Biochemistry Analyzer) from blood collected in fluoride heparin-coated tubes and …

☆ 儲存 99 引用 全部共 6 個版本

Metabolomic profiling during the differentiation of human induced pluripotent stem cells into hepatocyte-like cells — **[PDF]** hal.science

R Jellali, ML Bernier, Y Tauran, F Gilard, M Danoy… - Differentiation, 2020 - Elsevier

… YSI 2950 Biochemistry Analyzer. For that purpose, 100 µL of culture medium were inserted into the analyzer… glucose in the culture medium by the YSI enzyme sensors, as the enzymes L…

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[HTML] *In Vitro* Culture Expansion Shifts the Immune Phenotype of Human Adipose-Derived Mesenchymal Stem Cells — **[HTML]** frontiersin.org

R Jeske, X Yuan, Q Fu, BA Bunnell… - Frontiers in …, 2021 - frontiersin.org

… Transcriptomics and proteomics analysis of hASCs at different passages revealed changes … and lactate production by YSI 2950 Biochemistry Select Analyzer (Yellow Spring, OH, USA). …

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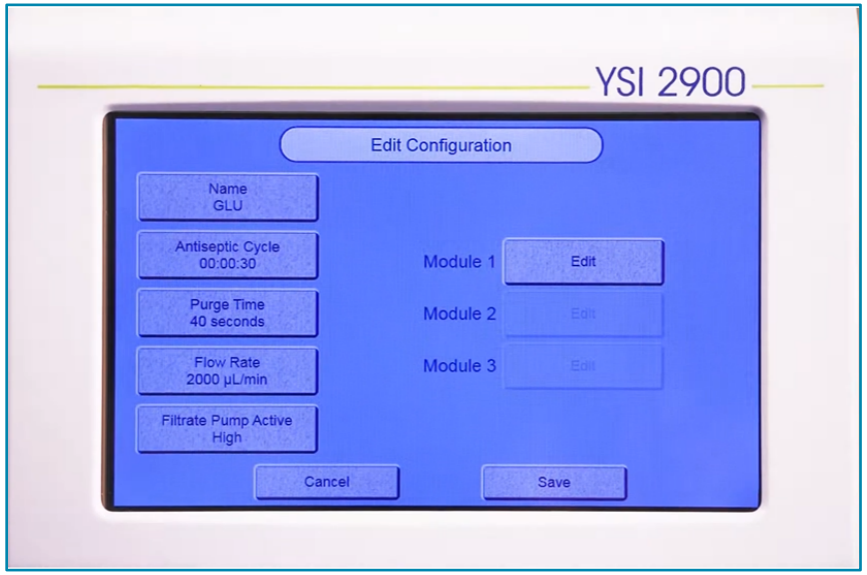
Videos ~ YSI Life Science 2500/2900 in Operation



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YSI 2900
Kimberly-Clark
KIMTECH
YSI
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Our South East & North Asia global users at a glance

- Hong Kong – Academic Research

❑ HK Polytechnic University – ABCD department

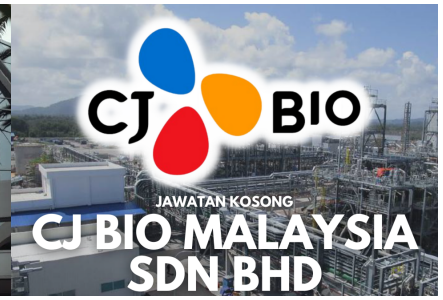
Scientific Research and teaching of fermentation process via YSI 2700, 2900 Series Biochemistry Analyzer.
YSI Biochemistry analyser, they have been using the legacy model of YSI 2700S for over 15 years and upgrade to YSI 2900D in 2015 for their research study running 365 a year and in-house instrument for lecturing the fermentation process for undergraduate.

- Korea - Bioprocessing

❑ Daesang InnoPark – The Bioprocessing, F&B R&D utilize few units of 2500, 2900 for their ammino acids high yield process monitoring

❑ LG Chem – have multiple units of 2900, 2950 for their bioprocessing R&D

- Malaysia– Clinical Diabetics diagnosis research
  - ❑ Dexcom Malaysia- Following US standard to run their diabetics diagnosis Research, utilize 5 sets of YSI 2900D
  - ❑ CJ Bio- currently more than 4 sets of YSI 2900D for their BIO API



- Singapore – Clinical Diabetics diagnosis research
  - ❑ NUS – Deploy 4-5 units of 2900D for running diabetic & GI research

- Indonesia – Bioprocessing
  - ❑ PT. CHEIL JEDANG (CJ Bio group) – our loyal customers for YSI 2900 and 2950 series. With their expansion in Indonesia, they will equip at least one 2900 or 2950 for their new laboratory for sucrose, glucose, lactate monitoring process

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Questions?

***An email will be sent out in the next few days that will include a link to the recording*

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