Chemistry analyzers (for mid-volume laboratories)

Part 1 of 10	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com
See related comments, page 49		
Name of instrument/first year sold in U.S.	Synchron CX4 Pro/2001	Synchron CX5 Pro/2001
List price	$162,400	$193,500
No. units in clinical use in U.S./outside U.S.	—/—	—/—
Country where designed/manufactured/where reagents mftd.	U.S./U.S./U.S. & Ireland	U.S./U.S./U.S. & Ireland
Operational type/reagent type	continuous random access/open reagent system	continuous random access/open reagent system
Sample handling system/model type	sectors, centrifugable/floor-standing	sectors, centrifugable/floor-standing
Dimensions (H x W x D)/instrument footprint	69 x 27 x 30 in/5.6 sq ft	69 x 61 x 30 in/12.7 sq ft
No. of tests for which analyzer has FDA-cleared applications	96	100
Tests cleared but not clinically released	none	none
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	none	none
Research-use-only assays	none	none
Tests in development	none	none
User-defined methods implemented for what analytes	UIBC, vancomycin, LDL direct	UIBC, vancomycin, LDL direct
Methods supported/immunoassay methods	photometry, potentiometry, turbidimetric/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay	photometry, potentiometry, turbidimetric/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay
No. of direct ion selective electrode channels	0	5 (indirect)
No. of different measured assays onboard simultaneously	24	29
No. of different assays programmed, calibrated at once	50	50
No. of user-definable (open) channels/no. active simultaneously	96/24	100/29
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	24/4,800–30,000 (200–1,500 tests per container)	29/25–2,500
Shortest/median onboard reag. stability/refrigerated onboard	168 hr/30 d/yes (2–8°C)	168 hr/30 d/yes (2–8°C)
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	yes
Walkaway capacity in minutes/specimens/tests-assays	400/63/1,512	400/63/1,827
System is liquid or dry	liquid	liquid
Uses disposable cuvettes/max. no. stored	no/n/a	no/n/a
Uses washable cuvettes/replacement frequency	yes/permanent–2-yr warranty (80 stored on instrument)	yes/permanent–2-yr warranty (80 stored on instrument)
Minimum sample volume aspirated precisely at one time	3 µL	3 µL
Supplied with UPS (backup power)/requires floor drain	yes/no	yes/no
Requires dedicated water system/water consumption	yes/7 L per hr	yes/7 L per hr
Noise generated	70 decibels	70 decibels
Dedicated pediatric sample cup/dead volume	yes/40 µL	yes/40 µL
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	yes/yes	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/no	yes/no
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/no	yes/no
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	no/yes	no/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	n/a/up to 90 d/60 d/14 d	24 hr/up to 90 d/60 d/14 d
Automatic shutdown/startup programmable	none required	none required
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	n/a, n/a	52 sec, 75 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	n/a, n/a	8 min, 75 specimens
• Album., bili. direct & total, AST, ALT, ALP	10 min, 32 specimens	10 min, 32 specimens
Typical time delay from ordering stat test to aspir. of sample	45 sec	45 sec
How often QC required/onboard SW capability to review QC	24 hr/yes	24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard & optional add-on (SW mftr: Beckman Coulter DataLink)/yes (addt'l cost)	onboard & optional add-on (SW mftr: Beckman Coulter DataLink)/yes (addt'l cost)
Interfaces up and running in active user sites with	Cerner, Sunquest, Meditech, Citation, MedLab, CHC, SMS, HBOC, Labquest, CCA, VA-Mumps, others	Cerner, Sunquest, MEDITECH, Citation, MedLab, CHC, SMS, HBOC, Labquest, CCA, VA-Mumps, others
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
Interface avail. (or will be) to automated specimen handling system	yes	yes
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	yes/yes/no	yes/yes/no
On-site time of svc. engineer/onboard error codes for troubleshooting	metro: same day; rural: same or next day/yes	metro: same day; rural: same or next day/yes
Mean time between failures/to repair failures	—/—	—/—
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 15 min; monthly: 20 min	daily: 5 min; weekly: 15 min; monthly: 20 min
Onboard maintenance records/maint. training demo module	no/no	no/no
Training provided with purchase/advanced oper. training avail.	1 d on-site, 5 d at vendor offices/no	1 d on-site, 5 d at vendor offices/no
Annual service contract cost (24 h/7 d)	—	—
Distinguishing features	serum indices; centrifugable sectors; clot detection; bar-coded calibrators & controls; host query; reagent load while running; ready-to-use liquid reagents; Peltier thermal ring; pulsed xenon light source; polychromatic correction; semipermanent glass cuvettes; DataLink Sample Manager	serum indices; centrifugable sectors; clot detection; bar-coded calibrators & controls; host query; reagent load while running; ready-to-use liquid reagents; Peltier thermal ring; ISE system; pulsed xenon light source; polychromatic correction; semipermanent glass cuvettes; DataLink Sample Manager

SURVEY OF INSTRUMENTS

Chemistry analyzers (for mid-volume laboratories)

Part 2 of 10	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com	Dade Behring Inc. P.O. Box 6101 Newark, DE 19714-6101 302-631-0433 www.dadebehring.com
See related comments, page 49		
Name of instrument/first year sold in U.S.	Synchron CX9 Pro/2001	Dimension AR^X Clinical Chemistry System/1999
List price	$220,600	$179,000
No. units in clinical use in U.S./outside U.S.	—/—	35/25
Country where designed/manufactured/where reagents mftd.	U.S./U.S./U.S. & Ireland	U.S./U.S./U.S.
Operational type/reagent type	continuous random access/open reagent system	continuous random access/self-contained multiuse cartridges-packages-slides
Sample handling system/model type	sectors, centrifugable/floor-standing	sample segments/floor-standing
Dimensions (H x W x D)/instrument footprint	69 X 74 X 30 in/15.4 sq ft	—/—
No. of tests for which analyzer has FDA-cleared applications	100	67
Tests cleared but not clinically released	none	C_3, C_4, transferrin, IgG, IgA, IgM, digitoxin, non-pretreat iron binding capacity
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	none	none
Research-use-only assays	none	none
Tests in development	none	HbA1c, cyclosporin A
User-defined methods implemented for what analytes	UIBC, vancomycin, LDL direct	none
Methods supported/immunoassay methods	photometry, potentiometry, turbidimetric/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay	photometry, potentiometry/PETINIA
No. of direct ion selective electrode channels	5 (indirect)	4 indirect ISE methods
No. of different measured assays onboard simultaneously	33	48
No. of different assays programmed, calibrated at once	59	75+
No. of user-definable (open) channels/no. active simultaneously	102/33	10/10
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	33/25–2,500	48/10–480
Shortest/median onboard reag. stability/refrigerated onboard	168 hr/30 d/yes (2–8°C)	24 hr/5 d/yes
Multiple reag. configurations supported	yes	no
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	yes
Walkaway capacity in minutes/specimens/tests-assays	400/63/2,079	—/60/1,200
System is liquid or dry	liquid	reconstitutes onboard
Uses disposable cuvettes/max. no. stored	no/n/a	yes/12,000
Uses washable cuvettes/replacement frequency	yes/permanent–2-yr warranty (80 stored on instrument)	no/n/a
Minimum sample volume aspirated precisely at one time	3 µL	2 µL
Supplied with UPS (backup power)/requires floor drain	yes/yes	yes/yes
Requires dedicated water system/water consumption	yes/7 L per hr	yes/2 L per hr
Noise generated	70 decibels	—
Dedicated pediatric sample cup/dead volume	yes/40 µL	no
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, as sample is being aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/no/no
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	yes/yes	no/yes
Dilution of patient samples onboard/automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/no	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	no/yes	no/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	24 hr/up to 90 d/up to 60 d/14 d	2 hr/3 mo/2 mo/2 mo
Automatic shutdown/startup programmable	none required	yes/yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	52 sec, 75 specimens	—, 240 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	52 sec, 75 specimens	—, 788 specimens
• Album., bili. direct & total, AST, ALT, ALP	10 min, 32 specimens	—, 300 specimens
Typical time delay from ordering stat test to aspir. of sample	45 sec	~60 sec in steady state; ~2 min from standby
How often QC required/onboard SW capability to review QC	24 hr/yes	shortest interval: 8 hr; longest: 24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard & optional add-on (SW mftr: Beckman Coulter DataLink)/yes (addt'l cost)	onboard/no
Interfaces up and running in active user sites with	Cerner, Sunquest, Meditech, Citation, MedLab, CHC, SMS, HBOC, Labquest, CCA, VA-Mumps, all LISs	—
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
Interface avail. (or will be) to automated specimen handling system	yes (AccelNet, Power Processor)	yes (STM, in development)
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	yes/no/no	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	metro: same day, rural: same or next day/yes	2 hr/yes
Mean time between failures/to repair failures	—/—	—/—
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 15 min; monthly: 25 min	daily: 5 min; weekly: none; monthly: 20 min
Onboard maintenance records/maint. training demo module	no/no	no/no
Training provided with purchase/advanced oper. training avail.	3 d on-site, 5 d at vendor offices/yes	4 d at vendor offices/no
Annual service contract cost (24 h/7 d)	—	situation dependent
Distinguishing features	serum indices; centrifugable sectors; clot detection; design optimized for automation; continuous random access for samples, controls, reagents, & results; no-maintenance glucose oxygen sensor; no-wait autoloader; polychromatic correction; thermal ring & semipermanent glass cuvettes; pulsed xenon lamp; advanced workflow & results mgmt.; liquid, ready-to-use reagents, calibrators, controls; DataLink Sample Manager	small, compact size; no reagent prep; broad menu; auto dilution & auto rerun; tracks expiration dates, calibration, & QC results; quick test turnaround

Tabulation does not represent an endorsement by the College of American Pathologists

Chemistry analyzers (for mid-volume laboratories)

Part 3 of 10

See related comments, page 49

	Olympus America Inc. Susan M. Watanabe, PhD susan.watanabe@olympus.com Two Corporate Center Dr. Melville, NY 11747 800-223-0125 www.olympus.com	Roche Diagnostics Roche Product Manager 9115 Hague Rd., P.O. Box 50457 Indianapolis, IN 46250 800-428-5074 us.labsystems.roche.com
Name of instrument/first year sold in U.S.	AU400/1998	Cobas Integra 700/1996 (Integra 800 introduced 2001)
List price	$130,000	$250,000
No. units in clinical use in U.S./outside U.S.	300/600	>350/>1,500
Country where designed/manufactured/where reagents mftd.	Japan/Japan/U.S. & Ireland	Switzerland/Switzerland/multiple countries
Operational type/reagent type	random access, discrete, continuous random access/open reagent system	random access, discrete, continuous random access/self-contained multiuse cartridges-packages-slides
Sample handling system/model type	rack & stat carousel/floor-standing	sample racks: 24 or 30 samples/floor-standing
Dimensions (H x W x D)/instrument footprint	47.6 x 57.1 x 29.9 in/62.7 sq ft	46 x 57 x 32 in/46 sq ft
No. of tests for which analyzer has FDA-cleared applications	122	137
Tests cleared but not clinically released	ceruloplasmin	cyclosporine (released 4th qtr 2000), cholinesterase dibucaine, digitoxin, D-dimer (released June 2001), soluble transferrin receptor (released June 2001)
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	cotinine	LDH (P→L), ALP (DGKC)
Research-use-only assays	none	—
Tests in development	LDL chol., acid phosphatase	IgE, lipoprotein (a), kappa/lambda light chains
User-defined methods implemented for what analytes	HbA1$_C$, fructosamine, cholinesterase	n/a
Methods supported/immunoassay methods	photometry, potentiometry, calculated tests/homogeneous	photometry, potentiometry, fluorescence polarization/turbidimetric, fluorescence polarization
No. of direct ion selective electrode channels	3	4
No. of different measured assays onboard simultaneously	up to 76	72
No. of different assays programmed, calibrated at once	99	72
No. of user-definable (open) channels/no. active simultaneously	95/—	0/n/a
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	76/100–1,333	72/50–800
Shortest/median onboard reag. stability/refrigerated onboard	120 hr/30 d/yes (4–12°C)	336 hr/84 d/yes (8°C)
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	no
Walkaway capacity in minutes/specimens/tests-assays	varies/up to 102/varies	450/120/4,500
System is liquid or dry	liquid	liquid, reconstitutes onboard
Uses disposable cuvettes/max. no. stored	no/n/a	yes/4,500
Uses washable cuvettes/replacement frequency	yes/permanent	no/n/a
Minimum sample volume aspirated precisely at one time	2 µL	2 µL
Supplied with UPS (backup power)/requires floor drain	no (optional)/yes (no w/ optional water pump)	yes/yes
Requires dedicated water system/water consumption	yes/26 L per hr peak consumption	no (direct connection, type I NCCLS)/5–7 L per h
Noise generated	65 decibels	—
Dedicated pediatric sample cup/dead volume	no/n/a	yes/approx. 50–70 µL
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/no
Automatic detection of adequate reag. for aspir. & analysis	yes	no
Hemolysis/turbidity detection-quantitation	yes/yes	no/no
Dilution of patient samples onboard/automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/yes	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	yes/yes	yes/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	1 d/30 d/14 d/14–20 d	5 hr/once per lot/140 d/60 d
Automatic shutdown/startup programmable	yes/yes	yes/yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	<5 min, 200 specimens	8.6 min, 118 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	<5 min, 80 specimens	8.6 min, 99 specimens
• Album., bili. direct & total, AST, ALT, ALP	<9 min, 67 specimens	9.8, 118 specimens
Typical time delay from ordering stat test to aspir. of sample	<2 min	1 min
How often QC required/onboard SW capability to review QC	per CLIA & laboratory's decision/yes	shortest interval: 8 hr–DAT, longest: 24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard/no (optional)	onboard/yes (addt'l cost)
Interfaces up and running in active user sites with	all common interfaces including Cerner, Antrim, CCA, Chemware, Dawning Technol., ADAC, Dynamic Healthcare, Antek, SMS, HBOC (Data Innov.), CPSI, Meditech, Sunquest, Citation	Cerner, CHCS, Citation, Compton, CompuLab, DynaMedix, EDS, Fletcher Flora, HBOC (ALG, PathLabs, StarLabs), HMS, Intellilabs, Isys, LabDaq, Labforce, Labfusion, LabSoft, LCI, Meditech, Northern Soft, Orsys, Seacoast, SMS, Soft Computer, Sunquest
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
Interface avail. (or will be) to automated specimen handling system	yes	no
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	yes/yes/yes	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	<24 hr/yes	8 hr or next business d/yes
Mean time between failures/to repair failures	average 2 calls per yr/<24 hr	—/—
Average time to complete maintenance by lab personnel	daily: 3 min; weekly: 7 min; monthly: 45 min	daily: <1 min; weekly: <5 min; monthly: none
Onboard maintenance records/maint. training demo module	yes (includes audit trail of who replaced parts)/yes	yes (includes audit trail of who replaced parts)/yes (onscreen help with diagrams & maintenance wizard)
Training provided with purchase/advanced oper. training avail.	3–5 d on-site, 5 d at vendor offices/yes	1 d on-site/5 d at vendor offices/yes
Annual service contract cost (24 h/7 d)	inquire	variable
Distinguishing features	Olympus is a leader in standardization with its family of chemistry immuno systems, the AU400, AU600, AU640, AU2700 & AU5400. Broad test menu of 120+ methods delivers standardized results for improved patient management & streamlined operation. Speed, reliability, advanced data management, & unprecedented onboard automation for the best walkaway in industry today	Comprehensive test menu including hemoglobin A1c; reagent cassette requires no operator prep. or special handling (can go straight from refrigerator to system with no warmup time); 97% of reagents are liquid, ready to use, system automatically reconstitutes if necessary, system forecasts daily reagent requirements based on history; operator maintenance automatically scheduled by system, based on actual use, not by calendar schedule; (800 has clot detection, bubble detection & can accommodate universal 5-position Hitachi rack for modular systems & Elecsys IA analyzers)

Tabulation does not represent an endorsement by the College of American Pathologists

Chemistry analyzers (for high-volume laboratories)

Part 4 of 10	Abbott Diagnostics	Bayer Corp., Diagnostics Div.
	Jack Kenny jack.kenny@abbott.com	**Denise Pastore** denise.pastore.b@bayer.com
	100 Abbott Park Road	**511 Benedict Ave.**
	Abbott Park, IL 60031	**Tarrytown, NY 10591**
	800-323-9100	**914-333-6122**
See related comments, page 49	**www.abbott.com**	**www.bayerds.com**

Name of instrument/first year sold in U.S.	Abbott Aeroset/1998	Advia 1650/1999
List price	$345,000	$289,000
No. units in clinical use in U.S./outside U.S.	200+/400+	20/400
Country where designed/manufactured/where reagents mftd.	Japan/Japan/U.S.	Japan/Japan/Ireland
Operational type/reagent type	continuous random access/open reagent system	batch, random access, discrete, continuous random access/open reagent system
Sample handling system/model type	rack, carousel/floor-standing	automated rack handler, sample carousel/floor-standing
Dimensions (H x W x D)/instrument footprint	42.7 x 74.4 x 44.1 in/22.7 sq ft	45 x 59 x 34 in/14 sq ft
No. of tests for which analyzer has FDA-cleared applications	62	37
Tests cleared but not clinically released	none	none
Tests not available in U.S. but submitted for 510(k) clearance	none	microalbumin, transferrin, glucose hexokinase II
Tests not available in U.S. but available in other countries	none	transferrin
Research-use-only assays	none	none
Tests in development	CRP, RF, digox., amphet., barbit., benzo., THC, cocaine, ethanol, methadone, opiates, PCP, propoxy	cholinesterase, total protein II, HDL direct, LDL direct
User-defined methods implemented for what analytes	TDMs, drugs of abuse, GHb	ammonia, alcohol, lactate, C3, C4, HbA1c, acetaminophen, salicylate, CK-MB, myoglobin, fructosamine, pancreatic amylase, β2-microglobulin, TDM, DAU
Methods supported/immunoassay methods	photometry, potentiometry/—	photometry, potentiometry, turbidimetrics/—
No. of direct ion selective electrode channels	3	3
No. of different measured assays onboard simultaneously	59	49
No. of different assays programmed, calibrated at once	100	100
No. of user-definable (open) channels/no. active simultaneously	100/59	62/62
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	59/400	49/650–700
Shortest/median onboard reag. stability/refrigerated onboard	7 d/28 d/yes	72 hr/28 d/yes
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	yes
Walkaway capacity in minutes/specimens/tests-assays	60/231/50,000+	90–470/200/20,000+
System is liquid or dry	liquid	liquid
Uses disposable cuvettes/max. no. stored	no/n/a	no/n/a
Uses washable cuvettes/replacement frequency	yes/minimum 1 yr guaranteed	yes/4 mo (221 stored on instrument)
Minimum sample volume aspirated precisely at one time	2 µL	2 µL
Supplied with UPS (backup power)/requires floor drain	no/no	yes/no
Requires dedicated water system/water consumption	yes/45 L per hr	yes/25 L per hr
Noise generated	—	—
Dedicated pediatric sample cup/dead volume	yes/50 µL	yes/50 µL
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes (2 of 5 interl., Codabar [NW7], codes 39 & 128)/auto-discrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/no	yes/yes/in development
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	yes/yes	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/yes	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	yes/yes	yes/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	8 hr/28 d/28 d/28 d	daily/30 d/30 d/daily
Automatic shutdown/startup programmable	yes/yes	yes, yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	10 min, 200+ specimens	10 min, 150 samples, 600 tests
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	10 min, 200+ specimens	10 min, 150 samples, 1,050 tests
• Album., bili. direct & total, AST, ALT, ALP	10 min, 200+ specimens	10 min, 200 samples, 1,200 tests
Typical time delay from ordering stat test to aspir. of sample	<15 sec	3 sec
How often QC required/onboard SW capability to review QC	shortest interval: 8 hr (ISE), longest: 24 hr/yes	per CLIA and laboratory's decision/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	no/yes (addt'l cost)	onboard/no
Interfaces up and running in active user sites with	all major vendors	Soft, Sunquest, Cerner, Meditech, Multidata, Seacoast
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	yes
Interface avail. (or will be) to automated specimen handling system	in development	yes (all systems)
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	no/no/no	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	<24 hr/yes	4–8 hr/yes
Mean time between failures/to repair failures	>2 mo/varies	—/4-8 hr
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 10 min; monthly: 30 min	daily: 10 min; weekly: 45 min; monthly: 1 hr
Onboard maintenance records/maint. training demo module	no/no	yes/yes
Training provided with purchase/advanced oper. training avail.	5 d on-site, 4 d at vendor offices/no	ongoing on-site, 5 d at vendor offices/—
Annual service contract cost (24 h/7 d)	$23,000	$20,803
Distinguishing features	workstation consolidation; high throughput; large capacity; extremely reliable; open, flexible system	system will aspirate every 3 sec & retain aliquot onboard. Original sample is available to leave system. All testing performed with aliquot of sample remaining on Advia 1650. All reruns/repeats/dilutions automatically performed with aliquot on system without user intervention. Microvolume technology allows 700 tests out of a 250-test wedge of reagent. Reflex testing available

Chemistry analyzers (for high-volume laboratories)

Part 5 of 10	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com
See related comments, page 49		
Name of instrument/first year sold in U.S.	Synchron LX20; Synchron LX4201/1997	Synchron LX20 Pro; Synchron LX4201 Pro/2001
List price	LX20 $278,000; LX4201 $556,200	LX20 Pro $343,000; LX4201 Pro $685,000
No. units in clinical use in U.S./outside U.S.	LX20 500/200; LX4201 200/50	LX20 Pro 30/15; LX4201 Pro 20/15
Country where designed/manufactured/where reagents mftd.	U.S./U.S./U.S. & Ireland	U.S./U.S./U.S. & Ireland
Operational type/reagent type	continuous random access/open reagent system	continuous random access/open reagent system
Sample handling system/model type	racks, centrifugable/floor-standing	racks, centrifugable/floor-standing
Dimensions (H x W x D)/instrument footprint	LX20 60 x 70 x 41 in/19.9 sq ft; LX4201 60 X 140 X 41 in/39.8 sq ft	LX20 Pro 60 X 70 X 41 in/19.9 sq ft; LX 4201 Pro 60 x 140 x 41 in/39.8 sq ft
No. of tests for which analyzer has FDA-cleared applications	100	100
Tests cleared but not clinically released	none	none
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	none	none
Research-use-only assays	none	none
Tests in development	none	high sensitivity CRP
User-defined methods implemented for what analytes	UIBC, vancomycin, LDL direct	UIBC, vancomycin, LDL direct
Methods supported/immunoassay methods	photometry, potentiometry, near infrared/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay	photometry, potentiometry, near infrared/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay, near infrared particle immunoassay
No. of direct ion selective electrode channels	5 (indirect)	5 (indirect)
No. of different measured assays onboard simultaneously	LX20 41; LX4201 71	LX20 Pro 41; LX4201 Pro 71
No. of different assays programmed, calibrated at once	LX20 150; LX4201 200	LX20 Pro 100; LX 4201 Pro 150
No. of user-definable (open) channels/no. active simultaneously	LX20 150/41; LX4201 200/71	LX20 Pro 100/41; LX4201 Pro 150/71
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	LX20 41/10,650; LX4201 71/21,300	LX20 Pro 41/10,650; LX4201 Pro 71/21,300
Shortest/median onboard reag. stability/refrigerated onboard	168 hr/30 d/yes (2–8˚C)	168 hr/30 d/yes (2–8˚C)
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	no	no
Walkaway capacity in minutes/specimens/tests-assays	LX20 83/132/5,280; LX4201 83/264/10,560	LX20 Pro 83/132/5,280; LX4201 Pro 83/264/10,560
System is liquid or dry	liquid	liquid
Uses disposable cuvettes/max. no. stored	no/n/a	no/n/a
Uses washable cuvettes/replacement frequency	yes/semipermanent–2-yr warranty (250 stored on instrument)	yes/semipermanent–2-yr warranty (250 stored on instrument)
Minimum sample volume aspirated precisely at one time	3 µL	3 µL
Supplied with UPS (backup power)/requires floor drain	yes/no	yes/no
Requires dedicated water system/water consumption	yes/LX20 16 L per hr; LX4201 32 L per hr	yes/LX20 Pro 16 L per hr; LX4201 Pro 32 L per hr
Noise generated	65 decibels	65 decibels
Dedicated pediatric sample cup/dead volume	yes/40 µL (samples directly from pediatric bullet)	yes/40 µL
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/yes
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	yes/yes	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/yes	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	no/yes	no/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	24 hr/up to 90 d/up to 60 d/14 d	1 d/up to 90 d/up to 60 d/14 d
Automatic shutdown/startup programmable	none required	none required
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	38 sec, 90 specimens	38 sec, 90 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	38 sec, 90 specimens	38 sec, 90 specimens
• Album., bili. direct & total, AST, ALT, ALP	8 min, 90 specimens	8 min, 90 specimens
Typical time delay from ordering stat test to aspir. of sample	16 sec	16 sec
How often QC required/onboard SW capability to review QC	24 hr/yes	24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard & optional add-on (SW mftr: Beckman Coulter DataLink)/yes (addt'l cost)	onboard & optional add-on (DL2000, Beckman Coulter)/yes (addt'l cost)
Interfaces up and running in active user sites with	Cerner, Sunquest, Meditech, Citation, MedLab, CHC, SMS, HBOC, Labquest, CCA, VA-Mumps, all LISs	Cerner, Sunquest, Meditech, Citation, MedLab, CHC, SMS, HBOC, Labquest, CCA, VA-Mumps, all LISs
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
Interface avail. (or will be) to automated specimen handling system	yes (Power Processor, total lab automation)	yes (Power Processor, total lab automation)
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	yes/yes/yes	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	metro: same day, rural: same or next day/yes	metro: same day, rural: same or next day/yes
Mean time between failures/to repair failures	—/—	—/—
Average time to complete maintenance by lab personnel	daily: none; weekly: 3.5 min; monthly: 25 min	daily: none; weekly: 3.5 min; monthly: 25 min
Onboard maintenance records/maint. training demo module	no/no	no/no
Training provided with purchase/advanced oper. training avail.	5 d on-site, 5 d at vendor offices/no	5 d on-site, 5 d at vendor offices/no
Annual service contract cost (24 h/7 d)	—	—
Distinguishing features	serum indices; centrifugable racks; clot detection; no-wait autoloader/linear racks; multiple wavelength blanking; smart modules, fiber optics; advanced workflow & data management; thermal ring & semipermanent glass cuvettes; pulsed xenon lamp; electronic stat notification; review by exception; reflex testing; add-on test	serum indices; centrifugable racks; clot detection; no-wait autoloader/linear racks; multiple wavelength blanking; smart modules, fiber optics; advanced workflow & data management; thermal ring & semipermanent glass cuvettes; pulsed xenon lamp; electronic stat notification; review by exception; reflex testing; add-on test; closed-tube sampling, near infrared detection

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SURVEY OF INSTRUMENTS

Chemistry analyzers (for high-volume laboratories)

Part 6 of 10

See related comments, page 49

	Dade Behring Inc. Christine Larriva christine_larriva@dadebehring.com P.O. Box 6101 Newark, DE 19714-6101 302-631-0440 www.dadebehring.com	Olympus America Inc. Terry Giacomo terry.giacomo@olympus.com Two Corporate Center Dr. Melville, NY 11747 800-223-0125 www.olympus.com
Name of instrument/first year sold in U.S.	Dimension RxL Clinical Chemistry System w/ Heterogeneous Module (HM)/1997	AU640/1999
List price	$239,400 w/ HM	$185,000
No. units in clinical use in U.S./outside U.S.	1,500/600	275/600
Country where designed/manufactured/where reagents mftd.	U.S./U.S./U.S.	Japan/Japan/U.S. & Ireland
Operational type/reagent type	random access, continuous random access/self-contained multiuse cartridges-packages-slides	random access, discrete, continuous random access/open reagent system
Sample handling system/model type	segmented sample wheel/floor-standing	rack & stat carousel/floor-standing
Dimensions (H x W x D)/instrument footprint	44 x 62.5 x 30.5 in/13.2 sq ft	50 x 74 x 32 in/68 sq ft
No. of tests for which analyzer has FDA-cleared applications	93	122
Tests cleared but not clinically released	none	ceruloplasmin
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	digitoxin	cotinine
Research-use-only assays	none	none
Tests in development	Equimolar PSA	LDL chol., acid phosphatase
User-defined methods implemented for what analytes	none	HbA1c, fructosamine, cholinesterase
Methods supported/immunoassay methods	photometry, potentiometry, Integrated Multisensor Technology (IMT)/heterogeneous EIA using HM, EMIT latex particle turbidimetric, latex turbidimetric	photometry, potentiometry, calculated tests/homogeneous
No. of direct ion selective electrode channels	4 (indirect)	3
No. of different measured assays onboard simultaneously	48/93 with optional inventory management system	up to 51
No. of different assays programmed, calibrated at once	93	99
No. of user-definable (open) channels/no. active simultaneously	10/10	95/—
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	—/max. 240	48 x 2/100–1,333
Shortest/median onboard reag. stability/refrigerated onboard	24 hr open well (30 d sealed)/3 d (30 d sealed)/yes (2–8°C)	120 hr/30 d/yes (4–12°C)
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	yes
Walkaway capacity in minutes/specimens/tests-assays	60/1,200/n/a	variable/up to 172/variable
System is liquid or dry	liquid, reconstitutes onboard	liquid
Uses disposable cuvettes/max. no. stored	yes/12,000	no/n/a
Uses washable cuvettes/replacement frequency	no/n/a	yes/permanent
Minimum sample volume aspirated precisely at one time	2 µL	2 µL
Supplied with UPS (backup power)/requires floor drain	yes/yes	no (optional)/yes (no w/ optional water pump)
Requires dedicated water system/water consumption	yes/3.2 L per hr	yes/40 L per hr peak consumption
Noise generated	<70 decibels	65 decibels
Dedicated pediatric sample cup/dead volume	yes/20 µL	no/n/a
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reag. for aspir. & analysis	no	yes
Hemolysis/turbidity detection-quantitation	no/no	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/yes	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	no (except for IMT)/yes	yes/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	every 2 hr-autocalibrate/—/60–90 d/30 d	1 d/30 d/14 d/14–20 d
Automatic shutdown/startup programmable	no/yes	yes/yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	50 sec, 288 tests	<4 min, 200 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	4.5 min, 500 tests	<5 min, 160 specimens
• Album., bili. direct & total, AST, ALT, ALP	10–11 min, 500 tests	9 min, 133 specimens
Typical time delay from ordering stat test to aspir. of sample	24 sec	1 min
How often QC required/onboard SW capability to review QC	24 hr/yes	per CLIA & laboratory's decision/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	optional add-on (SW mftr: Dade Behring–DataFusion)/yes (addt'l cost)	onboard/no (optional)
Interfaces up and running in active user sites with	Sunquest, Cerner, LabNet, HBOC, SMS, Meditech	all common interfaces including Cerner, Antrim, CCA, Chemware, Dawning Technol., ADAC, Dynamic Healthcare, Antek, SMS, HBOC (Data Innov.), CPSI, Meditech, Sunquest, Citation
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
Interface avail. (or will be) to automated specimen handling system	yes	yes
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	yes/yes/yes	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	2–8 hr/yes	<24 hr/yes
Mean time between failures/to repair failures	70 d/3 hr	average 2 calls per yr/<24 hr
Average time to complete maintenance by lab personnel	daily: 2 min, weekly: 2 min, monthly: 15 min	daily: 3 min; weekly: 27 min; monthly: 45 min
Onboard maintenance records/maint. training demo module	yes/no	yes (includes audit trail of who replaced parts)/yes
Training provided with purchase/advanced oper. training avail.	2 d on-site/4 d at vendor offices/yes	3–5 d on-site, 5 d at vendor offices/yes
Annual service contract cost (24 h/7 d)	business hrs: RxL HM: $19,755; RxL Basic: $18,355	inquire
Distinguishing features	only instrument available that integrates heterogeneous immunoassays onboard with other chemistries; allows single platform for over 95% of most requested tests; eliminates sample splitting between general tests & immunoassays	Olympus is a leader in standardization with its family of chemistry immuno systems, the AU400, AU600, AU640, AU2700, & AU5400. Broad test menu of 120+ methods delivers standardized results for improved patient management & streamlined operation. Speed, reliability, advanced data management, & unprecedented onboard automation for the best walkaway in industry today

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Chemistry analyzers (for high-volume laboratories)

Part 7 of 10	Olympus America Inc. **Terry Giacomo** terry.giacomo@olympus.com Two Corporate Center Dr. **Melville, NY 11747** **800-223-0125** www.olympus.com	Olympus America Inc. **Hiro Sekiya** hiro.sekiya@olympus.com Two Corporate Center Dr. **Melville, NY 11747** **800-223-0125** www.olympus.com
See related comments, page 49		
Name of instrument/first year sold in U.S.	AU2700/2000	AU5421 with dual ISE/2001
List price	$320,000	$465,000
No. units in clinical use in U.S./outside U.S.	n/a/n/a	0/30
Country where designed/manufactured/where reagents mftd.	Japan/Japan/U.S. & Ireland	Japan/Japan/U.S. & Ireland
Operational type/reagent type	random access, discrete, continuous random access/open reagent system	random access, discrete, continuous random access/open reagent system
Sample handling system/model type	rack & stat carousel/floor-standing	rack/floor-standing
Dimensions (H x W x D)/instrument footprint	50 x 79 x 45 in/92 sq ft	50 x 148 x 45 in/46.25 sq ft
No. of tests for which analyzer has FDA-cleared applications	122	122
Tests cleared but not clinically released	ceruloplasmin	ceruloplasmin
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	cotinine	cotinine
Research-use-only assays	none	none
Tests in development	LDL chol., acid phosphatase	LDL chol., acid phosphatase
User-defined methods implemented for what analytes	HbA1c, fructosamine, cholinesterase	HbA1c, fructosamine, cholinesterase
Methods supported/immunoassay methods	photometry, potentiometry, calculated tests/homogeneous	photometry, potentiometry, calculated tests/homogeneous
No. of direct ion selective electrode channels	3	3
No. of different measured assays onboard simultaneously	up to 51	99
No. of different assays programmed, calibrated at once	99	99
No. of user-definable (open) channels/no. active simultaneously	95/—	95/—
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	48 x 2/100–4,000	48 x 4/100–4,000
Shortest/median onboard reag. stability/refrigerated onboard	120 hr/30 d/yes (4–12°C)	120 hr/30 d/yes (4–12°C)
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	yes
Walkaway capacity in minutes/specimens/tests-assays	varies/up to 322/varies	varies/up to 300/varies
System is liquid or dry	liquid	liquid
Uses disposable cuvettes/max. no. stored	no/n/a	no/n/a
Uses washable cuvettes/replacement frequency	yes/permanent	yes/permanent
Minimum sample volume aspirated precisely at one time	1 µL	1 µL
Supplied with UPS (backup power)/requires floor drain	no (optional)/yes	no (optional)/yes
Requires dedicated water system/water consumption	yes/65 L per hr peak consumption	yes/120 L per hr
Noise generated	—	—
Dedicated pediatric sample cup/dead volume	no/n/a	no/n/a
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl.)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	yes/yes	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear- range high/low results	yes/yes	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/multipoint calibration supported	yes/yes	yes/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	1 d/30 d/14 d/14–20 d	1 d/30 d/14 d/14–20 d
Automatic shutdown/startup programmable	yes/yes	yes/yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	<4 min, 267 specimens	—, max 600
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	<4 min, 267 specimens	—, max 600
• Album., bili. direct & total, AST, ALT, ALP	9 min, 267 specimens	—, max 533
Typical time delay from ordering stat test to aspir. of sample	1 min	—
How often QC required/onboard SW capability to review QC	per CLIA & laboratory's decision/yes	per CLIA & laboratory's decision/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard/no (optional)	onboard/no (optional)
Interfaces up and running in active user sites with	all common interfaces including Cerner, Antrim, CCA, Chemware, Dawning Technol., ADAC, Dynamic Healthcare, Antek, SMS, HBOC (Data Innov.), CPSI, Meditech, Sunquest, Citation	all common interfaces including Cerner, Antrim, CCA, Chemware, Dawning Technol., ADAC, Dynamic Healthcare, Antek, SMS, HBOC (Data Innov.), CPSI, Meditech, Sunquest, Citation
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
Interface avail. (or will be) to automated specimen handling system	yes	yes
Modem servicing available/can diagnose own malfunctions/ determine malfunctioning component	yes/yes/yes	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	<24 hr/yes	<24 hr/yes
Mean time between failures/to repair failures	TBD/TBD	TBD/TBD
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 30 min; monthly: 45 min	daily: 5 min; weekly: 30 min; monthly: 45 min
Onboard maintenance records/maint. training demo module	yes (includes audit trail of who replaced parts)/yes	yes (includes audit trail of who replaced parts)/yes
Training provided with purchase/advanced oper. training avail.	3–5 d on-site, 5 d at vendor offices/yes	5 d at vendor offices/yes
Annual service contract cost (24 h/7 d)	inquire	inquire
Distinguishing features	Olympus is a leader in standardization with its family of chemistry immuno systems, the AU400, AU600, AU640, AU2700, & AU5400. Broad test menu of 120+ methods delivers standardized results for improved patient management & streamlined operation. Speed, reliability, advanced data management, & unprecedented onboard automation for the best walkaway in industry today	Olympus is a leader in standardization with its family of chemistry immuno systems, the AU400, AU600, AU640, AU2700, & AU5400. Broad test menu of 120+ methods delivers standardized results for improved patient management & streamlined operation. Speed, reliability, advanced data management, & unprecedented onboard automation for the best walkaway in industry today

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SURVEY OF INSTRUMENTS

Chemistry analyzers (for high-volume laboratories)

Part 8 of 10	Olympus America Inc. **Hiro Sekiya** hiro.sekiya@olympus.com **Two Corporate Center Dr.** **Melville, NY 11747** **800-223-0125** www.olympus.com	Ortho-Clinical Diagnostics **Christine Hopkins** **1001 U.S. Highway 202** **Raritan, NJ 08869** **800-828-6316** www.orthoclinical.com
See related comments, page 49		
Name of instrument/first year sold in U.S.	AU5431 with dual ISE/2001	Vitros 950, Vitros 950 AT/1995
List price	$575,000	950: $235,000; 950 AT: $285,000
No. units in clinical use in U.S./outside U.S.	0/30	>1,500/—
Country where designed/manufactured/where reagents mftd.	Japan/Japan/U.S. & Ireland	U.S./—/—
Operational type/reagent type	random access, discrete, continuous random access/open reagent system	batch, random access, discrete, continuous random access/self-contained single-use cartridges-packages-slides
Sample handling system/model type	rack/floor-standing	sample trays/floor-standing
Dimensions (H x W x D)/instrument footprint	50 x 200 x 45 in/62.5 sq ft	55 x 68 x 38 in/26 sq ft
No. of tests for which analyzer has FDA-cleared applications	122	69
Tests cleared but not clinically released	ceruloplasmin	—
Tests not available in U.S. but submitted for 510(k) clearance	none	—
Tests not available in U.S. but available in other countries	cotinine	—
Research-use-only assays	none	—
Tests in development	LDL chol., acid phosphatase	—
User-defined methods implemented for what analytes	HbA1c, fructosamine, cholinesterase	—
Methods supported/immunoassay methods	photometry, potentiometry, calculated tests/homogeneous	potentiometry, colorimetric–rate, potentiometry/—
No. of direct ion selective electrode channels	3	3
No. of different measured assays onboard simultaneously	up to 147	75
No. of different assays programmed, calibrated at once	99	75
No. of user-definable (open) channels/no. active simultaneously	95/—	n/a/n/a
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	48 x 6/100–4,000	60/60
Shortest/median onboard reag. stability/refrigerated onboard	120 hr/30 d/yes (4–12°C)	7 d/14 d/n/a
Multiple reag. configurations supported	yes	n/a
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	n/a
Walkaway capacity in minutes/specimens/tests-assays	varies/up to 300/varies	—/40/200 per hr
System is liquid or dry	liquid	dry
Uses disposable cuvettes/max. no. stored	no/n/a	no/n/a
Uses washable cuvettes/replacement frequency	yes/permanent	no/n/a
Minimum sample volume aspirated precisely at one time	1 µL	6 µL
Supplied with UPS (backup power)/requires floor drain	no (optional)/yes	no/no
Requires dedicated water system/water consumption	yes/180 L per hr	no/none
Noise generated	—	—
Dedicated pediatric sample cup/dead volume	no/n/a	yes/30 µL
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	yes/yes	not needed/not needed
Dilution of patient samples onboard/automatic rerun capability	yes/yes	no/no
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/yes	no/no
Autocalibration or autocalibration alert	yes	n/a
Calibrants stored onboard/multipoint calibration supported	yes/yes	no/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	1 d/30 d/14 d/14–20 d	6 mo/6 mo/3–6 mo/3–6 mo
Automatic shutdown/startup programmable	yes/yes	no/no
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	—, max 600	~6 min, 600 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	—, max 600	~6 min, ~700 specimens
• Album., bili. direct & total, AST, ALT, ALP	—, max 800	~7 min, ~700 specimens
Typical time delay from ordering stat test to aspir. of sample	—	8 sec
How often QC required/onboard SW capability to review QC	per CLIA & laboratory's decision/yes	24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard/no (optional)	onboard/no
Interfaces up and running in active user sites with	all common interfaces including Cerner, Antrim, CCA, Chemware, Dawning Technol., ADAC, Dynamic Healthcare, Antek, SMS, HBOC (Data Innov.), CPSI, Meditech, Sunquest, Citation	—
Bidirectional interface capability	yes (broadcast download & host query)	yes (broadcast download)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	—
Interface avail. (or will be) to automated specimen handling system	yes	yes (Lab-InterLink, Labotix, Coulter IDS, AutoLab)
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	yes/yes/yes	—/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	<24 hr/yes	<4 hr/yes
Mean time between failures/to repair failures	TBD/TBD	—/—
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 30 min; monthly: 45 min	daily: 2 min; weekly: 5 min; monthly: 15 min
Onboard maintenance records/maint. training demo module	yes (includes audit trail of who replaced parts)/yes	yes/yes
Training provided with purchase/advanced oper. training avail.	5 d at vendor offices/yes	3 d on-site, 5 d at vendor offices/yes
Annual service contract cost (24 h/7 d)	inquire	—
Distinguishing features	Olympus is a leader in standardization with its family of chemistry immuno systems, the AU400, AU600, AU640, AU2700, & AU5400. Broad test menu of 120+ methods delivers standardized results for improved patient management & streamlined operation. Speed, reliability, advanced data management, & unprecedented onboard automation for the best walkaway in industry today	superior assay precision; minimal interference from hemolysis, lipemia, bilirubin; smart metering; continuous process verification; no infectious waste; no plumbing, water, or drains; highest reportable result efficiency of any chemistry analyzer

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SURVEY OF INSTRUMENTS

Chemistry analyzers (for high-volume laboratories)

Part 9 of 10	Ortho-Clinical Diagnostics Christine Hopkins 1001 U.S. Highway 202 Raritan, NJ 08869 800-828-6316 www.orthoclinical.co00m	Roche Diagnostics Roche Product Manager 9115 Hague Rd. Indianapolis, IN 46250 800-428-5074 us.labsystems.roche.com
See related comments, page 49		
Name of instrument/first year sold in U.S.	Vitros 250, Vitros 250 AT/1993	Modular/1998
List price	$107,000	varies
No. units in clinical use in U.S./outside U.S.	>3,000/—	>50/>200
Country where designed/manufactured/where reagents mftd.	U.S./—/—	multiple countries/multiple countries/multiple countries
Operational type/reagent type	batch, random access, discrete, continuous random access/self-contained single-use cartridges-packages-slides	continuous random access/self-contained multiuse cartridges-packages-slides
Sample handling system/model type	rack/floor-standing	5-position rack/floor-standing
Dimensions (H x W x D)/instrument footprint	47 x 45.5 x 28 in/8.8 sq ft	varies per configuration/varies
No. of tests for which analyzer has FDA-cleared applications	69	>100
Tests cleared but not clinically released	—	soluble transferrin receptor, D-dimer
Tests not available in U.S. but submitted for 510(k) clearance	—	none
Tests not available in U.S. but available in other countries	—	ApoA, ApoB, Lpa
Research-use-only assays	—	none
Tests in development	—	—
User-defined methods implemented for what analytes	—	none
Methods supported/immunoassay methods	potentiometry, colorimetric–rate, potentiometry/—	photometry, potentiometry/HbA1$_c$
No. of direct ion selective electrode channels	3	3
No. of different measured assays onboard simultaneously	60	47->100
No. of different assays programmed, calibrated at once	60	47->100
No. of user-definable (open) channels/no. active simultaneously	n/a/n/a	5/5
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	60/60	47–100/100–3,000
Shortest/median onboard reag. stability/refrigerated onboard	7 d/14 d/n/a	72 hr/28 d/yes (2–12°C)
Multiple reag. configurations supported	n/a	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	n/a	no
Walkaway capacity in minutes/specimens/tests-assays	—/40/200 per hr	varies/300/varies
System is liquid or dry	dry	liquid
Uses disposable cuvettes/max. no. stored	n/a/n/a	no/n/a
Uses washable cuvettes/replacement frequency	n/a/n/a	yes/monthly
Minimum sample volume aspirated precisely at one time	6 µL	2 µL
Supplied with UPS (backup power)/requires floor drain	no/—	no/yes
Requires dedicated water system/water consumption	no/n/a	yes/varies (50 L/hr/mod)
Noise generated	—	<62 decibels
Dedicated pediatric sample cup/dead volume	yes/30 µL	yes/50 µL
Primary tube sampling/pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes	yes
Bar code placement per NCCLS standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/yes	yes/yes/no
Automatic detection of adequate reag. for aspir. & analysis	yes	yes
Hemolysis/turbidity detection-quantitation	not needed/not needed	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/no	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	no/no	yes/yes
Autocalibration or autocalibration alert	no	yes
Calibrants stored onboard/multipoint calibration supported	no/yes	yes/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	6 mo/6 mo/3–6 mo/3–6 mo	24 hr/varies/btl chg/lot chg
Automatic shutdown/startup programmable	no/no	yes/yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO2	7 min, 230 specimens	3.5 min, 300–600 specimens
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	7 min, 277 specimens	5.5 min, 160–600 specimens
• Album., bili. direct & total, AST, ALT, ALP	7 min, 250 specimens	10.5 min, 133–1,200 specimens
Typical time delay from ordering stat test to aspir. of sample	12 sec	—
How often QC required/onboard SW capability to review QC	24 hr/yes	24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard/no	onboard/no
Interfaces up and running in active user sites with	—	all major LIS vendors
Bidirectional interface capability	yes (broadcast download)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	no
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	—	no
Interface avail. (or will be) to automated specimen handling system	yes (Lab-InterLink, Labotix, Coulter IDS, AutoLab)	yes (Roche Pre-Analytical Modular)
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	—/yes/yes	yes/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	<4 hr/yes	8 hr/yes
Mean time between failures/to repair failures	—/—	—/—
Average time to complete maintenance by lab personnel	daily: 2 min; weekly: 5 min; monthly: 15 min	daily: 5 min; weekly: 10 min; monthly: 15 min
Onboard maintenance records/maint. training demo module	yes/yes	yes (includes audit trail of who replaced parts)/yes
Training provided with purchase/advanced oper. training avail.	3 d on-site, 5 d at vendor offices/—	5 d at vendor offices/yes
Annual service contract cost (24 h/7 d)	—	varies
Distinguishing features	superior assay precision; minimal interference from hemolysis, lipemia, bilirubin; smart metering; continuous process verification; no infectious waste; no plumbing, water, or drains; highest reportable result efficiency of any chemistry analyzer	Roche Hitachi chemistry & automation reliability & experience. Only system on the market today capable of consolidating up to 100 different assays on one high-throughput analyzer. A full integration with immunoassay will be available soon. System can be connected directly to preanalytical automation today. Flexible, expandable to lab's changing needs

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Chemistry analyzers (for high-volume laboratories)

Part 10 of 10	Roche Diagnostics Roche Product Manager 9115 Hague Rd. Indianapolis, IN 46250 800-428-5074 us.labsystems.roche.com
Name of instrument/first year sold in U.S.	RH 917/1995
List price	$275,000
No. units in clinical use in U.S./outside U.S.	>350/>2,000
Country where designed/manufactured/where reagents mftd.	multiple countries/multiple countries/multiple countries
Operational type/reagent type	continuous random access/self-contained multiuse cartridges-packages-slides
Sample handling system/model type	2 models: rack or disk/floor-standing
Dimensions (H x W x D)/instrument footprint	46 x 55 x 30.5 in/11.6 sq ft
No. of tests for which analyzer has FDA-cleared applications	>100
Tests cleared but not clinically released	soluble transferrin receptor, D-dimer
Tests not available in U.S. but submitted for 510(k) clearance	none
Tests not available in U.S. but available in other countries	Apo A, apo B, kappa/lambda light chains, % CDT, antithrombin III
Research-use-only assays	none
Tests in development	—
User-defined methods implemented for what analytes	multiple veterinary applications
Methods supported/immunoassay methods	photometry, potentiometry/HbA1$_c$
No. of direct ion selective electrode channels	3
No. of different measured assays onboard simultaneously	48
No. of different assays programmed, calibrated at once	86
No. of user-definable (open) channels/no. active simultaneously	5/5
No. of different analytes for which system accommodates reag. containers onboard at once/tests per container set	48/100–1,000
Shortest/median onboard reag. stability/refrigerated onboard	72 hr/28 d/yes (2–12°C)
Multiple reag. configurations supported	yes
Reag. container placed directly on system for use	yes
Instrument has same capabilities when 3rd-party reag. used	no
Walkaway capacity in minutes/specimens/tests-assays	disk: 264, rack: 360/disk: 110, rack: 150/disk: 5,280, rack: 7,200
System is liquid or dry	liquid
Uses disposable cuvettes/max. no. stored	no/n/a
Uses washable cuvettes/replacement frequency	yes/monthly
Minimum sample volume aspirated precisely at one time	2 µL
Supplied with UPS (backup power)/requires floor drain	no/yes
Requires dedicated water system/water consumption	yes/—
Noise generated	—
Dedicated pediatric sample cup/dead volume	yes/50 µL
Primary tube sampling/pierces caps on primary tubes	yes/no
Sample bar-code reading capability	yes, on sample transport, shortly before sample is aspirated (2 of 5 interl., Codabar, codes 39 & 128)/autodiscrimination
Reagent bar-code reading capability	yes
Bar code placement per NCCLS standard Auto2A	yes
Onboard test auto inventory (determines volume in container)	yes
Measures no. tests remaining/short sample detection/clot detection	yes/yes/no
Automatic detection of adequate reag. for aspir. & analysis	yes
Hemolysis/turbidity detection-quantitation	yes/yes
Dilution of patient samples onboard/automatic rerun capability	yes/yes
Sample volume can be reduced/increased to rerun out-of-linear-range high/low results	yes/yes
Autocalibration or autocalibration alert	yes
Calibrants stored onboard/multipoint calibration supported	yes/yes
Typical calib. frequency for ISE/metabolites/ther. drugs/drugs of abuse	24 hr/lot change/7 d/—
Automatic shutdown/startup programmable	no/yes
Stat time to completion of all analytes, throughput per hr. for:	
• Sodium, potassium, chloride, TCO2	3 min, 300 samples
• Sodium, potassium, chloride, TCO2, glucose, urea, creatinine	5 min, 160 samples
• Album., bili. direct & total, AST, ALT, ALP	10 min, 133 samples
Typical time delay from ordering stat test to aspir. of sample	18 sec
How often QC required/onboard SW capability to review QC	24 hr/yes
Onboard real-time QC/support multiple QC lot nos. per analyte	yes/yes
QC results transferred automatically to LIS	yes
Data mgmt. capability/instrument vendor supplies LIS interface	onboard/no
Interfaces up and running in active user sites with	all major LIS vendors
Bidirectional interface capability	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes
LIS interface operates simultaneously with running assays	yes
Uses LOINC to transmit orders & results	—
Interface avail. (or will be) to automated specimen handling system	yes (Roche Pre-Analytical Modular)
Modem servicing available/can diagnose own malfunctions/determine malfunctioning component	no/yes/yes
On-site time of svc. engineer/onboard error codes for troubleshooting	8 hr/yes
Mean time between failures/to repair failures	—/—
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 10 min; monthly: 15 min
Onboard maintenance records/maint. training demo module	yes (includes audit trail of who replaced parts)/yes
Training provided with purchase/advanced oper. training avail.	5 d at vendor offices/yes
Annual service contract cost (24 h/7 d)	varies
Distinguishing features	Exceptional reliability; large menu allows true consolidation; high throughput not affected by test mix; reduced sample & reagent handling greatly enhances lab efficiency

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What helps and hinders workstation consolidation

Raymond D. Aller, MD

An underlying thread tying together CAP TODAY's chemistry analyzer surveys in recent years has been the steady expansion of available, onboard test menus, which has enhanced workstation consolidation in the laboratory.

Such consolidation permits the clinician to draw a single tube and allows the laboratory to perform an array of clinical analyses on this specimen without the labor-intensive and risky process of aliquoting. Two important barriers, however, limit the usefulness of larger chemistry analyzers: defining alternative yet acceptable specimens and coping with a plethora of proprietary nomenclatures.

The first challenge involves defining what constitutes an acceptable specimen. Laboratories traditionally have used serum separator tubes for most chemistries. Still in question, however, is which therapeutic drugs can be measured in such tubes and which others are adsorbed by the separator gel at a rate that gives falsely low results. Likewise, what is the effect of plastic tubes? So why don't vendors provide their clients with definitive information that is specific to their method?

In some settings, particularly intensive care and dialysis units, heparinized plasma separator tubes have advantages over serum, as plasma avoids the formation of fibrin strands seen in partially clotted serum derived from patients with unstable coagulation systems. But which of the more than 120 analytes available on a modern instrument can be run on heparinized plasma? For example, some iron methodologies don't work in the presence of heparin. Others do. The package inserts seldom offer any help.

Outreach settings continue to be plagued by falsely high potassium values caused by potassium leaking from red cells, even after the cells are centrifuged in a serum separator tube. Some laboratorians have observed that citrated plasma (blue top) tubes seem to keep potassium from leaking, and they have successfully measured potassium and many other analytes on specimens sent by overnight express delivery at room temperature. But, again, manufacturers need to help laboratorians by identifying which of the 120 analytes can be measured using citrated plasma. One might assume that calcium would not work, but it may, depending on the method used. Manufacturers need to make such information available.

The second important barrier to workstation consolidation is the "Babel" of proprietary nomenclatures. For example, is ACET acetaminophen? Acetone (acetoacetate)? Acetylcholinesterase (total)? Angiotensin converting enzyme (total)?

As the number of analytes available on chemistry analyzers increases, it becomes more critical that orders be downloaded and results transmitted using a standard LOINC (Logical Observation Identifier Names and Codes) code rather than an instrument-specific proprietary cipher. We applaud Bayer Corp., the only manufacturer thus far to move a large chemistry analyzer—in this case the Advia 1650—to LOINC coding. (For details on an upcoming LOINC meeting, see "Public laboratory LOINC meeting," page 114.)

Pages 31–49 feature 19 mid- and high-volume chemistry analyzers from seven vendors. The data presented are the manufacturers' responses to a CAP TODAY questionnaire. We advise readers to verify the stated features and capabilities of any system under consideration. □

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