

Index

a

- absorption-based methods 12
 - application areas of, absorption spectroscopy 322
 - Bradford protein determination 326–327
 - dissolution testing 325
 - DNA and RNA quantification 327
 - ELISA 325–326
 - enzyme activity measurements 323–325
 - glucose-6-phosphate dehydrogenase, analysis of 325
 - hemoglobin analysis 323
 - pharmaceutical dosage forms, analysis of 325
 - physical background 321–322
 - porphyrins, analysis of 323
 - protein determination, using BCA assay 326
 - sun protection factors 327
- absorption-based readers 321
- Access Laboratory Workstation 100
- AccuVap* 269
- acoustic cavitation 256, 258
- acoustic dispensers 164–165, 173–176
- acoustic droplet ejection 156, 157, 165
- acoustic programming 287, 288
- Acquity UPLC Automated SPE System* 244
- active pharmaceutical ingredients (API) 141, 181
- adaptive grippers 311–314
- agglomerates 188, 257
- air conditioning 176
- air displacement
 - pipettes 116, 118, 159, 160
 - technology 117, 130, 141, 144, 148
- air humidity 116, 129, 132, 223, 225
- alkaline phosphatase (AP) 12, 326, 331
- allophycocyanin (APC) 332
- American National Standards Institute (ANSI) 70, 74, 394
- analog signals 415, 416
- Analytical Information Markup Language (AnIML) 424, 427, 482
- analytical measurement systems
 - available reader systems 333–341
 - market situation and 333–341
- Andrew+* 142
- antibody-dependent
 - cell-mediated cytotoxicity (ADCC) 11
 - cell phagocytosis (ADCP) 11
- antibody fragments 11
- anticoagulant 90, 91
- anti-freeze agent 72
- Aperio Serie* 104
- apoptosis 10, 11, 331
- apoptotic cells 11
- application programming interfaces (APIs) 212, 439
- articulated robots 7
- artificial object identification 385
- ASPEC™ systems* 243–244, 247

atmospheric pressure chemical ionization (APCI) 345, 346

atomic absorption spectrometry (AA) 259

attention deficit/hyperactivity disorder (ADHD) 20

Auto-ID identification systems 386

automated

- barcode reader 390–392, 395, 397–401, 443
- centrifugation 230–231, 233, 235
- cooling 205–211, 213, 215, 217, 219–220, 228, 260
- evaporation 263–267
- filtration 237–240
- heating 31, 204–209
- incubation 221–230
- Inert Crimp Capper* 105
- mixing 213–221
- shaking 216
- solid dispensing 181–198
- solid phase extraction 240–255
- sonication 257–262
- stirring 217–219
- thermocycler (ATC) 212

automatic identification 385

automatic mercaptan titrator 3

automatic oxidation-reduction potential titrator 30

automatic rotor recognition 233

automation

- definition 1
- strategies
 - with central system integrator 46
 - with flexible robot 47
 - intersystem automation 48
 - with multiple robots 48, 49

automotors 1

autophagy 11

AutoSIMS 373

b

bacterial proteins 9

bar-coded containers 394

barcode reader technology 392

- camera barcode reader 393–394

- CCD scanner 393
- laser scanner 393
- market situation 400, 402
- pen type reader 392

barcodes

- bar code reading of, storage tube racks 397–398
- bar coding of, microtiter plates 395–396
- decoding 390, 393, 394
- microplate footprint barcode reading 394–395
- proprietary solutions 398–400
- of serial tube racks 397
- on single tubes 396

barcode scanners 387, 392, 393, 440

bar coding 387

basic coordinates system (BASE) 284

bicyclic hydrocarbon norbornene 72

Big Kahuna 190

bilirubin analysis, in newborns 323

Bioshake series 216

biological applications 69, 70

- lids and sealing systems, for microtiter plates 76
 - advantages and disadvantages of, locking systems 81–82
 - application areas of, locking systems 82
 - foils and films 77–80
 - lids 77
 - mats 80
 - RoboLid* 80–81
- market potential and commercially available systems
 - market lids and sealing systems 83, 88
 - microtiter plates market 82–83
 - microplates, characteristics of 70–74, 76

biological materials 203

Biomek 1000 114

Biomek Series 134, 136, 141, 144

biometric methods 386

bioscreening and pharmaceutical testing 9

- cell-based assays 10–11
- cell culturing 13–14
- DNA/RNA extraction 12
- ELISAs 11–12

- enzymatic assays 9–10
- gene expression analysis 13
- NGS 13
- PCR/RT-PCR/q-PCR 12–13
- requirements 14–15
- biosensors 172, 176
- Biotage*[®] 244
- blood collection tubes 90
- Bluetooth Special Interest Group (SIG) 421
- BOD (biological/biochemical oxygen demand) incubators 222, 224, 225
- bovine serum albumin (BSA) 126, 127
- Bravo* 134
- 2 bucket rotor 235
- bulk reagent dispensing method 157, 177
- burettes 30

- C**
- camera barcode readers 393, 394, 401
- CAN bus (Controller Area Network) 420
- CapDecapPro 96*[™] enchtop system 104
- capillary blood sampling 90
- capillary effect, of liquids 125
- capillary sippers 164
- CapTrack* 105
- carbon dioxide incubator (CO₂ incubator) 225
- carbon monoxide 3
- Cartesian coordinate system 8, 284, 287
- cavity sealing mats 80
- CCD barcode scanners 393
- Cellario*[™] system 438–440
- CellBind surface 74
- cell
 - culturing 13–14, 62, 217
 - death assays 11
 - fractionation 12, 231
 - senescence assays 11
 - sheets 74
 - staining processes 141
 - viability assays 10, 64, 322, 324, 325
- central system integrator 46
- centrifugation
 - market situation and systems 235–237
 - requirements 233–235
- centrifuges 46, 95, 230–235, 291, 443
- centrifuge tubes 91, 95, 103, 105, 208
- ceramic pumps 161–162
- cerebrospinal fluid (CSF) 88, 91, 94, 258
- chemical cell disruption 12
- chemical oxygen demand (COD) 27
- chromatographic processes 204
- Chronect Quantos* 195, 196
- chronic diseases 62, 214, 226
- classical analytical applications 94–95
 - centrifuge tubes 95, 96
 - environmental analysis 26, 27, 39
 - food analysis 23, 39
 - requirements 27, 29, 30
 - safe-lock tubes 95–96
 - vessels for, microwave digestion 96–97
- clinical applications 15, 16, 88
 - classical parameter, determination of 15–18
 - collection of, blood samples 90, 91
 - collection of, examination material 91, 94
 - collection of, urine samples 91, 93
 - drugs of abuse, determination of 19–21
 - requirements 21–22
 - vitamins, determination of 18–19
- clinical radioimmunoassays 5
- cloud-based/web-hosted systems 467
- Codabar 389–390
- Code 39 388, 389
- Code 128 388, 390
- coefficients of variation (CV) 121, 158, 169
- collaborative robots 31, 289–294, 298, 300
- combustion processes 2, 3
- Commodore VIC-20 microcomputer 4
- complement-dependent cytotoxicity (CDC) 11
- complex automation systems 31, 46, 53, 100, 190, 211, 240, 244, 424
- compound plates 72
- Computype 409
- conductometric detector 30
- contact-based
 - dispensers, properties of 160
 - methods 155, 157

- contactless dispensing (jetting) methods 8, 155–157, 161, 165, 166
 - Contract Research Organizations (CRO) 65, 467
 - corrective and preventive action (CAPA) 468
 - cross-contamination 64, 76, 81, 82, 95, 105, 155, 158–160, 162, 169, 173, 177, 183, 184
 - CSMA/CD algorithm 421
 - CS700 Micronic Screw Cap Recapper* 104
 - CyBio Felix* 144
 - CyBio Well Vario* 149
 - cyclic olefin copolymer (COC) 72, 77
 - cyclic redundancy check (CRC) 420
 - Cytation Hybrid 336
 - cytotoxicity assays 11
- d**
- Data Acquisition and Reporting Tool (DART) 446
 - DataMatrix 390, 391
 - dead reckoning 303
 - D300e Digital Dispenser* 176
 - deep well plates (DPWs) 73–75, 116, 136, 140, 177, 224, 250
 - degree of automation 53, 88, 181, 189, 225, 241, 288, 481
 - degrees of freedom (DoF) 283, 284, 286, 287, 292
 - deoxyribonucleic acid (DNA) 11–13, 60, 64, 74, 76, 94, 95, 118, 144, 158, 209, 238, 257, 258, 262, 322, 327, 331, 350
 - detection technologies 321, 333, 347–348
 - digital interfaces 416–423
 - dimethyl sulfoxide (DMSO) 72, 77, 78, 80, 123, 125, 127, 136, 149, 150, 158, 177, 263
 - Dionex™ AutoTrace™ 280 system* 244
 - direct analysis in real time (DART) 346
 - discontinuous gravimetric dosing processes 188, 189
 - dispensers
 - acoustic dispensers 164–165
 - capillary sipper 164
 - displacement-based dispenser 156
 - ceramic pumps 161–162
 - peristaltic pumps 161
 - piezoelectric valve-based dispensers 164
 - solenoid 163
 - valve-based 162
 - disposable syringe dispensers 159
 - dissolution testing 325
 - D-mannitol 183
 - DNA extraction 12, 142, 144
 - dosable solvents, sciDROP PICO 172
 - dosing errors 128, 160, 162, 173, 176, 177, 183, 189
 - dosing process 111, 116, 122, 125, 131, 162, 163, 183, 185, 186, 188, 190, 194, 195
 - dosing speed 161, 165, 170, 195
 - Dragonfly systems* 170
 - drop-by-drop dispensing 157
 - drop-on-demand principle 172
 - drug discovery process 9, 181
 - DryPette®* 194
 - dual-dye ratiometric photometric system 132
- e**
- Echo Liquid Handler Series* 165, 167, 168, 176
 - Echo MS* 373
 - economic potential
 - market dynamics 55–56
 - market shares
 - by application 62–64
 - by region 56–61
 - by users 64–65
 - by vendors 65–66
 - edge locking mechanism (ELM) 220
 - Edge system* 244
 - Electric Decapper DC 480* 104
 - electrical heating processes 206
 - electrically erasable programmable read-only memory (EEPROM) 402
 - electromagnetic radiation 322, 404

- Electronic Industries Association (EIA) 419
- electronic laboratory notebook (ELN)
466–471, 474, 477
- electrospray ionization 203, 343, 345
- enzymatic assays 9–10, 23
- enzymatic degradation, of adhesion
molecules 223
- enzyme-linked immunosorbent assays
(ELISA) 7, 11, 44, 69, 133, 258, 321,
325–326, 440
- epMotion* 134, 141
- Ethernet 141, 212, 217, 235, 315, 394, 421,
427, 443
- ethylene vinyl acetate (EVA) 80
- European Article Number (EAN) 388–389
- evaporation
market situation 264–269
technologies and application areas
262–264
- EvoBot* 142
- Exactive™ Series* 353
- extractions (solid–liquid, liquid–liquid,
liquid–gas) 201
- Extrahera™* system 249
- extranet 421
- f**
- fast-working processors 415
- fault-free automation system 54
- Feature Definition Language (FDL) 426
- Filterpress™* 250
- filtration microplates 74
- 4-finger centric gripper 310
- flavin-adenine-dinucleotide (FAD) 15
- flexible membrane 163
- Fluent® Automation Workstation* 148
- fluidization 186
- FluidX IntelliXcap™* 48 104
- fluorescence spectroscopy
fluorescence-based methods 327
application areas of 330–333
physical background 327–330
fluorescence-based microplate readers
328
- fluorescence correlation spectroscopy
(FCS) 328–330
- fluorescence detection 328, 330–336
- fluorescence intensity (FI or FLINT)
328–332, 334–336
- fluorescence lifetime analysis (FLT, FLIM)
328, 330
- fluorescence polarization (FP) 328, 329
- fluorescence resonance energy transfer
(FRET) 328, 329, 332, 334, 335
- time-resolved fluorescence (TRF) 328,
329
- time resolved FRET (TR-FRET) 329
- fluvoxamine 167
- food monitoring 1, 27, 349
- Fourier transform ion cyclotron resonance
(FT-ICR) 342, 347, 348, 353
- fragile substrates 156
- FreedomEVOLyzer* 142
- Freestyle SPE module* 243
- FREESTYLE EVaporation module* 269
- full automation (TLA) 30, 31, 45, 444
- fumigation incubator (CO₂ incubator) 222
- furafylline 167
- g**
- GAM series* 353
- gas chromatography (GC) 21, 27, 96, 103,
113, 201, 203, 264, 291, 346, 350, 352,
421
- gear pumps 121
- glucose oxidase (GOD) 12, 15
- glucose-6-phosphate dehydrogenase (G6PD)
activity 325
- glutamate dehydrogenase (GLDH) 9
- glycan arrays 172
- glycomics 172
- GoFa* 294
- gravimetric dosing methods 187–189
- gravimetric performance monitoring
131–132
- Green Button Go®* 440, 441
- grippers 97, 100, 104, 141, 143, 144, 281,
284, 285, 301, 308–315
- clamp 310

grippers (*contd.*)
 magnetic 311
 pneumatic 308, 310–311
 vacuum 310
 gripping systems 222, 308, 314
 GST-MEK5-PB1 chimera 332

h

half area bottoms (HA bottom) 71
 half-width method 342
 hematocrit (HC) 16, 17
 hemoglobin (Hb) 16, 17, 232, 323
 hierarchical workflow management system
 (HWMS) 447–448
HiG centrifuges 235
 high density polyethylene (HD-PE) 90
 high-end barcode readers 394
 high-level workflow management system 48
 high-resolution mass spectrometry (HRMS)
 349
 high throughput experimentation (HTE)
 181
 hit picking 115–116, 134, 176
Horizon SmartPrep 244, 247
 horizontal circular motion 215
 horseradish peroxidase (HRP) 12, 326
 HRP *o*-phenylenediamine (OPD) 326
 hump structure 163
 hydrogen peroxide (H₂O₂) 15
 hydrophobization 117
 11-hydroxy- Δ^9 -tetrahydrocannabinol
 (11-OH-THC) 21

i

I.DOT series 177
 immunosensors 17
 incubation 221, 222
 air humidity 223
 market situation 226–230
 number of revolutions 224
 oxygen and carbon dioxide content
 223–224
 systems, in laboratory 224–226
 temperature 223
 vessels 224

incubators 8, 9, 44, 45, 204, 221–228, 394,
 395, 443
 industrial robots 281, 289–292, 294, 298,
 299, 316
 inertial measuring unit (IMU) 307
1290 Infinity Online SPE System 244
Infinite® 200 PRO 335
infsoft LocAware platform® 406, 410
 integrated PolyPico ultra-low-volume
 microdispensing head (ULVD) 176
 integrated system 43–45, 100, 249, 394, 398,
 435, 436, 444, 446
 interfaces
 analog interfaces 415–416
 digital interfaces 416
 network interfaces 421–423
 parallel interfaces 416–418
 serial interfaces 418–420
 intersystem automation 45, 48
 intracellular signal transmission 10
 intranets 421
 ionization 116, 184, 203, 342–346
 ion trap mass spectrometers 346, 347, 353
 ITF code 389

j

Junior 190–191

k

Kevin 304
 Konstanz Information Miner 482
KMR iiwa 304

l

laboratory automation 1
 advantages of 50–53
 history of 5–6
 limitations of 53
 laboratory automation system 311
 laboratory execution systems (LES) 470,
 476
 reduction of, risk errors 477
 standardization of, laboratory equipment
 477, 478

- laboratory information management system (LIMS) 449, 450, 466
 - architectures 452
 - core functionalities of 450
 - selection of, LIMS-systems 454
 - vendors 465–466
 - LabX™, software* 409
 - labware handling
 - foils and films 97–102
 - microtiter plates and lids 97
 - lactate dehydrogenase (LDH) 9
 - Lambert–Beer’s law 12
 - LANEXO™ system* 409
 - Lara* 299
 - LBR series* 294, 298
 - LD platform series* 307
 - LiDAR (Light Detection and Ranging) 302–303, 307
 - linear bar codes 388, 389
 - linear imagers 393
 - liquid extraction methods 202
 - liquid handlers 43, 123, 132–136, 395
 - liquid handling 5, 43, 74, 113, 114, 133, 182, 207, 237, 399
 - critical parameters and error source 121–132
 - definition 111–112
 - history 112–115
 - robots 111, 126, 213, 397, 398, 437
 - systems 55
 - technologies
 - aspiration methods 119–121
 - pipetting technologies 116–119
 - liquid handling arm (LiHA) 148
 - liquid heat carriers 206
 - liquid–liquid extraction 201, 265
 - local area network (LAN) 421
 - long-term cost savings 51
 - low dispensing technologies 156
 - low-volume
 - delivery technologies 157
 - dispensers 155, 167–170
 - acoustic dispensers 173–176
 - piezoelectric dispenser 170, 172–173, 176
 - positive displacement systems 170, 171
 - low-volume liquid delivery
 - application areas for, low-volume dispensing 167–169
 - contact-based dispenser technologies 158
 - dispensers with disposable tips 159–160
 - dispensers with, fixed tips 159
 - pin tools 158
 - contactless dispenser technologies 161, 162, 164–166
 - LUO concept 41, 42
 - automation strategies 45
 - automation systems, with central system integrator 46
 - automation systems, with flexible robot 47
 - automation systems, with multiple robots 48, 49
 - intersystem automation 48
 - classes of, laboratory systems and devices 42–45
- m**
- Maira* 299
 - malate dehydrogenase (MDH) 9
 - manual processing 51, 54, 112, 469
 - market potential
 - automated centrifuges 235–237
 - automated evaporation 264–269
 - automated sonication 258–262
 - barcode reader 400, 402
 - general channel configurations 134–136
 - laboratory incubators 226–230
 - lids and sealing systems 83–88
 - liquid handling accessories 149–150
 - liquid handling systems 132–134
 - liquid handling systems, with 1-8 channels 136–143
 - mass spectrometry 351–374
 - microplate reader 333–341
 - microtiter plates 82
 - multichannel systems 144–149
 - RFID Technology 409–412

- market potential (*contd.*)
 - robots
 - mobile 303–307
 - stationary 292–299
 - mass spectrometric detector (LC/MS) 21
 - mass spectrometric methods
 - application areas 348–351
 - market situations 351–374
 - mass spectrometry systems 351–374
 - physical background
 - detection technologies 347–348
 - ionization 343–346
 - separation technologies 346–347
 - mass spectroscopy (MS) 264, 348–353
 - Matrix 300n* 400
 - MaxiCode 390, 392
 - membrane attack complex (MAC) 11
 - MEMS pressure sensors 130
 - microdispensing processes 157
 - microdrop dispenser 173
 - Microlab Series* 4, 134, 136, 141–142, 144
 - Micronic Push Cap Decapper CP620* 104
 - microplate format labware 205, 237
 - Microplate Shaker+* 217
 - microtiter plate-based test methods 7
 - microtiter plate dimensions 243
 - microtiter plates (MTPs) 14, 69–74, 76–84,
 - 88, 96–100, 114, 155, 163, 195, 207,
 - 208, 212, 214, 216, 217, 224, 235,
 - 243, 250, 262, 321, 394–396, 406,
 - 409, 443
 - mineral oil hydrocarbons (MKW) 27
 - mobile manipulator 304, 307
 - mobile robots 48
 - application scenarios 301
 - market situation and available systems 303–308
 - sensor systems 302–303
 - momentum* 346, 441–442
 - monitor single-channel dispensing 132
 - monochromator 5, 6, 322, 328, 336
 - Mosquito* series low-volume dispenser 168, 170
 - [MPE]²* 249
 - multichannel liquid dispensers 132
 - Multidrop Combi series* 161, 177
 - multimode reader 334, 336, 444
 - multiplexed array-based assays 172
 - Multi TEC Control (MTC) 207
 - mVAP* 269
 - Myra liquid handling system* 136
- n**
- nanotiter plates (NTPs) 224
 - necrosis 11
 - network Interfaces 421, 423
 - next-generation sequencing (NGS) 9, 13,
 - 132, 136, 141, 142, 144, 148, 168, 257,
 - 259, 262
 - nicotinamide adenine dinucleotide phosphate (NADP⁺) 325
 - N-methyl-2-pyrrolidone (NMP)* 263
 - nonionic hydrophilic chemicals 98
 - 11-nor-9-carboxy- Δ^9 -tetrahydrocannabinol (THC-COOH) 21
 - Nunclon Sphera 74
- o**
- ODTC* 213
 - office-size electronic computer 4
 - one-armed chemists 7
 - 1D bar codes 388
 - OneLab* 442–443
 - Open-LH* 142
 - Open-Source LIMS Solutions 466
 - optical performance monitoring 132
 - organoids 74, 406, 407
 - OT-2* 142
 - out-of-the-box (OOB) LIMS 454
 - OverlordTM* 443
- p**
- Palo Alto Research Center (PARC) 421
 - Panda* 299
 - parallel data transmission 417
 - PC device software 437
 - peeling or descaling systems 99
 - Peltier elements 206, 209, 211, 219
 - Peltier + module* 209
 - perfluorinated alkyl acids (PFAAs) 244

- peristaltic pumps 112, 120, 121, 161, 163
- peroxidase *o*-phenylenediamine (oPD)
12
- PHERASTAR*[®] 336
- photomultiplier tubes (PMT) 322, 328
- pick-and-place arm (PnP) 148
- PicoPRECISE* 176
- PicoSpotter* 176
- piezo dispense capillaries (PDCs) 170
- piezoelectric dispensers 164, 170, 172–173
- PIPETMAX* 135
- Pipette+* 207
- pipetting technologies 99, 111, 112, 119, 121
air displacement pipettes 116
positive displacement pipettes 5, 116–118,
160, 170, 192
- PipeJet*[®] 173
- plasma technology processes 125
- PlateLoc* thermal microplate sealer 98
- plate replication and reformatting 115
- platform-independent software solutions
436
- p*-nitrophenol (pNP) 12, 326
- p*-nitrophenyl phosphate (pNPP) 12, 326
- POLARstar*[®] *Omega* 335
- polychlorinated biphenyls (PCB) 26
- polychlorinated dibenzodioxins and
dibenzofurans 26
- polycyclic aromatic hydrocarbons (PAH) 27,
264
- polyethylene glycol (PEG) 127
- polyethylene terephthalate (PET) 74
- polymerase chain reaction (PCR) 7, 9,
12–13, 63, 69, 74, 77, 78, 82, 83, 95, 98,
111, 114, 117, 136, 141, 142, 144, 167,
172, 176, 177, 209, 211–213, 235, 330,
440
- polypropylene (PP) 72, 77, 80, 90, 91, 111,
117, 127
- polystyrene (PS) 69, 72, 77, 90, 130, 177
- polyvinyl alcohol (PVA) 127
- polyvinyl chloride (PVC) 72
- polyvinylidene fluoride (PVDF) 74
- polyvinyl pyrrolidone (PVP) 127
- Positive Pressure Unit* 247, 249
- potentiometric methods 4, 302
- Powdernium*[™] *Classic Hopper* 190–192
- Powdernium*[™] *Storage Vial Hopper (SV)*
191, 192
- pressure-based
performance monitoring 130
sensors 131
- proAnt platform* 307
- process control system (PCS) 43, 46, 49, 242,
435–449
- proliferation assays 10, 324, 332
- Propette* 114
- propidium iodide 331
- protein
crystallography 136, 168, 170, 173, 176
precipitation 22, 232, 264
purification 9, 74, 148, 168
- pull-off finger 99
- pulsed laser irradiation 203
- pumps
flow 120–121
piston 119–120, 161, 162
vacuum 119, 120
Push Decapper CP 620 104
- ## q
- Quadra96* 114
- Quantos* 194–195
- QIASymphony* 142
- QIAgility* 136
- quadrupole 346
- quasi-volumetric method 155, 161
- Quick Response Code 390–391
- ## r
- radio frequency identification (RFID)
technology 148, 262, 387, 411
- RapidCap2* 105
- Rapidfire* 245, 373
- real-time quantitative PCR (qPCR or
RTD-PCR) 13
- REDI* system 189, 194
- relative positioning technique 303
- reservoir filling 150

reversed phase liquid chromatography
(RP-LC) 203

RoboLid 77, 80–81

robotic

actuator 245

joints 283

loading 195, 215

manipulator arm 148

robot operating system (ROS) 299, 304

robots 281

controllers 285, 287, 294, 315

gripper systems 308, 313–314

adaptive gripper 311–312

magnetic gripper 311

mechanical gripper 308–310

pneumatic grippers 310–311

sensors and safety systems 314–316

mobile robots 300–301

robotic configurations 285, 286

robot programming 288

stationary robots 294–299

Rotanta 235

rotatory joints 283

Rotina 235

round bottoms (U-bottom) 71, 76

S

safety aspects, in laboratory automation
316–318

saliva (sputum) 17, 20, 21, 88, 94, 242,
331

SAMI EX (Beckman Coulter) 444–446

sample identification

barcode technology 387, 394–400

market situation 409–412

reader technology 392–394

types 388–392

sample preparation 5, 22, 23, 27, 29, 31, 74,
76, 94, 111, 115, 116, 141, 292,
344–346, 351, 352, 406, 448, 450, 476

Sato CLANX 409

scheduling 44–47, 437–438, 440, 445, 448

sciDROP 106

scientific data management system (SDMS)
479, 480

vendors 480, 481

Scorpion 136

sector field mass spectrometers 346

Secure Sockets Layer (SSL) standard 442

self-filling reservoirs 150

serial dilution 115, 148, 149, 170

serine-threonine protein kinases 332

shaking incubators 216–218, 222, 224, 225

short range device (SRD) 403

silicone sealing mats 80

single-cell suspensions 74

single-channel system 113, 134, 136, 244

single samples handling

automated opening/closing of 104–106

automated transport 100, 104

small computer system interface (SCSI)
417–418

Smart Cards 386

SmartSample™ 409

snap-cap closures 105

Society for Laboratory Automation and
Screening (SLAS) 70

sodium chloride 183

software requirements specifications (SRS)
468

solenoid

pressure bottle instruments 163

valve dispensers 163

valve syringes 163

solid dispensing 182, 185–186, 197–198

systems 190, 192–196

technologies 186

solid phase extraction (SPE) 76, 204, 240,
243, 349

automated parallel processing systems
245–247

automated single sample processing
systems 243–245

automated SPE systems, requirements for
242–243

high parallel systems 247–250

labware 250, 255, 269

column types 252

fully automated parallel 251

with limited parallelity 248

- requirements 242–243
 - semiautomated systems 241–242
 - solariX* 353
 - SOLO* 135
 - sonication
 - basics and applications of, ultrasonic systems 256
 - cell lysis, extraction, and fragmentation 257–258
 - dispersion and deagglomeration 257
 - ultrasonic homogenization 256–257
 - market situation and systems 258–262
 - sonochemistry 258
 - sound waves 256
 - Spark*[®] 335, 336
 - speed of sedimentation 231
 - SPEEDY* 245
 - SR-2000W* 400
 - standardization 424
 - SiLA 2 Standard 425–427
 - standard
 - operating procedures 52, 195, 444, 476–478, 480
 - pipettes (SPIP) 172
 - pipetting method 118
 - stationary robot systems 294–299
 - stirrers, magnetic 214–217, 219
 - Sturtevant Automatic Coal Crasher 3
 - swing-bucket rotors 232
 - Swifti* 294
 - SWILE* 191–193
 - synchronous communication 418
 - synchronous or asynchronous mode 418
 - Synergy™ H1 Hybrid* 336
 - system control software/process control systems 435–438
 - Cellario* 438–440
 - Green Button Go* 440–441
 - HWMS* 447–448
 - momentum* 441–442
 - OneLab* 442–443
 - Overload* 443
 - SAMI EX* (Beckman Coulter) 444–446
 - VWorks* 446–447
- t**
- Talos* 304
 - tapered bottoms (V-bottom) 71
 - Tecan 500* 114
 - Teleshake 216
 - Δ^9 -tetrahydrocannabinol (THC) 21
 - therapeutic antibodies 11
 - thermal cyclers 13, 207–213, 443
 - Thermo-Matrix tubes 104
 - thin-layer chromatography 203
 - Thomson (Th) unit 342
 - Tiago* 304
 - 2D Tilting Unit* 217
 - 3D Tilting Unit* 217
 - time-of-flight mass spectrometers (TOFMS) 347
 - tissue culture (TC) 74, 224
 - titration methods 3, 132
 - TM lightweight robots* 299
 - tool center point (TCP) 284, 285
 - torque sensors 290, 298, 299, 317
 - total nitrogen (TN) 259
 - total organic carbon (TOC) 27, 259
 - Tox21 Screening System* 8
 - Tube Shaker+* 217
 - TurboVap vaporizers* 265
 - two-dimensional (2D) barcodes 105, 388, 390–393, 398, 402
 - TX2-Touch series* 298
- u**
- ultra-high frequency (UHF) range 404
 - ultra-low-volume dispensing (ULVD) 176
 - ultrasonic sensor 240
 - ultrasound-based performance monitoring 132
 - Ultra™* 173
 - ultraviolet (UV) radiation 322
 - Universal Product Code (UPC) 388
 - Universal Robots systems 294
 - Univo Electric Capper CP860* 105
- v**
- vacuum-based approach 241
 - vacuum cleaners 302

- Versette* automated liquid handling system
148–149
- Viscous Dispenser Unit* 140
- visible (VIS) radiation 322
- vitamin K deficiency 19
- volatile halogenated hydrocarbons (LHKW)
27
- volume delimitation, of bulk material 187,
188
- volumetric dosing methods 186–188
- vortexer 214
- vortex mixers 214
- Vspin* centrifuge 235
- VWorks* 446–447
- W**
- water-soluble dye 3-(4,5-dimethylthiazol-
2-yl)-2,5-diphenyltetrazolium bromide
(MTT) 10
- water-soluble tetrazolinium (WST-1) test
323–324
- web based structures 453
- Wide Area Network (WAN) 421
- workflow automation software 448
- workstation 42–45, 51, 53, 54, 100, 113,
132–134, 141, 150, 182, 222, 242, 245,
249, 250, 265, 288, 394, 399, 444, 446,
448, 452
- world coordinate system (WORLD) 284, 285
- World Health Organization (WHO) 62, 226
- X**
- XcelVap* 265
- Y**
- Yumi* 299
- Yu robot* 298
- Z**
- Z-axis movement 155
- Zephyr G3* liquid handling workstations 148
- Zephyr G3 SPE workstation* 249
- Zeroconfig/Bonjour protocol 425
- Zymark's systems 282

