

## Subject Index

### **a**

absorption 42, 47, 262, 267, 277  
 accelerated solvent extraction 101, 694  
 accurate mass 7, 323, 332, 339, 374, 436, 462, 693, 730, 741  
 acetate buffer 14, 573, 594  
 acetylation 40, 763  
 Achilles heel 128  
 acquisition rate 235, 246, 335, 506, 598  
 acrylate 30, 37, 44, 45  
 acrylonitrile butadiene styrene (ABS) 651  
 actinomycete bacteria 632  
 activated charcoal 68, 79, 84  
 active ingredients 603, 626  
 active sites 222, 515, 711  
 adduct ion 301, 312, 420, 769  
 adsorption 22, 23, 42, 59, 62, 65, 77–85, 141, 144, 150, 515, 542  
 adulteration 173, 338, 637  
 AED 251–254, 432  
 AFID 259  
 air analysis 77–79, 86, 541  
 air-water distribution ratio 48  
 alcoholic beverages 619  
 allergens 644, 649  
 Amberlite XAD-2 78, 84, 649  
 Amberlite XAD-4 78, 81  
 ambient BP 161–163  
 AMDIS 426–433, 438, 637–644, 657, 668, 673–677  
 ammunition plant 618, 619

analysis time 28, 35, 148, 152, 161, 194, 197, 200–204, 216, 221, 226–228, 235, 240, 597, 612, 713  
 analyte protectants 222, 596, 626, 629  
 animal feed 101, 718  
 antifouling agents 573  
 APCI 310, 331, 382  
 APGC 2, 196, 311  
 appearance potential 294  
 Aquasil 141  
 aqueous samples 17, 25, 38, 47, 53, 64, 74, 87, 549, 570, 616, 700, 748  
 Arabidopsis Thaliana 657  
 aroma profiling 637, 644  
 artificial intelligence (AI) 249, 433  
 ASE *see* accelerated solvent extraction  
 ASTM Method 3710 191  
 ASTM Method 5501 191  
 ASTM Method 5504 191  
 ASTM Method 8368 268  
 ASTM Method D 2887 191  
 ASTM Method D 5134 191  
 ASTM Method D 5623 191  
 ASTM Method D 6584 192  
 ASTM Method D2369 678  
 ASTM Method D5116-97 96  
 ASTM Method D6196 82  
 ASTM Method D7143-05 96  
 ASTM Method D7706 96  
 ASTM Method D8071 268  
 ASTM Method D8267 268  
 ASTM oxygenates methods 192  
 ASTM Standard Practice D-7210 102

- ASTM Standard Practice D-7567 102  
asymmetric peaks 217  
atmospheric pressure chemical ionization  
*see APCI*  
atomic emission detector *see AED*  
authentication 173  
authenticity 338  
automation 9–12, 15, 17, 18, 25–29, 31,  
32, 34, 36, 39, 42, 46, 47, 49, 50, 56,  
59, 64, 70, 73, 74, 84, 85, 87–89,  
98–101, 129, 135, 143, 158, 162,  
164, 169, 171–173, 227, 250, 265,  
554, 594, 599, 614, 632, 647, 665,  
683  
automobile industry 677  
automotive paint 89  
AutoSRM 387, 658  
autotune 389, 741  
AutoTwister 87  
avocado 595  
axial diffusion 197, 238  
ayurvedic churna 604  
azo dyes 683
- b**  
backflush 66, 128, 151–155, 164, 250,  
273, 355  
background subtraction 417, 423–426,  
449, 452  
background 67, 69, 75, 78, 152, 269, 307,  
324, 384, 399, 414, 480, 508,  
523–527, 668, 734  
baffled liner 143, 159, 167, 600, 699  
Baijiu 619  
bake-out phase 70  
beverages 34, 73, 77, 253, 265–266, 268,  
338, 637  
BFB tune criteria 552  
BFB tuning 373, 391, 395, 549  
BFRs 504, 697, 700, 739, 747  
biodiesel 192  
bioethanol 191  
biological samples 101, 102  
biomarker 385, 656  
biomedical analysis 240
- BKF *see backflush*  
blood alcohol 54, 193  
blood 732, 763  
bottom-sensing 17, 18  
breakthrough volume 19, 77  
brewing industry 189  
BSIA *see bulk stable isotope analysis*  
BTEXTRAP 69  
BTV *see breakthrough volume*  
bulk stable isotope analysis 351  
butyl rubber septa 73, 527, 531
- c**  
C18 sorbent 14, 16, 25, 212, 601  
calculation of gas flow rates 271  
calibration curve 344, 512–515  
calibration function 389, 509, 513  
calibration substances 390  
cancerogenic amines 683  
cannabis 751  
car interior materials 677  
carbenium ion 469  
Carbograph 79, 80  
Carbograph 5TD 645  
carbon wide range 30, 34, 37, 45, 48  
Carbon WR *see carbon wide range*  
carbonized molecular sieve 79, 80  
CarbonX 601  
Carbopack 43, 66, 68–70, 77, 79, 82  
Carbopack C 79  
Carbosieve 69, 77, 79  
Carbosieve SIII 68, 80–82  
Carbotrap 78–80, 82, 167  
Carboxen 43–45, 66, 68–70, 77, 79, 80,  
187  
carrier effect 520, 521  
carrier gas(es) 41, 71, 100, 132, 136, 141,  
143, 174, 194, 204, 212, 258  
argon 196  
helium 64, 132–134, 149, 174, 195,  
198–201, 211, 216, 229, 253, 258,  
261, 263–267, 271, 396  
hydrogen 64, 132, 149, 194, 195,  
198–201, 216, 237, 257, 265–267,  
271, 396

- nitrogen 64, 132–134, 196, 199, 229,  
     265–267, 271  
 purity 526  
 carrier gas flow 138, 139, 146, 160,  
     197–200, 205, 225, 227, 233, 249,  
     251, 253  
 constant flow 136, 198, 199, 215,  
     229–232, 253  
 constant pressure 174, 198, 199, 229,  
     231, 253, 270  
 optimum flow conditions 198  
 carrier gas flow rate 216  
 carrier gas re-routing 76, 130  
 carrier gas regulation 129, 131  
     back pressure regulation 131  
     forward pressure regulation 130  
 gas saver 133  
 mass flow controller 131  
 carrier gas saving 132  
 carrier gas supply 171  
 carrier gas velocity 148, 174, 198, 199,  
     201, 202, 221, 224, 233, 238  
 carryover 47, 72, 75, 149  
 centrifugation 17, 18, 605, 759  
 centrifuge 651  
 cereals 12, 13  
 certified reference standards 82  
 cesium iodide 392  
 charcoal 68, 82  
 cheese 644  
 chemical ionization 6, 196, 295–313,  
     766, 767  
     ion volumes 312  
     negative *see* negative chemical  
         ionization  
     positive *see* positive chemical ionization  
 chemical noise 174, 373, 414, 424, 447,  
     508  
 chicken 12  
 China Method GB 8410-2006 678  
 China Method GB/T 19649-2005 102  
 China Method GB/T 21911-2008 625  
 China Method GB/T 27630-2011 678  
 China Ministry of Health 619  
 chiral column phases 183  
 chlorophyll 14, 16  
 choice of GC columns 173  
 chromatographic resolution 167, 201,  
     216–227, 239–245, 250, 353, 688,  
     695  
 chromatography parameters 212  
 Chromosorb 80, 82, 147, 163, 228  
 ChromSync 90  
 CI *see* chemical ionization  
 CI gases  
     ammonia 300, 307, 767, 769  
     argon 301  
     benzene 301  
     carbon monoxide 301  
     charge exchange 301  
     isobutane 300, 307  
     methane 300, 306, 753, 767, 769  
     methanol 300, 308  
     nitric oxide 301  
     nitrogen 301  
     proton affinities 300  
     water 300, 310, 498  
 CID 382, 383  
     collision energy 382  
 collision gases 383  
 citrate buffer 595  
 classical detectors 9, 249, 251, 268, 430,  
     506  
 Clausius-Clapeyron equation 149  
 clean-up 9–14, 16, 17, 19, 22, 25, 26, 50,  
     70, 75, 98, 99, 102, 105, 151, 584,  
     594, 599  
 α-cleavage 468, 496  
 closed loop cooling 64, 167  
 closed-loop stripping (CLS) 632  
 CLP SOW Method OLM04.2 102  
 co-elution 244, 384, 416–429, 447, 713  
 Codex Alimentarius 583  
 coeluting compounds 243, 323, 335, 384,  
     597, 637, 640, 658, 665, 673, 677,  
     690, 701, 733  
 coffee 173  
 cold needle injection 147  
 collision energy 387  
 collision induced dissociation *see* CID

- column bleed 134, 135, 167, 174–176, 203–205, 209, 210, 212, 233, 269, 391, 423, 525  
 column clipping 152, 155  
 column flow 130, 132, 133, 138–140, 146, 202, 265  
 column length 202, 204, 216, 221, 229, 231, 232, 241  
 column lifetime 155, 206  
 column storage 205  
 Commission Regulation (EEC) 2568/91 173  
 Commission Regulation (EU) 2017/771 718  
 compound specific isotope analysis 351, 569  
 comprehensive GC 199, 239, 242, 248  
 concentrated samples 148, 171  
 concentration dependent detectors 251  
 concurrent backflush 151–154  
 concurrent solvent evaporation 165, 172  
 concurrent solvent recondensation 16, 24, 131, 150, 151, 162, 164  
 conditioning station 41  
 confidence interval 344, 510, 513–515, 520  
 confirmatory methods 343, 718, 719  
 consumer products 739  
 contour plot 248  
 cooled injection system CIS 135  
 cosmetics 637  
 cost per sample 11, 85, 99, 600  
 cost reduction 28  
 cross-contamination 59, 74  
 CRSSs *see* certified references standards  
 cryo-enrichment 168  
 cryo-milling 584, 601, 651  
 cryo-trap 355, 357  
 cryoconcentrator 543  
 cryofocusing 35, 64, 71, 72, 75, 87, 166, 167, 203, 246, 541, 543, 545, 571  
 cryohomogenization 594  
 CSIA *see* compound specific isotope analysis  
 CSR *see* concurrent solvent recondensation  
 cup liner 143  
 Curie temperature 92  
 CWR *see* carbon wide range  
 cyanobacteria 632  
 cyclo liners 143
- d**
- dairy samples 73  
 data acquisition 322  
 centroid mode 322  
 profile mode 322  
 de Broglie wavelength 292  
 dead time 174, 197, 215, 224, 431  
 Deans switch 249, 272  
 decision limit 507–510  
 deconvolution 247, 336, 425, 506, 637, 656, 665  
 deep eutectic solvents 11  
 degradation 593, 739, 762  
 degradation pathways 569  
 Depot Area Air Monitoring System tubes 86  
 derivatization 10, 27, 32, 39, 40, 44, 56, 103, 164, 304, 471, 492, 656, 665, 751, 762  
 acetylation 763  
 diazotation 616  
 DMOX 471  
 ethylation 573  
*in situ* derivatization 572, 614  
 iodination 614, 616  
 methoximation 656, 661  
 methoxyamination 660  
 methoxybromination 471  
 methylation 349, 492  
 pentafluorpropionylation 763  
 silylation 349, 656, 660, 661, 763  
 TMSH 492  
 two-step derivatization 660  
 desorption phase 66  
 detergents 649  
 DFTPP tuning 395  
 diatomaceous earth 104

- Diesel 268  
 DiffLok end-cap 85  
 diffusion 81, 85, 134, 139, 142, 145, 197, 198, 223, 226, 250  
 diffusion pumps 399  
 diffusion-locking 85  
 DIN EN 12393-2 151  
 dioxin 159, 164, 190, 255, 295, 302–304, 311, 317, 323, 339, 343, 375–381, 385, 495, 504, 513, 520, 718–738  
 dioxin-like 712, 718, 729–737  
 direct column heating 227, 235  
 direct immersion sampling 27, 28, 34, 46  
 direct liquid introduction 168  
 direct MS coupling 233  
 discrimination 144, 147, 148, 157  
 disperser 17  
 dispersive SPE 11, 15, 594, 601–605  
 dissociative electron capture 254  
 DLLME 17–19  
 doping control 752  
 double focusing MS 316  
 drinking water 62, 64, 88, 263, 265, 560, 614, 619, 632, 748  
 Dronabinol 751  
 drug analysis 27, 34, 40, 141, 189, 208, 267, 339, 345, 496  
 drug screening 762  
 dry purge phase 66, 69, 75, 79, 562, 570, 645  
 dSPE *see* dispersive SPE  
 dual detection 668  
 dual-column adapter 639  
 dual-column separation 637  
 dwell time 379, 507  
 dynamic headspace analysis 9, 10, 53, 62, 74, 76, 167, 338, 644, 647  
 ITEX DHS 74, 76, 265  
 purge and trap 62, 63, 67, 68, 70, 71, 76, 130  
 spray-and-trap 63  
 dynamic range 158, 256, 265, 267, 335
- e**
- ECD *see* electron capture detector  
 ECD-MS 302
- Eddy diffusion 198, 215  
 edible oils 72, 173  
 eggs 601, 732  
 EIC *see* extracted ion chromatogram  
 ELCD *see* electrolytical conductivity detector  
 electrolytical conductivity detector 256  
 electron capture 10, 254, 261, 262  
 electron capture detector 10, 18, 66, 190, 250–252, 254–256, 260, 262, 432  
 electron mass 392  
 electronic components 98  
 electronic flow and pressure control 130  
 electronic pneumatic control 130  
 element-specific detectors 251  
 elemental formula 296, 329, 457  
 elution temperature 170, 203, 204, 209, 226, 233, 238, 741  
 emergency toxicology 757  
 EN ISO 16017 83  
 EN Method 14013 192  
 EN Method 14105 192  
 EN Method 14106 192  
 EN Method 14110 192  
 endocrine disruptors 88  
 enrichment 18, 19, 34, 35, 77, 79, 166  
 environmental analysis 1, 12, 26, 48, 62, 65, 72, 89, 98, 101, 206, 235, 240, 247, 253–255, 263, 265, 268, 549, 697, 748  
 environmental contaminants 235, 594, 598, 697–712  
 EPA Method 0030 82  
 EPA Method 0031 82  
 EPA Method 1613 190, 344, 520, 721, 730  
 EPA Method 1613B 375  
 EPA Method 1614 739  
 EPA Method 1624 79  
 EPA Method 1625 190  
 EPA Method 1994b 721  
 EPA Method 1P-1B 82  
 EPA Method 311 98  
 EPA Method 3445A 101  
 EPA Method 3540 102  
 EPA Method 3541 102

- EPA Method 3550 102  
 EPA Method 502 263  
 EPA Method 502.2 189  
 EPA Method 503.1 263  
 EPA Method 504 190  
 EPA Method 505 190  
 EPA Method 507 191  
 EPA Method 508 190  
 EPA Method 524.2 189, 560  
 EPA Method 525.2 25  
 EPA Method 542.2 79  
 EPA Method 543 25  
 EPA Method 552 190  
 EPA Method 601 189  
 EPA Method 602 189, 263  
 EPA Method 608 190, 191  
 EPA Method 610 228, 229  
 EPA Method 624 79, 189, 550  
 EPA Method 625 190  
 EPA Method 8010 189  
 EPA Method 8020 189  
 EPA Method 8080 190  
 EPA Method 8081 190, 191  
 EPA Method 8081b 141  
 EPA Method 8082 190  
 EPA Method 8141A 191  
 EPA Method 8151 102, 190  
 EPA Method 8240 189, 560  
 EPA Method 8260 189, 549, 560  
 EPA Method 8270D 190  
 EPA Method 8270E 9  
 EPA Method 8275 98  
 EPA Method CLP 191  
 EPA Method SW-846 82  
 EPA Method TO-1 82  
 EPA Method TO-14 82, 87, 541, 546  
 EPA Method TO-15 87, 541, 543  
 EPA Method TO-17 82  
 EPA Method TO-2 82  
 EPA Methods 524.2 550  
 EPA SW-846 Test Method 3545A  
 102  
 epoxidized soy bean oil 173  
 equilibrium extraction 36, 38, 49–52,  
 70, 71  
 error probability 509  
 ESBO *see* epoxidized soy bean oil  
 essential oils 268, 602, 603, 637  
 EU Commission Regulation 278/2012  
 343  
 EU Commission Regulation No.  
 1883/2006 343  
 EU Commission Regulation No. 589/2014  
 343  
 EU Commission Regulations No.  
 252/2012 343  
 EU Directive 2002/61/EC 685  
 EU Directive 2003/11/EC 739  
 EU Directive 2009/48/EC 649  
 EU Regulation 1881/2006 692  
 EU Regulation 835/2011 692  
 EU SANCO identification criteria 701  
 European Council Directive 96/23/EC  
 516  
 European Union Water Framework  
 Directive 572  
 evaporation 19, 20, 24, 32, 34, 100, 105,  
 138–141, 143, 144, 147–149, 151,  
 157, 159, 163, 165, 168, 169, 172,  
 754  
 exhaustive evaporation 70  
 exhaustive extraction 36, 40  
 exothermic reaction 13, 297, 306  
 explosives 193, 238, 339, 498  
 external standard 148, 429, 516, 522,  
 544, 557, 579, 596, 605, 620, 628,  
 650, 749, 806  
 extractables 16, 665–667  
 extractant 17  
 extracted ion chromatogram 415,  
 624  
 extraction time 38, 47, 88, 100  
 Extrelut 752
- f**  
 fabric softeners 649  
 FAMEs 180, 192, 204, 208–211, 257, 356,  
 442, 472  
 fast GC 131, 179, 204, 227, 228, 232, 233,  
 235–237, 239, 242, 272, 335, 337,  
 594, 597, 691, 712, 713  
 fat removal 105, 599

- fatty matrices 13, 599  
 FD *see* fluorescence detector  
 FET *see* full evaporation technique  
 FF-TG-GC *see* flow-field thermal gradient GC  
 FID *see* flame-ionization detector  
 field sampling 27, 36, 74  
 film thickness 64, 70, 166, 174, 198, 200, 202, 204, 221, 224, 228, 232, 237  
 Firemaster 320  
 fish 12, 595, 698  
 fish farming 697  
 fish feed 697  
 flame-ionization detector 89, 132, 173, 211, 229–232, 241, 251–253, 255, 257–259, 261–263, 266, 268, 269, 432  
 flamephotometric detector 251, 253, 258, 265, 432  
 flameproofing agents 504  
 flavoring 628, 637, 691  
 flavors 27, 36, 53, 62, 77, 189, 206, 253, 257, 267, 268, 637, 691  
 flight time *see* ion flight time  
 flooded zone 170  
 flow optimization 197  
 flow path 131, 222, 273  
 flow switching 249, 271  
 flow-field thermal gradient GC 237  
 fluorescence detector 584  
 foaming samples 63, 65, 75  
 fog 677  
 Fomblin 399  
 food 11, 13, 25, 26, 46, 48, 50, 53, 57, 77, 89, 96, 101, 152, 173, 210, 240, 253, 254, 265, 267, 268, 338, 595, 599, 645, 691, 732  
 food container 46  
 food packaging materials 62, 72, 77  
 food quality 644  
 food safety 572, 577, 603, 619, 626, 697, 718  
 food safety analysis 1, 25, 26, 48, 173, 210, 235  
 forensic analysis 25, 26, 89, 268, 751  
 Fourier transformation 332  
 FPD *see* flamephotometric detector  
 fragment ion 90, 294, 328, 381, 416, 418, 420, 457, 462, 491, 690, 740, 754, 769  
 fragmentation 292–297, 300, 306–308, 311, 314, 339, 381–384, 415, 418, 434, 436, 468–472, 657  
 neutral loss 384, 457, 470  
 fragmentation pathways 499, 673, 766–770  
 fragmentation pattern 365, 373, 419, 436, 457, 472, 492, 496, 668, 757  
 fragmentation rules 90, 468  
 fragrances 27, 44, 62, 189, 253, 257, 267, 268, 637, 649  
 frit liner 143  
 fruits 152, 578, 584, 595, 627  
 fuels 258  
 full evaporation technique 32, 56, 639  
 full scan screening 757  
 full scan spectra 195, 234, 240, 247, 332, 339, 363–365, 387, 769  
 full scan confirmation 614  
 fungicides 577
- g**  
 GAC *see* green analytical chemistry  
 gas-phase acidity scale 305  
 gasoline 549  
 GC column phases 175–193, 205–212  
 GC method  
 isothermal phase 15, 131, 171, 226  
 solvent peak 15, 53, 131, 163, 164, 169–171  
 GC method translator 196, 198  
 GC × GC 209, 223, 239–245, 335–339  
 GC × GC/HRMS 247  
 GC × GC/IRMS 247  
 GC × GC/QMS 246  
 modulator 242, 245, 246, 248  
 GC × GC/TOF-MS 247  
 GC-ICP-MS 251  
 GC-IRMS 251  
 GC-LC Concordance 90

- GC-O *see* olfactometry  
 GC-Q-TOF-MS 334, 335  
 GCB *see* graphitized carbon black  
 gel permeation chromatography 10, 99,  
     102, 601, 722  
 genotype 656  
 glass beads 64, 70, 167  
 glass cap cross divider 270  
 glass dome 249, 270  
 glass wool 138, 140, 141, 143, 144, 147,  
     150, 151, 157, 159, 163, 167  
 GMW 15634 standard 678  
 goose neck liner 139  
 GPC *see* gel permeation chromatography  
 grains 658  
 grapeseed oil 173  
 graphene 23, 48  
 graphite ferrules 273, 525  
 graphitized carbon black 14, 16, 69,  
     78–80, 605  
 green analysis 24  
 green analytical chemistry 9, 11, 17, 25,  
     27, 28, 98, 637  
 groundwater 614, 619  
 guard column 100, 205, 234, 269, 573,  
     595
- h**
- Hagen–Poiseulle law 271  
 halfmil columns 256  
 Hall detector 256  
 hard discs 98  
 HayeSep D 80  
 height equivalent to a theoretical plate  
     174, 196–198, 201, 214, 216, 224  
 He-PDPID *see* PDID  
 headspace analysis 554  
     dynamic headspace 9, 53, 56, 62, 76,  
         167, 639, 647  
     multiple headspace extraction 40, 56  
     pressure balanced injection 60  
     sample loop 61  
     static headspace 38, 49–52, 56,  
         59–75, 84, 148, 166, 554–558, 639,  
         673
- syringe injection 60  
 vial pressurization 61  
 headspace liners 143  
 headspace sorptive extraction 87  
 heart cutting 239, 241, 242, 249, 272  
 heat of evaporation 149  
 helium ionization detector 252, 258,  
     261  
 Henry's law 50  
 herbicides 102, 191  
 herbs 595, 603, 694  
 HETP *see* height equivalent to a  
     theoretical plate  
 HID, *see* helium ionization detector  
 high boiling compounds 3, 80, 93, 140,  
     145, 152, 154, 157, 159, 161, 170,  
     194, 225, 234, 273  
 high mass resolution 291, 323, 328, 332,  
     339, 374, 737  
 high mass tune 382  
 high resolution accurate mass 7, 10, 324,  
     339, 390, 541, 693  
 high resolution MS 240, 317, 322, 691,  
     694, 718, 739, 748  
 HLB *see* hydrophilic-lipophilic balance  
 HLB-WAX 48  
 HLB-WCX 48  
 H53 method 238  
 honey 12, 32  
 hops 268  
 hot wire detector 265  
 HPLC 34, 98, 99, 382, 492, 584  
 HRAM *see* high resolution accurate mass  
 HRMS *see* high resolution MS  
 HS-GC *see* headspace analysis  
 HS-SPME *see* SPME  
 HSSE *see* headspace sorptive extraction  
 human error 25  
 human nose detector 268  
 hydrocarbon background 324  
 hydrolysis 577, 753, 762  
 hydrophilic-lipophilic balance 25, 36, 48  
 HyperChrom GC 238  
 hyphenated techniques 9, 10

***i***

IDL *see* instrument detection limit  
 IDL calculation 511  
 IMS *see* ion mobility MS  
 in-cell clean-up 104  
 in-cell sample preparation 104  
 INCOS library search 444  
 incubation temperature 27, 38, 47, 50,  
     51, 53, 56  
 indoor air analysis 77, 96, 649, 677  
 information content 381  
 injection port septa 134  
     average lifetime 135  
     bleed and temperature-optimized  
         (BTO) 135  
     Merlin MicroSeal 135, 136  
 injection techniques 10, 129, 131, 138,  
     144  
     cold needle with liquid band formation  
         138  
     hot needle with thermospray 138,  
         144, 146  
 injection volume 60, 75, 131, 139, 145,  
     146, 149, 151, 162, 170  
 injector temperature gradient 135  
 inlet liner 41, 42, 138–140, 143, 152, 155,  
     158, 166, 171  
 inlet liner activity 140–142  
 inlet liner deactivation 140–142, 147,  
     150, 574, 700  
 instrument detection limit 344, 415, 510  
 internal diameter 159, 200–202, 204, 230  
 internal mass calibration 375, 390  
 internal standard 40, 53, 57, 59, 62, 74,  
     146, 148, 517  
     isotopically labeled 247, 517, 519  
 interpretation of mass spectra 451  
 in-tube extraction 74–76  
 ion flight time 291, 314, 322, 335, 388,  
     395, 420  
 ion mobility MS 53, 336  
 ion ratio confirmation 718  
 ion source 10, 53, 195, 196, 202, 230,  
     233  
 ion source matrix effect 10, 16

ion trap MS 541, 560, 614, 762  
 ion trap MS/MS 649, 747, 766  
 ionic liquids 48, 209, 210  
 ionization 196, 258, 261–264, 292, 312,  
     359, 418, 468  
     chemical ionization 295  
     electron ionization 5, 292, 418, 436,  
         554  
     energy 293  
     ionization selectivity 297  
     low voltage ionization 292, 331,  
         381  
     potential (IP) 263, 292, 701  
 ions source vacuum 249  
 irm-GC-MS *see* isotope ratio mass  
     spectrometry  
 ISO 11890-1 678  
 ISO 11890-2 677, 678  
 ISO 12219-3 96  
 ISO 14362-1 to-3 685  
 ISO/EN 16000-6/-9/-10/-11 96  
 isobaric interference 359  
 isomeric compounds 267, 433, 637, 688,  
     701, 721  
     stereoisomers 638  
 isothermal phase 15, 131, 147, 151, 159,  
     160, 169, 171, 196–198, 204, 205,  
     224–226, 242, 431  
 isotope abundance 291, 346, 463  
 isotope dilution quantitation 517, 519,  
     520, 541, 693, 721, 734, 739  
 isotope effects 347, 349  
 isotope pattern 295, 375, 446, 457,  
     461–467, 473, 480, 490, 495, 496,  
     504, 507, 575, 734, 737  
 isotope ratio mass spectrometry (IRMS)  
     249, 344, 345, 569  
     delta notation 346  
     Faraday cup 359  
     online combustion 355  
     online reduction 355  
     primary reference materials 362  
 isotope separation 353  
 isotopic signature 569  
 ISTD *see* internal standard

**j**

jet fuel 268  
juices 12, 27, 577

**k**

kidney 12, 573  
Kovats index 225, 431, 436–439

**l**

landfill gases 77  
large volume injection 24, 25, 130, 155, 157, 162–165  
larger sample volumes 163, 170  
LC-GC analysis 10, 99, 100, 162, 165, 171–173, 200  
LC-MS 12, 15, 16, 18, 25, 34, 87, 102, 311, 594  
leachables 665  
leak check 525  
leak detector 134, 523, 525  
leaks on GC side 48, 134, 136, 138, 273, 523–525  
leaks on MS side 270, 508, 523–525  
leather 679, 683  
lettuce 601  
library search 90, 195, 248, 267, 268, 556, 656, 683, 690, 768  
reverse search 673  
life sciences analysis 268  
limit of detection 2, 34, 238, 243, 344, 415, 509, 512, 514, 544, 546, 558–560, 564, 583, 593, 617, 624, 655, 696, 732, 749, 754  
limit of quantitation 24, 39, 378, 385, 512–516, 564, 583, 594, 624, 655, 696, 711, 719, 745, 754  
liner deactivation 140, 142, 147, 150, 273, 574  
AquaSil 141, 142, 574  
Siltek 604, 615, 699, 700  
SurfaSil 141, 142, 574  
lipids 16, 173, 339, 441, 442, 700  
lipophilic compounds 13  
liquid band injection 144, 147  
liquid CO<sub>2</sub> 64, 70, 167, 245, 554

liquid desorption 87

liquid N<sub>2</sub> 64, 70, 167, 245, 659

liquid/liquid extraction 9, 11, 15, 19, 23, 98, 572, 584, 603, 604, 620, 639, 649, 697, 700, 757

liver 601

LLE *see* liquid/liquid extraction

local normalization 446

location of double bonds 471

lock-mass technique 375

lock-plus-cali mass technique 375

LOD *see* limit of detection

loop type sampler 71

LOQ *see* limit of quantitation

low temperature HS 73

low pressure GC 200, 233, 597

LPGC *see* low pressure GC

LPGC-MS 234, 235, 594, 597

LVI *see* large volume injection

LVI-PTV 153, 162, 164

**m**

magnetic sector MS 246, 316, 327, 374, 390, 691, 734, 739

magnetic solid phase extraction 23

maintenance 13, 73, 75, 152, 155, 235, 264

makeup gas 257, 270

Ar/10% methane 254

nitrogen 252, 254

Marinol 751

mass calibration 321, 323, 375–379, 388–396

mass chromatogram 90, 160, 378, 415–422, 447, 452, 456, 498, 517, 521

mass defect 323, 324, 343, 389

mass flow controller 131

Mass Frontier software 665, 673, 766

mass resolution 314, 338, 720, 730

mass resolving power 314, 316

10% valley definition 315

FWHM definition 314

mass spectral libraries 90, 99, 637

Adams essential oil library 439

- Chemical Concepts library 443  
 The Fiehn library 441, 658  
 Geochemicals, petrochemicals, and biomarkers database 442  
 The Golm metabolome database 441  
 Kühnle pesticides library 440  
 The lipid library 442  
 Maurer Meyer Pfleger Weber library (MMPW) 440  
 Mondello flavors and fragrances of natural and synthetic compounds (FFNSC) 439  
 NIST 657, 668, 768  
 NIST Tandem Mass Spectral Library 436  
 NIST/EPA/NIH Mass Spectral Library 436  
 Physiologically active substances of drugs, steroid hormones, and endocrine disruptors 440  
 Pyrolysis of synthetic polymers 442  
 Rösner designer drugs 438  
 SWGDRUG MS library 441  
 Volatiles in food 439  
 Wiley KnowItAllMass 440  
 Wiley Registry of Mass Spectral Data 437, 657  
 Yarkov library of organic compounds 443  
 mass flow dependent detectors 251  
 matrix effect 15, 16, 34, 40, 54, 522, 584  
 matrix-matched standards 581, 583  
 matrix solid phase dispersion 23  
 maximizing masses peak finder 413  
 maximum residue level 516  
 McLafferty rearrangement 471  
 MCSS *see* moving capillary stream switching  
 MDHS 72 82  
 MDL *see* method detection limit  
 meat 12, 595, 691, 732  
 medical applications 627  
 megabore columns 172, 200, 233  
 metabolites 751  
 metabolomics 27, 48, 77, 332, 656  
 metal columns 172, 200  
 metal ferrules 273  
 metastable ion 420  
 methanizer 257  
 method detection limit 25, 141, 321, 509, 511, 551–554, 571, 635  
 methylation 164  
 MHE 40, 53, 57, 59, 74  
 micro pollutants 697  
 micro-chamber 646  
 micro-SPE 595, 601  
 $\mu$ SPE 9, 15, 19, 23–26, 235, 594–598, 600–603  
 microchannel devices 271  
 microextraction 10, 17, 27, 35, 48  
 microfluidic devices 271, 668  
 microplastic analysis 89, 94  
 microprep trap 251  
 microwave assisted extraction 100  
 milk 12, 36, 44, 732  
 miniaturization 9, 11, 19, 24, 27  
 minimum required performance limit 516  
 modulator 199, 223  
 dual jet cryo modulator 245  
 loop-based cryogenic-free flow modulators 245  
 moisture 77, 212, 266  
 moisture removal 64–67, 74, 75, 77, 104  
 molecular ion 293, 420, 456, 468, 766  
 molecular sieve 78–81  
 monoisotopic elements 462  
 MOSH/MOAH 173  
 moving capillary stream switching 249, 270  
 MRL *see* maximum residue level  
 MRPL *see* minimum required performance limit  
 MS Excel Data Analysis ToolPak 512, 515  
 MS/MS analysis 380, 415  
 fragmentation 767  
 neutral loss scan 384  
 precursor ion scan 384  
 MSChromSearch 90

MSDP *see* matrix solid phase dispersion  
 MSPE *see* magnetic solid phase extraction  
 mulch film 94  
 multi-dimensional GC 239–241  
 multi-residue analysis 594, 603  
 multi-sorbent tubes 96  
 musk fragrances 44

**n**

Nafion dryer 87, 354, 541, 543  
 nanomaterial 11, 22, 23, 48  
 nanoplastics 89  
 narrowbore column 200, 233, 235  
 natural abundances 346, 347, 362, 520  
 natural gas 265  
 NCI *see* negative chemical ionization  
 needle penetration depth 147  
 negative chemical ionization 299, 301,  
     306, 433, 491, 751, 767  
     charge transfer 304  
     electron capture 302  
     proton abstraction 304, 305  
     reagent ion capture 306  
 negative ion mode 337, 338  
 neutral loss scan 470  
 $(\text{NH}_4)_2\text{SO}_4$  54  
 NIOSH 2549 82  
 NIST Chemistry WebBook 436  
 NIST GC Retention Index Database 436  
 NIST library 556  
 NIST library search 444, 622  
 nitrogen 73, 253, 257, 259, 262–264, 266,  
     329  
 nitrogen rule 457  
 nitrogen/phosphorus detector 10,  
     251–253, 255, 259, 260, 416,  
     432  
 nominal mass resolution 291, 317, 326,  
     332  
 non-polar compounds 13, 69, 80, 81  
 non-polar hydrocarbons 209, 210  
 non-selective extractions 48  
 non-targeted analysis 4, 42, 47, 323, 332,  
     438, 618, 757  
 non-vaporizing injection 168

non-volatile samples 88  
 normal phase LC 99, 171  
 NPD *see* nitrogen/phosphorus detector  
 nuclear magnetic resonance (NMR)  
     293  
 number of theoretical plates  $N$  197, 216,  
     224  
 nutrivolatilomics 77

**o**

O-FID 252, 257, 258  
 occupational health screening 62  
 OCI 131, 157, 171  
 odor threshold 632  
 odors 50, 257, 338, 678  
 off-line technique 10  
 off-odors 632, 644  
 olfactometry 249, 250, 268  
 olive oil 32, 173, 338  
 on-column cryofocusing 166  
 on-column injector 100, 130,  
     168  
 online analysis 9–11, 15, 18, 24, 25,  
     27, 29, 34, 39, 87, 94, 99, 163,  
     171–173, 198, 252  
 online coupling 10, 99  
 online SPE 23–25  
 open split interface 268, 351–354, 543  
 open-tubular columns 215  
 Orbitrap analyzer 323  
 Orbitrap MS 329, 390  
 ortho effect 498, 618  
 orthogonal separation 241  
 outgassing 62, 76, 94, 95, 167, 677  
 outlet splitter 265  
 outlier 515  
 oven temperature program 133, 151,  
     154, 155, 159, 160, 164, 170, 197,  
     198, 205, 220, 225–228, 235, 239,  
     242  
 oxygen 35, 46, 73–75, 77, 91, 102, 134,  
     136, 205, 212, 252, 253, 257, 259,  
     262, 264, 266  
 oxygen-specific detector 258

**p**

packaging materials 62, 72, 77, 256, 338, 619  
 packed columns 20, 66, 128, 168, 198, 214, 228–230, 256  
 P&T *see* dynamic headspace analysis; purge and trap  
 paprika 601  
 parallel MS detection 265, 266, 268  
 partial concurrent solvent evaporation 173  
 partition coefficient 17, 27, 38, 48–54, 70, 72, 74, 75, 212, 216, 219, 748  
 PBM library search 444  
 PCI *see* positive chemical ionization  
 positive chemical ionization 299, 306, 433, 491, 496, 498, 767  
 adduct formation 301  
 charge exchange 300  
 hydride abstraction 300  
 protonation 299  
 PDD *see* pulsed discharge detector  
 PDED *see* pulsed discharge detector  
 PDMS overcoated 28, 46  
 peak apex plot 243  
 peak area vs. height 506  
 peak broadening 71, 128, 171, 197, 198, 223, 226  
 peak capacity 225, 239–241, 243  
 peak matching 394  
 peak profile 217  
 peak symmetry 66, 222  
 peak tailing 222, 256, 631  
 peak width 217, 224  
 pepper spray 626  
 perfume 637  
 persistent organic pollutants 1, 12, 374, 697, 698, 712, 718  
 personal defense products 626  
 pesticides 11–16, 25–27, 48, 94, 99, 100, 102, 141, 146, 151, 152, 154, 159, 190, 191, 195, 205–208, 233–235, 251, 254, 255, 258, 323, 332, 374, 482, 584, 594, 599, 603  
 basic pesticides 594

petrochemical analysis 240, 253, 254, 265, 266  
 PFE *see* pressurized fluid extraction  
 PFTBA 372, 390, 392, 393, 434  
 pH value 16, 38, 594  
 pH-sensitive analytes 16  
 pharmaceutical analysis 53, 159, 189, 206, 254, 266  
 pharmaceutical products 665  
 phase ratio  $\beta$  52, 87, 203, 204, 221, 224  
 phenotype 656  
 photo ionization detector 262, 432  
 PID *see* photo ionization detector  
 PID lamp types 262  
 pigments 14, 16, 251, 712, 713, 730–734  
 pipette tip transport 26  
 planar analytes 16  
 plant material 658  
 plasma 758  
 plasticizer 20, 46, 100, 529, 619  
 PLE *see* pressurized liquid extraction  
 PLOT *see* porous-layer open tubular columns  
 poisoning 757  
 polar compounds 13, 16, 27, 34, 36, 39, 42, 69, 77, 79, 102, 141, 152, 159, 174, 203, 210, 212  
 polyethylene glycol 37, 46, 66, 181, 209  
 polymer analysis 89, 666  
 polymer materials 619, 677, 679  
 polystyrene (PS) 54, 651  
 polyvinylchloride (PVC) 57, 651  
 POPs *see* persistent organic pollutants  
 Porapak 80  
 pork 598  
 porous-layer open tubular columns 187  
 PPINICI *see* pulsed positive-ion negative-ion chemical ionization  
 pre-column 16, 99, 128, 131, 143, 152–155, 162, 164, 165, 169–173, 200, 249, 250, 270  
 precursor ion 321, 343, 382–388, 437, 575, 597, 629, 651, 658, 702–709, 720, 723–725, 727, 767  
 prep ahead mode 18, 597, 601, 660, 661

- preparative GC 251  
 pressure corrected solvent BP 146, 149, 151, 158, 159, 169, 172, 226  
 pressure pulse 139, 140  
 pressure-balanced injection 71  
 pressurization 71  
 pressurized fluid extraction 101  
 pressurized liquid extraction 100–105  
 preventive maintenance 129, 135, 138, 141, 150  
 primary secondary amine 14, 16, 601–605  
 product ion spectrum 382, 385–389, 415, 575, 769, 770  
 product safety 626, 649, 665, 683  
 productivity 18, 44, 98, 103, 154, 198, 205, 210, 212, 226–228, 230  
 programmed temperature vaporizer (PTV)  
     15, 64, 70, 100, 131, 136, 154, 155, 157–159, 161–164, 167, 171  
     cryofocusing mode 167  
     heating rate 159  
     large volume injection 24, 130, 153–158, 162–165, 579  
     on-column injection mode 64, 100, 162, 165, 166, 171  
     solvent elimination 165  
     split injection 161  
     splitless injection 159, 574, 605, 699, 720, 753  
 proteomics 332  
 PSA *see* primary secondary amine  
 PTV *see* programmed temperature vaporizer  
 pulsed discharge detector 261, 262  
 pulsed discharge HID (PDHID) *see* pulsed discharge detector  
 pulsed positive-ion negative-ion chemical ionization 299  
 pumping capacity 174, 195  
 purge and trap 549, 560, 569, 632, 665  
 Pyrofoil 93  
 pyrogram 88  
 pyrolysis 10, 88–91, 93–96, 167, 357  
     Curie point pyrolysis 89, 92  
     foil pyrolysis 89, 90  
     furnace pyrolysis 89, 94  
     micro furnace pyrolysis 95
- q**  
 quadrupole analyzer 6, 174, 235, 240, 246, 310–312, 316–319, 321–327, 329, 331, 333–336, 363, 364, 389, 398, 434, 441, 442, 445, 447, 513, 525, 544, 557  
 hyperbolic rods 6, 319–322, 386  
 resolving power 319  
 round rods 319, 321, 383, 386  
 qualifier 365, 373, 415, 584, 651, 734, 761  
 qualifier ion 585, 597, 599, 761  
 quality control 338, 637  
 quantification 40, 556, 594, 621, 632, 656, 683, 747  
 quantitation 47, 53, 56, 57, 62, 74, 148, 248  
     isotope dilution 734, 739  
     one-point calibration 757  
 quartz wool plug 141  
 quasimolecular ion 296, 420, 468  
 QuEChERS 11–16, 26, 151, 578, 584, 594  
     AOAC method 2007.01 14, 594  
     European Standard EN15662 14, 594  
 QuEChERSER 15, 594
- r**  
 radio frequency identification 86  
 rapeseed oil 173  
 raspberries 601  
 reagent gas cluster 297, 306–310  
 recondensation effect 16, 131, 148, 150, 151, 162  
 reconstructed ion chromatogram 413, 414, 641  
 residual gas analyzer 266  
 residual solvents 72, 189  
 residual water 73  
 resolving power (GC) 200, 216, 224  
 resolving power (MS) 291, 314–319, 322–326, 329, 335, 338, 340, 344, 743, 745

- retention gap 100, 131, 151, 169–171, 200, 248, 593, 615  
 retention index 268, 429, 430–434, 436, 637, 673, 765  
 retro Diels Alder reaction 470, 490  
 retrospective analysis 333  
 reversed column flow 152  
 reversed Nier Johnson geometry 327  
 RFID *see* radio frequency identification  
 RIC *see* total ion chromatogram  
 rice 659, 663  
 robotic autosampler *see* x,y,z-robot  
 robotic x,y,z-sampler *see* x,y,z-robot  
 room-temperature ionic liquids *see* ionic liquids  
 rotary vane pumps 399  
 RTILs *see* ionic liquids  
 rubber 679  
 rule of thumb 71, 78, 139, 140, 146, 149, 169, 174, 324  
 100% report 641
- S**
- S/N ratio 128, 158, 161, 174, 199, 226, 233, 243, 245, 297, 321, 344, 373, 378, 380, 384, 398, 415, 508–510, 512, 513, 559, 576, 583, 624, 631, 711, 717, 749  
 salmon 105, 598  
 salt addition *see* salting out  
 salting-out effect 11, 17, 38, 47, 54, 118, 584  
 sample capacity 10, 129, 138, 166, 200, 222, 235  
 sample collection 81  
 sample preparation 9–11, 20, 22–25, 27, 49, 73, 98, 99, 105, 129, 151, 163, 164, 171, 227, 599  
 instrumental integrated 9  
 sample throughput 9, 10, 12, 13, 17, 28, 36, 50, 56, 86, 89, 163, 174, 227, 228, 234, 235, 242, 243, 632, 664  
 sandwich injection 146  
 SBSE *see* stir bar sorptive extraction  
 scan rate 335, 340, 363, 395, 506  
 scan speed 246, 394, 506, 688, 716  
 scavenging mode 19, 25  
 SCD *see* sulfur chemiluminescence detector  
 screening 96, 253, 310, 339, 385, 593, 664, 712, 718, 757, 762  
 sector field MS *see* magnetic sector MS  
 secureTD-Q technology 86  
 seeds 658  
 selected reaction monitoring 323, 598, 603, 656, 750  
 AutoSRM 387  
 data-dependent acquisition 388  
 timed-SRM 572, 575, 659, 721  
 selectivity 15, 42, 44, 99, 209–212, 216, 218–220, 247, 251–253, 256–258, 260, 262–264, 267  
 selectivity tuning 239  
 sensitivity 1, 24, 27, 35, 41, 52, 53, 70, 88, 99, 167, 255, 292, 364, 507, 513  
 separation funnel 212  
 septum bleed 134, 137  
 septum purge 130–136, 149  
 sewage 712, 718  
 SFE *see* supercritical fluid extraction  
 shark fins 222  
 SI mass unit 291  
 SIEVE software 664  
 silica gel 22, 66, 68, 79, 105  
 silicon wafers 98  
 silicone grease 530  
 Silonite 87  
 SilTite 273  
 silylation 142, 349, 465, 656, 763  
 SIM mode 320, 323, 324, 340, 363, 364, 373, 374–379, 389, 415, 506  
 retention timed SIM 365, 373, 542  
 SIMDIS *see* simulated distillation  
 simulated distillation 192  
 single quadrupole MS 549, 554, 577, 584, 619, 632, 637, 656, 665, 677, 683, 712, 751, 757  
 SISCOM library search 444  
 SLE *see* solid/liquid extraction  
 sludge 98, 712

- smart technology 30  
 smoke 691  
 sniffing device 268  
 soft ionization 232, 295, 310, 381, 468, 767  
 soil 98, 554, 560, 595  
 solid phase extraction 9–11, 14, 15, 19, 20, 22–25, 27, 98, 100, 102, 584, 651, 700, 751, 763  
 $\mu$ SPE 9, 15, 19, 23, 25, 26, 594, 595, 598, 599  
 C18 595  
 dSPE 15, 601  
 GCB 595  
 online-SPE 25  
 scavenging mode 25  
 wash-and-elute mode 25  
 solid phase microextraction (SPME) 9, 10, 23, 27–32, 34, 36–45, 47, 48, 87, 88, 100, 135, 137, 138, 143, 203, 265, 573, 639  
 arrow 30–32, 34, 36, 42, 48, 632  
 arrow derivatization 32  
 desorption 40  
 devices 42  
 DI-SPDE 34, 47  
 DI-SPME 28, 38–40, 44, 46–48, 614  
 fiber 28–32, 34, 37–39, 41, 42, 44–46, 48, 87, 137  
 high capacity probe 28  
 HiSorb probe 34  
 HS-SPDE 34  
 HS-SPME 27, 28, 32, 38, 48, 747  
 injection 167  
 injector temperature 40  
 inlet liner diameter 41  
 inlet liner 47, 143  
 in-tube SPME 34  
 MFX 42  
 MHS-SPME 40  
 multi-fiber exchange 42  
 multiple injections 167  
 multiple SPME extraction 40  
 on-fiber derivatization 32, 39  
 operation for GC-MS 36  
 rinsing 36, 46  
 sorbent materials 42  
 sorbent swelling 32, 46  
 SPDE 34  
 TFME 35  
 thin film SPME 35  
 TV-SPME 32  
 Vac-HS-SPME 32  
 solid samples 53, 72, 94, 96, 98, 100, 101  
 solid wastes 98  
 solid/liquid extraction 639  
 solvent displacement 84  
 solvent effect 146, 149, 150, 152, 159, 161, 170, 171, 173  
 solvent expansion volumes 139, 145  
 solvent vapor cloud 146, 151, 158  
 solvent vapor exit 100, 165, 171  
 solvent vapor volume 139, 146  
 sonication 17, 141  
 sorbent material 13, 19, 20, 25, 27, 30–32, 35, 38, 41, 48, 66, 76, 78, 87, 163  
 sorghum 99  
 sources of contamination 569  
 Soxhlet extraction 9, 100–102, 105, 747  
 soybean oil 173  
 SPE *see* solid phase extraction  
 spectrum skewing 336, 434, 506  
 spices 13, 578, 603, 626, 694  
 spirits 619  
 spiomolecular pumps 399  
 split at column end 270  
 split flow 130, 131, 133, 138, 163  
 split injection 138, 143, 148, 161  
 split ratio 148  
 split/splitless injector 16, 130, 131, 135, 144, 149, 150–155, 157, 158  
 splitless injection 139, 143, 148, 149, 159, 226  
 SPME *see* solid phase microextraction  
 SRM *see* selected reaction monitoring  
 SRSE *see* stir rod sorptive extraction  
 SS *see* surrogate standard  
 SSL injector *see* split/splitless injector  
 stabilizer 529

- standard addition method 40, 47, 53, 148, 522  
 standard atmospheres 83  
 standard deviation 40, 53, 129, 215, 344, 508, 511, 512, 517  
 stationary phase 10, 19, 34, 134, 149, 170, 174, 175, 187, 197, 198, 200, 204, 205, 210, 212, 216, 220, 221, 223, 224  
 polyethylene glycol 205  
 polysilarylene 176, 179, 205  
 siloxancarborane 205  
 stereoisomers 436  
 stir bar sorptive extraction 28, 87, 88, 167 liquid desorption (SBSE/LD) 88  
 stir rod sorptive extraction 23  
 structure elucidation 295, 384, 385, 457, 766  
 structure related selectivity 594  
 SulfiCarb 80  
 sulfur chemiluminescence detector 265, 432  
 SUMMA canister 86, 541  
 sunflower oil 173  
 Supelcoport 163  
 supercritical fluid extraction 23, 100  
 surface water 549, 554, 619  
 surfactants 767  
 Surfasil 141  
 surge pressure 139, 140, 149  
 surrogate standard 517, 519, 561  
 SVE *see* solvent vapor exit valve  
 Swedish ethyl acetate method 15, 599  
 SweEt *see* Swedish ethyl acetate method  
 syringe needle 26, 76, 134, 137, 144, 147, 168  
 syringe needle transport 26, 598
- t**  
 tandem with FID 266  
 tapered liners 142  
 targeted analyses 4, 168, 240, 323, 332, 364, 372, 383, 438, 505, 541, 656, 757  
 TCD *see* thermal conductivity detector
- TCM *see* traditional Chinese medicine  
 TD *see* thermal desorption  
 tea 13, 595  
 technical samples 101  
 TEF values 712, 730  
 2005 WHO TEFs 733  
 2022 WHO TEFs 723, 733, 734  
 temperature rise time 89–93  
 Tenax 64, 66–70, 78, 79, 82, 84, 96, 163, 167, 639, 680  
 Tenax GR 70, 77, 78, 81  
 Tenax TA 67, 77, 79, 81, 82, 645  
 TEQ *see* toxicity equivalents  
 textiles 683  
 thermal conductivity 266  
 thermal conductivity detector 196, 259, 266  
 thermal decomposition 73, 77, 158, 170  
 thermal degradation 157  
 thermal desorption 9, 36, 78, 79, 82–88, 94–96, 130, 131, 166, 167, 639, 647, 677  
 thermal desorption tubes 81, 83  
 DiffLok end caps 85  
 VOST stack sampling tubes 82  
 thermal electrons 253, 301, 304, 310  
 thermal extraction 10, 94, 96, 98, 644, 646  
 thermal gradient 237  
 thermodesorption 4, 35, 81, 256, 541  
 thermolabile compounds 88, 158, 226, 745  
 thick film columns 71, 202, 543, 551, 655, 759  
 thin film columns 202, 221, 230, 713, 745  
 3D contour plot 243  
 TIC *see* total ion current  
 time-of-flight MS 2, 5, 235, 240, 2455–248, 311, 316, 322, 333–339, 344, 389, 398, 425, 427, 441, 597, 646  
 timed SRM 386 572, 574, 600, 605, 612, 628, 659, 699, 721  
 TOF *see* time-of-flight MS  
 total ion current 303, 413, 426, 651, 682

total petroleum hydrocarbons 102, 191  
 total sample transfer 10, 139, 143, 148,  
   159, 161, 168  
 total volatile organic compounds 677,  
   681  
 toxicity equivalent factors *see* TEF values  
 toxicity equivalents 712, 724, 728, 733  
 toys 649  
 traceability 31, 82, 378  
 traditional Chinese medicine 626  
 transfer line 63, 64, 72, 77, 130, 132, 143,  
   166, 205, 268, 269  
 transfer time 149, 153, 154, 160  
 Trennzahl number 224  
 triple quadrupole MS 572, 594, 599,  
   603, 626, 651, 656, 697, 718, 747,  
   762  
 tropylium ion 469, 475  
 TRT *see* temperature rise time  
 tube absorption 677  
 tube tagging 86  
 turbomolecular pumps 397  
 TVOC value *see* total volatile organic  
   compounds  
 Twister 87  
 two-hole ferrule 639

***U***

UFGC *see* ultra fast gas chromatography  
 UFM *see* ultra fast column module  
 ultra fast column module 235, 236  
 ultra fast gas chromatography 227, 230,  
   235–237  
 Ultramark 392  
 ultrasonic extraction 100, 651  
 UniCarb 80  
 unit mass resolution 291, 317, 319, 323,  
   326, 332, 340, 343, 381, 386, 720,  
   734, 737  
 unknown identification 249, 267, 292,  
   295, 296, 333, 384, 388, 418, 421,  
   436, 443–457, 471, 640, 665–677,  
   766  
 urine 34, 752  
 USE *see* ultrasonic extraction

***V***

vacuum-assisted 32, 34  
 vacuum ITEX 77  
 vacuum outlet 230  
 vacuum outlet GC 200, 230, 233  
 vacuum ultraviolet detector 252 253,  
   266–268  
 vacuum UV wavelength range 266  
 validation 86, 578, 580, 602, 605, 711  
 van Deemter 174, 197, 201, 214, 224  
 van Deemter curve 194, 196–199  
 vapor pressure 70, 78, 209  
 vapor volume calculator 139  
 VDA 278 98, 678–683  
 vegetables 152, 578, 584, 595  
 vehicle air analysis 96, 677–683  
 Vespel ferrules 273, 525, 639  
 veterinary drug analysis 12, 235  
 veterinary drugs 598  
 vial shaking 59  
 Vienna Pee Dee Belemnite 569  
 viscosity 59, 101, 194, 198, 209, 271  
 vITEX *see* vacuum ITEX  
 VOCARB 66, 68, 69, 79  
 volatile pesticides *see* pesticides  
 volatile polar compounds 48  
 volatilomics 338  
 volume contraction 149, 151  
 VPDB *see* Vienna Pee Dee Belemnite  
 VUV detector *see* vacuum ultraviolet  
   detector  
 VUV spectra 267

***W***

wall-coated open tubular columns 175  
 wastewater 64, 265, 549, 554, 619, 748  
 water 11, 13, 15–17, 20, 25, 27, 28, 34, 35,  
   39, 44, 46–49, 52–54, 56, 62, 64, 65,  
   67, 69, 73, 74, 79, 84, 87, 139, 159,  
   257, 263, 266, 560, 572  
   drinking water 35, 39, 64  
 water removal 66, 67, 104, 355–358  
 water vapor 53, 66, 74, 75, 261, 747,  
   749  
 waxes 206

weak anion exchange 48  
weak cation exchange 48  
wine 12, 189  
workplace air monitoring 77  
workplace drug testing 752

**X**

x,y,z-robot 10, 12, 15, 18, 32, 36, 40, 42,  
76, 87, 88, 594, 601, 634, 665, 734,  
752  
XIC *see* mass chromatogram

