

Index

- a**
- accelerated solvent extraction (ASE) 31, 256f.
 - accuracy 69
 - acetic acid 281ff.
 - acid-base chemistry 318f.
 - acids, organic 281ff., 295, 306, 318, 396f.
 - active sampling 7
 - adhesives
 - emissions test standards 124
 - for floor coverings 388f.
 - odor annoyance 177
 - adsorption
 - interference with analysis 21, 29, 35, 105f.
 - of organic compounds 21f., 318
 - surface 21
 - theory 20f.
 - aerosols 315, 425
 - from secondary reactions 111, 306ff., 357
 - air exchange rate (ACH) 59, 65, 149, 302f.
 - air fresheners 176, 221, 357f.
 - air handling units (AHUs) 216f., 230f.
 - air pollutants *see also* volatile organic compounds (VOCs)
 - benzene 55ff., 90, 220
 - classes of 327f.
 - formaldehyde 54f., 283, 306
 - inorganic 90, 278ff., 294f.
 - particulates 21f., 197f., 359
 - toluene 219f.
 - air quality, indoor (IAQ)
 - cleaning techniques 66, 91ff., 183, 230f., 307f.
 - effect of indoor chemistry 302f., 329
 - evaluation 189f.
 - health effects 221, 306, 330ff., 365
 - in domestic housing 53ff., 349
 - large chamber testing 111f., 125f., 128
 - sensory perception of 165ff., 196, 330ff.
 - standards 47f., 52, 119f., 207f.
 - air sampling pumps 27
 - aircraft cabins
 - air quality 165, 367f.
 - effects of ozone 94ff., 316
 - aldehydes
 - from carpets 177, 314
 - from paints 385f.
 - indoor air levels 206
 - sampling and analysis 5, 153
 - allergies 335, 386
 - amines
 - sampling and analysis 154
 - trimethylamine (TMA) 318f.
 - analysis method development 36ff., 120f.
 - new product screening 134ff., 182f.
 - standardization 132ff., 150f., 153, 168
 - artifacts 12
 - formation 26
 - as low as reasonably achievable (ALARA) guideline 329, 334ff.
 - asthma 365
 - incidence 56, 312, 335
 - automobile interiors *see* car interiors
- b**
- background contamination 23
 - badge samplers 51f., 58
 - benzene
 - diurnal changes, outdoor urban 90f.
 - from laser printers 417f.
 - measurement of 52, 143
 - biocides
 - health risks 262f., 288f.
 - indoor persistence 241f.
 - sampling 5, 7, 26
 - sources 260ff., 380, 383, 394
 - use in preservation 288ff.

- biomonitoring 261f.
 - Blue Angel* environmental label 409, 412f., 418
 - breakthrough volume 11f., 25
 - building materials
 - degradation 142, 361, 395f.
 - emissions testing standards 104, 109f., 122ff., 394f.
 - floor coverings 388ff.
 - inorganic products and fittings 393f., 397ff.
 - life cycle assessment 373, 375f.
 - paints and coatings 377ff.
 - VOC emissions from 87ff., 90, 226, 377f.
 - wood and wood-based products 394ff.
 - buildings
 - air-conditioning 215f., 231, 278
 - complaints from occupants 240, 337, 379, 392
 - diurnal air quality variation 227ff.
 - new and refurbished 203, 373, 377
 - sources of VOCs 221, 225ff., 284ff., 367
 - Byne's disease 282f.
- c**
- calibration 39, 81f., 141f.
 - cancer 262f., 335, 379, 417
 - known carcinogens 257, 306, 312, 390, 392
 - risk assessment unit (UR) 208
 - Cannizzaro reaction 284
 - car interiors
 - conditioning of 149
 - effect of temperature and driving conditions 149, 159ff.
 - emissions test standards 123, 130, 160f.
 - organochemical sources and effects 147ff., 151, 165
 - pollutant identification 154f., 159
 - quantitative emissions measurement 151ff.
 - test stand conditions 149ff.
 - carbon dioxide (CO₂) 197, 215, 291, 333
 - carbon monoxide (CO) 333, 335
 - carbon-based solid sorbents 4, 6
 - carcinogens *see* cancer
 - cardiovascular effects 335, 365
 - carpets 176f., 248, 314ff., 389ff.
 - certification schemes 119, 120, 131, 388
 - *Blue Angel* environmental label 409, 412f., 418
 - ingredients 359, 365f., 368
 - test protocols 134, 136, 391f.
 - chambers for laboratory investigations of materials, pollution and air quality (CLIMPAQs) 28f., 111, 168
 - cleaning of indoor air
 - monitoring performance 66, 91ff., 233ff.
 - cleaning products 176, 221, 307, 308, 358f.
 - climatic conditions 215f., 239, 276ff.
 - clothes, VOC emissions from 95f., 221, 361, 366f.
 - 'cold spots' 35
 - cold traps 10, 34, 174f.
 - computers (PCs) 367, 419f.
 - concrete 312, 393f.
 - condensed-phase chemistry 310ff.
 - hydrolysis 311
 - oxidation 310
 - confidence limits (emissions testing) 143
 - conservation strategies (museums)
 - biocide use 288ff.
 - climatic control 276ff.
 - monitoring pollutant levels 292f.
 - physical containment 275f.
 - continuous flow-PAS 76
 - controls 41
 - charts 41
 - cooking
 - kitchen surface emissions 316, 397f.
 - odors 310
 - toxic emissions from stoves 366
 - cosmetics 362f.
 - cryo-trapping 3f., 12f., 173
- d**
- decipol scale 169ff., 334
 - denuder sampling 26
 - deodorizers *see* air fresheners
 - desorption *see* extraction
 - desorption electrospray ionization (DESI) 32
 - detection methods
 - flame ionization (FID) 35, 78ff., 365
 - fluorescence (FD) 36
 - mass spectrometry (MS) 7, 32, 35f., 66ff.
 - olfactometry 172ff., 367
 - particle sizers 425
 - photo-ionization 80f.
 - detergents 176, 359
 - di-(2-ethylhexyl)phthalate (DEHP) 21, 28f., 252f., 261, 312
 - diffusion, internal 108f., 139f., 158, 384
 - diffusive sampling 7, 47ff.
 - applications for air quality monitoring 53ff., 204

- sampler types and performance 49, 50ff.
- theoretical basis 48f.
- dinitrophenylhydrazine (DNPH) 51
- dioxins 256f.
- discrete sampling 74ff.
 - FTIR/PAS 76f.
 - nondispersive PAS 74f.
- disinsection, aircraft 368
- disposal bins 367
- dust, surface
 - chronic reference dose 263, 265
 - cleaning 196
 - filter sampling 27f., 412
 - pollutant levels 240ff., 414, 417
 - sampler 28, 47

e

- edge effects 140
- electronic equipment, emissions 180f.
 - 407f., 415f.
- computers 367, 419f.
- copiers and printers 221, 414, 417ff., 425ff.
- monitors and TVs 421ff.
- standards 128f.
- testing 112, 180, 408ff.
- emission mechanism 139
- emission rate 106f.
 - area-specific 221
- emission studies
 - during operation 410f., 422f.
 - effect of substrate 381ff., 384
 - life cycle assessment 373, 375f., 399f.
 - quantification 376f., 411f.
 - used for exposure limits 388, 392, 394, 409, 413
- emission test chambers
 - choice of sampling method 7, 28f., 121
 - impact of sink effects 105f., 141, 413, 422
 - models and calculations 106ff., 410ff.
 - practical applications 109ff., 408ff.
 - sample preparation and storage 140f.
 - size classes 101ff., 138f.
 - with sensory evaluation 168f.
- endocrine disrupting compounds (EDC) 240f.
- environmental
 - test chambers 101ff.
 - cells 101ff.
- evaporative emissions 108f., 139, 157f., 384
- exposure 239, 261ff., 319, 361
 - indicators 332ff., 336f.
 - measurement of 7, 58f.
- extraction, from solid sorbents 8ff., 30f.

f

- Fick's first law (of diffusion) 48, 392
- field and laboratory emission cells (FLEC) 28f., 103, 110f.
- filters
 - choice of, for SVOC/POM sampling 25f.
 - cleaning of 24
 - ventilation (HVAC) systems 316
- flame ionization detection (FID) 3, 7, 35, 78ff., 365
- flame retardants 312f., 420
- floor coverings 177, 221, 312
 - adhesives 388f.
 - carpets 389ff.
 - emissions test standards 123, 126, 129
 - vinyls/polymer 392f.
- fluorescence detection (FD) 36
- fogging
 - car windscreen 147f., 151, 155, 158f.
 - in museum displays 287f.
 - plate 110, 409, 413
 - precipitate 155
- formaldehyde
 - emission from building materials 281ff., 383, 388, 393ff.
 - passive badge sampler measurement 54, 58
 - real-time monitoring 89f.
 - removal 94
- formic acid 283f.
- Fourier Transform IR (FTIR) analysis 76
- fragrances 304, 357, 365f.

g

- gas chromatography (GC) 32, 34f., 142f.
- gas/particle partitioning 20
- gas-phase organic oxidation chemistry 303f.
 - hydroxyl radical 308
 - nitrate radical 309
 - ozone 303
- Germany
 - Indoor Air Quality Guideline 193, 194ff.
 - IRK/AOLG Ad-hoc working group 189, 194, 197
- glass wool 9
- glassware cleaning and storage 24f.
- glycols/glycol ethers
 - from paints 379ff., 387f.
 - sampling and analysis 5, 153
- guide values
 - basis for assessment 191f., 263, 293, 328
 - derivation factors 194f., 197

- for total VOC concentration 198ff., 336f., 342f.
 - legal status 194ff., 329
 - gypsum-based products 179, 381ff., 394
- h**
- health risks
 - indicators of 137f., 332ff., 336f.
 - of damp buildings 311f.
 - of pesticides 262f., 288f.
 - reducing exposure 195ff., 199ff., 230
 - to children 261, 263f.
 - toxicology data 192ff., 222, 263f., 328f.
 - types of 330ff., 365
 - heaters, ceiling 398f.
 - heterogeneous chemistry 313ff.
 - high performance liquid chromatography (HPLC) 36
 - with fluorescence detection (HPLC-FD) 36
 - with mass spectrometric detection (LC-MS) 36
 - home (domestic) environments
 - perception of odors 165ff.
 - pollutant levels 54ff., 204ff., 240ff.
 - sources of contamination 260f., 349ff.
 - household products
 - home care/cleaning 356ff., 363ff.
 - human activities 351, 354, 356, 366ff.
 - personal care 361ff., 365f.
 - product classes 351
 - usage and emission rate 350
 - VOC ingredients 352ff.
 - human body emissions 221, 291f., 316
 - humidity
 - and sample drying methods 13
 - control, in museums 277f., 291
 - effect on diffusive sampler performance 49
 - interference with metal oxide sensors 86
 - hydrocarbons *see also* polycyclic aromatic hydrocarbons (PAHs)
 - cooking stove emissions 366
 - sampling and analysis 5, 78ff., 83ff., 152
 - hydrolysis reactions 311f.
 - hydroxyl radicals 308f.
 - hypersensitivity 329, 331
- i**
- incenses 363ff.
 - indoor air
 - chemical reactions 279, 301f., 329
 - definition 190
 - exchange rate with outdoor air 59, 149, 159ff., 216, 227
 - velocity 49, 109
 - indoor environment
 - compounds 22
 - matrices 22
 - indoor material samples 28
 - inorganic atmospheric compounds 278f.
 - inorganic solid sorbents 4, 6
 - insecticides
 - health risks 262f., 289
 - ingredients/emissions 356f., 368
 - insulation materials 177
 - ionization potentials 81f.
 - irritation (nose, eye and throat) 330f., 339f.
 - isoprene 69f., 73, 221, 303
- j**
- Junge's equation 20
- k**
- kinetics 108f.
- l**
- large volume injection (LVI) 34
 - latex paints 314, 379, 380ff.
 - legal limit values 194
 - lighting, indoor 309
 - limits of detection (L_D) and quantification (L_Q) 38f., 143, 182
 - linearity 69
 - linoleum 178f., 310, 392f.
 - linseed oil 176, 178, 310
 - liquid absorption 3f.
 - loss of target compounds 23
 - lowest observed adverse effect level (LOAEL) 192, 194, 263, 328, 341
- m**
- mass spectrometry (MS) 32, 35f.
 - proton transfer reaction (PTR-MS) 7, 66f.
 - mass transfer models 108f.
 - materials emissions testing 120f.
 - measurement
 - field monitoring (workplace) 5, 47f., 190, 217, 233
 - quality standards 207
 - total (TVOC) emissions 137f., 142, 154, 191
 - uncertainty factors 49, 52, 69ff., 130, 139ff.
 - medium-density fibreboard (MDF) 394ff.
 - metal oxide (MOX) sensors 83ff.

- metals, corrosion 279ff., 283
- method
 - uncertainty 130
 - variability 130
- micro chamber, emissions testing (μ -CTE) 103f.
- standards 122, 127, 130
- multiple chemical sensitivity (MCS) 335
- museums
 - environmental factors 273ff.
 - exhibit preservation strategies 275f., 288ff.
 - pollutants in 278ff., 294f., 396f.
- musk compounds 242f., 365

- n**
- neurotoxic effects 335, 365, 379
- newspapers 351f., 354, 356
- nicotine 317f., 333
- nitrate radicals 309f.
- nitric oxide (NO) 90f.
- nitrosamines 154
- no observed adverse effect level (NOAEL) 328, 341

- o**
- odorant 165ff.
 - identification 172
 - threshold 180
- odors
 - analysis 172f., 367
 - evaluation (sensory testing) 167ff., 310
 - identification of odorants 175f.
 - relationship to VOC emissions 165ff., 180ff., 341
 - sources 176ff., 314
- oils
 - human skin 316
 - rancidity 310
- on-column injection (OC) 34
- organic compounds in outdoor air 90f.
- organophosphates
 - in cars (esters) 159ff.
 - plasticizers/flame retardants 243ff.
- organotin compounds 246f., 414
- outdoor air quality
 - and ventilation effectiveness 230, 278f.
 - diurnal variation 90f.
- oxidation reactions 310f.
- oxygen, magneto-acoustic detector
 - measurement 76f.
- ozone
 - cause of VOC sampling artifacts 14f., 26f., 95
 - effect on aircraft air quality 94ff.
 - emissions from printers 412, 414
 - initiated chemistry 94f.
 - reaction with indoor surfaces 111, 313ff.
 - reactions with terpenes 303ff.
 - removal from samplers 27

- p**
- paints (and coatings/varnishes) 221, 314
 - 'natural' 386f.
 - emissions test standards 125, 127, 130
 - health hazards 377, 379
 - interior 377
 - low/zero VOC 387f.
 - remover 353, 359f.
 - solvent-based 383ff.
 - water-based (latex, resin) 379ff.
- panel (olfactory) testing 167ff.
- paper 283, 351, 394, 419
- parallel testing 12, 69, 90
- particle size, pollutant
 - effect on inhalation 22
 - measurement 425
- particulate organic material (POM)
 - analysis 32ff.
 - definition 19f., 239
 - filter sampling 23, 27f.
 - types and sources 22f., 28
- partition coefficient (particle-gas, K_p) 20, 89f.
- peak concentrations, monitoring 7
- pentachlorophenol (PCP) 242, 261, 289
- Perceived Intensity scale (PI) 171
- perfluorinated compounds 246, 248
- personal care products 221
 - cosmetics 362f.
 - hygiene 357, 361f.
- phenolic compounds 240f.
- photo-acoustic spectroscopy (PAS) 3, 7, 73ff., 87ff.
- photo-ionization detectors (PID) 3, 80ff.
- photocatalytic oxidation (PCO) 91f.
- photocopiers 221, 419
- phthalates *see also* di-(2-ethylhexyl)phthalate (DEHP)
 - emission as SVOCs 248ff., 408, 423
 - sampling and analysis 22, 59, 153
- plasticizers 248, 312
- plastics 179f., 420
- polishes 359ff.
- polybrominated diphenyl ethers 253f.
- polychlorinated biphenyls (PCBs) 5, 253, 255f.

- polychlorinated dioxins/furans 256f.
 - polycyclic aromatic hydrocarbons (PAHs)
 - 22f., 257ff., 420
 - polyphenylene oxides (PPOs)
 - as solid sorbents 5, 142
 - odor properties 180, 182
 - polyurethanes (PUs)
 - as sink/source for VOCs 366f.
 - carpet underlay 390f.
 - foams, as solid sorbents 5, 26
 - odor properties 180
 - POM *see* particulate organic material (POM)
 - porous polymer sorbents 4ff., 26, 142
 - pressurized liquid extraction (PLE) 30f., 33
 - printing
 - emissions during operation 410ff., 414, 417ff.
 - ultra-fine particle emission 425ff.
 - proton affinity 66f.
 - proton transfer reaction mass spectrometry (PTR-MS) 66ff., 90
 - pumps, air sampling 27
 - purging, of building TVOCs
 - equipment 230f.
 - monitoring of effects 233ff.
- q**
- quality control systems
 - products 102f., 148f., 182f.
 - test methods 37ff., 141
 - quartz wool
 - for sorbent retention 8f.
 - in cold traps 10
- r**
- radial diffusive samplers 51, 57
 - real-time monitoring
 - flame ionization detection (FID) 78ff.
 - importance and uses 65f., 87ff.
 - metal oxide sensors 83ff.
 - photo-acoustic spectroscopy (PAS) 73ff., 87ff.
 - photo-ionization detectors (PID) 80ff.
 - proton transfer reaction mass spectrometry (PTR-MS) 66ff., 90
 - reference
 - health 192
 - legal 194
 - reference values (background exposure) 192, 203ff., 263
 - regulations (legislation) 119f., 131ff., 143f., 191, 400
 - for priority pollutants 334
 - resins 311f., 379, 383f.
 - respiratory tract
 - chemical irritants 306, 332
 - particulates deposition 22
 - Richtwert (RW I and RW II) values 193ff., 423
 - risk assessment
 - effectiveness 206f., 292f.
 - toxicology database resources 207f., 263
 - use of TVOC value 198ff., 333, 336f.
 - rubber materials 177, 389, 393
- s**
- safe sampling volume (SSV) 11f.
 - sampling
 - analysis equipment 23
 - artifacts, from reactive gases 14f., 26f., 95
 - background (blank) determinations 14f., 23f.
 - choice of active or passive method 7, 47
 - filter/sorbent methods 8ff., 24ff.
 - headspace 168, 175, 366, 368
 - instrumentation 87
 - objectives 50, 102
 - orientation 140
 - sensitivity 3, 32, 174f.
 - standardization 132ff.
 - time period 7, 50, 140f.
 - transport of samples 140, 167
 - volume control 7, 11f., 27
 - screening (materials emission) 129, 134ff.
 - sealants 177, 367
 - secondary emissions 282ff., 303ff.
 - secondary organic aerosols (SOA) 111, 306ff., 357
 - semi-volatile organic compounds (SVOCs)
 - analysis 32ff., 412f.
 - definition 19f., 239
 - emissions testing 28ff., 155
 - gas/surface partitioning 20ff.
 - health related properties 22
 - identification of 155
 - indoor exposure and health 261ff.
 - sampling 23ff., 59, 110, 155
 - types and sources 22f., 158ff., 240ff., 287f.
 - sensory testing 167ff.
 - Sick Building Syndrome 165, 316, 332
 - sieves
 - molecular (solid sorbents) 4
 - stainless steel (in sampler tubes) 9
 - Singapore
 - building characteristics 216f., 231
 - compared with EU and US 218ff., 225
 - sink effect 105f., 141

- solid phase extraction (SPE) membranes
 - 26
 - solid sorbents
 - advantages and limitations of use 4, 174f.
 - artifacts 12
 - degradation products 14f.
 - pre-cleaning and storage 13f., 24
 - sampler design 8
 - sampling strategies (active/passive) 7
 - target compound degradation 15
 - types and properties 4ff., 6, 142
 - water affinity 12f.
 - solvent extraction 8, 30f., 159
 - concentration of extracts 32f., 35, 174f.
 - from diffusive samplers 51
 - injection techniques 34
 - reaction product artifacts 14, 16
 - solvent-assisted flavor evaporation (SAFE) 175
 - solvent-based paints 379, 383ff.
 - sorbent impregnated filters (SIFs) 26
 - specific emission rate (SER) 355
 - calculation 106ff., 223, 411f.
 - for standard emissions testing 134, 349
 - standards, international
 - agencies 138
 - emissions testing methods 8, 104, 122ff., 409
 - harmonization 130f., 144
 - indoor air 47f., 52, 119f., 207f.
 - quality assurance 207
 - standardization 119ff.
 - stealth chemicals 180, 420
 - supercritical fluid extraction (SFE) 30f., 291
 - surface adsorption 21
 - surface chemistry
 - surface dust *see* dust, surface
 - heterogeneous (interface) 279ff., 313ff.
 - in water film 311f.
- t**
- target compounds 121
 - tarnishing of metals 279ff.
 - temperature
 - car interior 149, 159ff.
 - electronic devices 405f., 419f.
 - museum 278, 292
 - Tenax® 5, 14f., 26, 142
 - terpenes
 - breakthrough volume determination 11f.
 - in air fresheners 357f.
 - in wood resin 177f.
 - reaction with ozone 111, 176, 303ff., 317
 - thermal desorption (TD)
 - conditioning of equipment 24, 30
 - coupling with GC analysis 34f.
 - from diffusive samplers 51f.
 - in emissions testing 136f.
 - process, principles of 8ff.
 - thermoplastic polyolefins (TPOs) 179
 - tin compounds, organic 246f., 414
 - toluene
 - as calibration standard 82, 137, 141, 154, 191
 - concentration in buildings 219f.
 - removal by PCO 92ff.
 - toner 414, 417ff.
 - total (TVOC) emissions concept 137f., 142, 154, 191
 - definition 374f.
 - in health risk evaluation 198ff., 333, 336f.
 - indicator 336
 - toxicity 137f., 191, 328f., 336
 - tropical climate 215f.
- u**
- ultra-fine particles (UFP) 425ff.
 - utilization cycle 190
- v**
- vacuum cleaner sampling 27f., 257
 - validation 37ff., 143f.
 - ventilation
 - effects on air quality 227ff.
 - evaluation 65, 223
 - for reducing health risks 196, 203
 - systems 226, 314, 316
 - very volatile organic compounds (VVOCs) 142, 239, 281, 374
 - volatile organic compounds (VOCs)
 - as cause of human symptoms 337ff.
 - definition 191, 374
 - detection techniques compared 3f., 73
 - emissions levels over time 375
 - emissions limits/labels 376
 - emissions test method 133
 - exposure indoors 329
 - identified in emissions testing 350ff.
 - measurement of the sum (Σ VOC) 155f.
 - semi-quantitative determination 154
 - sorbent selection 5, 7, 13, 15
 - source strength 221
 - stability, during analysis 15f.
 - types, in indoor air 55, 217ff., 284ff., 407f.

W

- water affinity 12
- water vapour
 - effects on materials 277f., 311f.
 - interference with air sampling 12f., 78, 151f.
- water-based paints 379ff.
- wood preservatives 289
- wood products
 - building panels 394ff., 397
 - emissions test standards 123, 125f., 129, 394f.
 - formaldehyde and organic acid emissions 281f., 311f., 396f.
 - odorants 177f.
- wood-burning stoves 22
- wool products 354, 366