

## Index

### **a**

acetylcholine 193, 202, 203, 204, 209  
 adrenaline 39, 193, 206, 207  
 aedamer 352, 358  
 aggregation-induced emission 452, 455, 463, 491  
 allosteric mechanism 413  
 $\alpha$ -helix 338, 340, 350  
 $\alpha$ -helix mimic 340  
 $\alpha$ -helix stabilizer 340  
 $\alpha$ -synuclein 39, 357  
 Alzheimer's disease 23, 39, 87, 92, 107, 208, 257  
 amphiphile 377  
     gemini 377  
     nanoparticle 384  
     supramolecular 304, 314–321, 375, 384, 386  
 amyloid  $\beta$ -protein 39, 107–108, 356  
 analytical centrifugation 340  
 anion metathesis 255  
 anionophore 45  
 antenna effect 427  
 antibody 94, 505, 509  
 anti-cancer activity 257  
 antigen 515  
 apoptosis 97, 217, 512, 514, 515  
 aptamer 49, 106, 184, 510  
 aquaporin 366  
 artificial protein 413  
 arylamide foldamer 355  
 aspirin 268

### ATPase 134

ATP hydrolase 138  
 ATP phosphotransferase 138  
 ATP synthase 138  
 Avogadro, Amadeo 2  
 azacrown ether 43, 44, 64  
 azacryptand 224, 225  
 azacyclophane 124

### **b**

bacterial periplasmic protein 163  
 bambusuril 44, 45, 64, 65, 66, 67, 230, 233, 238, 239  
 base-pairing 346, 510  
 benanomycins 179  
 $\beta$ -estradiol 56  
 $\beta$ 2-microglobulin 357  
 bioavailability 42, 209, 253  
 biohybrid polymers 378  
 bioimaging 257, 301, 464, 465  
 biological membranes 375, 397, 399, 404  
 biomarker 515, 517  
 biomimicry 162  
 biopolymer 115, 298, 337, 338, 366, 367, 378  
 bioprinting 325  
 biosensing 361  
 biosensor 417  
 biotechnology 393  
 biotin 36, 46, 55, 200, 231, 292, 300, 344, 532, 533  
 biotinuril 45, 231, 239

- bolaamphiphile 289, 290, 301, 304, 305, 377  
 boron dipyrromethene (BODIPY) 467, 468, 471, 472, 487, 518, 519  
 boronic acid 99, 100, 150, 161, 180, 181, 182, 183, 184, 312, 359, 360, 459, 460, 515, 547  
 boronolectin 183
- C**
- calixarene 45, 80, 96, 97–99, 108, 167, 204–205, 397, 463, 464, 531, 537, 542  
 catalysis 537  
 calixcrown 43  
 calmodulin 93  
 cancer 55, 67, 87, 184, 253, 388, 393, 395, 399, 403, 484, 505–516, 518–520  
 capillary electrophoresis 52  
 carbonic anhydrase 89  
 carbon nanotube 16, 55  
 cascade complexes 216, 220  
 catalysis 42, 47, 58, 136, 147, 249, 260, 261, 262, 265, 270–272, 273, 292, 337, 338, 361, 363–364, 367, 376, 393, 413–442, 525–551  
 catalytic antibody 505, 509  
 cation- $\pi$  interactions 48  
 Cavendish, Henry 2  
 cavitand 58–62, 65, 66, 201–202, 228, 229, 234, 238, 538  
 cavity-directed synthesis 269  
 cellobiose 164, 173, 174, 178, 180  
 C–H activation 533  
 chain vesicle 385  
 chaotrope 21, 61, 229, 232  
 chelate effect 180, 458  
 chelation-enhanced fluorescence 473, 480  
 chelation-enhanced fluorescence quenching 480  
 chemodosimeter 451, 465, 471, 487  
 chemometric method 79, 99, 100  
 chemosensing 414, 415, 418, 426, 427, 428, 429, 430, 454, 455, 456, 457, 491  
 chemosensing ensemble 456, 457  
 chemosensor 58, 67, 140, 141, 147, 426, 451, 452, 453, 454, 455, 456, 457, 462, 482, 483, 491  
 cholesterol 53, 54, 67, 396, 401, 403  
 chromatography 96, 136, 255, 309, 344, 347, 428  
 circular dichroism 40, 58, 59, 63, 97, 166, 291, 304, 305, 306, 316, 317, 318, 320, 322, 323, 340, 461  
 circularly polarized luminescence 179  
 cisplatin 267, 268  
 clickamer 40  
 coiled coil 338, 339, 340, 342, 344, 345, 349, 350, 361, 401  
 collagen 288, 321, 322, 323, 324  
 collisional quenching 454, 455  
 colorimetric sensor 251, 449, 465, 472, 473, 476, 487  
 combinatorial chemistry 37, 168, 203  
 combinatorial fluorescent molecular sensor 104, 105, 107, 108  
 computational chemistry 3, 5, 11, 12  
 molecular dynamics simulation 11, 126, 127, 128, 230, 379, 425  
 concavity 15, 17, 18, 22  
 cone conformation 45, 47, 96, 98, 205, 537  
 convexity 15, 18  
 cooperativity 347, 349, 361, 433, 442, 482, 532, 540, 550  
 coordination cage 210, 212, 213, 260, 263, 269, 270  
 catalysis 270–272  
 coronand 42  
 critical aggregation concentration 380  
 critical gelation concentration 291  
 critical micelle concentration 40, 380  
 critical phase transition temperature 380  
 crown ether 42–44, 64, 65, 66, 67, 197–198, 209, 223, 237, 384, 397, 423, 456, 469  
 cryptand 42–44, 64, 65, 66, 67, 197–198, 456, 463  
 cryptophane 204

- cucurbituril 17, 55, 82–84, 108, 168, 199–201, 205, 208–209, 292, 294, 296, 397, 399, 531  
 catalysis 529–531
- cyclam 214, 215, 485
- cyclen 131, 132, 133, 142, 145, 147, 214, 215, 437
- cyclodextrin 49, 50–54, 140, 196, 198, 232, 233, 292, 383, 388, 391, 396, 397, 398, 399, 400, 402, 456, 526, 536  
 catalysis 533
- cyclopeptide 87, 98, 217
- cyclophane 202–204
- cytochrome c 92
- cystic fibrosis 19, 92
- d**
- dangling hydrogen bond 13, 14, 16, 17
- deep cavitand 49, 58–62, 65, 66, 201, 228, 537
- Democritus 2
- dendrimer 54, 58, 529, 533  
 catalysis 539
- dendron 301
- denticity 43
- dewetting 14, 15, 16
- diabetes 92, 161
- diagnostics 147
- Diels-Alder reaction 526
- diffusion-ordered spectroscopy 429
- dipicolylamine 465  
 copper(II) complex 140  
 zinc(II) complex 145, 216, 217, 465, 480, 489, 514
- dissipative systems 286, 304
- disulfide interchange 168
- DNA origami 403, 404
- DNAzyme 431
- Dole-Jones equation 21
- dopamine 39, 47, 46, 193, 202
- double helix 354
- drinking water 54
- drug delivery 47, 67, 147, 150, 361
- drug design data resource 25
- drug discovery 79, 89
- drug release 287
- dynamic combinatorial chemistry 168, 203
- dynamic combinatorial library 252, 263
- e**
- effective conditional stability constants 121
- effective molarity 420, 530
- emission spectroscopy 449
- Empedocles 2
- emulsion polymerization 393
- energy dissipation 286
- energy transfer 301, 452
- enthalpy-entropy compensation 211, 215, 236
- environmental monitoring 197
- enzyme-linked immunosorbent assay 184
- EPR spectroscopy 416, 423
- error-checking 255
- eutrophication 193
- excimer 144, 145, 453
- exciplex 452, 453
- f**
- flip-flop 380
- fluorescence polarization 451
- fluorescence quenching 459
- fluorophore-spacer-receptor 456
- foldamer 39, 166, 533
- Förster radius 454
- Förster resonance energy transfer 107, 289, 320, 347, 417, 452, 453, 457, 465
- fullerene 16
- g**
- galactosamine 56
- ganglioside 179
- glucosamine 56
- glucose monitoring 184
- glucose sensing 184
- glycobiology 162, 177
- glycocalyx 399
- glycocluster 49
- glycoluril 54
- glycosidic bond 119

G-quadruplex 148, 253, 257  
 G-quartet 147  
 green chemistry 525, 547  
 guanidiniocarbonyl pyrrole 37, 81,  
 143, 227

***h***

half-sandwich complex 249, 252  
 helix bundle 338, 340, 347, 350, 360,  
 361, 364  
 hemolysis 53  
 heparin 90, 164, 166, 362  
 heterogenous catalysis 393  
 hierarchical clustering analysis 487  
 high-energy water 18, 37, 44, 56, 62,  
 200, 206, 223, 231, 232, 234  
 Hill equation 482  
 histamine 48  
 histone 203, 205  
 histone post-translational  
 modification 203  
 Hofmeister effect 9, 19, 61  
 reverse 9, 23  
 Hofmeister series 19, 211, 229  
 hole-size fitting concept 42, 44  
 Hoogsteen base-pair 134, 268  
 hormone 56  
 human growth hormone 95  
 Huntington's disease 89  
 hydration enthalpy 195  
 hydroformylation 526, 542, 544  
 hydrogel 54, 147, 148, 150, 227, 286,  
 287, 288, 289, 290, 292, 293,  
 298, 303, 304, 307, 309, 310,  
 311, 312, 313, 314, 316, 318,  
 319, 323, 324, 544  
 hydrogelator 287, 292, 307, 309, 311,  
 312  
 hydrogen bond acceptor 118, 124  
 hydrogen bond donor 118  
 hydrophobic effect 9, 14, 17, 21, 38,  
 42, 62, 163, 171, 174, 184, 229,  
 263, 301, 338, 345, 347, 350,  
 352, 354, 376, 379, 413, 526,  
 527, 536, 538  
 classical 13  
 non-classical 13, 18

hydrophobic interactions 86  
 hydrophobic shielding 285, 288, 289,  
 306, 316

***i***

iceberg model 5, 11  
 imaging 257  
 cellular 259, 261  
 fluorescence 389  
 magnetic resonance 396, 501, 502  
 optical 501, 502, 518  
 photoacoustic 392  
 positron emission tomography 44  
 ultrasound 501, 502  
 indicator displacement assay 48, 56,  
 88, 142, 217, 250, 427, 457  
 insulin 95, 96, 161  
 integrin 86  
 intercalation 124, 133  
 inverse phase-transfer 529, 536, 536,  
 537, 538  
 ion transport 42  
 islet amyloid peptide 356  
 isothermal titration calorimetry 82,  
 87, 168, 179, 352, 360, 363, 417

***k***

Kemp elimination 539  
 kinase 134  
 knobs-into-holes interactions 338  
 Knoevenagel condensation 539  
 kosmotrope 21, 61, 229  
 kryptofix-2.2.2 44

***l***

Lambert-Beer law 450  
 law of matching water affinities 24  
 lectin 49, 161, 162, 164, 171, 174, 177,  
 178, 399  
 leucine zipper 339, 355  
 linear discriminant analysis 99, 100,  
 103, 104, 250  
 linear response theory 6  
 liposome 377, 395, 396, 541  
 loss modulus 287  
 lower critical solution  
 temperature 49, 392

- Lum-Chandler-Weeks theory 14  
 luminescence 253, 256, 257, 259, 450  
 luminescence enhancement 453  
 luminophore 450
- m**  
 median binding concentration 169  
 medicinal chemistry 88  
 medicine 43, 287, 314, 487  
 membrane 40  
 membrane transport 44  
 memory of water 1  
 mesoporous silica 393  
 metallacrown 209, 251  
 metallocage 531, 538  
 metallamacrocycle 253  
 metallomicelle 541  
 metallosurfactant 541  
 metal-organic framework 180, 249, 272  
 micellar effect 540  
 micelle 40, 49, 50, 65, 529, 533, 539, 545, 547, 549  
     catalysis 540  
 molar attenuation coefficient 450  
 molecular beacon 417  
 molecular clip 207  
 molecular flask 269, 530, 539  
 molecular imprinting 402, 530  
 molecular print board 54  
 molecular rectangle 253  
 molecular tube 59, 65, 66  
 molecular tweezer 38, 62, 65, 66, 67, 207, 208  
 multidenticity 458  
 multitopicity 458  
 multivalency 37, 54, 83, 397, 420, 421, 430, 432, 532, 540  
 multivariate analysis 250
- n**  
 nanocage 355, 395, 403, 404  
 nanocapsule 58, 375, 394  
 nanofiber 148, 291, 303, 307, 309, 310, 311, 312, 313, 314, 316, 318, 323, 358  
 nanomaterial 375  
 nanomicelle 549
- nanoparticle 54, 58, 143, 391, 505, 515, 520, 539, 540, 549  
 gold 391, 402  
 silica 393  
 nanopore 366  
 nanoreactor 375, 529  
 nanoribbon 302  
 nanoring 304  
 nanorod 290, 302, 307, 316, 318, 319  
 nanotransporter 387  
 nanotube 300, 304, 355, 358  
 nanozyme 414, 430, 431, 435  
 naphthalenediimides 301  
 native peptide ligation 363  
 Nazarov reaction 539  
 Negishi reaction 548  
 neurotransmitter 47, 56, 202, 204  
 nicotine 268  
 NMR spectroscopy 414  
     chemosensing 414  
     chromatographic 416  
     DOSY 414, 416, 429  
     NOE 414  
     NOE pumping-CPMGz 430  
     shift reagent 252  
     STD 415, 430  
 non-canonical nucleobases 116  
 noradrenaline 39, 193  
 nuclear Overhauser enhancement 414  
 nucleobase 118  
 nucleoside 119  
 nucleotide 119
- o**  
 octa-acid 61, 228, 531, 537  
     catalysis 538  
 oligoamide foldamer 354, 364  
 oligoresorcinol oligomer 354  
 oligosaccharide profiling 184  
 oligourea 350, 358, 361  
 on water conditions 547  
 out-of-equilibrium 286, 304, 305, 309, 313
- p**  
 packing parameter 376  
 paraquat 46, 66, 83, 205

- Parkinson's disease 23, 39, 208  
 pattern recognition 491  
 peptide amphiphile 314, 316,  
     318–319  
 peptidocalixarene 80  
 peptoid 338, 346  
 perylenebisimide 301  
 perylenediimide 301  
 phase-transfer 42, 43, 536  
 phenethylamine 47, 202  
 $\pi$ -stacking 118, 124, 125, 126, 127,  
     128, 129, 133, 140, 143, 150  
 phosphacalixarene 544  
 phospholipid 513  
 phosphoramidate 134, 136, 138, 139,  
     140  
 phosphoramidite synthesis 117  
 phosphorescence 450  
 phosphorylation 87  
 phosphoryl transfer 138  
 photo-induced charge transfer 452,  
     453  
 photo-induced electron transfer 181–  
     182, 452, 460, 468, 471  
 photoluminescence spectroscopy 451  
 photothermal cancer therapy 392  
 photothermal effect 391  
 PICsome 386  
 pillararene 48, 59, 65, 66, 67, 205, 388,  
     397, 531, 537  
 Plato 2  
 polyamine receptors 119, 121, 130,  
     134, 139  
 polymersome 378, 382, 384, 388, 389,  
     392, 395, 541  
 polyoxometalate 273  
 polywater 1  
 porphyrin 165  
 pradimycins 179  
 preorganization 42, 458  
 principal component analysis 99, 100,  
     107, 487  
 probe 451  
 prostaglandin 53  
 proton sponge 127  
 pseudorotaxane 175, 383  
 purine 118  
 putrescine 119  
 pyridoxal kinase 131  
 pyrimidine 118
- q**  
 quantum dot 417
- r**  
 ratiometric response 455  
 reactive oxygen species 388  
 regenerative medicine 287  
 resorcinarene 537  
 rheology 286  
 rigidochromic effect 452, 455  
 rotaxane 233, 239  
 Ruhrchemie/Rhone-Poulenc  
     process 525
- s**  
 saccharide recognition 459  
 salt bridge 221  
 salting-in salt 20  
 salting-out salt 20  
 scaled particle theory 17  
 scorpions 128  
 second-sphere coordination 211  
 self-assembly 418  
 self-correction 250  
 self-healing 286, 288, 289, 292, 293,  
     298  
 self-sorting 252, 290, 297, 303, 310  
 sensor 161, 301, 375, 451  
 sensor array 99, 194, 250  
 separation process 393  
 Sharpless-Fokin catalyst 540  
 ship-in-a-bottle concept 269  
 Sialyl Lewis X 164  
 SNAzyme 431  
 soft material 375  
 soft template 393  
 solute-solvent interaction energy 6  
 solvent switch method 382  
 solvophobic effect 264, 265, 285, 301  
 spermidine 119  
 spermine 119  
 spherand 43, 197  
 spin label 416

- steroid 56  
 stimuli-response material 47  
 stimuli-responsiveness 57, 298  
 Stokes shift 450  
 storage modulus 287, 290, 311  
 streptavidin 36, 300, 344, 532  
 subcomponent self-assembly 263  
 sulfonatocalixarene 293  
 supramolecular polymer 87  
 supramolecular protecting group 270  
 supramolecular velcro 56  
 surface enhanced Raman scattering 418  
 surface plasmon coupling 426  
 surface plasmon resonance 88, 418  
 surfactant 40, 375  
 Suzuki-Miyaura reaction 533, 540, 547  
 systems chemistry 435
- t**  
 temple receptor 168, 171, 177, 178  
 testosterone 56  
 theranostics 519, 520  
 therapy  
     photodynamic 520  
     photothermal 520  
 thermochemiluminescence 103  
 thermoplastic elastomers 287  
 Thompson-Friedenreich antigen 184  
 3D printing 287  
 time-correlated  
     photoluminescence 451  
 tissue engineering 150, 287  
 tissue regeneration 147  
 tomography  
     computed 501, 502  
     positron emission 501, 502  
     single-photon emission  
         computed 501, 502  
 transition state stabilization 526  
 transthyretin 39  
 transthyretin amyloidosis 39  
 trimethyllysine 203, 205  
 Trojan horse 253  
 tryptophane 58  
 tube inversion test 286  
 turn-on constant 467  
 tyramine 47, 202
- u**  
 UV-Vis spectroscopy 449
- v**  
 vancomycin 38  
 Van't Hoff analysis 222  
 velcrand 59, 65, 537  
     catalysis 451  
 velcro peptide sequence 344, 347, 363  
 vesicle 42, 49, 51, 65, 142, 529, 533  
     catalysis 537, 541  
 viologen 48, 49, 58, 83  
 viscoelastic material 287, 288  
 viscoelastic properties 288
- w**  
 Wacker process 525, 529, 539  
 waste water 54  
 water channel 50  
 water properties  
     dielectric constant 4  
     dipole moment 4  
     heat capacity 3, 13, 22  
     hydrogen bond acceptor 4  
     hydrogen bond donor 4  
     ionization constant 5  
     Kamlet-Taft solvent parameter 4  
     Reichardt solvent parameter 4  
     surface tension 5  
     viscosity 5  
 water structure breaker 21, 22, 23  
 water structure maker 21, 22, 23  
 Watson-Crick base-pair 255, 268  
 wetting 14  
 wheat germ agglutinin 171

