

Index

- AC, *see* activated carbon
- AC beads 278, 280, 284, 286
- AC beads for protein bound toxin
 - removal 275, 277, 279
- AC monoliths 345–346
- ACM, *see* activated carbon monoliths
- ACs, *see* activated carbons
- activated carbon (AC) 4–5, 15–16, 34, 37, 39, 42, 157–158, 182, 230–233, 236–237, 242–243, 271–275, 277, 281–282, 284–287, 297–300, 309–311, 373, 379–380, 382, 384, 386, 388, 390–404, 406, 408–410, 422, 424–426, 428, 430–433
- activated carbon adsorption 273, 392
- activated carbon monoliths (ACM) 286–290, 346
- activated carbon powder 311
- activated carbon surface
 - functionality 409
- activated carbons (ACs) 4–5, 15, 34, 37, 116, 153, 158, 182, 230, 271–275, 277–283, 297–298, 306, 360, 379–380, 382, 384, 386, 388, 390–398, 400–404, 406, 408, 410, 425–426, 432
- activated carbons
 - characterization 398
 - granular 390, 393
 - modified 397, 403
 - preparation of 153, 391, 397
 - surface area of 424, 433
- activated carbons in nitrates
 - removal 390–391, 393, 395
- activated coals 131, 392, 422–423, 426, 429
- active carbons 9, 390, 395
- adhesion 8, 20, 38, 233, 241, 257
- adsorbent nanoporous carbons 310
- adsorbents 5, 7–8, 16, 26, 37, 41, 115–116, 132–133, 176–177, 212, 283, 309, 386, 390, 392–394, 397
- adsorption
 - biotoxin 285
 - cytokine 281–282, 327, 329
 - nitrate ion 380, 410
- adsorption chromatography 173–174, 176, 197
- adsorption immobilization 7, 243
- adsorption methods of
 - immobilization 7, 355
- AFM, *see* atomic force microscope
- albumin 276–280, 345
 - AC adsorption of 277, 279
- ammonia 276, 315, 381, 387, 390, 396–397, 401
- ammonium ions 195–197, 203
- AMW, *see* average molecular weights
- anions 388, 393
- antagonistic activity 246–247, 259, 263–264
- antibiotics 6, 16, 21, 212–213, 239, 248, 252, 254, 261, 355

- antimicrobial activity 156, 167, 215–217, 219, 221, 223, 254, 259
- apoptosis 150–151, 153
- apricot stones 9, 12, 14, 33–34, 46, 51, 69–70, 80, 83, 85, 115, 117, 142, 203, 361, 423
- Artemia salina* 155, 163–165
- artificial seawater 155
- atomic force microscope (AFM) 89–90, 94–95, 306
- ATPase 152–153
- Auger electrons 106–107
- auxin 199–201
- average molecular weights (AMW) 302

- back-scattered electrons (BSE) 86–87
- bacteria 20–21, 24, 26, 41, 43, 156, 213, 215, 231–232, 241, 243–244, 247–249, 252–254, 259, 262–263, 367, 385
 - lactic acid 20–21, 244, 358
- bacterial adhesion 16
- bacterial cells 27, 33, 41–42, 56–57, 59, 231–232, 262
 - immobilized 64, 246
- bacteriocins 20, 235, 241, 244, 247
- bamboo 394
- bead carbons 320, 324–329
- bidens* 215–217
- bifidobacteria 23, 236, 243, 253–254, 261–262, 373
- bilirubin 276, 279–280, 282, 299
- biocatalysts 7–8, 28, 36, 353–355, 358, 374
 - immobilized 6–8, 28, 355–356, 360
- biocompatibility 273–274, 282–283, 298, 326, 346
- biocomposite materials 9, 17–18, 22–23, 251
- biocomposites 18, 211–212, 214, 216–218, 223, 225, 254, 259, 261
- biofilms 234, 242, 247, 254
- biological fluids 182–183, 313
- biomass 8, 256–257
- biomedicine 3–4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28
- bioremediation 26–27, 35
- biosensors 195–196, 203, 357
- biosorbents 26, 33–36, 56, 58, 60, 62, 64–66, 69–70, 195, 250, 353, 358, 366–368, 374
- biostimulator 173, 188, 197, 199
- biotechnological processes 6, 8–9, 39, 41
- biotechnology 35–36, 358
- biotoxins 271, 274–277, 280, 285, 313
- birch cuttings 117–121, 124, 298
- blood 41, 149, 157, 181–183, 187–188, 219, 230, 285, 287, 299, 313, 326–327, 332, 342, 346, 348
- blood cells, traumatization of 182–183
- Boehm titrations 408, 410
- BSE, *see* back-scattered electrons

- cadmium 125–127, 131, 429–431
- calendula 215–219
- cancer 151, 185
- cancer cells 150–153
- carbon
 - adsorbent 273, 299
 - monolithic 313, 338, 341
 - resin-derived 300–301, 313, 333
 - sulfonated 387

- carbon adsorbents 271–272, 327
 - microporous 158
 - nanostructured 271
- carbon based wound dressings
 - 211–212, 214, 216, 218, 220, 222, 224, 226
- carbon beads 282–283, 288
- carbon dioxide 305, 307–308, 310, 318, 339, 371, 391, 424
- carbon dioxide activation 307, 310
- carbon-mineral sorbents 430
- carbon nanofibers 396
- carbon nanospheres 285
- carbon nanostructures 12, 136, 142
- carbon nanotubes 9, 13, 393
 - adsorption capacity of 393
 - synthesis of 9, 12
- carbonaceous adsorbents 9
- carbonaceous materials 116
- carbonaceous matter 80, 83
- carbonaceous precursor 4, 391–392
- carbonization
 - flame 9–12
 - high-temperature 46, 213, 230, 353, 356, 360, 374
- carbonization of plant raw
 - materials 421–422, 424, 426, 428, 430, 432, 434, 436–437
- carbonization temperature 48–49
- carbonization temperature of
 - phragmites 130
- carbonized adsorbents 13, 250
 - nanostructured 22
- carbonized apricot stones, EPR of 141
- carbonized carriers (CCs) 33–34, 36, 44, 54, 56, 59–62, 295, 367, 373
- carbonized phragmites 128–129, 131–132
 - EPR investigation of 128–129, 131
- carbonized rice husk (CRH) 5–6, 18, 136, 213–214, 216, 218, 220–221, 223–226, 230–233, 236–239, 243–247, 249, 251, 253–254, 259–260, 264, 392, 401–402, 405
- carbonized sorbents 10, 27, 34, 42, 55, 69–70, 131, 215, 365, 373–374, 432, 437
 - plant-derived 10–11, 13
 - surface modification of 394
- carbonized vegetable materials
 - 115–116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142
- CCs, *see* carbonized carriers
- cell immobilization 38, 41, 56, 68
- cell suspension 43–44, 252
- cell wall 55, 66, 68, 217, 232–233, 248, 312
- cells
 - microbic 230
 - microorganism 33, 355
- cellulose 7, 66, 82–83, 324, 333–335
- chamomile 215–217
- coconut shells 39
- colon 236, 240, 243, 261–262
- copper 47, 127, 131, 367, 387–388, 429, 431
- creatinine 276, 299, 327
- CRH, *see* carbonized rice husk
- cytokine removal 183, 280–281, 330
- cytokines 23–24, 149, 173, 183, 187–188, 201, 281, 298–299, 331
- cytokinin 189, 199–200

- denitrification 384–385
 - biological 384–385
- detoxification 181–182, 230, 260, 264, 274
- dysbacteriosis 21, 239, 245, 247–249, 260–261
- electron diffraction 100–101
- electron paramagnetic resonance (EPR) 102, 107–108, 116, 122, 125, 133, 135, 139, 426
- endotoxemia 19, 248
- endotoxins 24, 219, 224, 248, 281, 290
- engineering zymology 354, 357–358
- Enterobacteria 19, 21, 232, 248–249
 - opportunistic 236, 261–262
 - pathogenic 247–248, 262
- enterosorbents 116, 216, 236, 259, 262
- enzymes, immobilized 354, 358
- epithelial cells 23, 239, 250
- EPR, *see* electron paramagnetic resonance
- ethanol 120, 154, 156, 159, 198–199, 222, 358, 384
- ethylene glycol 315, 317–318
- free-radical states (FRS) 118–121, 125–133, 135–136, 138, 141–142, 427
- FRS, *see* free-radical states
- fusicoccanes 152–153
- fusicoccin 147, 149–152, 154, 156–164, 166, 168–170
 - sodium adduct of 161
- GAC, *see* granular activated carbon
- gastrointestinal tract 19, 219, 230, 240, 243, 252, 373
- Gram-negative bacteria 66–67, 217, 232–233, 239, 247–248
- Gram-positive bacteria 66–67, 217, 232
- granular activated carbon (GAC) 390, 393
- grape seed 9, 55, 117–121, 128, 353, 356, 360–362, 366–367, 369, 374, 421, 424–427
- groundwater 380–382, 385–386, 390
 - contaminated 386
- groundwater bodies 381
- heterogeneous biocomposites 221–222, 225, 230
- hexamine 303–304, 312, 315, 317, 338
- hydrocarbon oxidizing
 - microorganisms 371, 373
- hydrocarbons 369, 371
- hydrophobicity 17, 53, 55–56, 59, 70
- hydrophobicity coefficient 43, 56, 59
- immobilized probiotics 239, 241, 243, 245, 249, 251, 253, 255, 257, 259, 261, 263
- indoxyl sulphate 276–277, 279, 289, 345–346
- intestinal epithelium 22, 250
- intestinal microflora 236–237, 239, 248, 261, 264
- intestinal mucosa, colonization of 250, 253

- intestinal toxins 264
- intestine
 - large 234, 238, 241, 245, 248–249, 262, 373
 - small 20, 239–240, 248–249
- iron, zero-valent 385
- iron nanoparticles, zero-valent 386

- KOH, activation of 392

- Lactobacillus 22, 230, 240, 243–245, 250–251, 261, 264
- Lactobacillus cells 21, 250
 - immobilized 22, 247
- Lactobacillus fermentum* 21, 244, 246, 252, 254
 - immobilized cells of 246, 252
- lactose 256–258

- macropores 11, 289, 314, 316, 320, 339, 397, 433
- macroporosity 281, 314, 316, 337–338
- maximum permissible concentrations (MPC) 124, 131
- melanoma cells 152
- microbial cells 8, 15–17, 26, 28, 34–39, 43–44, 53, 55–60, 62, 64–65, 67–70, 213–214, 219, 230–234, 244, 264, 357, 359, 366, 373
 - adhesion of 7, 55
 - desorption of 60–61
 - immobilization of 7, 37, 39, 60, 70, 242
 - immobilized 6, 33–36
- microbiocenosis 236, 261–262, 373
- Micrococcus luteus* 370, 372–373
- microorganisms 6–8, 19, 23, 25–26, 28, 34, 38, 40–41, 55–56, 60, 62–64, 70, 193, 212, 214, 223, 234, 236, 241–242, 246, 251, 259, 261, 359, 368, 371, 373
 - immobilized 35, 42, 373
 - immobilized cells of 354, 359, 372
- microorganisms cells 359
- micropores 11, 109, 158, 278, 289, 299, 314, 329, 337, 394, 397, 433
- microwave plasma enhanced chemical vapor deposition (MPECVD) 9, 12
- molecular-sieve chromatography (MSC) 174, 177–179, 191–192, 194–195
- MPC, *see* maximum permissible concentrations
- MPECVD, *see* microwave plasma enhanced chemical vapor deposition
- MSC, *see* molecular-sieve chromatography

- nanoporosity 285, 287, 289
- nanoporous carbons 301, 303
- nanostructured carbon adsorbents 396
- nanostructured carbon sorbents (NCSs) 9, 13, 17–19, 22, 24–27
- nanostructured carbonized materials, synthesis of 9

- nanostructured carbonized sorbents 3–4, 25, 264
- nanostructured carbons 272–274
- nanotubes 106, 108, 120, 142–143, 264, 362, 435, 437
- NCSs, *see* nanostructured carbon sorbents
- nitrate reduction 387–388
- nitrate removal 384, 388, 390
- nitrate removal 379, 389–391, 393, 395
- NMR, *see* nuclear magnetic resonance
- nuclear magnetic resonance (NMR) 102, 107–108

- p-cresyl sulphate (PCS) 276, 279, 289, 345–347, 428
- pathogens 187, 220, 225, 234–235
- PCS, *see* p-cresyl sulphate
- permeable reactive barrier (PRB) 330–331, 386
- phenolic resin carbons, pyrolysed 306–307
- phenolic resins 281, 287, 300–301, 303, 305, 307, 309, 311, 315–316, 332–333, 336–337, 339
- phonons 104–106
- phragmites 115, 117, 128, 130–131, 133
- phytoextracts 216–217, 219–221
- phytotoxin 150–151
- plasma 67, 299, 313, 329, 331, 342, 344, 346–347
- porosity 6, 50–51, 59, 336, 365, 390, 400, 422–424, 429–430, 433
- PRB, *see* permeable reactive barrier
- probiotic bacteria 20, 239, 241–243, 249, 259
- immobilization of 239, 242
- probiotics 19–20, 213, 241, 244, 246, 249–251, 254, 261–262, 373
- proteins 16, 22, 108, 152–153, 178–179, 275–277, 281, 283–285, 289, 299
- Pseudomonas aeruginosa* 58, 60–61, 63–65, 218, 367, 370, 372–373
- Pseudomonas mendocina* 33, 54, 56–59, 62, 64, 69

- reverse osmosis 384, 389
- RH, *see* rice husk
- Rhodotorula glutinis* 33, 53, 56–57, 59–60, 62–65, 69–70, 368–369
- rice husk (RH) 4–5, 10, 14, 21, 23, 27, 33, 46–48, 50–54, 56–62, 64–66, 69–70, 80, 82–83, 85, 115, 117, 133–136, 248, 360, 365–366, 368–369, 379–380, 382, 384, 386, 388, 390–392, 394, 396–410
- carbonized 44, 48, 50, 54, 57–59, 65

- Salmonella typhimurium* 21, 217, 219, 231, 233, 246–248, 259
- Salvia officinalis* 216, 218–219
- scanning electron microscope (SEM) 85–88, 194, 279–280, 284, 290, 345–346, 401, 410
- scanning probe microscopy (SPM) 89–94
- SEM, *see* scanning electron microscope

- sheat bran, EPR analysis of 136–137, 139
- spherosomes 189–190, 193–196, 203
- SPM, *see* scanning probe microscopy
- Staphylococcus aureus* 157, 167, 215–219, 231
- starch 256–258, 400
- TEM, *see* transmission electron microscope
- TNF 281–282, 346–347
- TNF-related apoptosis inducing ligand (TRAIL) 151
- toxins 9, 15, 22, 24–25, 150, 173, 181, 224, 230, 243, 262–263, 277, 279–280, 332, 346
- TRAIL, *see* TNF-related apoptosis inducing ligand
- transmission electron microscope (TEM) 78–80, 100
- tryptophan 278–279, 327–328
- tumor cells 150, 153, 187
- typhimurium 218, 220, 231, 233, 260
- uraemic toxins 275, 277, 279, 327, 346
- urea 276, 299, 303, 327, 379–380, 390, 396, 408–410
- valence vibrations 15, 425–426
- walnut shells 9, 11, 55, 115–123, 125–127, 154, 169, 353, 356, 374, 396, 421–426, 432–433
- waste, industrial 34, 36, 41
- wastewater 26, 36, 56, 354, 382, 384–386, 400
bio-purification of 356
- wastewater treatment 34, 36
- water-alcohol extracts 217–218
- wheat bran 9, 80, 83–84, 115, 117, 136–140
- wheat grain 189–190, 194, 196
- woody plants 189, 200–201, 203
- wound healing 24–25, 219, 223, 226
- wounds 24, 212–213, 222–224, 226
- yeast 43, 56–57, 59, 261–262
sorption of 58–59
- yeast cells 43, 58–60, 356, 367, 437

