

Index

a

- absorption 123, 129, 139, 213, 246–247, 313, 487, 639, 732, 740–741, 767, 770, 772, 833, 837
- Acanthamoeba* sp. 228
- acaricides 285, 287
- acenaphthene 310, 707, 727, 730
- acenaphthylene 310, 727
- acerola fruit juice 90, 482
- acetaldehyde 364
- acetate 241, 247, 265, 271–272, 277, 279, 499
- acetic acid 62, 116, 244, 276, 281, 372, 686–688, 809
- acetic anhydride 116, 686
- acetone 74, 76, 80, 113, 134, 372, 710, 714–715, 717, 740, 742, 744, 748
- acetonitrile 753
- acetyl cellulose 117
- acetylene tetrachloride 719
- acetylpyridinium chloride (CPC) 606
- acidic wastes 138–139, 647, 652
- acid phosphatase 521
- acid recovery 93, 675–678, 685, 689–690
- acrolein 713
- acrylamine 740
- acrylic acid 752, 757, 763–764, 774
- acrylonitrile 57–58, 547, 706, 713, 768, 829
- acrylonitrile-butadiene-styrene (ABS) 36
- actinomycetes 274
- activated alumina (AA) 267
- activated carbon 216, 219, 267, 274–277, 279, 281, 286, 292, 297, 299, 357, 365–366, 443, 512, 525, 552, 707, 720, 734
- activated charcoal 443, 525
- activated clay 506
- activated coconut charcoal 525
- activated sludge 83, 244, 261, 265, 292, 297–298, 357, 360, 362–363, 509, 734–735, 775
- adsorbent 11, 215, 261, 263–264, 267, 275, 297, 437, 477, 488–489, 553, 617, 619, 629, 692, 725
- adsorption 44, 63, 66, 88–89, 123, 130, 143, 144, 214, 219, 225, 229, 261, 263, 267, 274–276, 282, 286, 289, 291, 298, 304, 317, 320–323, 357, 363, 365, 392, 400, 415, 426, 434, 443, 445, 617, 619, 621, 627–632, 682, 707, 714, 720, 741, 744, 755, 757, 764–766
- adsorptive membrane chromatography 143
- affinity membrane chromatography 141, 437, 621
- affinity membranes 144, 145, 146, 434, 436, 438–439
- affinity ultrafiltration 445
- alachlor 282, 290, 291, 740
- albumen 372
- albumin 147, 232, 373, 441, 516–517, 740
- alcohol 61, 115, 119, 291, 513, 539, 553, 717, 747, 753
- aldicarb 290–291
- aldrin 707, 728
- algae 219, 273, 308, 311
- alginic acid 621, 744, 747
- alkylated hydrocarbon 768
- alkynes 703–704
- alloy membranes 117
- allyldioxybenzene methylene ether 727
- aluminum 220, 261, 264, 266, 269, 311, 653, 690, 709, 740
- aluminum acetylacetonate (AlAcAc) 764
- aluminum humates 274
- aluminum hydroxide 274
- aluminum oxide 254–255
- aluminum phosphate 261
- aluminum polychloride 360
- aluminum sulfate 267, 366, 372, 527
- aluminum trioxide 396

- amino acids 72, 102, 138–139, 142, 273, 276, 512, 514, 521, 531, 691–694, 809–810
aminobenzene 713, 740
aminonaphthalene 727
aminopenicillanic acid (APA) 438, 694
aminophenol 740
aminophosphonates 432
ammonia 209, 554, 262, 271, 299, 678, 740
ammonium 57, 58, 249, 254, 323, 690
ammonium chloride 372, 430
ammonium fumarate 241
ammonium nitrate 679
ammonium sulfate 372, 375, 434, 522
amoebae 228, 233
amyl acetate 372
amyl alcohol 372
amylase (diastase) 521
amyloid 435–436
aniline 739–740
anilinophenol 740
animal blood 521–522
anion exchange membranes 95, 97, 101, 102, 242, 270, 322–323, 440, 626, 675, 739
anionic surfactant 69
anthocyanidins 550
anthracene 310, 727, 730
anthracite 279, 293
antibiotics 60, 81, 89, 425, 429–432, 470, 713
antibodies 141, 142, 435, 444
antilow density lipoprotein antibody (anti-LDL) 437
antimony 60, 61, 221, 601–605, 633
antithrobin 426
anyvim 740
apple juice 60–61, 478, 480–482, 484, 493
aqueous effluents 619–620
aroma almond/nutty 494
aroma apple 60, 115, 491–492
aroma banana 115
aroma black currant 115, 492–493
aroma butter 494
aroma cucumber 494
aroma grape 115
aroma lemon 492
aroma mushrooms 594
aroma orange 115, 493
aroma peach 486, 492
aroma pineapple 115, 481, 494
aroma potato 494
aroma raspberry 486
aroma rose 492
aromatase 550
aromatics 133
aroma tomato 492
arsenic 60, 61, 66, 81, 97, 214, 221, 601–609
arsenic pentoxide 602
arsenic trioxide 602
arsenious acid (H_3AsO_3) 601
aspartic acid 146, 147
Aspergillus niger 688, 690
assimilable organic carbon (AOC) 225, 251, 271
ATP 309, 427–428
attractants 285
azobisisobutyronitrile 621
azodye 358
- b**
- Bacillus* sp. 428
bacteria 62, 89, 208–209, 211, 218–220, 225–228
bacterial spores 89, 536
bactericides 373, 375
bacteriophage 226, 230–231, 233, 441, 471
barium 224, 256–257
barium sulfate 256–257
beer 61, 67, 472, 500, 554
bentazone 287–288, 292, 822
bentonite 405, 477, 480, 552–553
benzacenaphthene 727
benzaldehyde 491
benzenamine 740
benzene 34, 97, 102, 113, 116–118, 136, 140, 706, 710, 760–765
benzidam 740
benzidine 727
benzoic acid 551, 554, 727, 731
benzopyrene 707
benzophenone-tetracarboxylic-dianhydride (BTDA) 34, 723
benzopyrene 707
benzoylchitosan 117
benzyl alcohol 372, 727
benzyl penicillin 429–430
beryllium 61, 311
bicarbonate 43, 234, 270, 394
bilirubin 437
biocides 67, 283, 286–287, 311, 355, 372, 510, 704
– characteristic 283
– conventional removal 286
– membranes for removal 286
biodegradability 286, 298, 364
biogas 522
biological phosphorous (Bio-P) 252, 265
biological treatment 66, 67, 261, 292, 298, 359, 364, 375, 377, 393, 400, 405, 509, 521, 652, 707

- biomass 131, 225, 243, 244, 251, 256, 297, 429, 502
 biopharmaceutical products 440
 bioproduct 429, 440
 bioreactors 206, 426, 690, 707, 741, 766
 biosorbent 619, 632
 biosorption 11, 632, 634–635
 biotechnology 81, 89, 98, 144
 biochemical oxygen demand (BOD) 271, 300, 469
 biodegradable organic matter (BOM) 271, 277
 biological powdered activated carbon (BPAC) 299
 bipolar membrane 98, 99, 237, 685, 689, 693
 bis(aminophenoxyphenyl) hexafluoropropane (BAPPH) 34, 758
 bis(aminophenoxyphenyl) propane (BAPP) 34, 758
 bisaminopropyl 715
 bisaminopropyl tetramethyldisoxane (MDMS) 715
 bischloroethoxy ethane 728
 bischloroethoxy ether 728
 bischloroethoxy methane 728
 bischloroethoxy phthalate 728
 bischloroethyl ether 728
 bischlorophenyl-trichloroethane (DDT) 441–442, 707, 728–729
 bisethyl-hexyl phosphoric acid 646
 bisethylhexyl-phthalate 727
 bisphenol 126
 bistrimethylpentyl monothiophosphinic acid 627
 black liquor (BL) 81, 400–403
 blood 97, 372, 432–436, 530
 boiler 66, 471, 523, 534
 bone char 518
 borates 268, 611
 borax 372, 609
 boric acid 140, 301, 372, 610, 680
 boron 60, 221–222, 301, 609–617
 bovine serum albumin (BSA) 145, 433, 445
 BP-3MPDIPDP 759
Brachionus calyciflorus 554
 brackish water 11, 57, 60, 67, 102, 204, 217, 222–223, 237, 266, 301–303, 611, 614, 678
 brewing 67, 500–501
 brine 70, 239, 252–253, 257, 259, 473, 525, 535, 636
 bromide 215
 bromodichloromethane 720
 bromoform 720
 bromomethane 719
 bromophenyl phenyl ether 728
 broth 429–430
 BTX 117, 136, 140, 706, 730–732
 buffers 420
 bulk liquid membranes 627
 butadiene 36, 709, 769
 butane 774
 butanediol 118, 714
 butanol 33, 113, 115, 118, 714, 716, 743
 butenes 774
 butter 494, 533
 butyl acetate 430, 491
 butyl acrylate 722, 757
 butyl alcohol 120, 713, 750
 butylbenzene 441
 butyl-benzyl phthalate 727
 butylenes dichloride 719
 butylphenyl-methylcarbamate (BPMC) 441
 butyraldehyde 364
 butyric acid 683
 byproduct 364–365, 482, 509–510, 521–522, 528, 539, 542, 632, 685, 694, 704–705, 713, 720, 755
- c**
- cadmium 61, 69, 138, 311, 355, 618–621, 638
 calamine 653
 calcite 279
 calcium 214–215, 220, 234, 235, 237, 258, 261, 267, 278, 289, 290, 302, 308, 375, 416, 509, 513, 517, 534, 611, 618, 637, 690
 calcium chloride 372
 calcium citrate 689
 calcium hydrosulfide 372
 calcium hydroxide 214, 372, 688
 calcium lactate 685
 calcium oxide 517, 519
 calcium phosphate 321, 542
 calcium sulfate 257–258
 calcium tartrate 554
 calixarene 623–624
Candida rugosa 694
 caramels 518
 carbofuran-dihydro-dimethylbenzofurarn-7-yl-methylcarbamate 314
 carbon 38, 41, 90, 130, 132, 218, 396, 405, 643–645, 652–653
 carbon dioxide 44, 123, 126–128, 131–132, 246, 269, 271, 314, 387, 405
 carbon disulfide 713, 741
 carbon membranes 41, 130–131
 carbon tetrachloride 133, 706–707, 719, 740
 carbonyl sulfide 741

- carboxylic acid 60, 62, 214, 271, 273, 688, 734, 753, 776
 carboxyl methyl cellulose (CMC) 629
 casein 71–72, 372, 473, 480, 534–535, 539–540, 729
 cashew apple juice 482
 catalase 521
 catalysis 551, 644, 671
 catalyst 4, 11, 61, 66, 213, 253–255, 313, 355, 358–359, 426, 429, 472, 513, 532, 603, 626, 630, 639, 644–646, 650, 688, 740, 745, 751
 catalytic membranes 11, 255–256, 495
 – reactors 40, 118, 495
 catechol dioxygenase 736
 catechol oxidases 551
 cation exchange membrane 93, 98, 421, 439–440, 627, 635–636, 678–679, 689–690, 774
 cation-exchange resin 214, 421, 628
 caustic 67, 256, 363, 473, 510, 549
 caustic soda 234, 238, 372, 503, 510, 545, 610, 689
 cell 81, 89, 98, 270, 440, 653
 cellophane 31, 752
 celluloid 31
 cellulose 56, 145, 396, 474, 475, 484, 517, 621, 740, 752
 cellulose acetate (CA) 56, 96, 222, 264, 746
 cellulose ester (CE) 686, 750
 cellulose nitrate 31, 233, 264, 606
 cellulose triacetate (CTA) 62, 422, 752
 cephalosporin 81
 ceramic membrane 38, 42, 101, 116, 117, 255, 276, 280, 296, 303, 384, 402, 549, 628, 744, 754, 764
 cesium 138, 622–623
 cesium carbonate 623
 cesium nitrate 623
 cesium picrates 623
 charged membranes 63, 81, 116, 282, 687
 cheese 72, 81, 244, 473, 494, 522, 533, 535, 536, 538–542
 chelates 146, 690, 776
 chemical cleaning 303, 503, 510, 611
 chemical industry 61, 73, 116, 131, 203, 207, 542, 682, 686, 705, 721, 749
 chiral 444–445, 447
 chitin 143
 chitooligosaccharides 428
 chitosan 81, 114, 116, 145, 428, 443, 526, 542, 629, 630, 737, 744, 747
 chitosanase 428
 chloralkali 259, 638
 chloramine 273, 278
 chlordane 707, 728
 chloride 73, 137, 221, 237, 242, 268, 270, 290, 292, 366, 375, 376, 386, 399, 400, 509, 602, 603, 644
 chlorinated benzene (CBs) 706
 chlorinated hydrocarbons 218, 294, 705, 728
 chlorinated phenols 315
 chlorinated pyridine 287
 chlorine 80, 133, 214, 221, 226, 228, 259, 271, 273, 294, 304, 364, 391, 470, 611, 637, 719, 728
 chlorine dioxide 274, 637
 chloroacetyl chloride 721
 chloroaniline 728
 chlorobenzene 705, 707, 740, 762
 chlorobenzilate 728
 chlorodibromomethane 719
 chloroethane 719
 chloroform 33, 97, 116, 140, 221, 649, 654, 705, 710, 720, 723, 724, 813
 chloromethane 120, 719
 chloronaphthalene 707, 728
 chloroneb 289
 chlorophenol 67, 552, 706, 707, 734
 chlorophenyl phenylether 728
 chlorophylls 518
 chloropropane 719
 chloropropene 846
 chlorosulfonic acid 745
 chlorotetradecane 137, 138
 chlorphenothane 728
 cholesterol 436, 437
 chondroitin sulfate 83, 813
 chromate 623, 625, 641
 chromatography 98, 141, 143, 206, 429, 444, 692
 chromic acid 81, 623, 680, 681
 chromium 61, 81, 137, 138, 355, 375, 377, 379, 384, 413–416, 623–626, 641, 642, 671, 813
 chromium hydroxide 383, 624
 chromium oxide 385
 chromium sulfate 379
 chrysene 310, 727
 cider 501–502
 cinnamic acid 551, 554
 citrate 393, 688
 citric acid 101–103, 481, 507, 510, 682, 683, 688, 744
 clams 81, 526
 clarification
 – of fruit juices 477
 – of wines 497
 clay 256, 307, 506, 552
 clean acids 413

- cleaner production 3
 operations in the tanning industry 377, 379
 clean pharmaceuticals 12, 425
 clean technologies
 – definitions 8–9
 clean water 203, 211, 319
 – act 1, 308, 706
Clostridium acetobutylicum 118, 714
Clostridium sporogenes 536
Clostridium tyrobutyricum 536
 coagulant 128, 215, 219, 280, 281, 297, 367, 368
 coagulation 66, 81, 88, 214, 219, 230, 235, 274, 279, 280, 289, 297, 302, 305, 357, 359, 363, 367, 377, 404, 405, 420, 472, 524, 602, 608, 707
 coal 260, 264, 310, 617, 619, 706, 730
 cobalt 81, 355, 626–628, 642, 813
 cobalt chloride 680
 cobalt separation membranes using 627
 chemical oxygen demand (COD) 60, 222, 270, 297–299, 316, 372, 396, 470
 coenzyme 427, 428
 coffee 61, 70, 472, 521, 720
 coliphage 230–232, 298, 299
 collodion 31, 51
 colloids 11, 84, 209, 221, 265, 270, 296, 380, 479, 498, 499
 color(s) 61, 67, 68, 211, 218–220, 222, 235, 273, 274, 276, 282, 293, 308, 357, 358, 361, 363, 364, 376, 395, 422, 477, 481, 485, 488, 511, 515, 517, 519, 814
 combined process 241, 315
 commercially available membranes 76, 396, 607, 611, 691, 732
 concentration of whey components 541, 542
 contactors 11, 139, 140, 206, 212, 213, 245, 430, 492, 509, 682, 737
 copper 61, 69, 81, 97, 253, 311, 355, 413–415, 502, 509, 513, 628–630, 647, 653, 671, 690, 814
 copper ferrocyanide 31
 copper nitrate 649
 copper oxide 256
 copper sulfate 256
 corrosion 256, 271, 393, 399, 648, 653
Corynebacterium glutamicum 90
 crabs processing 526
 cresol 552
 cresolase 552
 cross-flow 431, 483, 495, 501, 512, 519, 525, 527, 545, 549
Cryptosporidium 88, 214, 226, 228–230, 232, 233
Cryptosporidium parvum 88, 228, 294
 crystallization 312, 429, 431, 444, 472, 498, 518, 519, 692, 755
 cuprammonium regenerated cellulose 228
 cuprophane 115, 715
 cutinase 90
 cyanazine 287
 Cyanex 621, 627, 631, 643
 cyanide 57, 58, 103, 222, 414
 cyanoferrates 628
 cyanol 740
 cyanuric chloride 764
 cyclodextrin 101, 121
 cyclohexane 34, 116, 117, 136, 620, 650, 730, 749, 754, 764
 cyclohexanone 654, 713
 cyclohexene 749, 767, 768
 cyclohexylamine 740
 cyclopentane 730
 cysteine 146, 147
 cysts 219, 227, 229, 303
 cytochrome 528
- d**
 dairy aroma 115, 494
 dairy industry 60, 66, 71, 81, 89, 115, 469, 473, 533–535, 540, 541, 543, 545–549
 – water purification 305, 357, 363, 397
 dairy process 60, 66, 534, 543, 548
 dairy products 534–537
Daphnia magna 554
 deactivation 732
 decane 118, 726, 730
 decanol 137, 138, 738
 decene 118
 degassing 209
 dehydration 114–116, 682–684, 686, 704, 716, 742–747
 dematerialization 5, 7, 363, 552, 704, 707, 734
 dense membranes 52, 135, 446, 764
 deodorization process 486, 506, 507, 511
 desalination 11, 56, 59, 60, 69, 102, 207, 211, 212, 223, 269, 299, 300, 302, 542, 543, 611, 613
 desizing 353, 356, 359
 dextran 427, 472, 518
 dextrose 472, 521
 diafiltration 718
 dialysis 24, 51, 84, 92, 93, 97, 206, 289, 435, 445, 446
 dialysis membranes 96, 97, 144, 437, 446
 diamine-epichlorohydrin 439
 diaminobenzoic acid (DABA) 758
 diaminodiphenyl disulfonic acid (BDSA) 34

- diaminodiphenyl sulfone (DDS) 723
 diatomaceous earth 472
 dibenzo-18-crown-6 (DB18C6) 632
 dibenzoanthracene 730
 dibenzodimesylate 623
 dibenzo-dioxin 441, 442
 dibenzofuran 727
 dibenzylcellulose 731
 dibromochloromethane 710, 720
 dibromochloropropane (DBCP) 441, 719, 729
 dibromomethane 719
 dibutylphthalate (DBP) 441
 dichloroaniline 317
 dichloroanisole (DCA) 499
 dichlorobenzene 710, 728
 dichlorobenzidine 728
 dichlorobromomethane 719
 dichloroethane (DCE) 120, 133, 317, 649, 710, 719, 721, 725
 dichloroethylene 115, 710, 729
 dichloromethane 73, 113, 705, 708, 719, 720
 dichlorophenol 728
 dichloropropene 719
 dicyanoaurate(I) 632
 dicyclopentadiene (DCP) 532
 dieldrin 728
 dienes 703
 diethylene glycol 33
 diethylenetriaminepenta acetic 393
 diethyl phthalate (DEP) 441, 710
 diethylenetriaminepentaacetate (DTPA) 416
 diethylhexylphosphoric acid 627, 650
 diethylstilbestrol (DES) 441, 729
 diffusion dialysis 92, 93, 96, 97, 674–678
 dihexyl ether 137, 138
 dihydroxybenzene (catechol) 551, 554
 diisopropyl ether (DIPE) 751
 dimercaprol 618
 dimethylacetamide 723
 dimethylamino-ethyl-methacrylate 66, 321
 dimethyl arsenic acid (DMAA) 603
 dimethylbenzene 117, 754, 756
 dimethyl-benzodioxol-4-yl-methylcarbamate (bendiocarb) 441
 dimethylbutane (DMB) 136, 765
 dimethylbutene 732
 dimethyl disulfide 741
 dimethylformamide (DMF) 135, 771
 dimethylheptane 730
 dimethylheptylacetamide 739
 dimethylhexane 730
 dimethylpentane 730
 dimethylphenol 730
 dimethyl phthalate 710, 727
 dimethyl siloxane (DMS) 36, 37
 dimethylsiloxane oligomers (ODMS) 715
 dimethyl sulfide (MeS) 742
 dimethyltrisulfide 494
 dinitroocresol (DNOC) 287, 288, 292
 dinitrophenol 727
 dinoseb 288
 dioctyl phthalate 727
 dioxin 315, 441, 442, 729, 734
 diphenilsulfone tetracarboxylic dianhydride-dimethyl-diaminibenzothiophene-dioxide (DSDA-DBDT) 759
 diphenylenemethane 727
 diphenylhydrazine 727
 dipropanolamine 631
 dipropylcalix[4]arene crown ether (CCE1) 623
 dipropylcalix[4]arene dibenzo crown ether (CCE2) 627
 disinfection 88, 207, 208, 218, 226, 227, 230, 246, 293, 359, 387, 503, 720
 disinfection in water treatment 215
 disk module 251
 dissolved organic carbon (DOC) 224
 dissolved organic matter (DOM) 222, 290
 diuron 287–291
 divinylbenzene (DVB) 121, 532, 675
 divinyl-polydimethylsiloxane 136
 DNA 141, 309, 426, 430, 440, 443, 444, 447, 653
 dodecane 622, 642, 647, 730
 dodecanol 137, 138
 dodecylether sulfate 69
 Donnan dialysis 97, 242, 268, 270
 downstream processing 89, 429, 447, 682, 692
 drinking water 59, 60, 67, 81, 88, 204, 214, 215, 219, 221–223, 226, 228, 229, 234, 238–240, 243, 249, 251–252, 257, 266, 268, 272–274, 280, 283, 288, 303, 304, 307, 308, 413, 420, 502, 523, 602, 603, 605, 606, 611, 706, 720
 dyeing 68, 234, 353, 354, 356, 358, 362–367, 371, 376, 380, 385
 dyes 61, 67, 68, 82, 141, 142, 256, 310, 353–355, 361, 364, 623, 704, 707
- e**
- effluents from the paper industry 492
 egg white 61, 473
 electrodialysis (ED) 71, 268, 416, 477, 644, 645, 673
 – wine stabilization 497
 – zinc hydrometallurgy industry 678
 electrodialysis with bipolar membranes (EDBM) 99, 103, 684

- electroflotation 400
 electroless plating 42, 66, 130, 414, 415
 electroless plating water reuse 414
 electrolysis 81, 314, 400, 630, 678
 electronic industry 59, 60, 84, 208, 419, 420, 671, 673, 676
 electrosorption 267
 electroplating rinse waters recovery 70, 414, 644
 emulsion 77, 84, 430, 512, 645, 648, 686, 709
 emulsion liquid membranes 137–138, 447, 620, 626, 630, 645, 738
 enantiomers 12, 137, 206, 425, 444–447
 encephalomyocarditis virus 231
 endocrine disruptors 117, 309, 425, 426, 441–442, 729
 endotoxin 227, 229, 425, 443
 endrin 728
 enterotoxins 81, 536
 enterovirus 228
 enzyme 80, 144, 311, 382, 425–427, 438, 444, 481, 521, 524, 532, 535, 552
 enzymatic cleaning 546
 enzyme applications 478
 enzyme recovery 81
 erythromycin 429, 713, 718
Escherichia coli 90, 232, 448
 esprocarb 289
 esterification 118, 121, 479, 684, 694
 estradiol 442
 estrogen 628, 734
 estrogenic hormones 60, 442, 443
 ethion 727
 estrone 442–443
 ethane 703, 706, 772, 775
 ethanol 33, 56, 67, 74, 97, 113, 115, 116, 140, 243, 372, 434, 493, 496, 551, 676, 710, 713–714, 716, 717, 743, 750, 751, 753, 754
 ethoxyethanol 706
 ethylacrylate 38
 ethyl acetate 67, 73, 74, 115, 491, 493, 713, 718, 742
 ethylbenzene 116, 706, 730, 749, 755, 767, 768
 ethyl butanoate 493
 ethyl butyrate 491
 ethyl cellulose 121
 ethyl esters 121
 ethyl ethanoate 487
 ethyl ether 713
 ethyl hexanoate (ETH) 494
 ethyl ketone 121
 ethyl parathion 727
 ethyl propionate 491
 ethyl tertiary-butyl ether (ETBE) 749
 ethylene 678, 703, 721, 765, 768, 771, 772, 775
 ethylenediamine-tetra acetic acid (EDTA) 393
 ethylene dibromide 719
 ethylene dichloride 721, 768
 ethylene oxide 775
 ethylene propylene diene monomer (EPDM) 113, 708
 ethylhexanol 120
 ethylhexyl-phosphonic acid mono-ethylhexyl ester (EHPNA) 627, 628
 ethyl-methyl butanoate 493
 ethylpentane 730
 evaporation 42, 71, 140, 214, 258, 365, 367, 392, 393, 399, 429, 474, 476, 495, 524, 526, 529, 535, 622, 672, 688, 691, 741, 751
 extractants 119, 624, 627, 632, 634, 682, 738
 extraction 74, 114, 119, 138, 236, 242, 421, 425, 430, 487, 490, 505, 507, 509, 514, 537, 620, 630, 637, 641, 648, 682, 689, 695, 705, 707, 727, 738
- f**
- factor VIII 436
 fermentation broths 81, 89, 103, 115, 429, 430, 504, 688, 669, 671, 673, 715, 716
 ferric ammonium citrate 688
 ferric humates 274
 ferrous acetate 372
 ferrous sulfate 372, 605
 fertilizer 12, 295, 310, 508, 514, 553, 609
 fibers 59
 fine solids removal 300
 fish brines 525
 fish industry 524
 fish fillets processing 525
 fish gelatin 81, 531
 fish meal processing 494, 525, 532
 fish meal production
 – wastewaters generated during 524, 530
 fish oil 531–532
 fish unloading waters 530
 flat sheet membrane 144
 flavonoids 518
 flavors 494–495, 501
 fluor–aluminum 267
 fluoranthene 730
 fluorene 727, 730
 fluoride 266–270, 394, 680
 fluoride acids 680
 fluorine 34, 266
 fluoropolymers 485
 fluorotrichloromethane (Freon 11) 719

- fluosilicic acid (FSA) 671, 677
 fly ash 261, 264, 617
 food industry 61, 70, 80–81, 102, 469–555
 – wastewater treatment 471–472
 food processing 71, 115, 469, 471, 486
 formaldehyde 364, 641, 738, 774
 formic acid 372, 470, 744
 fouling caused by proteins 504
 fouling during wine production 499
 free fatty acids (FFA) 74, 507
 fructofuranosyl 480
 fructo-oligosaccharides (FOS) 66, 480
 fructose 472, 480–481, 520
 fruit pulp 83, 474
 fuel cells 11, 119, 132
 fulvic acids 271, 273, 275, 277, 278, 282, 306, 307, 321
 fumarase 694
 fumaric acid 683, 694
 functional groups 98, 113, 145–147, 318, 631, 712, 750
 fungi 219, 283, 428, 552
 fungicides 287, 372, 375, 647, 740
- g**
- gallic acid 555
 gamma-decalactone 492
 gas permeation 124, 125, 131, 135, 771, 773
 gas purification 123
 gas separation 24, 42, 123, 206, 520, 715
 gelatin 89, 372, 473, 474, 477, 480, 531
 gelatin liquor 531
 gene 81, 448
 geosmin 274, 499
 germanium 630, 631
 germanium oxide 630, 631
Giardia lamblia 229, 294
Giardia 88, 218, 226, 229, 230
 glacial acetic acid 686
 glass industry 647, 671, 672
 glass 38, 256, 266, 642, 671
 global environmental policy 1, 2
 globulin 373, 433
 gluconic acids 102, 689
 gluconolactone 690
 glucopyranoside (8G1) 775
 glucosamine 428
 glucose dehydrogenase 428
 glucose oxidase 521
 glucose 71, 479–481, 495, 691
 glues 372, 731
 glutamate 428, 693
 glutamic acid 146, 147, 495
 glutamine 72, 693
 glutaraldehyde (GA) 687, 744
 glutathione 72, 693
 gluten 90, 472
 glycanase 428
 glycerin 71, 539
 glycerol 688, 695
 glycerol trichlorohydrin 719
 glycidyl methacrylate (GMA) 758
 glycine 101, 495, 693
 glycol 310, 639, 717
 glyoxalin 364
 GMA, *see* glycidyl methacrylate
Gnathotrichus sulcatus 427
 gold 260, 415, 631–632, 642, 646
 gold cyanide 632
 granulated activated carbon (GAC) 707
 green chemistry 4–5, 7
 groundwater 60, 67, 201, 202, 204, 237, 239, 246, 250, 251, 269, 270, 273, 277, 278, 283, 305, 307–310, 601, 603, 613, 637, 706, 720, 726, 751
 – recovery with membranes 307
 growth factors 147, 425, 439
 guaiacol 499
 gums 472, 518, 731
- h**
- haloacetic acid (HAA) 720
 halogenocarbons 308
 hardness removal 214, 220, 238, 361
 heavy metals 1, 12, 61, 69, 202, 222, 264, 273, 311, 313, 413, 416, 510, 619–621, 629, 634, 635, 690
 – removal 416, 619, 634
 helium 123, 132
 helminths 294
 hematite 281
 hemicellulose 474–475, 484, 691
 hemoglobin 147, 433, 437
 hepatitis A virus 231
 hepatitis B virus 232
 hepatocyte growth factor (HGF) 439
 heptachlor 707, 728
 heptane 66, 74, 116, 632, 694, 754
 herbicides 12, 287, 291, 601, 705–707, 740
 Herpes simplex 231–232
 hexaaza-18-crown-6 (HA18C6) 632
 hexachloride 728
 hexachlorobenzene 728
 hexachlorobutadiene 719, 728
 hexachlorocyclohexane 441–442, 729
 hexachlorocyclopentadiene 719, 728
 hexachloroethane 719
 hexadecylpyridine chloride 625

- hexadiene 749, 765, 767–768
 hexafluoroisopropylidene dianiline (6FpDA) 758
 hexafluoroisopropylidene-diphthalic anhydride (6FDA) 715, 758, 772
 hexafluorophosphate 753
 hexamethyl pararosaniline chloride 69
 hexanal 493
 hexane 60, 74, 110, 116, 487, 506, 510, 513, 718, 738, 753–554
 hexenal 491
 hexene 749, 765, 767
 hexylbenzene 730
 HF recovery 60, 676–677
 high density polyethylene graft methylacrylate (HDPE-g-MA) 759
 high methoxyl pectin (HMP) 479
 histamine 443
 histidine 142, 146, 435–436
 HIV 230, 441
 honey 474, 521, 689–670
 hormones 202, 425, 431, 439, 441, 444, 525, 728, 729
 horseradish peroxidase (HRP) 735
 human immunoglobulin G (HIgG) 434
 human plasma purification 433
 human serum albumin (HSA) 434, 446
 humate 214
 humic acid 81, 103, 225, 273, 274, 276, 278, 280, 282, 289, 317–321
 humic substances (HS) 273, 274, 281, 321
 humin 299
 hydrazine 119, 209, 743
 hydriodic acid 102, 679
 hydrocarbons 12, 61, 62, 117, 118, 129, 131, 132, 221, 273, 310, 313, 489, 703, 705–706, 754, 767
 hydrochloric acid 357, 372, 654, 675–676
 hydrofluoric acid 416, 671, 675
 hydrogen 34, 44, 129, 131, 213, 246, 249, 255, 259, 427, 497, 645, 734, 740
 hydrogen carbonate 213, 652
 hydrogen chloride 67, 97, 214, 362, 428, 530, 646, 675, 676, 681, 688, 738, 744
 hydrogen peroxide 61, 286, 314, 358, 372, 378, 404, 416, 521, 552, 637, 707, 740
 hydrogen sulfide (H₂S) 44, 130–132, 258, 282, 378, 741
 hydrogen tartrate 496, 498
 hydroquinine 740
 hydrosilicofluoric acid 672
 hydrosulfide 372–373
 hydroxide ions 503, 739
 hydroxyapatite 261
 hydroxyl-diethyl-amino-propyl-methacrylate-styrene 764
 hydroxyethylcellulose (HEC) 116, 121, 746
 hydroxyethylmethylacrylate 758
 hydroxylase 735
 hydroxylated biphenyl 735
 hydroxytyrosol 554
Hyphomicrobium VS 742
 hypochlorite 637
- i**
- idenopyrene 730
 imidazole 439
 iminodiacetic acid 435
 iminodiethanol 631
 immunoglobulin E (IgE) 436
 immunoglobulins 147, 426, 433–435
 immunotoxins 426
 indigo 739
 indium 69, 633
 indium phosphide (InP) 633
 industrial ecology 5
 ink 213, 403
 inorganic acids 671–673, 675, 677, 679
 inorganic membranes 38, 41, 95, 126, 300, 513, 543, 745
 inorganic salts 44, 66, 259, 279, 298, 429, 430, 495, 775
 insecticides 285, 287, 314, 441, 444, 601, 705, 706
 interferon 81, 141
 internal purification in the paper industry 392
 invertase 521
 iodine 679, 719
 ion exchange 43, 63, 71, 92, 98, 100–102, 120, 141, 146, 209–211, 234, 235, 238, 239, 242, 253, 257, 258, 261, 267, 301, 314, 322, 358, 362, 385, 392, 400, 414, 416, 432, 440, 443, 478, 518, 531, 612, 624, 674, 677, 690, 735, 739, 816, 830
 iron 214, 220, 223, 235, 261, 264, 265, 266, 307, 311, 314, 366, 378, 413, 416, 437, 653
 iron chloride 297, 606
 isobutane 730, 773, 774
 isobutanol 122, 713, 747
 isobutene 773, 774
 isobutylene 751, 774
 isodurane (1,2,3,5-tetramethylbenzene) 118
 isomers 116, 120, 140, 442, 447, 514, 731, 748, 750, 768, 812, 847, 850, 851, 864
 isooctane 767
 isopentane 730
 isophorone 727
 isopropanol 717, 718

- isopropylbenzene 708, 847
isoproturon 288
isotopes 101, 129, 310, 311, 622, 636, 651
isoxathion 289
- j**
juice 60–62, 70, 81–83, 89–91, 469, 472, 474, 477, 478, 479, 480, 481, 482, 484, 485, 490, 492, 550, 810, 818, 820
juice acerola 90, 478, 482
juice apple 61, 83, 480
juice cashew apple 482
juice clam 526
juice grapefruit 478
juice guava 479, 482
juice kiwifruit 478
juice lemon 481, 492
juice onion 61
juice orange 61, 115, 476–478, 481, 492, 493
juice passion fruit 482, 821
juice peach 486, 492
juice pear 478, 479
juice pineapple 83, 91, 115, 478, 481, 494
juice potato 81, 516
juice sugar cane 82, 83, 825
juice tomato 61
juice watermelon 61
- k**
kerosene 626, 638, 643, 646
kestose 480
ketazine 122
ketoglutarate 428
kraft pulp mill 391, 399, 401, 713, 718
krystallin 740
- l**
laccases 551
lactalbumin (LA) 433, 535
lactate 103, 536, 686, 695
lactic acid 102, 140, 372, 539, 685, 689, 818
Lactobacillus 233
Lactococcus lactis 103
lactoglobulin (LG) 71, 433, 535
lactones 489, 493
lactose 71, 72, 535, 541, 544, 549
landfill leachates 12, 60, 310, 315
lanoline 372
large scale 81, 209, 220, 398, 426, 432, 444, 445, 447, 542, 690
large-scale protein purification 433
latex 41, 82, 90, 91, 116
lauric acid 648
laurylacrylate 38, 722, 835
- lead 61, 67, 102, 266, 311, 313, 413, 629, 634–636, 642, 647, 721, 749, 751, 853, 854, 858, 859, 861, 862
leather industry 81, 375–376
lecithin 372, 507, 513
lectins 142
Leptospirillum ferrooxidans 256
lignin 81, 102, 299, 393, 396, 401, 402, 474, 475, 484, 551
lignosulfonates 82, 401
lime 214, 216, 234–236, 238, 257–258, 267, 308, 366, 373–375, 381, 382, 405, 416, 473, 517, 518, 602, 624, 688–689
limonin 481
limonoid 481
linalool 122, 824
lindane 441, 728, 847, 849, 864
lipase 447, 513, 694
lipids 273, 521, 522, 526, 528, 529, 532, 542, 717, 740
lipopolysaccharide (LPS) 229, 443
lipoprotein 436–437, 542, 653
lipoxigenase 550
liquid–liquid extraction 115, 138, 139, 487, 492, 499, 636, 652, 714, 737
liquid membranes (LM) 43, 131, 137–139, 242, 425, 428, 445, 447, 488, 520, 619, 624, 627, 641–643, 648, 654, 711, 770
–antibiotics purification 60, 81, 137–139, 429–431
–extraction 137–138, 242, 316, 428, 430, 445, 488, 495, 620
–for aminoacids 138, 139, 446
–for enantiomers separation 447
Listeria monocytogenes 537
lithium 627, 636, 746
lithium hydroxide 636
lobster processing 81, 526–527
low density polyethylene (LDPE) 752–753
low methoxyl pectin (LMP) 479
lysine 443, 693
lysozymes 426
- m**
magnesium 215, 234, 235, 386, 509, 513, 614, 637, 650, 678, 690, 855
magnesium chloride 355
magnesium hydroxide 91, 614
magnesium phthalocyanine 36
malathion 727, 847, 849, 851
maleic acid 693, 744, 747
L-malic acid 694
malonic acid 101
maltodextrin 472

- maltose 521
- mandelic acid 138, 139, 684, 694
- manganese 97, 138, 235, 311, 629, 636–637, 678, 690, 856, 857
- manganese oxide 379
- mathematical models of membrane processes 739
- meat 81, 470, 473, 521–533
- medmycin 429
- melanoidins 518
- membrane absorption 140, 837
- membrane affinity chromatography 141–144, 146, 425, 436, 621
- membrane application in fish processing 524
- membrane bioreactors 81, 248, 297
- membrane bioreactors for wastewater treatment 297–299
- membrane characteristic 79, 317, 491, 504
- membrane chromatography 141–146, 426, 434, 440
- membrane cleaning 80, 219, 220, 251, 282, 308, 385, 504, 528, 544–547
- membrane contactor 139, 206, 209, 212–213, 255, 430, 488, 492–493, 495, 624, 680, 682, 695, 733, 737–738, 772–773
- membrane distillation (MD) 140, 206, 209, 212, 476, 708, 724
- membrane extraction (ME) 140, 206, 316, 430, 445, 495, 514, 622, 682, 686
- membrane filters 226, 227
- membrane filtration for
 - clarification of fruit juices 90
 - clarify apple juice 90, 478
 - potato starch industry 514–515
 - recovery of dyes 61, 67
 - utilization of rinse solutions from electroplating industry 427, 643
- membrane fouling 80, 101–102, 219, 224, 225, 282, 298, 304, 317, 322, 483–485, 499–500, 532, 675
 - beverage industry 504
 - fruit juices 473–485
 - meat production 473
 - polysaccharides and polyphenols of wine 495–498
 - processing of beer 500–502
- membrane fouling in water technologies 317–323
 - fouling on IX membranes 322–323
 - fouling on MF 320–322
 - fouling on nanofiltration membranes 317–320
 - UF membranes 320–322
- membrane
 - blending 37, 747
 - copolymerization 32, 36
 - crosslinking 34–35
 - doping 35–36
 - for agricultural wastewaters treatment 299–300
 - for enhancement wastewater treatment 292–293
 - for water recovery and reuse 301–309
 - for water recovery from wetlands 308–309
 - grafting 113, 320, 757
 - in the recovery of acid 93, 96, 678
 - modification 32–38
 - processes for the recovery 293–297, 300, 363
 - reuse of wastewater 204, 293–297, 360, 405
- membrane for olefin/paraffin separations 132, 134–135, 770
 - dairy industry 115, 473
 - petrochemical industry 132, 766
- membrane operations
 - treatment of dairy process waters 543, 548
- membrane processes 11–12, 51, 209, 215, 240, 242, 262, 268, 286, 293, 317, 359, 363, 384, 396, 401, 425, 474, 483, 493, 524, 535, 541, 673, 708, 718, 731, 742
- membrane reactors 213, 255, 264, 426, 447, 736
 - aromatic hydrocarbon from aliphatic 116
 - beer industry 501
 - beer production 500
 - benzene 34, 97
 - beverage industry 502, 504
 - chromium recovery from tanning wastes 375, 384
 - dairy industry 473, 533, 535
 - electronics industry 208, 419, 420, 671, 673, 676
 - enantiomers 447
 - fish meal industry 66, 67, 530
 - food industry 469, 472
 - fruit juice industry 501
 - honey processing 521
 - hydrofluoric acid recovery 672
 - olive industry 507
 - pharmaceutical industry 425
 - sugar industry 472
 - sugar industry for an effective clarification process 472
 - textile industry 353
 - textile industry wastewater 355
 - wastewater in fruit juice for purposes of reuse 469
 - wastewater of the oils and fats industry 508

- wine production 495
 - mercury 61, 81, 132, 140, 638–640, 818, 854, 855, 862, 864
 - mercury removal and recovery from aqueous solutions by coupled complexation ultrafiltration and electrolysis 81
 - mercury sulfide 639
 - mesitylene-trimethylbenzene 118
 - metabisulfite 372
 - metal finishing 354, 356, 376
 - metallothionein 618
 - metal plating 413–416
 - metals separations 601–606
 - metamitron 288, 291
 - metatartaric acid 496
 - metazachlor 288
 - methacryloylamidophenylalanine (MAPA) 437
 - methane 44, 89, 123, 126, 129, 132, 517, 703, 706, 708, 720
 - methanethiol 741
 - methanol 30, 35, 76, 113, 116, 122, 132, 244, 713, 715, 751, 752, 760
 - methoxychlor 291, 292
 - methoxyethanol 120, 706
 - methyl acetate 115, 122
 - methyl chloride 706
 - methyl ethyl ketone (MEK) 495, 713
 - methyl isobutyl ketone 118, 713
 - methyl thiobutanoate 490, 494
 - methylacetate 710, 818
 - methylacrylate 38, 758, 759
 - methyl-butadiene 730
 - methyl-butene 730
 - methylcyclohexane 730, 738
 - methylcyclopentane 730
 - methylene chloride 113, 708
 - methyl-ethyl ketone 495
 - methylglucamine 612
 - methyl-heptane 730
 - methyl-hexane 730
 - methylisoborneol 499
 - methylnaphthalene 727, 730
 - methylparathion 727
 - methyl-pentane 136
 - methyl-pentanone 713
 - methyl-phenol 727
 - methyl-propanol 493
 - methylpropylbenzene 730
 - methyl-*tert*-butyl ether (MTBE) 116, 119, 122, 491, 705, 749, 750, 751, 760
 - methylthiobutanoate 490, 494
 - metolachlor 291, 292
 - metribuzin 288, 292
 - meta-phenylenediamine (mPDA) 34, 835
 - micellar enhanced ultrafiltration 627, 725
 - microalgae 830
 - microemulsion 122
 - microfiltration 84, 88, 89, 90, 91, 221, 232, 268, 497, 547
 - adsorption for plasma protein fractionation 89
 - integrated with precipitation 89
 - milk pasteurisation 534
 - protein purification 549
 - purification of the vaccines 81
 - reverse osmosis of acerola fruit juice 482
 - skim milk for removal of bacterial spores 89, 91, 536
 - stages of beverage processing 500
 - microorganisms 60, 67, 80, 88, 103, 203, 209, 212, 214, 218, 221, 224
 - miglyol 495
 - milk 81, 89, 102, 244, 257, 442, 470, 472, 473, 533–541, 543–545, 547–549
 - milk processing 523, 535
 - mine water 256–257, 259–260
 - mining industry 257
 - mirex 728
 - molasses 66, 83, 258, 682
 - molecular recognition 146, 444, 481
 - molluscicides 286
 - Moloney murine leukemia virus* (MoMuLV) 441
 - molybdenum 61, 137–139, 641
 - monoacrylate 321
 - monoamino-oxidase 550
 - monochlorobenzene (MCB) 317, 719, 725
 - monochlorotriazinyl 621
 - monoclonal antibodies 144, 426, 440
 - monomethyl hydrazine (MMH) 743
 - monomethyl mercury 82
 - monoxygenase 552, 735
 - montmorillonite 628
 - mordenite ($(Ca_2, Na_2, K_2)Al_2Si_{10}O_{24} \cdot 7H_2O$) 41
 - municipal wastewater 204, 217, 260, 262, 292–294, 296, 297, 309
 - municipal water 214–235
 - muratic acid 372
 - Mycobacterium austroafricanum* 750
 - myoglobin 437, 528
- n**
- NAD (H) 427
 - NADP (H) 427
 - Naegleria lovaniensis* 233
 - nafion 644

- nanofiltration (NF) 633, 635
 – for concentration of antibiotics 429
 – for removal of antibiotics from
 wastewaters 60, 430
 – in water treatment 67
 – of textile wastewater for water reuse 362
 – reverse osmosis for removal of estrogenic
 hormones
- naphthalene 727, 730
 naphthol 552
 naringin (trihydroxyflavanone-7-
 rhamnoglucoside) 481
 native protein recovery from potato fruit juice by
 ultrafiltration 516–517
 natural organic matter, *see* NOM
 nematodes 229, 295, 314
 neoprene 719
 nickel 38, 61, 67, 70, 81, 97, 102–103, 137–138,
 355, 413–416, 510, 626–627, 642–644, 647,
 653, 671
 nickel carbonyl 643
 nitrate 98, 101, 201, 214, 215, 220–223, 233,
 238–244, 246–255, 262, 264, 268, 294, 307,
 323, 415, 603, 606, 623, 635, 649, 679–680,
 705, 774
 nitric acid 102, 137, 416, 620, 632, 635, 638,
 650, 679
 nitric oxide (NO) 242, 243
 nitrile 709
 nitrite 238, 239, 243, 244
 nitroaniline 727
 nitrobenzene 706, 727, 740
 nitrochlorobenzene 317
 nitrogen 36, 123, 126, 131, 133, 135–136, 213,
 238–244, 247, 250–252, 254–255, 294–295,
 316, 373, 384, 416
 nitrogen oxide 2, 866
 nitrophenol 727
 nitrophenyl octyl ether (NPOE) 648
 N-nitrosodimethylamine 727
 N-nitrosodiphenylamine 727
 N-nitrosodi-*n*-propylamine 727
 nitrous oxide 243
 natural organic matter (NOM) 215, 273,
 279–280, 306–307, 320–321
n-nonane 730
 nonionic surfactant 364, 627, 726, 775
 norbornadiene (NBD) 532
 nucleic acids 426, 432
 nucleotides 495
 nylon 145, 435–436, 555
 nylon 6-graft-poly-ethyl methacrylate 758
 nylon-6-graft-poly-oxethylene 758
 nystose 480
- o**
- octane 60, 117, 134, 654, 709, 713, 718, 744,
 749–751, 754–757, 759, 763
 octane boosters 768
 octane-trimethylpentane 117, 754, 756
 octanoic acid 102, 684, 820
 octanol 694, 712, 729
 octyl-phenyl-diisobutylcarbamoymethyl
 phosphine oxide (CMPO) 622
 odors 122, 486, 741
 oil 60, 62, 74, 76, 81, 82, 116, 130, 132, 140,
 209, 217, 244, 283, 310, 313, 353, 371–372,
 377, 382, 413, 469, 472, 473, 505–514,
 523–524, 529, 554
 oil cedarwood 487
 oil fish 531–532
 oil lavender 487
 oil olive 505, 507–511, 513, 550
 oil palm 60, 81, 509
 oil rapeseed 507, 513
 oil soybean 82, 513
 oil sunflower 505
 oily water treatment 60
 olefin/paraffin separations in the petrochemical
 industry 768, 769, 771
 oligosaccharides 428
 oligosilylstyrene 708
 oocysts 88, 228–229, 232
 orange II 76
 organochlorine 728
 organochlorine pesticides (OCPs) 284
 organophosphinic acid 643
 organosiloxane 37
 orthophosphate 260, 261
 osmotic distillation for concentration of
 juices 140, 502
 oxalic acid 101, 353, 621
 oxidases 551
 oxides 261, 264
 oximes 643
 oxygen 41, 123, 126, 130, 209, 213, 222, 244,
 245, 247, 251, 252, 262, 264, 270, 271, 282,
 296–300, 311, 312, 314–316, 387, 395, 437,
 469, 470, 480, 501, 551, 633, 648, 707, 721,
 725, 734, 741, 748–751, 771, 776
 oxygenate 116, 130
 ozone 1, 226, 273, 274, 285, 357, 358, 364, 365,
 367, 470, 637, 706, 721
- p**
- paint 82
 palladium 38, 129, 137, 138, 213, 253–255,
 644, 645, 766
 palladium acetate 767

- palladium dichloride 645
 palm oil 60, 81, 509
 paper 517, 682, 688, 740
 paper industry 391–406
 parasites 88, 228, 440, 470
 parathion 314, 727
 passion fruit juice processing 475, 478,
 480–481, 483, 484, 553
 pathogen 214, 221, 226, 228, 292, 294, 428,
 431, 443, 470, 536
 pea 81, 83, 515–516
 pea whey 515, 516, 821
 pectin 81, 83, 356, 474, 475, 477–479, 484, 509,
 554
 pectin esterase (PE) 478
 pectin lyase (PL) 478
 pectinase 478
 penicillin G (Pen G) 430
 penicillin G acylase (PGA) 438
 pentachlorobenzene 728
 pentachloroethane 719
 pentachlorophenols (PCPs) 310
 pentaethylene glycol ditosylate 623
 pentane 60, 117, 136, 718, 754, 755, 765
 pentanol 33
 pentene 683
 pepsin 539
 peptides 65, 71, 72, 138, 139, 425, 426, 431,
 432, 495, 550
 perchloroethane (PCA) 310
 perchloroethylene 372, 719
 perfluorosulfonic acid 43
 peroxidase 437, 438, 552, 735
 peroxide 284, 313–314
 pervaporation (PV) 11, 24, 34, 38, 104, 109,
 112, 114–120, 206, 207, 222, 380, 442,
 487–594, 684, 686–688, 708, 709, 715,
 722–724, 753
 pesticide 201, 211, 218, 220, 222, 236, 273,
 283, 285–292, 307, 441, 601, 647, 705
 petroleum ether 487
 pharmaceutical industry 425, 426, 430, 438,
 480, 713
 phenanthrene 310, 727, 730
 phenol 61, 81, 115, 117, 128, 137–138, 140,
 275, 293, 311, 313–316, 317, 438, 469, 477,
 485, 706, 707, 715, 727, 733–740, 774
 phenolase 551, 552
 phenyl acetic acid 138, 139, 551, 554, 693
 phenyl ethanol 551, 554
 phenyl naphthalene 727
 phenylacetic acid (PAA) 693, 744
 phenylalanine 72, 437, 693
 phenylene-diamine 56
 phenylene-pyrene 727
 phenylethylalcohol 492
 phosphate 232, 252, 260–266
 phosphinic acids 652
 phospholipids 507, 511–512, 542, 550
 phospholipoproteins 542
 phosphoric acid 60, 140, 510, 620, 643, 676, 823
 phosphorus 97, 260–263, 265, 266, 271, 299,
 513, 850
 phthalicanidride 694
 pigment 256, 353, 372, 513, 553, 653, 671, 672,
 740
 pineapple juice processing 481
 piperazine 242
 piperazine trimesimide 70
 pirimicarb 291
 piscicides 286
 plasma 31, 33, 83, 89, 117, 321, 425, 433, 434,
 435, 436, 437, 440, 473, 522, 621, 620, 678,
 709, 726, 741, 744
 plasmin 439
 plasminogen 439
 plasticizers 127, 311
 plastics from fish oils 531
 plating rinse water 70, 415
 platinum 61, 138, 644, 645, 646
 platinum recovery by supported liquid
 membranes 138
 plutonium 646, 647
 plutonium oxide 646
 pneumococcal conjugate vaccine 431
 poliovirus 229, 230, 231, 232, 233
 pollen 521
 poly(acrylic acid-co-maleic acid) sodium salt 628
 poly(acrylonitrile-co-butadiene-co-styrene-co-
 diaryltetrazolyl) (ABS) 758
 poly(acrylonitrile-co-acrylic acid) (PAAN) 481
 poly(allyl amine hydrochloride) 745
 poly(bis-phenoxy-phosphazene) (PPOP) 113,
 709, 836
 poly(butadiene-acrylonitrile rubber) (NBR)
 709, 764
 poly(butadiene-styrene) rubber (SBR) 764
 poly(butyl-methacrylate)-PDMS (PBMA-g-
 PDMS) 723
 poly(diallyl dimethylammonium chloride)
 (PDADMAC) 238
 poly(dimethylaminoethyl methacrylate)
 (PDMAEMA) 66, 835
 poly(dimethyl-phenylene oxide) (PPO) 34, 98,
 126, 129, 132, 135, 551, 552
 poly(ether ether ketone) (PEEK) 114, 746
 poly(ether-block-amide) (PEBA) 122, 490,
 491, 493, 709, 737, 762, 835

- poly(ethylene oxide imide) 120
poly(ethylene terephthalate-co-cyclohexane-dimethanol phthalate) (PETG) 756
poly(ethylmethacrylate)-PDMS (PEMA-g-PDMS) 723
poly(ethyl-oxazoline) (POZ) 132, 133, 771, 775–777, 836
poly(hydroxyethylmethacrylate) (pHEMA) 621, 622
poly(methyl methacrylate-co-methacrylic acid) 764
poly(methyl-pentene) 744
poly(4-methylpentene-1-co- α -olefin) 769
poly(sodium styrene sulfonate) 745
poly(styrene sulfonic acid) 693, 747
poly(styrene sulfonic acid-co-maleic acid) (PSSA-MA) 683, 693
poly(styrene-co-maleic anhydride) 36, 37
poly(*tert*-butyl methacrylate-co-styrene) 121
poly(trimethylsilyl-propyne) (PTMSP) 120, 129, 714, 717
poly(trimethylsilyl-propyne)-graft-poly(acrylic acid)-Ag⁺ (PTMSP-g-AA-Ag⁺) 773
poly(vinylpyrrolidone-co-vinyl acetate) 121
polyacrylate-grafted polyethylene acid (PE-g-AA) 114, 116, 121, 744, 746, 836
polyacrylic acid (PAA) 114, 635, 694, 744, 747, 759, 773
polyacrylonitrile-co-styrene (PAS) 759
polyacrylonitrile (PAN) 82, 90, 96, 120–122
poly(alkylmethacrylate) 113
polyallyl amine (PAAm) 759
polyaluminum chloride 274, 281, 366
polyamide (PA) 34, 56, 67, 68, 72, 80, 128, 222, 223, 225, 259, 279, 289, 291, 292, 359, 362, 386, 605, 636, 687
polyamide arylene 69, 625
polyamine 645
polyaniline 35, 120, 122, 129
polyaryl ketone 126
polybromophenylene oxide dimethylphosphonate ester (PPOBrP) 759
polybutadiene 132, 687, 769
polycarbonate (PC) 37, 90, 126, 493, 683, 756, 835
polychlorinated biphenyl (PCB) 310, 313, 441, 442, 707, 851, 865
polychlorinated dioxin 442
polychlorodibenzo-*p*-dioxins (PCDD's) 734
polychlorodibenzofurans (PCDF's) 734
polychlorophenoxyphenols (dioxins) 734
polycyclic aromatic hydrocarbons (PAH) 853, 858
polydimethyl siloxane (PDMS) 112, 120, 122, 123, 708, 716, 835
polydimethylsiloxane-imide (PSI) 715
polyelectrolyte enhanced ultrafiltration (PE-UF) for mercury recovery 639–640
polyester urethane asymmetric PEU 759
polyether-block-polyamide (PEBA) 112, 835, 836
polyetherimide (PEI) 36, 117, 686, 742, 761, 836
polyethersulfone (PES) 82, 96, 128, 223, 231, 320, 399, 481, 606, 693
polyethersulfone polyacrylate (PEPA) 96
polyether urea 607
polyethyl methacrylate–ethylene glycol dimethacrylate (PEMA–EGDEM) 759
polyethylene (PE) 80, 114, 117, 121, 126, 132, 135, 229, 296, 421, 427, 434, 436, 517, 650, 678, 731, 744, 746, 752, 756, 769, 773, 836
polyethylene glycol (PEG) 33, 230, 427, 434, 650, 731, 836
polyethylene imine (PEI) 399
polyethylene oxide (PEO) 770, 774
polyethylene oxide-polypropylene oxide triblock copolymer (PEO–PPO–PEO) 135
polyethylene phthalate (PEP) 776, 836
polyethylene terephthalate (PET) 756
polyethylene vinyl alcohol 436
polyethylenimine (PEI) 117, 126, 132, 238, 635, 640, 678, 742, 836
poly(furfuryl alcohol) 41
polygalacturonase (PG) 478
polyglycidyl methacrylate (PGMA) 758
polyhexamethylene sebacate (PHS) 709, 764
polyhydroxyethylmethacrylate (pHEMA) 621, 622, 640
polyimide (PI) 33–36, 41, 117, 120, 128, 513, 624, 758, 769, 771
polylysine 443
polymer electrolyte membrane 132, 770, 771, 775–777
polymer enhanced ultrafiltration (PEUF) 237, 619, 639
polymerase 231
polymethyl methacrylate (PMMA) 96, 117, 723, 731, 758
polymethyl glutamate 758
polymethylacrylate graft 2-hydroxyethyl methacrylate (MA-g-HEMA) 759
polymethylmethacrylate-polydimethylsiloxane (PMMA-g-PDMS) 723
polymyxin B 443
polynucleotides 141

- polyoctylmethyl siloxane (POMS) 113, 120, 123, 491, 836
 polypeptides 141, 144
 polyphenol oxidase (PPO) 126, 128, 129, 132, 135, 551, 552, 677, 762
 polyphenols 81, 469, 480, 495, 499–501, 504
 polyphenylene 34
 polyphenylene oxide 34, 769
 polyphosphate 260
 polyphosphazene 121
 polypiperazine 66, 223
 polypropylene (PP) 72, 74, 80, 82, 90, 91, 120, 135, 145, 233, 235, 246, 321, 385, 498, 622, 627, 654, 694, 714, 733
 polypropylene glycol (PPG) 733
 polypyrrole 36, 37, 116, 753, 836
 polysaccharides 77, 430, 435, 474, 475, 477–479, 484, 496–500, 504, 554, 555, 744
 polysiloxane 508, 509
 polysiloxane imide (PSI) 715
 polysiloxaneurethane 491
 polysodium *p*-styrene sulfonate (PSS) 361
 polystyrene 126, 552
 polystyrene diethylphosphonate PPN 758
 polysulfonamide 82, 527
 polytetrafluoroethylene (PTFE) 120, 527, 753
 polytetramethylene oxide (PTMO) 135
 polytetramethyleneglycol (PTMG) 490
 polythiophene 35
 polytrimethylsilylpropyne (PTMSP) 120, 129, 714
 polyurethane (PU) 112, 126, 708
 polyurethane-tetraethylorthosilicate (PU-TEOS) 709, 759
 polyurethane urea 134, 135
 polyvinyl acetate (PVAc) 117, 122, 723
 polyvinyl alcohol (PVA) 70, 122, 291, 400, 621, 743
 polyvinyl chloride 674, 721
 polyvinyl pyrrolidone (PVP) 122, 133, 480, 500, 554, 752
 polyvinylbenzyltrimethylammonium fluoride (PVBTAf) 44
 polyvinylidene fluoride PVDF 113, 399, 439, 646, 708
 polyvinylpolypyrrolidone (PVPPP) 480
 polyvinylpyrrolidone (PVP) 480, 500, 554
 polyvinyltrimethylsilane (PVTMS) 34
 potassium 497, 509, 514
 potassium chloride 355
 potassium hydrogen tartrate (KHT) 496, 498
 potassium permanganate 605, 637
 potassium phosphate 404
 powdered activated carbon (PAC) 218, 219, 274, 276, 281, 297–300, 707
 precipitation 81, 89, 214, 261, 269, 275, 320, 363, 365, 378, 392, 414, 484, 497, 528, 547, 606, 624, 629, 635, 652, 682, 692, 695, 707
 propane 132, 767, 771–773, 775
 propanol 33, 113, 714
 propanone 487
 propene 132, 749, 766, 767
 propionaldehyde 364
 propionic acid 684
 propolis 521
 propylbenzene 730
 propylene 132, 765, 768, 771–773, 775, 776
 propylene dichloride 719
 protease 428, 532
 protein 67, 71, 77, 97, 141, 142, 144–145, 209, 271, 273, 375, 426, 430, 431, 433–435, 442, 469, 472, 474, 477, 484, 494, 501, 504, 514, 517, 521, 524, 525, 529, 530, 532, 535, 539, 544, 554
 protein purification 145, 426, 433, 446
 protozoa 88, 219, 228, 229, 294
Pseudokirchneriella subcapitata 554
Pseudomonas diminuta 232, 233
Pseudomonas fluorescens P17 272
Pseudomonas syringae 736
 pulp and paper industry 392, 394, 398, 399, 713
 pyrazines 489
 pyrene 310, 727
 pyridine 287
 pyrite 256
 pyrocatechol 735
 pyrogen 203, 226, 229, 443
 pyrophosphate 261
- q**
- quinone 551, 552, 706, 735, 737
 quintozene 728
- r**
- radionuclides 222, 237
 radon 650, 651
Rauscher murine leukaemia virus (MuLV) 231
 raw cane sugar 91
 rayon 31
 receptor 141, 141–142
 red 2 dye 90
 red mud 263
 regenerated cellulose (cellophane) 31, 82, 96, 228, 230, 279, 396, 435, 441, 516, 553, 606
 rhodium 138, 645
 ribonuclease 147
 ribose 495
 rodenticides 288

S

- saccharides 71, 291
 Safranin O 76
 seafood 494, 524, 525, 529
Selenastrum capricornutum 554
 selenium 61, 67, 299, 647
 semivolatile organic components (SVOCs)
 117, 704, 706, 712, 727, 728
 Semliki Forest virus 231
 sepharose 436
 serum 433, 435, 535, 541, 637
 shrimps processing 526
 silica oxide 209
 silica 37–38, 114, 203, 224, 263, 394, 436,
 477, 480, 630, 747
 silicalite 113, 494, 686, 714, 716, 717, 723, 750
 silicates 493, 653
 silicic acid 635
 silicon dioxide 635, 671–672
 silicone 126, 134, 372, 494, 533, 686, 725
 siloxane 36, 37, 134, 135, 715
 silver 38, 61, 138, 139, 311, 642, 647, 648,
 767, 769, 771, 776
 silver nitrate 649
 silver tetrafluoroborate 775
 simazine 287, 288, 290, 291
 sindbis virus 231
 skim milk 60, 81, 83, 91, 473, 533, 535, 537,
 540, 544, 547, 548
 synthetic organic chemicals (SOCs) 282, 705
 soda 234, 356, 379, 400, 416
 sodium 58, 289, 386, 623, 651, 767
 sodium acetate 265, 372, 430
 sodium aluminosilicate 136, 756
 sodium bisulfite 378
 sodium butyrate 692
 sodium carbonate 372, 404, 652
 sodium chloride 101, 223, 242, 259, 355, 372,
 375, 430, 520, 606
 sodium citrate 372, 688
 sodium dodecyl sulfate (SDS) 627, 726
 sodium formate 372
 sodium gluconate 62, 689–690
 sodium hydroxide 259, 372, 404, 405, 624, 654,
 685, 689, 739
 sodium lactate 685
 sodium lauryl sulfate 256, 531
 sodium metabisulfite 302, 372, 378
 sodium phosphates 404
 sodium phthalate 372
 sodium polystyrene sulfonate 238
 sodium propionate 692
 sodium silicate 404
 sodium sulfate 256, 259, 260, 355, 375, 745
 sodium sulfide 372, 373
 sodium sulfhydrate 373
 sodium thiosulfate 372
 softening 57, 127, 132, 220, 234–235, 237, 239,
 286, 307, 360
 soluble polymers 237, 629, 639
 solvent extraction 137, 429, 430, 429, 487, 488,
 505, 506, 623, 629, 634, 643, 648, 649, 672,
 676, 682, 683, 690, 692, 718–719, 734
 solvent recovery 74, 76, 118–119
 sorbitan monooleate 645, 652
 sorbitol 690
Spirillum NOX 272
 spirits 244, 355, 372
 spores 89, 536
Staphylococcus aureus 536
 starch 89, 90, 353, 397, 469, 474, 514, 515, 517,
 519
 starch hydrolysate 682
 steel 60, 82, 93, 102, 266, 416, 420, 623, 625,
 653, 671, 715
 sterile filtration 425, 431, 501
 sterilisation 825
Streptococcus pneumoniae 431
 strontium 224, 621
 styrene 116, 361, 713, 749, 755, 767–768
 styrene-co-acrylonitrile 37
 submerged membrane 265, 297
 succinic acid 102, 694, 696
 sucrose 71, 480, 481, 517, 519
 sugar 63, 66, 70, 81, 89, 119, 244, 283, 395, 396,
 469, 475, 479, 481, 484, 495, 498, 509, 514,
 517, 520, 521, 551, 682, 689, 717
 sulfanilic acid 740
 sulfate 57, 58, 66, 97, 214, 215, 222, 223, 256,
 257, 259
 sulfide 742
 sulfonated poly(ether ether ketone) (SPEEK) 744
 sulfonated polyester sulfide 279
 sulfonated polyethersulfone (SPES) 73, 692
 sulfoxide 652
 sulfur dioxide 517
 sulfur odorous 115, 494
 sulfur oxide 132
 sulfur 132, 243, 251, 489, 494, 539, 648, 705, 741
 sulfuric acid 93, 97, 102, 256–257, 260, 271,
 279, 372, 375, 376, 379, 507, 509, 623, 627,
 650, 673–676, 678, 679, 688, 703, 745, 747
 supported liquid membrane 43, 137–139, 432,
 520, 619, 620, 622–624, 627, 631, 632, 633,
 636, 639, 644, 689, 693, 733, 770
 supported membranes 138
 surfactants 11, 66, 69, 81, 82, 219, 230, 355,
 361, 363, 375, 379, 383, 404, 420, 441, 469,
 650, 673, 725
 surimi processing wastewater 524, 527, 528

- t**
 tannase 429
 tannic acids 291
 tannin 234, 299, 376, 384, 500, 553, 554, 556, 826
 tartaric acid 497, 554
 taurine 495
 tea 61
*tert*butylazirine 288, 291
 terephthalic acid 686
 terpenes 493
 terpenoids 488, 493
*tert*amyl methyl ether 491
*tert*butyl methyl ether (MTBE) 116, 119, 705, 748, 751, 752, 762
 tertiary-amyl alcohol (TAA) 751
 tertiary-amyl ethyl ether (TAEE) 751
 tertiary-amyl methyl ether (TAME) 116, 751, 752, 762
 tertiary-butyl alcohol (TBA) 499, 750, 751
 tetrabromo bisphenol-A polycarbonates 126
 tetrabutylammonium bromide 687
 tetrachloroaurate(III) 632
 tetrachloroethane 67, 719
 tetrachloroethylene (TCE) 81, 113, 117, 310, 708, 720, 723, 760
 tetrachloromethane 706
 tetrachlorophenol 728
 tetradecanol 137, 138
 tetraethylorthosilicate 729
 tetrahydrofuran 73, 114, 122, 763
 tetramethylammonium bromide 687
 tetramethylbenzene 118, 730
 tetramethylene oxide 135, 491
 tetramethylphenylene diamine (4MPD) 758
 tetraphene 727
 tetrathiadiazacyclooctadecane 648
 tetraethers 648
 textile industry 353
 – effluents 360
 textile wastewater
 – treatment 367
 – for reuse 362, 367
Thamnocephalus platyurus 554
 thiobencarb 291, 292
 thionein 618, 621, 622
 thiosulfate 311, 384, 652
 thiourea 139, 623, 645, 653
 thorium 138, 653, 655
 thorium dioxide (ThO₂) 654
Tiobacillus ferrooxidans 254
 titanium 91, 252, 276 311, 313, 372, 420, 635, 672–674, 681
 titanium oxide 83, 90, 91, 98, 295, 313, 358–360, 421, 732, 816, 824
 tocopherol 513, 514
 toluene 74, 113, 116, 117, 120, 123, 133–135, 139, 372, 694, 705, 708, 710, 731–733, 752–754, 756, 760
 toluene diisocyanate 731, 740
 toluene sulfonate 731, 740
 total organic carbon (TOC) 73, 203, 212, 213, 220, 270–275, 279, 289, 292, 296, 298, 306, 396, 415, 416, 421, 523, 543, 826
 toxaphene 728, 863
 Tragardht 306
 triamine pyrimidine (TAP) 723
 triarylphosphates 552
 triazines 289
 tribromoanisole (TBA) 499
 tributyl phosphate (TBP) 620, 622
 trichloroanisole (TCA) 113, 311
 trichlorobenzene 728, 848
 trichloroethane 67, 117, 133, 311, 705, 708, 710, 719 720, 722, 728, 761, 807, 848, 858
 trichloroethylene 81, 117, 221, 311, 355, 705, 706, 710, 762, 764, 827, 848
 trichloromethane 706, 719
 trichlorophenol 728
 trichlorotrifluoroethane 719
 tricyclazole 288
 trifluoroethane (Freon 113) 719
 triglyceride oils 512
 trihalomethane (THM) 222, 223, 278, 306, 708, 720, 724, 826
 triisooctylamine 624
 trilaurylamine 689
 trimesoyl chloride (TMC) 56, 836
 trimethylaluminum 836
 trimethylbenzene 118, 726, 730
 trimethylethylbenzene 730
 trimethylheptane 730
 trimethylhexane 730
 trimethylpentane 117, 730, 754, 755
 trioctylamine (TOA) 646, 654, 689
 trioctylphosphine oxide (TOPO) 632, 638, 650, 652
 tripolyphosphate 261
 tritium 131
 trophozoites 88, 233
 tryptophan 142, 146, 147, 445, 450, 693
L-tryptophan 445, 450
 tungsten 67, 650
 tyrosinases 551
 tyrosine 147, 693

u

ultrafiltration 77, 80, 81, 208, 209, 215, 219, 222, 231, 232, 236, 241, 264, 276, 279, 282, 290, 296, 300, 306, 320, 360–364, 367, 380–382, 395, 396, 398–403, 420, 425–427, 430, 432–434, 441, 445, 446, 473, 479, 480, 512, 526, 536, 541, 542, 546, 547, 606, 609, 624–629, 638–640, 644, 675, 680, 690, 692, 725, 747, 767
 ultrapure water 208–213
 ultrapure water production 208–212
 undecane 137, 138, 726
 unsymmetrical dimethylhydrazine (UDMH) 743
 unsym-trichlorobenzene 728
 uranium 67, 70, 137–138, 650–652
 uranium nitrate 651
 uranyl acetate 651
 uranyl hydrogen carbonate 652
 urea 71, 289, 607
 urease 97
 urethane 491, 723, 756
 urine 439
 urokinase 439

v

vaccines 81, 89, 141, 425, 426, 431
 vacuum membrane distillation 212, 488, 724, 733
 valeric acid 62, 140, 694
 vanadium 61, 98
 vapor permeation 133–134, 489–490, 708
 vapor permeation for aroma recovery fruit juices 490, 492
 vesicular stomatis virus (VSV) 231
 vinclozolin 288
 vinyl acetate 686, 713
 vinylbenzene 730
 vinyl chloride 719, 719
 vinylidene chloride 719, 846
 vinylidene fluoride 117, 758
 vinyl-pyridine (4VP) 675, 757, 758
 vinyl-pyrrolidinone (NVP) 319
 vinyl pyrrolidone 753
 vinyl trichloride 719
 virus 81, 88, 218, 226–233, 298–381, 426, 431, 433, 440, 441
 viscose 31
 vitamin A 507, 521, 539, 653
 vitamin B 507, 521
 vitamin B2 729
 vitamin B12 729
 vitamin C 482, 488, 521 550
 vitamin D 514

vitamin E 140, 514

vitamin K 521

volatile organic compounds (VOC) 112–117, 123, 133, 140, 220, 313, 356, 380, 493, 704–709, 711–714, 717–719, 722–726, 730, 732, 733, 741, 742

w

wastewater reuse 292
 wastewater treatment 292
 water denitrification 238–242, 255, 294
 water desalination 301
 water hardness removal 214, 220, 238
 water industry 201–322
 water management 201
 water resource
 – integrated management 203
 – scarcity 201
 water sanitation 226
 water softening 234–238
 water treatment 214–224, 226–229
 waxes 372, 472, 480, 517, 552
 whey 61, 71, 72, 81, 89, 102, 473, 515, 516, 533, 535, 541–548, 678
 wine 60, 61, 81, 89, 103, 115, 495–500

x

xanthan gum 472
 xantin-oxidase 550
 xylene 75, 117, 133
 xylenediamine 35
 xylitol 691
 xylose 103, 691

y

yeast 90, 472, 496, 501–502
 yoghurt 62, 522

z

zeolite 40–41, 113–117, 119, 129, 133, 136, 137, 234, 654, 688, 714, 745, 757, 764
 zeolite membranes 40
 zinc 60, 97, 102, 137–139, 256, 355, 413, 415, 628, 644, 653, 654, 671, 673, 678, 695, 740
 zinc chloride 653, 654
 zinc hydroxycarbonate 653
 zinc hydroxysilicate 653
 zinc methyl 653
 zinc oxide 653
 zinc sulfate 256
 zirconium 254
 zirconium oxide 478, 485
Zymomonas mobilis 690

