

SUBJECT INDEX

- AAS, *see* Atomic absorption spectrometry;
Techniques and Tests
- Ab initio* methods, *see* Molecular modelling
- Additive analysis, 9, 562–605
- atomic absorption spectroscopy (AAS),
563–567, *see also* Techniques and
Tests
 - differential scanning calorimetry (DSC),
565, *see also* Techniques and Tests
 - gas chromatography (GC), 565–567,
see also Techniques and Tests
 - GC-MS, 566
 - Inductively coupled atomic emission
spectroscopy, ICP-AES, 571,
see also Techniques and Tests
 - liquid chromatography-mass
spectrometry, LC-MS, 570–571,
see also Techniques and Tests
 - mid-infrared spectroscopy, 567–570,
see also Techniques and Tests
 - scanning electron microscopy-energy
dispersive analysis, SEM/EDA,
571, *see also* Techniques and Tests
 - thermogravimetric analysis, TGA, 572,
see also Techniques and Tests
 - X-ray fluorescence spectroscopy, XRF, 573,
see also Techniques and Tests
- Additives, 87–117
- anti-blocking agents, 92, 573
 - anti-fogging agents, 111, 573
 - antimicrobial agents, 574
 - anti-oxidants, 98–103, 574–582
 - anti-ozonants, 103–104, 582
 - antistatic agents, 93–94, 582–584
 - biocides, 109–110
 - blowing or foaming agents, 95–96, 584–585
 - cross-linking agents, 585–587
 - cure accelerators, 585–587
 - cure reaction products, 594, 598, 599
 - degradation additives, 111–112
 - dyes, *see* pigments and dyes below
 - fillers, 588
 - flame retardants, 107–109, 588
 - heat stabilisers, 88–91
 - impact modifiers, 588
 - lubricants, 91–92, 588–589
 - mechanical property modifiers, 112–114
 - metal deactivators, 589
 - mould-release agents, 92–93
 - nucleating agents, 589, 591
 - pigments and dyes, 591
 - plasticisers, 94–95, 592
 - slip and anti-slip agents, 92, 588–589
 - surfactants, 593
 - ultra-violet (UV) stabilizers, 104–107, 594
- Adhesion, 677–678
- Advanced materials, 84
- Aesthetics, 81, 87, 110, 115–117, 608–618
- AFM, *see* Atomic force microscopy;
Techniques and Tests
- Ageing, *see* Degradation
- Amorphous, 18, 70–74
- Analytical competence, 3–6
- Antioxidants, 483–487
- Atactic, *see* Tacticity
- Atomic absorption spectrometry, AAS,
see Techniques and Tests
- Atomic force microscopy, AFM,
see Techniques and Tests
- ATR, *see* Attenuated total reflection;
Techniques and Tests
- Attenuated total reflection, ATR,
see Techniques and Tests
- Berry plot, 224
- Blend(s), *see* Polymer
- Blob
- concentration, 131
 - tensile, 131
 - thermal, 131
- Bolland-Gee scheme, *see* Degradation
- Branching, 139–153
- hyperbranched, 7, 23, 140–141, 163–165
 - long-chain, LCB, 7, 23, 39, 139
 - short-chain, SCB, 7, 23, 39, 139
 - star polymers, 140
- Brillouin scattering, *see* Techniques and Tests

- Capillary electrophoresis, *see* Techniques and Tests
- Carbonyl index, *see* Techniques and Tests
- Carothers equation, 55
- Chain ends, *see* Polymer, end groups
- Chain folding, 20, *see also* Polymer chain structure, chain length
- Chain length, 15–17, 27, *see also* Polymer chain structure, chain length
- Chain polymerization, 34
- Chain radius of gyration, 126
- Chain structure, *see* Polymer chain structure,
- Characterisation, 3, 15
- Chemical titration,
see Techniques and Tests
- Chemiluminescence, CL, 463–483,
see also Degradation and Techniques and Tests
- Cis-trans*, *see* Isomerism 15–17, 35, 70
- CL *see* Chemiluminescence; Techniques and Tests
- Coatings, 81–84
- Coil structure/coil size, 127–133
hydrodynamic radius, R_h , 130, 132–133
radius of gyration, R_g , 126, 132–133
self-avoiding walk, SAW, 127
- Comonomer(s), *see also* Polymer, copolymer, 7, 48, 50, 141, 156, 159, 161
- Competance, analytical 3–6
- Composites, 84–85
- Composition, 7
- Computational chemistry, *see* Molecular modeling
- Configuration, 29–30
- Conformation, 7, 30–33, 127, 134, 137
- Contaminant analysis, *see* Failure analysis
- Copolymer(s), 50–53, *see also* Polymer, alternating, 68
block, 52–53
graft, 51–52, 68
random, 68
sequencing, 7, 24, 715
- Critical oxygen index, COI, *see* Limiting oxygen index
- Cross-linking, 7, 24, 57–58, 69
- Crystallinity, crystallisation, 72–73, 153–163, 257, 338, *see also* Lamellae
amorphous content, 3, 8, 353–354
phase analysis, 8–9, *see also* phase structure
- Crystallisation-melt temperature, T_m , 19–21, 70–71, 72, 338
- Cure, 681–682
- Defect analysis, *see* Failure analysis
- Degradation, 8, 58–62, 388–447, 452–496, 500–521, 679
Bolland-Gee scheme, 462, 470
carbonyl index, 8, 394–397, 410,
see also Techniques and Tests
chemiluminescence, CL, 463–496
chemically initiated electron exchange luminescence, CIEEL, 466
degradation cascade, 500–501
differential photocalorimetry, DPC, 438,
see also Techniques and Tests
differential scanning calorimetry, DSC, 436–438, 476–478, *see also* Techniques and Tests
diffusion-limited oxidation, DLO, regime, 501
dissociation energies, 453–454
electron spin resonance, ESR, 500–521,
see also Techniques and Tests
electron spin resonance imaging, ESRI, 510–521, *see also* Techniques and Tests
- fluorescence spectroscopy, 418–422,
see also Techniques and Tests
- gas chromatography, GC, 442–443,
see also Techniques and Tests
- hydroperoxide(s), 456–458, 476, 500
induction period, 458, 461
- liquid chromatography, LC, 443–447,
see also Techniques and Tests
- mass spectrometry, 422–429,
see also Techniques and Tests
- melt flow index, 399–402,
see also Techniques and Tests
- mid-infrared spectroscopy, 402–414,
see also Techniques and Tests
- molecular modeling, 697
- nuclear magnetic resonance spectroscopy, NMR, 429–433, *see also* Techniques and Tests
- oxidative-induction time, OIT, 390–393,
see also Techniques and Tests
- oxygen uptake, 390–393,
see also Techniques and Tests
- phosphorescence spectroscopy, 418–422,
see also Techniques and Tests
- Raman spectroscopy, 414–418,
see also Techniques and Tests
- secondary ion mass spectrometry, SIMS, 435–436, *see also* Techniques and Tests

- staining, *see also* Techniques and Tests, 397–399
- thermogravimetric analysis, TGA, 438–442, *see also* Techniques and Tests
- titration, 435–436, *see also* Techniques and Tests
- uv spectroscopy, 418–422, *see also* Techniques and Tests
- X-ray photoelectron spectroscopy, XPS, 433–435, *see also* Techniques and Tests
- Degree of polymerization (d_p), 7, 68
- Delamination, 679, 681
- Dendrimer, 24, 140
- Density functional methods, DFT, *see* Molecular modeling
- Density, 8, 260–261
- Dielectric relaxation, *see* Techniques and Tests
- Differential photocalorimetry, DPC, *see* Techniques and Tests
- Differential scanning calorimetry, DSC, *see* Techniques and Tests
- Direct insertion probe pyrolysis mass spectrometry, DPMS, *see* Techniques and Test, mass spectrometry
- Distribution functions, 208–211, 352
- DPC, *see* Differential photocalorimetry; Techniques and Tests
- DSC, *see* Differential scanning calorimetry; Techniques and Tests
- EDS, *see* Energy dispersive spectroscopy; Techniques and Tests
- Elastomers 74–77, 338–376
- Electron spectroscopy for chemical analysis, ESCA, *see* Techniques and Tests
- Electron spin resonance spectroscopy, ESR, *see* Techniques and Tests
- End-group, 7, 27–28, 171–202, 207
- Energy dispersive spectroscopy, EDS, *see* Techniques and Tests
- Entanglement(s), 27, 339, 350–351
- ESCA, *see* Electron spectroscopy for chemical analysis; Techniques and Tests
- ESR, *see* Electron spin resonance spectroscopy; Techniques and Tests
- ESRI, *see* Electron spin resonance imaging *see* Techniques and Tests
- Evolved gas analysis, EGA, *see* Techniques and Tests
- Failure analysis, 9, 607–674
aesthetics, 608–618
contaminant and defect analysis, 9, 618–647
delamination, 679, 681
- FFF, *see* Field-flow fractionation; Techniques and Tests
- Fibres, 77–79
- Fibril, 21
- Field-flow fractionation, FFF, *see* Techniques and Tests
- Film(s), 79–81
- Fluorescence spectroscopy, *see* Techniques and Tests
- Fourier transform infrared spectroscopy, FTIR, *see* Techniques and Tests
- Fracture, 679
- FTIR, *see* Fourier transform infrared spectroscopy; Techniques and Tests
- Gas chromatography, GC, *see* Techniques and Tests
- GC, *see* Gas chromatography; Techniques and Tests
- Gel effect, 39–41
- Gel permeation chromatography, GPC, *see* Techniques and Tests; *see also* Size exclusion chromatography, SEC
- Gelation, *see also* Techniques and Tests, 352
- Gel-point determination, *see* Techniques and Tests,
- Glass transition temperature, T_g , 17–19, 28, 71
- GPC, *see* Gel permeation chromatography; Techniques and Tests; Size exclusion chromatography, SEC
- Graft copolymers, *see* Copolymers
- Heat distortion temperature, HDT, 73
- High performance liquid chromatography, HPLC, *see* Techniques and Tests
- High performance liquid chromatography, HPLC, *see* Liquid chromatography
- High performance polymers, 84–87
- High-throughput analysis, HTA, 735–743
- Hindered amine stabilizers, HAS, 459, 502–504, 517
- Homopolymer, 21–23
- HPLC, *see* High performance liquid chromatography; Techniques and Tests
- Hydroperoxides, 397–399, 402, 456–459, 476, 500, *see also* Degradation

- ICP-AES, *see* Inductively coupled plasma atomic emission spectroscopy; Techniques and Tests
- ICP-MS, *see* Inductively coupled plasma mass spectrometry; Techniques and Tests
- IGC, *see* Inverse gas chromatography; Techniques and Tests
- Induction period, 458, 461
- Inductively coupled plasma atomic emission spectroscopy, ICP-AES, *see* Techniques and Tests
- Inductively coupled plasma mass spectrometry, ICP-MS, *see* Techniques and Tests
- Infrared, IR, *see* Techniques and Tests
 carbonyl index, *see* Techniques and Tests
 IR-microscopy, 9, 308, 537
 mid-infrared, mid-IR, *see* Techniques and Tests
 near-infrared, NIR, *see* Techniques and Tests
- Interphase (crystalline-amorphous), 271–274, *see also* Phase structure
- Inverse gas chromatography, IGC, *see* Techniques and Tests
- Iodometric test, *see* Techniques and Tests
- Ionomer, 76
- IR, *see* Infrared
- Isomerism 7, 27, 29, 714
- Isotactic, *see* Tacticity
- Kevlar[®], *see* Polymer, Thermoplastic, Poly(p-phenylene terephthalamide)
- Kuhn unit, Kuhn (step) length, 7, 125–127
- Ladder polymers, 85
- Lamellae, 20–21, 53, 256, 280–284
- Lamellar thickness, 284–286
- Laminates, 545–549
- Laser enhanced ionization spectroscopy, LEIS, *see* Techniques and Tests
- LC, *see* Liquid chromatography; Techniques and Tests
- LC-CC, *see* Liquid chromatography under critical conditions; Techniques and Tests
- LEIS, *see* Laser enhanced ionization spectroscopy; Techniques and Tests
- Light scattering, *see* Techniques and Tests
- Limiting oxygen index, LOI, 85
- Liquid chromatography under critical conditions, LC-CC, *see* Techniques and Tests
- Liquid chromatography, LC, *see* Techniques and Test
- Liquid crystalline polymers, 74, *see also* Liquid-crystalline elastomers
- Longitudinal acoustic mode, LAM, 262, 284–286
 disordered LAM, 263, 267
- Macromers, 68
 telechelic macromers/telechelic polymers, 68
- Magnetic resonance imaging, MRI, *see* Techniques and Tests
- MALDI-MS, *see* Matrix-assisted laser desorption mass spectrometry; Techniques and Test
- MALDI-TOF-MS, *see* Matrix-assisted laser desorption time-of-flight mass spectrometry; Techniques and Tests
- Maltose cross, 20, 274, 275
- Matrix-assisted laser desorption mass spectrometry, MALDI-MS, *see* Techniques and Tests
- Matrix-assisted laser desorption time-of-flight mass spectrometry, MALDI-TOF-MS, *see* Techniques and Tests
- Medium-throughput analysis, 740–742
- Melt flow index, MFI, *see* Techniques and Tests
- Membrane osmometry, *see* Techniques and Tests
- MFI, *see* Melt flow index; Techniques and Tests
- Microscopy/Microscopies, *see* Techniques and Tests
- Microstructure, 14–62
- Miscibility, 71, 130–131
- Molar mass, *see* Molecular weight
- Molecular density functional methods, *see* Molecular modelling
- Molecular dynamics, *see* Molecular modelling
- Molecular mass distribution, *see* Molecular weight distribution
- Molecular mass, *see* Molecular weight
- Molecular mechanics, *see* Molecular modelling
- Molecular modelling, 686–730
ab initio methods, 689–690
 Auger spectroscopy, 703–712
 electron spin resonance, ESR, 727–729
 infrared spectroscopy, 693–703
 mass spectrometry, 712–718
 metal-polymer interactions, 708–709

- molecular density functional methods, 690
- molecular dynamics, 692–693
- molecular mechanics, 691–692
- Monte Carlo methods, 692–693
- Nuclear magnetic resonance, NMR, 722–727
- photoelectron spectroscopy, PES, 703–712
- quantum mechanics, 687–688
- Raman spectroscopy, 693–703
- semi-empirical methods, 688–689
- solid-state density functional methods, 690–691
- X-ray diffraction, 718–722
- Molecular orientation, *see* Orientation
- Molecular weight distribution, 7, 15, 71, 148, 205–247, *see also* Techniques and Tests
- Molecular weight, 7, 15, 205–247, 478
- Monomer(s), 7, 15–17, 594
- Monte Carlo methods, *see* Molecular modeling
- Mooney-Rivlin isotherms, 351
- Morphology, 3, 255–286
- supermolecular, 274–286
- MRI, *see* Magnetic resonance imaging; Techniques and Tests
- Network, 8, 69, 338–376
 - affine model, 345–346
 - bimodal networks, 359–364
 - elastic free energy, 344
 - elastic modulus, 344–345
 - filler reinforcement, 354–355
 - force-temperature relations, 358–359
 - gelation, 352
 - liquid-crystalline elastomers, 365–370
 - phantom network model, 346–347
 - reduced stress, 344–345
 - stress-strain isotherms, 352–353
 - trimodal networks, 364–365
- NMR, *see* Nuclear magnetic resonance spectroscopy; Techniques and Tests
- Nuclear magnetic resonance spectroscopy, NMR, *see* Techniques and Tests
- OIT, *see* Oxidative-induction time; Techniques and Tests
- Oligomers 15, 68
- Optical microscopy, *see* Techniques and Tests
- Orientation, 8, 32, 72, 295–333
 - biaxial distribution, 299–300
 - birefringence, 8, *see also* Techniques and Tests
 - compensation method, 303–304
 - refractometry method, 303
 - transmission method, 304–305
 - fluorescence spectroscopy, 322–325
 - infrared linear dichroism, IRLD, 305–313
 - reflection IRLD, 309–312
 - time-resolved IRLD, 312–313
 - transmission, IRLD, 307–309
 - nuclear magnetic resonance spectroscopy, 325–327
 - orientation distribution function, ODF, 296–297
 - Raman spectroscopy, 313–322
 - uniaxial distribution, 300
 - X-ray diffraction spectroscopy, 328–333
- Osmometry,
 - membrane, *see* Techniques and Tests
 - vapour pressure, *see* Techniques and Tests
- Oxidation, *see* Degradation; Techniques and Tests
- Oxidative-induction time, OIT, *see* Degradation; Techniques and Tests
- Oxygen uptake, 8, 393–394, *see also* Techniques and Tests
- Paint(s), 81–84
- Persistence length, 7, 125–127
- PES, *see* Photoelectron spectroscopy; Techniques and Tests
- Phase structure, 255–274
 - crystalline, 257
 - interphase, 271–274
 - liquid-like, 267–271
- Phosphorescence, *see* Techniques and Tests
- Photoelectron spectroscopy, PES, *see* Techniques and Tests
- Polycondensation, *see* Polymerisation, Step
- Polydispersity index, 17
- Polyethylene (PE), 16, 17, 22, 23, 27, 32, 39, 266, 268, 272, 285, 394, 402
 - high density PE, HDPE, 46, 49
 - low density PE, LDPE, 23, 39, 49, 397, 409, 435
 - linear low density PE, LLDPE, 23, 46, 49, 153–160, 265
- Polymer chain structure, 7, 23, 123
 - branching, 7, 139–152, 163
 - chain folding, 19
 - chain length, 7, 15, 27, 723
 - Kuhn length, 7, 125–127
 - persistence length, 7, 125–127
 - radius of gyration, 125, 126
 - stiffness, 723–724
 - comonomer, 7
 - composition, 7
 - configuration, 27, 29–30, 137–138
 - conformation, 7, 27, 30–33, 137–138

- copolymer sequencing, 7, 24, 161–163
- cross-linking, 7, 24, 69
- degree of polymerization (d_p), 7
- end group, 7, 27–28, 171–202, 207
- elasticity, 341–344
- entanglements, 27
- helices, 33, 138
- isomerism, 7, 27, 29
- Kuhn unit/length, 7, 125–127
- lamellae, *see* lamellae
- molecular weight, 7, 15
- molecular weight distribution, 7, 15
- monomer, 7, 15
- persistence length, 7, 125–127
- sequence length, *see* Copolymer(s), sequencing
- stereoregularity, 7, 135–138
- tacticity, 7, 29–30, 46, 134–139
- unsaturation, 7
- Polymer product analysis/characterization
 - additive analysis, *see also* Additives, 9
 - contaminant analysis, *see* Failure analysis
 - crystallinity, crystallization, 8, 70–74
 - defect analysis, *see* Failure analysis
 - degradation, *see* Degradation
 - fracture, *see* Failure analysis, 679
 - molecular Orientation, *see* Orientation
 - network, *see* Network
 - spatial heterogeneity, 9
 - stability, 453
 - surface analysis, 9, 675–682
- Polymer,
 - blend(s), 52, 53, 57, 66, 81, 111, 112, 114, 117, 140, 232, 279, 426, 538, 555
 - chemistry, 14–62
 - copolymer
 - acrylonitrile/butadiene/styrene, ABS, 66, 436
 - ester copolymers, 720–721
 - ethylene/ α -olefin, 260, 264, 270, 275
 - ethylene/vinyl acetate, 413, 419, 441
 - ethylene/propylene/diene, EPDM 75
 - styrene/acrylonitrile, SAN, 66
 - styrene/butadiene, SBR, 75
 - vinylidene difluoride/per-fluoropropylene, (Viton[®]), 76
 - natural,
 - cellulose, 16, 484
 - polyisoprene, 29, 479
 - pullulan, 490
 - networks, 338–376
 - thermoplastic
 - conjugated polymers, 711–712, 714–715N
 - poly(acetylene), 711
 - Neoprene[®] (2-chlorobutadiene polymer), 76
 - nylon(s), 16, 32, 66, 172, 660, 721
 - nylon 6 (polyamide 6), 108, 427
 - nylon 66 (polyamide 66), 16, 72, 74, 108, 406, 427, 632
 - organosiloxanes, 726–727
 - polyacrylonitrile, PAN, 78, 698, 706
 - polyacrylate(s), 66
 - poly(aminoborane), 702–703
 - polyamides, 721, *see also* nylon above
 - poly(aniline), PANI, 416, 728–729
 - poly(ether imide), PEI, 74, 109
 - poly(aryl ether ether ketone), PEEK, 74, 85, 86, 434, 435, 718
 - poly(aryl ether ketone), PEK, 86, 718
 - poly(aryl ether sulfone), PES, 71, 74, 86, 173–174
 - polybutadiene, 487
 - polybutene, 22
 - poly(butylenes(s) terephthalate), PBT, 60, 273
 - polycarbonate(s), 66, 74, 419, 423, 426, 713
 - polyester(s), 66
 - poly(ethers), 709–710
 - poly(ethylene adipate), 277
 - polyethylene, PE, 16, 17, 22, 23, 27, 32, 39, 46, 49, 139, 143, 153, 278, 394, 472, 473, 475, 696, 697, *see also* Polyethylene above
 - poly(diethyl siloxane), PDES, 366–367
 - poly(2,6-dimethyl-1,4-phenylene oxide), 470
 - poly(dimethyl 5-(4hydroxy butoxy isophthalate), 165
 - poly(dimethyl siloxane), PDMS, 140, 341, 343, 352, 353, 354, 362–364
 - poly(ethylene oxide), (PEO), 725–726
 - poly(ethylene terephthalate), PET, 16, 32, 72, 78, 183–194, 392, 472
 - poly(hexamethylene adipamide), *see* Nylon 66
 - poly(hydroxyl butyrate), 126
 - polyisobutylene, 33, 43
 - polyisoprene, 466
 - poly(methyl methacrylate), PMMA, 16, 59, 135, 137, 175–183, 404, 405, 434–435, 698–700
 - poly(methyl-phenyl silane), 30
 - polyoelfins, 45, 49
 - polyoxymethylene(s), POM, 66, 391, 439
 - poly(phenylene oxide), PPO, 66, 71
 - poly(phenylene sulphide), PPS, 74

- poly(p-phenylene terephthalamide), (Kevlar[®]), 32, 66, 86
- poly(3-phenyl-1-ureidionitrile), PUN, 700
- polyphosphazenes, 367
- polypropylene, PP, 16, 17, 23, 30, 32, 33, 39, 41, 46, 70, 138, 259, 274, 281, 282, 392, 410, 442, 462, 472, 469, 473, 479, 481, 484, 518, 677, 697
- poly(propylene glycol), PPG, 194–201
- poly(pyridine), 710
- polystyrene, PS, 16, 17, 36, 44, 70, 71, 130, 395, 472
- poly(tetrafluoroethylene), PTFE, 33, 66, 70
- poly(thiophene(s)), 701, 724
- poly(urethane(s)) 67, 430
- poly(vinyl acetate), PVA, 19, 82, 717
- poly(vinyl chloride), PVC, 16, 17, 137–137, 416, 452
- poly(vinyl pyrrolidine), PVP, 472
- thermoset,
 epoxy resin, 17
 phenol-formaldehyde resin, 17
 urea/melamine formaldehyde resin, 17
 unsaturated polyester, 17
- Polymeric materials, 66
- Polymerisation
 chain (addition), 34, 67
 ionic, 42–45, 83, 194–201
 radical, 35–41, 172, 175–182
 metallocene-catalysed, 47–48, 153, 159–160, 161
- Phillips process, 45–46
- step (polycondensation), 34, 53–54, 55–56, 60, 66–67, 182–193
- vinyl, 66
- Ziegler-Natta process, 46–47, 76, 161
- Positron annihilation lifetime spectroscopy, PALS, *see* Techniques and Tests
- Prepreg, 85
- Processing, 68–87
- Pulse-propagation, *see* Techniques and Tests
- Pyrolysis, Py, *see* Techniques and Tests
- Quantum mechanics, *see* Molecular modelling
- Raman spectroscopy, *see* Techniques and Tests
- Raman-microscopy, *see* Techniques and Tests
- Residual solvents, 599
- Resins, 82–84
- Resonance ionization spectroscopy, RIS, *see* Techniques and Tests
- Rheology, *see* Techniques and Tests
- RIS, *see* Resonance ionization spectroscopy; Techniques and Tests
- SALLS, *see* Small-angle laser light scattering; Techniques and Tests
- SANS, *see* Small-angle neutron scattering; Techniques and Tests
- SAXS, *see* Small-angle X-ray scattering; Techniques and Tests
- Scanning electron microscopy, SEM, *see* Techniques and Tests
- Scanning near-field optical microscopy, SNOM, *see* Techniques and Tests
- Scanning tunneling microscopy, STM, *see* Techniques and Tests
- SEC, *see* Size exclusion chromatography; Techniques and Tests
- Secondary ion mass spectrometry, SIMS, *see* Techniques and Tests
- SEM, *see* Scanning electron microscopy; Techniques and Tests
- Semi-empirical methods, *see* Molecular modelling
- Sequence, 7, 24–25, 715, *see also* Copolymers(s), sequencing
- Sheets, 79–81
- SIMS, *see* Secondary ion mass spectrometry; Techniques and Tests
- Size exclusion chromatography, SEC, *see* Techniques and Tests
- Small-angle laser light scattering, SALLS, *see* Techniques and Tests
- Small-angle neutron scattering, SANS, *see* Techniques and Tests
- Small-angle X-ray scattering, SAXS, *see* Techniques and Tests
- s-NMR, *see* Solid-state nuclear magnetic resonance spectroscopy; Techniques and Tests
- SNOM, *see* Scanning near-field optical microscopy; Techniques and Tests
- Solid-state density functional methods, *see* Molecular modelling
- Solid-state nuclear magnetic resonance spectroscopy, s-NMR, *see* Techniques and Tests
- Spatial heterogeneity, 9, 527–557, 676–677
- Spatial imaging, *see* spatial heterogeneity
- Spherulite, 21, 274–275, 281
- Stabilizers, 457–458, 459 483–487
- Staining, *see* Techniques and Tests

- Stereoregularity, 7, 134–139, 478
- STM, *see* Scanning tunneling microscopy;
Techniques and Tests
- Supramolecular morphology, 274–286
- Surface(s), 679
 surface analysis, 9, 675–682
 surface coatings, 81–84
- Swelling, *see also* Techniques and Tests,
356–358
- Syndiotactic, *see* Tacticity
- Tacticity, 7, 29–30, 46, 135–139, 698
- TDFRS, *see* Thermal diffusion forced
Rayleigh scattering; Techniques and
Tests
- Techniques and Tests
 atomic absorption spectrometry, AAS, 9,
 563–565
 atomic force microscopy, AFM, 8, 99, 275,
 374–347, 410
 Auger spectroscopy, 703–712
 birefringence, 8, 301–305, 374,
 see also Orientation
 Brillouin scattering, 8, 376
 capillary electrophoresis, 7
 carbonyl index, 8, 394–397, 410,
 see also Degradation
 chemical titration, *see* Techniques and
 Tests, Titration
 chemiluminescence, CL, 8, 463–496
 density, 8, 260–261
 dielectric relaxation, 272–273
 differential photocalorimetry, DPC, 8
 differential scanning calorimetry,
 DSC, 8–9, 476–478, 490, 565, 618,
 619, 652, 721
 dynamic light scattering, 210, 225–227,
 243–244
 energy dispersive analysis/spectroscopy,
 EDA/EDS, 9
 electron spectroscopy for chemical
 analysis, ESCA, 9, 555, 676, 681, 682,
 see also XPS
 electron spin resonance spectroscopy, ESR,
 8, 500–521, 727–729
 nitroxide radicals, 507, 518
 spin trapping, 507, 516–517
 electron spin resonance imaging, ESRI,
 8–9, 510–521, 552–554
 electrophoresis, 240–241
 evolved gas analysis, EGA, 8, 389
 EGA-IR, 8
 field-flow fractionation, FFF, 207, 232–235
 fluorescence spectroscopy, 8, 322–325,
 418–422
 gas chromatography, GC, 8–9, 422, 565–567
 GC-IR, 8
 GC-MS, 9, 422, 565–567, 624
 gel permeation chromatography, 7–9, 141,
 490, 617, 673, 741, *see also* Size
 exclusion chromatography, SEC
 GPC-IR, 8
 GPC-MS, 8, 565
 gelation, 8
 gel-point determination, 7
 high performance liquid chromatography,
 HPLC, 7
 high throughput analysis, HTA, 735
 inductively coupled plasma atomic
 emission spectroscopy, ICP-AES,
 9, 571
 inductively coupled plasma mass
 spectrometry, ICP-MS, 9, 622
 infrared spectroscopy, IR, 7–9, 207, 240,
 262, 305, 374, 402, 693
 attenuated total reflection, ATR, 9,
 535–536, 541–542, 612–614, 617,
 618, 629, 636, 640, 644, 646, 653,
 657, 659, 660–663, 666–669, 678,
 681, 740
 carbonyl index, 8, 394–397, 410,
 see also Degradation
 FTIR-microscopy, *see* IR-microscopy
 below
 IR-microscopy, 8, 9, 411, 404, 534–540
 mid-infrared spectroscopy, mid-IR, also
 Fourier transform infrared
 spectroscopy, FTIR, 7–9, 135,
 172–174, 179, 185–188, 207, 262,
 402–414, 567, 612, 624, 637, 740
 near-infrared spectroscopy, NIR, 9,
 550–551, 740, 742
 near-infrared imaging, 9
 specular reflection, 311–312
 time-resolved, 312–313
 iodometric test, 8, 397, 410
 inverse gas chromatography, IGC, 8
 laser enhanced ionization spectroscopy,
 LEIS, 9, 555–557
 liquid chromatography, LC, 8, 207, 443–447
 LC under critical conditions, LC-CC, 8
 LC-IR, 8
 LC-MS, 7–9, 570–571
 light scattering, *see also* dynamic and static
 light scattering 7
 magnetic resonance imaging, MRI, 9

- mass spectrometry, MS, 7, 172–202, 207, 237–239, 422–429, 712–718,
see also ICP-MS
- direct insertion probe pyrolysis mass spectrometry, DPMS, 426
- electrospray ionization-MS, ESI-MS, 173
- matrix-assisted laser desorption mass spectrometry, MALDI-MS, 7,
- matrix-assisted laser desorption time-of-flight mass spectrometry, MALDI-TOF-MS, 8, 173–174, 207, 427, 429, 741
- MS-MS and MSⁿ 173
- melt flow index, MFI, 8, 399–402
- molecular modeling, *see* Molecular modelling
- molecular weight distribution methods, 207
- dynamic light scattering, 207
- field-flow fractionation, FFF, 7, 207
- mass spectrometry, *see* MALDI-TOF-MS above
- membrane osmometry, 7, 207
- sedimentation equilibrium, 407
- sedimentation velocity, 207
- size exclusion chromatography, SEC, *see* SEC below
- static light scattering, 207
- Ubbelohde viscometer, 207
- ultracentrifugation, 7, 207, 244
- vapour phase osmometry, 207
- near-infrared spectroscopy, NIR, *see* infrared spectroscopy above
- nuclear magnetic resonance spectroscopy, NMR, 7–9, 135, 139, 143, 145–147, 162, 164–165, 172–202, 207, 239–240, 266–267, 325–327, 375, 429–433, 629, 655, 722–724
- Grant and Paul chemical shifts, 145–147
- magnetic resonance imaging, MRI, 552–554
- solid-state NMR, s-NMR, 8–9
- optical microscopy, 8, 278, 610, 613, 649, 663–666
- osmometry, *see also* molecular weight distribution methods above 207, 213–217
- oxidative-induction time, OIT, 390–393, *see also* Differential scanning calorimetry, DSC,
- oxygen uptake, 8, 393–394
- photoelectron spectroscopy, PES, 9, 555, 703–712
- phosphorescence, 8
- plasma emission spectroscopy, 571
- positron annihilation lifetime spectroscopy, PALS, 269
- pulse-propagation, 8
- pyrolysis, Py, 412, 415, 416
- Py-GC-IR, 8, 412
- Py-GC-MS, 8, 422, 594
- Py-IR, 8
- Py-MS, 8, 422, 426
- Raman spectroscopy, 7–9, 262–266, 284–286, 313, 414, 693, *see also* Longitudinal acoustic mode
- Raman-microscopy, 8, 9, 319, 529–534, 540, 542
- resonance ionization spectroscopy, RIS, 9
- rheology, 7, 147–150
- scanning electron microscopy, SEM, 9, 538–540, 610, 611, 628–631, 637, 645, 647–648, 650, 657, 663
- SEM-EDA/EDS, 9, 571, 610, 630, 645
- scanning near-field optical microscopy, SNOM, 9, 551–552
- scanning tunneling microscopy, STM, 8, 374
- secondary ion mass spectrometry, SIMS, 8–9
- TOF-SIMS, 9, 552
- size exclusion chromatography, SEC, 7–9, 139, 141–143, 207
- SEC-HPLC, 7
- SEC-IR, 7
- SEC-MS, 7
- small-angle laser light scattering, 8, 278
- small-angle neutron scattering, SANS, 7, 8, 126, 131, 150–153, 375–376
- small-angle X-ray scattering, SAXS, 7, 8, 150
- solid-state nuclear magnetic resonance spectroscopy, s-NMR, 7, 8
- staining, 8, 397–399, 408
- static light scattering, 207, 220–224
- swelling, 8
- thermal analysis, TA, 8, 261–262, 436–442
- thermal diffusion forced Rayleigh scattering, TDFRS, 7, 228, 244
- thermogravimetric analysis, TGA, 8, 438–442, 572, 647, 652, 663, 670
- TGA-IR, 8, 413
- TGA-MS, 8, 439–440
- titration, 7, 8, 185
- transmission electron microscopy, TEM, 8
- ultracentrifuge, *see* molecular weight distribution methods above
- uv spectroscopy, 396, 408, 418, 419
- viscometry, 7, 207, 218–220, 672
- visible spectroscopy, 8

- wide-angle X-ray diffraction, WAXD, 8, 258, 328, 329
- wide-angle X-ray scattering, WAXS, 8, 266, 270
- X-ray diffraction, XRD, 258–260, 328–333, 718–722
- X-ray fluorescence spectroscopy, 9, 573
 μ -XRF, 9, 554–555
- X-ray photoelectron spectroscopy, XPS, 8–9, 409, 433, 555, 626, 703–712
- Teflon[®] 33, *see also* Polymer, Thermoplastic, Poly(tetrafluoroethylene)
- Telechelic, 68
- TEM, *see* Transmission electron microscopy; Techniques and Tests
- T_g , *see* Glass transition temperature
- TGA, *see* Thermogravimetric analysis; Techniques and Tests
- Thermal analysis, *see* Techniques and Tests
- Thermal diffusion forced Rayleigh scattering, TDFRS, *see* Techniques and Tests
- Thermogravimetric analysis, TGA, *see* Techniques and Tests
- Thermoplastic, 17, 68–70
- Thermoset, 17, 68–70
- Tie-molecules, 21, 73, 75
- Time-temperature-transformation, TTT, 24
- Titration, *see* Chemical titration; Techniques and Tests 7, 8
- Tramsdorff effect, 39–41
- Transmission electron microscopy, TEM, *see* Techniques and Tests
- Ultracentrifugation, *see* Techniques and Tests
- Unit cell, 19–20
- Unsaturation, 7
- UV spectroscopy, *see* Techniques and Tests
- Vapour pressure osmometry *see* Techniques and Tests
- Viscometry, *see* Techniques and Tests
- Visible spectroscopy, *see* Techniques and Tests
- Vitrification, 39–41
- Vulcanisation, 57, 69, 75
- WAXD, *see* Wide-angle X-ray diffraction; Techniques and Tests
- WAXS, *see* Wide-angle X-ray scattering; Techniques and Tests
- Wide-angle X-ray diffraction, WAXD, *see* Techniques and Tests
- Wide-angle X-ray scattering, WAXS, *see* Techniques and Tests
- XPS, *see* X-ray photoelectron spectroscopy; Techniques and Tests
- X-ray fluorescence spectroscopy, XRF, *see* Techniques and Tests
- X-ray photoelectron spectroscopy, XPS, *see* Techniques and Tests
- XRF, *see* X-ray fluorescence spectroscopy; Techniques and Tests
- Zimm plot, 223