

Index

A

- Activation entropy, 118
- Adsorption, 174
 - efficiency of, 174
- Air–water interface, polymer monolayers in
 - adsorption of polymers or proteins, 166
 - change in spreading conditions, 178
 - PEO chain adsorbed at, 175
 - properties of poly(D, L-lactic acid) monolayers, 178
 - schematic illustration of monolayers, 196
 - surface micelles, 189
- Amphiphilic block copolymers, 189, 198
 - nanoparticulate drug delivery systems, 190
- Amphiphilic polymer, 172
- Analogous poly(itaconate)s polymers, 104
- Anelasticity, *see* Viscoelasticity
- Anelastic material, 56
- Aspergillus itaconicus*, 131
- Aspergillus terreus*, 131
- Association-dissolution of host (cyclodextrin) and guest (p-xylene), 212
- Atomic force microscopy (AFM), 198

B

- Block copolymers, 190
 - molecular characteristics of, 196
- Boltzman equation, 69
- Brewster Angle Microscopy (BAM), 226
- Broadband viscoelastic spectroscopy (BVS), 60
- Brownian motion, 45

C

- Capillary rheology behavior of polymer monolayers, 186–187
- γ -CD and PMVE, proposed structure of complex between, 220

CD molecules

- characteristics of, 208–211
- dimensions and hydrophobic/hydrophobic regions, 211
- α -CD-PEC and γ -CD-PEC complexes,
 - proposed structure of, 218
- γ -CD with organic compounds, complexes of, 208
- Complex permittivity, 142
- Conductive processes, 107–109
- Configurational distortion, 45
- Cooperativity, 48
- Copolymer unimers, 193
 - assembled in bilayer around aqueous reservoir, 193
 - in “frozen” state, 192
- Creep, 52
 - deformation, 52
 - strain rate, 53
- Critical methylene group number (CMG), 182
- Critical surface pressure, 167
- γ -cyclodextrin (γ -CD), 210
- Cyclodextrins (CDs), 207, 210, 212, 215, 216, 219, 220, 222, 226
 - characteristics of α -, β - and γ -CDs, 210
 - chemical structures and geometric dimensions of, 209

D

- Debye peak, 108
- Debye type relaxation, 110
- Dendrimer generation on π -A isotherms of stearate-terminated PEO-PAMAM diblock copolymers, 230–231
- Dendritic macromolecules, 227
 - examples of different dendritic architectures, 228
 - within molecular layers at interfaces, 229
- Dielectric constant, 113

- Dielectric relaxational behavior
 Poly(dimethylphenyl methacrylate)s,
 112–120
- Differential scanning calorimetry (DSC), 221
- Dilational rheology behavior of polymer
 monolayers, 186
- Dilute *vs.* semi – dilute polymer
 concentrations, 22
- Dynamic mechanical relaxational behavior
 Poly(dimethylphenyl methacrylate)s,
 120–122
- E**
- “Escaping tendency”, 2
- Excluded – volume effect, 17
- Eyring equation, 113, 148
- F**
- Flory – Huggins interaction parameter, 5,
 10, 11
- Flory – Huggins theory, 10
- Free energy change, 10
- Fuoss-Kirkwood equations, 66, 71
- G**
- Gibbs free energy, 219
- Gibbs mixing function, 3, 38
- Gibbs – Szyskowski equation, 213
- Glass transition temperature (T_g), 48–49, 97
- Glassy modulus (E_g), 56
- H**
- Havriliak-Negami (HN) equation, 67, 71, 115
- Havriliak-Negami model, 91
- Havriliak-Negami procedure, 101
- Hildebrand solubility parameter, 10
- Homopolymer, 26, 192
 molecular characteristics of, 196
- Host (cyclodextrin) and guest (p-xylene),
 association-dissolution of, 212
- Huggins viscosity constant, 11
- “Hybrid architectures”, 223
- Hydrophilic poly (ethylene oxide) (PEO), 224
- Hydrophobically – modified poly
 (N – isopropylacrylamides)
 (HM – PNIPAM), 186
- Hysteresis, 51, 165, 175, 179, 186
- I**
- Inclusion complexes (ICs), 208
 formation of cyclodextrins and conducting
 polymer chain, 217
- “Insulated molecular wire”, 215
- Interchange energy, 34
- Interfacial tension as function of IC
 concentration at different temperatures,
 214
- Intimate ternary blend system of
 poly(carbonate) (PC)/poly (methyl
 methacrylate) (PMMA)/poly (vinyl
 acetate) (PVAc), 221
- K**
- Kelvin-Voigt model, 57, 58
- Kerr effect, 215
- Kuhnian chains, 199, 200
- “Kuhnian” concentration, 23
- Kuhnian limit, 199
- “Kuhnian” overlap length, 23
- L**
- Langmuir – Blodgett technique (LB), 166,
 184, 193
- Langmuir monolayers, 167
 and Langmuir-Blodgett films, 167–189
 molecular areas of, 168, 169
 spreading monolayer Langmuir
 technique, 167
- Lanmuir isotherms, 174
- Linear viscoelasticity, 54
- Linear viscosity, 54
- Liquid lattice theory, 3
- Long – range interference of monomer units,
see Excluded – volume effect
- Lower critical solution temperature (LCST), 25
- Low frequency dispersion (LFD), 105–106
- M**
- McMillan – Saito theory, 16
- Macrosurfactants, 198
- Maleic anhydride – alt – stearyl
 methacrylate(MA-alt-StM), 179
- Mark – Houwink – Sakurada (MHS) equation,
 12, 13
- Maxwell model, 57, 58
- Maxwell–Weichert model, 59
- Minimum surface tension, 175
- Moderate creep, 52
- Molecular Dynamic Simulation (MDS), 68,
 97, 169
- Molecule 1, methyl-terminated branches
 and, 226
- Molecule 2
 hydroxyl-terminated branches, 226
 synthesis of, 225
- Monomolecular particles, 171
 particle diameter distribution of, 171

N

- Nanocapsule, 192
- Newtonian, 51
- N-methyl-2-pyrrolidone (NMP), 215
- Nonlinear viscoelasticity, 56
- Nonpolar hydrocarbon, 172
- Nuclear magnetic resonance (NMR), 165

O

- Onsager-Fröhlich-Kirkwood equation (OFK), 128
- “Osmotic pressure of a solute”, 2
- Osmotic virial expansion, 17
- Overlap concentration, 21

P

- Particle diameter distributions, 171
- PBLG – PEO diblock copolymers
 - AFM images of monolayers film at different surface concentrations, 198
 - at air – water interface, 197
 - characteristics of, 198
- P25DFBM, 122, 124, 126
- P26DFBM, 122, 123, 124, 126
- PEE-PEO monolayer, molecular arrangement of, 195
- Perhydrotriphenylene (PHTP), 222
- Phase angle, 46
- Phenyl groups, 116
- Phenyl isomers of poly(benzyl methacrylate)s (PBM), 122
- Physicochemical aspects of polymer at interfaces, 163–166
 - amphiphilic block copolymer behavior in solution and interfaces, 189–199
 - Langmuir Monolayers and Langmuir-Blodgett Films, 167–189
 - polymer adsorption from solution, 199–202
 - wettability behavior and contact angles, 202–203
- Physicochemical properties of
 - (poly(γ -benzyl-L-glutamate)) (PBLG) –(poly (ethylene oxide)) (PEO), *see* PBLG – PEO
- Plastic deformation, 52
- P3MTHFM, 109–111
- Poli(dicyclohexyl itaconate)s, 146–147
- Poli(diitaconate)s containing different cyclic side chains, 150–152
- Poly(alkyl vinyl ether)s, 219
- Polyamides, solubility of, 29
- Polyamidoamine (PAMAM) dendrimers, 229
- Poly-aniline with emeraldine base, 217
- Poly(benzyl methacrylate)s (PBzM), 120
- Poly(carbonate) (PC)/poly(methyl methacrylate) (PMMA) pair, 220
- Poly(2-chlorocyclohexylacrylate) (P2ClCHA), 64
- Poly(2-chloroethyl methacrylate) (P2CEM), 61
- Poly(3-chloropropyl methacrylate) (P3CPM), 61
- Poly(cyclobutyl methacrylate) (PCBuM), 89–94
- Poly(cyclobutyl methacrylate)s, 88–94
- Poly(cycloheptyl methacrylate) (PCHpM), 81–84, 82
- Poly (cycloheptylmethyl methacrylate) (PCHpMM), 82
- Poly(cyclohexylalkyl methacrylate)s, 64
- Poly(cyclohexyl methacrylate) (PCHM), 64
- Poly(cyclooctyl methacrylate) (PCOcM), 81–84, 82
- Poly(D, L-lactic acid) monolayers, properties of, 178
- Poly(dichlorobenzyl methacrylate)s (PDCIBM), 127–130
- Poly(diethylitaconate) (PDEI), 132
- Poly(2,4-difluorobenzyl methacrylate) (P24DFBM), 122
- Poly(2,5-difluorobenzyl methacrylate) (P25DFBM), 122
- Poly(difluorobenzyl methacrylate)s, 122–127
 - dielectric relaxational behavior, 123–127
- Poly(diisobutylitaconate) (PDIBI), 132
- Poly(diisopropylitaconate) (PDIP), 132
- Poly(dimethyl itaconate) (PDMI), 132
- Poly(2,4-dimethylphenyl methacrylate) (2,4PDMP), 120
- Poly(2,5-dimethylphenyl methacrylate) (2,5PDMP), 120
- Poly(2,6-dimethylphenyl methacrylate) (2,6PDMP), 120
- Poly(3,5 dimethylphenyl methacrylate) (3,5PDMP), 120
- Poly(dimethylphenyl methacrylate)s, 112
 - dielectric relaxational behavior, 112–120
 - dynamic mechanical relaxational behavior, 120–122
- Poly(di-n-butylitaconate) (PDIBI), 132
- Poly(di-n-propyl itaconate) (PDPI), 132
- Poly(1,3-dioxan-5yl-methacrylate) (PDMA), 97
- Poly(ditetrahydrofurfuryl methacrylate), 104–105
- Poly(ϵ -caprolactone) (PEC), 217, 220, 222
- Poly(ϵ -caprolactone) (PEC)/poly (L-lactic acid) (PLLA) pair, 220

- Polyelectrolytes, 184
 Poly(ethylene glycol) (PEG), 216
 Poly(ethylene oxide)s, 173
 Poly(ethyl vinyl ether) (PEVE), 219
 Poly(itaconate)s, 37, 131–132, 138–143
 dielectric relaxational behavior, 138–143
 of poly(diitaconate)s, 146–152
 dynamic mechanical relaxational behavior, 143–146
 containing aliphatic and substituted
 aliphatic side chains, 132–138
 Poly(itaconates) monolayers, 177
 ν values, 177
 Polymer adsorption, 199
 Polymer-bridging flocculation, mechanism
 of, 165
 Polymer effect, 46
 Polymeric nanosphere, 191
 Polymeric surfactants, 198
 Polymeric vesicles (polymersomes), 191
 Polymer inclusion complexes (PICs), 208, 221
 Polymer monolayers, capillary rheology
 behavior of, 186–187
 Polymer-polymer interaction for poly(ester)s,
 molecular models of, 170
 Polymer solution behavior
 critical phenomena in polymer solution,
 24–28
 polymers in binary solvents, cosolvency
 effect, 28–35
 polymer solutions in good solvent, 15–17
 excluded – volume effect, 17
 preferential adsorption phenomena, 35–40
 solution properties, 1–15
 theta condition: concentration regimes,
 17–23
 Polymer – solvent interactions, magnitude
 of, 10
 Polymer – solvent phase diagram, 24
 Polymersome, 191
 Poly(methacrylate) monolayer, 178
 Poly(methacrylate)s, 31, 60–61
 containing aliphatic and substituted
 aliphatic side chains, 61–63
 containing aromatic side chains, 112–130
 containing heterocyclic side groups,
 96–112
 rigidity factor, 32
 containing saturated cyclic side chains,
 63–96
 bulky substituents on the dynamic
 mechanical and dielectric
 absorptions, effect of, 71–81
 containing norbornyl groups, 95–96
 number of members in the saturated
 rings, effect of, 81–95
 spacer group on dynamic mechanical
 and dielectric absorptions, effect of,
 63–71
 structure, 60
 side groups of, 32
 Poly (methyl methacrylate) (PMMA), intimate
 ternary blend system of, 221
 Poly(3-methyl-2-norbornyl methacrylate)
 (P3M2NBM), 95
 Poly(3-methyl tetrahydrofurfuryl methacrylate)
 P3MTHFM, 104
 Poly(monobenzyl itaconate) (PMBzI), 12
 Poly(mono- β n-decyl itaconate) (PMDI), 132
 Poly(monochlorobenzylmethacrylate)s
 (PMCIBM), 127
 Poly(mono-cyclohexylitaconate)
 (PMCHI), 138
 Poly(monomethyl itaconate) (PMMeI), 179
 chemical structure, 180
 Poly(mono-n-octylitaconate) (PMOI), 132
 Poly(neopentyl glycol sebacate)(PNGS), 217
 Poly(N – isopropylacrylamide)
 (PNIPAM), 186
 Poly(2-norbornyl methacrylate) (P2NBM), 95
 Poly(n- propyl vinyl ether) (PnPVE), 219
 Poly(N-vinyl-2-pyrrolidone) (PVP), 26
 phase diagram with temperature and SDS
 concentration, 27
 preferential adsorption behavior of, 33
 Poly(octamethylene tetrachloro-
 terephthalamide), intrinsic viscosities
 of, 30
 Poly(pentachlorophenyl methacrylate), 13
 in benzene, 18
 Poly(pentachlorophenyl methacrylate)
 (PPCIpH), 14
 Poly(phenyl acrylate) (PPhA), 121
 Poly(phenyl methacrylate) (PPHM), 120
 Poly(2-tertbutylcyclohexyl methacrylate)
 (P2tBCHM), 73
 Poly(4-tert butylcyclohexyl methacrylate)
 (P4tBCHM), 73
 Poly(tetrahydropranyl methacrylate)
 (P4THPMA), 98–103
 Poly[4-(1,1,3,3- tetramethylbutyl)phenyl
 methacrylate], chemical structure of, 19
 Poly(thiocarbonate)s, 152–155
 Poly(vinyl acetate) (PVAc)
 intimate ternary blend system of, 221
 Poly(vinylbutyral) film, 56

- Poly(4-vinylpyridine) quaternized with tetradecyl bromide (P4VPC₁₄)
molecular model of one monolayer, at air-water, 184
surface behavior, 182
- Preferential adsorption coefficient, 31, 32
dependence on mixed solvent composition, 33, 34
variation of, 38
with solvent composition, 33
- Preferential adsorption phenomena, 35–40
- Primary creep, 53
- PTHFM, 108–111
- PTHMPMA, 103
- R**
- “Random coil”, 2
- Regular solution, 5
- γ -relaxation, 102
- Resonant ultrasound spectroscopy (RUS), 60
- S**
- Scanning tunneling microscopy (STM), 215
- Screening, 20, 23
- Secondary creep, *see* Steady-state creep
- Selective adsorption, *see* Preferential adsorption phenomena
- Self-assembly of PEO-b-PAA into vesicular nanostructures at pH 10 induced by complexation between PEO segments and α -CD, 221
- Semi-dilute regime, 22
See also Dilute vs. semi-dilute polymer concentrations
- Shear stress, 43, 47
- Small-angle neutron scattering (SANS), 20
- Solubility parameter, 9, 10–11
- Solute, 2
- Solvent, 1–2
- Solvent-mediated force, 16
- Stable Langmuir monolayers, 172
- Standard free energy of adsorption as function of temperature for IC and PEO in aqueous solution, 215
- Standard linear solid model, 57, 58
- Static compressibility modulus, 176
- Steady-state creep, 53
- Stearate-terminated diblocks, 230
- Stearic acid, molecular structure, 172
- “Steric” stabilization, 164–165
- Storage modulus, 57
- Stress, 43–47
- Stress-strain, 45–47, 52, 57
- Supramolecular structures, complex polymeric systems
inclusion complexes between polymers and cyclic molecules surface activity, 212–223
self-assembles, block copolymers and dendronized polymers at interfaces, 223–232
dendronized polymers, 223
“hybrid architectures”, 223
- Surface energetic properties of solids, 165
- Surface free energy (SE), 203
- Surface light scattering (SLS) technique, 187–188
- Surface micelles, 189
- Surface pressure-area ($\pi - A$) isotherms, 167
of block copolymers, 196
MA-alt-StM, 178–179
poly(D, L-lactic acid) monolayers spread at air/water interface, 178–179
of poly(4-vinylpyridine), 181–182
for PVP, 168
- Surface relaxation modes, 186–187
- Swelling, 9
- T**
- Ternary interaction parameter, 39–40
- Tetrahydrofuran - water (THF/water), 31
- Thermodynamic behavior of polymer solutions, 8
- Thermodynamic parameters
for the adsorption of IC and PEO in dilute aqueous solutions, 215
for inclusion complex formation of PEG - diadamantane with β -CD, 211
- Thermogravimetric analysis (TGA), 221
- Theta condition: concentration regimes, 17–23
- Theta solvent, 17
- Time-dependent deformation, 53
- Transition state theory, 218–219
- Transmission electron microscopy (TEM), 221
- Tungsten, 53
- Two dimensional compressibility (Cs), 175
- U**
- Upper critical solution temperature (UCST), 25
- V**
- Virial regime, 22
- Viscoelasticity, 43–47
molecular theory, 49–53
dynamic modulus, 56–60

- mechanism of creep depends on
 - temperature and stress, 54
 - molecular mechanisms, 54–56
 - nature, 47–49
 - of poly(itaconate)s, 131, 138–143
 - dielectric relaxational behavior, 138–143
 - dielectric relaxational behavior of poly(diitaconate)s, 146–152
 - dynamic mechanical relaxational behavior, 143–146
 - containing aliphatic and substituted aliphatic side chains, 132–143
 - of poly(methacrylate)s, 61–62
 - containing aliphatic and substituted aliphatic side chains, 61–62
 - containing aromatic side chains, 112–130
 - containing heterocyclic side groups, 96–111
 - containing saturated cyclic side chains, 61–96
 - poly(thiocarbonate)s, 152–155
 - stress–strain, 45–47, 52
 - Vogel-Fulcher Tamman-Hesse (VFTH) equation, 91, 101, 109
 - Voigt model, *see* Kelvin-Voigt model
- W**
- Wettability behavior and contact angles, 202–203
- Y**
- Young's modulus, 45