

Index

a

ab initio theory 17, 124
 Accelerating Rate Calorimetry (ARC)
 15
 Active Pharmaceutical Ingredients
 (APIs) 44, 235
 actuators 225
 alkoxy-ammonium ILs 90
 anti-microbial compounds 237
 APIs, *see* Active Pharmaceutical
 Ingredients (APIs) 235
 aprotic ILs 8
 aprotic OIPC 219
 aqueous based reference electrodes
 181
 asymmetric, charge delocalised anions
 41
 atomistic simulations 68

b

Baylis–Hillman reaction 165, 166
 biocompatibility, significance 231
 biodegradation 233–234
 biomass 9, 169
 boron clusters 49
 Bragg's law 61, 64
 buffer ionic liquid 241–242
 Butler–Volmer equation 180
n-butylammonium acetate 95

c

cellulose 169
 [Ch][Ac] 86
 chemical toxicity 231–232
 chiral ILs 96

chitin 170
 chloroaluminate ILs 27, 90, 163, 193
 choline dihydrogen phosphate 238,
 241
 [C₂mim]Br-zeolite template material
 168
 [C₃mpyr]Cl 40
 CO₂ dissolution 155, 158–159
 CO₂ reduction 199–200
 conducting polymer-based actuators
 225
 conductivity 17, 121, 136
 Cottrell equation 192
 Coulomb's Law 32
 cyclic voltammetry (CV)-based
 techniques 16, 179

d

deep eutectic solvents 141
 dicamba 238
 Diels–Alder reaction 163
 DIMCARB 113, 199
 1,3-dimethylimidazolium
 trifluoromethanesulfonate 82
 distillable ionic liquids 13, 171
 dual active APIs 235
 dye-sensitised solar cells (DSSCs)
 185–186, 220

e

electric double layer 16, 72, 125, 223
 Electrochemical Impedance
 Spectroscopy (EIS) 16, 125
 electrochemical sensors 12
 electrochemical stability 16

- electrochemical window (EW)
 182–184
 anodic degradation 184
 cations and anions 182–183
 definition 182
 impurities 183
 working electrode 184
- electrosynthesis reactions
 counter and working electrodes 196
vs. electrodeposition 195–196
 mass transport limitations 196
 oxidation reactions
 alcohol oxidation 198–199
 fluorination 197–198
 reduction reactions
 C–C bond formation 200–201
 CO₂ reduction 199–200
- energetic materials 11, 49
 enthalpy of vapourisation 111
 entropy of mixing 131
 [ethylimidazolium][NTf₂] 66
 eutectic temperature 132
 excess molar volume 134
 Extended X-ray Absorption Fine
 Structure (EXAFS) 64
 extremophiles 233
- f**
 flow reactor method 87
 fragility 109
 Friedel–Crafts reaction 163
- g**
 gas chromatography (GC) 157
 green chemistry 7, 149, 170, 231
- h**
 half-reactions 177
 halide-free method 87
 Haven ratio 126
 heat capacity 15, 106, 118
 Heck reaction 161
 Henry's Law 155, 156
 herbicides 238
 high temperature molten salts 1
 hydrated ionic liquids 234
 hypergolic IL 11, 49
- i**
 IL-based gels 18
 ILThermo 103
 imidazolium-based ionic liquid 163
 inorganic material synthesis 167–169
 inorganic–organic ionic liquids 194
 ion-exchange reactions 85
 ionic conductivity 16, 121, 136
 ionicity 56–58, 126–129, 137–138
 ionic liquid (IL)-based polymer
 electrolytes 18
 ionothermal synthesis 10, 169
 ion polarizability 108
 Ion Selective Electrodes (ISEs) 97
 isothermal analysis 114
- k**
 Kauzman's Paradox 106
 keratin 170
- l**
 Lever Rule 132
 Li–air battery 215
 LiCoO_x 214
 lignocellulosic materials 169
 linalool chloride 166
 linear sweep voltammetry (LSV) 179
 liquid-crystal based phase transition
 110
 liquidus temperature 131
 Li–S batteries 215
 lithium-ion battery
 high voltage cathode materials 214
 [NTf₂][−] anion 212
 Lower Critical Solution Temperature
 (LCST) 151
- m**
 Madelung constant 34, 39, 44
 Marcus theory 187
 [Me-DBU][NTf₂] 135
 melting point (T_m) 13–14
 cation substituents 41–43
 charge delocalisation 37–39
 computational prediction 35–37
 degrees of freedom 43–44
 determination 104

dications 47–49
 hydrogen bonding 44–47
 ion asymmetry 39–41
 ion size 32–34
 thermodynamics 29–31
 metal bipyridyl complexes 187–188
 metal-containing ILs 49
 metal electrodeposition
 aluminium 193
 chloroaluminates 193
 cyclic voltammograms 191
 lithium 194
 magnesium 194
 sodium 194
 zinc 192, 193
 metallocenes 185
 metathesis reaction 83–85
 methyl carbonate-based ILs 98
 microelectrodes 180
 molecular dynamics (MD) simulations
 17, 68, 70
 multi-ion ILs 92

n

nanoparticle synthesis 76
 nano-structure 14, 60–62
 Nernst–Einstein equation 17, 56, 122
 Nernst equation 177, 192
 neutron diffraction 59, 62, 64, 73
 [NMe₄][BF₄] 36
 Nuclear Magnetic Resonance (NMR)
 56, 67, 97, 126, 137

o

organic electrolytes 209
 organic ionic plastic crystals (OIPCs)
 109, 219
 organic redox reactions 188–189
 osmotic toxicity 232
 oxygen reduction reaction (ORR) 216,
 217

p

[P_{4,4,4,4}][Cl] 57
 pesticides 238
 pharmaceutical salts 9, 44, 235
 plasmid DNA (pDNA) 239

plastic crystalline phase 109
 polymer ionic liquids (Poly-ILs) 19, 93
 polymorphism 35, 44, 236
 polyoxometalates (POMs) 189–190
 polypyrrole-based actuator 225
 porous carbon materials 19
 propanthalline cyclamate 235
 protic ionic liquids (PILs) 8, 57, 95,
 140, 171, 216
 protic OIPC 219
 protic pharmaceutical ILs 237
 pseudo activation energy 107
 pseudo-capacitors 224
 pseudo-reference electrodes 181
 pulse field gradient NMR 67

q

quantum chemical methods 67
 quaternization reactions 81–84, 87, 94

r

radial distribution function (RDF) 68
 rare earth metals 10
 redox active ionic liquids 190–191
 redox potentials 177–178, 185
 resin-based ion exchange reaction 86
 reversible carbamate reaction 171
 rocking chair batteries 211
 room temperature ionic liquid 1, 6, 27,
 29, 49, 112

s

scanning potential techniques
 179–180
 Seebeck coefficient 222
 short range structuring 58–60
 silk 171
 small interfering RNA (siRNA) 239,
 240
 SO₂ capture 159
 solvate ionic liquids 7, 89, 141
 solvent-based electrolytes 209
 solvent extraction 152–154
 sonoelectrochemistry 196
 standard hydrogen electrode (SHE)
 180
 structural heterogeneity 60

- structural proteins 242
 - structuring of ILs
 - confined spaces 74–75
 - experimental probes 64–67
 - hydrogen bonding 62–64
 - ionicity 56–58, 67
 - ion pairing 56–58
 - simulation approaches 67–71
 - solid interfaces 71–74
 - substitution reactions 166
 - supercapacitors 224–225
 - supported ionic liquid phase (SILP)
 - catalysts 19
 - surface tension 118–120
- t**
- task-specific ionic liquids (TSILs) 8, 81, 90
 - thermal analysis 103–104
 - thermal conductivity 15, 118
 - thermoelectrochemical cells 220–222
 - thermogravimetric analysis (TGA)
 - 113, 114
 - three-electrode measurement
 - 178–179
 - transport properties 103, 120
 - tribology 11, 118–120
- 2,2,2-trifluoromethylsulfonyl-*N*-cyanoamide anion 40
- N*-3-(3-trimethoxysilylpropyl)-1-methylimidazolium chloride 87–88
- u**
- Upper Critical Solution Temperature (UCST) 151–153
- v**
- vapour pressure 8, 13, 155
 - viscosity 12–13, 135–136
 - Vogel–Tamman–Fulcher (VTF) equation 107, 124
- w**
- Walden plot 127, 138, 140, 141
 - Walden Rule 122
 - water splitting 10
 - Wheland intermediate 161
 - wool fibre 171
- x**
- x-ray diffraction 40, 59, 61–65, 73
- z**
- zwitterionic ILs 91–92



























