

Index

- Absorption, electromagnetic radiation, 113
Absorption spectrum *see* excitation spectrum
Acetic acid
 role in DFO process, 234
 role in 1,2 indandione process, 239
 role in ninhydrin process, 229
 role in protein stain process, 365
Acetone, 248
ACE-V process, 470
Acid Black 1, 108, 361, 363, 365
Acid Blue 83 *see* Coomassie Blue
Acid dyes *see* protein stains
Acid Violet 17, 361, 363, 365
Acid Violet 19, 363, 369
Acid Yellow 7, 361, 363, 365
Additives
 in paper, 74, 339
 in polymers, 73, 474
Adhesion, 58, 202
Adhesive surfaces, 77, 291, 293–294, 323, 335, 475
Age
 estimation of fingermark, 94–95
 variable during research, 435
Airborne substances, factor in environmental exposure, 80
Alanine
 cyanoacrylate polymerisation initiator, 162
 fingermark constituent, 39
Alloxan
 outline history, 259
 processing of exhibits, 259
 theory, 259
Aluminium black, 392
Aluminium flake powder, 205–206
Amido Black *see* Acid Black 1
Amino acid reagents
 alloxan, 259–260
 benzo[f]ninhydrin, 242–245
 dansyl chloride, 262–263
 diamethylaminocinnamaldehyde (DMAC), 263–267
 1,8 diazafluoren-9-one (DFO), 231–237
 ‘dual action,’ 222–223
 fluorescamine, 246–249
 genipin, 252–256
 1,2 indandione, 237–242
 lawsone, 256–259
 5-methoxyninhydrin, 242–245
 5-methylthioninhydrin, 242–246
 NBD chloride, 260–262
 ninhydrin, 224–231
 o-phthalaldehyde, 250–252
 overview, 221–223
Amino acids, 39
Ammonia, 37, 40
Ammonium hydrogen carbonate, 190
Ammonium iron (II) sulphate, 342, 350
Ammonium thiocyanate, 460
Analytical techniques, 7
 α -naphthoflavone, 183, 298
Anthracene, 190
Antibody, 216
Antimony trichloride, 190
Anti-Stokes fluorescence, 128
Apocrine sweat, composition, 37

- Ardrox, 158
- Atmospheric pollutants, factor in
environmental exposure, 91, 93
- Atomic force microscopy (AFM), 58
- Attenuated total reflection–Fourier transform
infrared spectroscopy (ATR-FTIR), 415
analysis of fingerprints, 38, 45, 49, 402
operational use, 404
- Audit trail, 483
- Automated fingerprint identification system
(AFIS), 438
- Autoradiography, 186, 343
- Background fluorescence, 128, 136
- Background staining, 294
- Backscattered electron imaging, 408
- Bacteria, 55
- Ballistic analysis
impact of fingerprint processes on, 464
impact of recovery on fingerprints, 464
- Basic Red 1, 158
- Basic Red 14 (BR14), 169
- Basic Violet 2, 311–313
- Basic Violet 3 (BV3)
constituents targeted, 101
operational use, 285
outline history, 284, 290–291
processing of exhibits, 293–295
theory, 291–293
use in sequence, 448
- Basic Yellow 40 (BY40), 169
- Benzidine, 362, 369
- Benzo[*f*]ninhydrin, 243, 244
- Bifurcation, 5
- Biological development, 56
- Biological properties, 55–57
- Black granular powder, 207
- Black magnetic powder, 208
- Black powder suspension
carbon-based, 334
iron oxide-based, 334
- Bleaching, 343, 344
- Blood, 357–361, 460, 478
- Blood enhancement processes, 357–363, 455
see also Peroxidase reagents; Protein
stains
- Bright field transmission, 122
- Bromophenol blue, 460
- Bronze flake powder, 205–206
- Buffer solution, 297
- BY40 *see* Basic Yellow 40
- Cadmium
ninhydrin toning, 230
vacuum metal deposition, 172
- Calcium carbonate, 339
- Camphor fuming, 181
- Capillary action, 204
- Carbohydrates, 37
- Carbon
black granular powder, 207–208
ESDA toner particles, 213, 216
powder suspension, 334
- Cartridge electrostatic recovery apparatus
(CERA), 385, 390
- Cathodoluminescence, 409
- Cationic surfactants, 338
- Cellulose, 74, 223, 323
- Ceramic surfaces, 72
- CFC113
role in DMAC process, 279
solvent for iodine fixative, 185
solvent for NBD chloride, 262
- Chemical incompatibility, 108
- Chemical mapping, 7
- Chemiluminescence, 126, 372
- Chlorides, 40
- Chloroform, 190
- 4-Chloro-7-nitrobenzofuran (NBD) chloride
outline history, 260
processing of exhibits, 262
theory, 260–261
- Cholesterol, 41
esters, 42
- Citric acid
role in multimetal deposition process, 350
role in physical developer process,
337–338, 342
- Cleanliness
finger, 22
surface, 30
- Clingfilm surfaces, 325
- Colloidal gold, 345
- Colour filtration
operational use, 116
outline history, 115, 144
processing of exhibits, 147–149
theory, 144–147

- Colour toning, 344
Colour wheel, 145
Configuration, fingermarks, 2
Confirmatory test, 360
Contact
 area, 18, 25
 between fingers and surface, 2, 12
 multiple, 4
 transfer, 265–267
Contaminants, 4, 22, 35, 44–46, 357, 433, 470
Contextual information, 2, 7, 470
Contrast, 12
Coomassie Blue, 361, 363, 369
Copper, 72, 386
Copper acetate, 313
Copper phthalocyanine, 191
Corotron, 213, 216
Corrosion, 86, 384, 389
 visualisation, 388
Cosmetics, 35, 45
Cross polarisation, 122
Crowle's double stain, 361, 363
Crystal violet *see* Basic Violet 3 (BV3); Leuco
 Crystal Violet
Curcumin *see* Natural Yellow 3
Cyanoacrylate fuming
 constituents targeted, 101
 one step fluorescent systems, 165, 171
 operational use, 156
 outline history, 156, 158
 processing of exhibits, 167–171
 theory, 159–167
 use in sequence, 448, 459
Cyclohexane, 298

Dansyl chloride
 outline history, 262
 processing of exhibits, 263
 theory, 262–263
Dark field reflection, 120
Dark field transmission, 122
1,1,1,2,2,3,4,5,5,5-decafluoropentane *see*
 HFC4310mee
Deformation
 fingerprint ridges, 20
 fingertip, 17
 surfaces, 14
Deoxyribonucleic acid *see* DNA
Depletion series, 428

Depth of field, 485
Dermis, 17
Desorption electrospray ionisation (DESI),
 51, 402
Detergent, 321–322
Diaminobenzidine (DAB)
 operational use, 362
 processing of exhibits, 374–375
 theory, 370
1,8-diazafluoren-9-one (DFO)
 constituents targeted, 101
 operational use, 224
 outline history, 222, 231
 processing of exhibits, 234–237
 theory, 232–234
 use in sequence, 445
Dichloromethane, 190, 298
2,6-dichlorophenol-indophenol sodium salt, 276
Dielectric constant, 60, 214
Diffraction, 112
Diffuse lighting, 120
Diffuse reflection, 112–113
Diffusion
 fingerprint constituents, 93
 gold nuclei, 173, 175
Digital forensics
 impact of fingerprint processes on, 458
 impact of recovery on fingermarks, 458
Dilution series, 426
Dimethylaminobenzaldehyde (DMAB)
 amino acid reagent
 operational use, 264
 outline history, 263
 processing of exhibits, 265–267
 theory, 264–265
 fluorescent cyanoacrylate constituent, 166
Dimethylaminocinnamaldehyde (DMAC)
 amino acid reagent
 operational use, 264
 outline history, 263
 processing of exhibits, 265–267
 theory, 264–265
 urea indicator reagent
 operational use, 276
 outline history, 276, 277
 processing of exhibits, 279
 theory, 278
Dioctyl sulfosuccinate sodium salt (DOSS),
 293, 304, 307, 329

- Distal pulp, 18
- Disulphur dinitride (S₂N₂), 191, 192, 466
- DNA
 - in blood, 360
 - impact of fingerprint processes on, 454
 - impact of recovery on fingerprints, 458
 - recovery from fingerprints, 7, 46
- Document examination
 - impact of examination on fingerprints, 461
 - impact of fingerprint processes on, 461
- Drugs, 45
- Dust, 112, 118, 406

- Eccrine glands, 37
- Eccrine sweat, composition, 37, 38
- Edgeoscopy, 21
- Elastic limit, 26
- Electrochemical processes, 383
- Electrochromic enhancement, 394–395
- Electrodeposition, 384, 392
- Electromagnetic radiation, surface
 - interactions, 112
- Electromagnetic spectrum, 111, 127
- Electrons
 - role in fluorescence, 126–127
 - in scanning electron microscopy, 407–409
- Electrostatic detection apparatus (ESDA)
 - constituents targeted, 101
 - operational use, 201
 - outline history, 200, 212
 - processing of exhibits, 215–216
 - theory, 213–215
 - use in sequence, 446, 462
- Electrostatic forces
 - role in ESDA process, 213
 - role in multimetal deposition process, 345
 - role in powders process, 203
- Electrostatic lifting (ESLA), 459
- Electrostatic powdering, 202
- Emission, electromagnetic radiation, 112
- Emission spectrum
 - Acid Yellow 7, 368
 - Basic Red 14, 171
 - Basic Violet 2, 313
 - Basic Violet 3, 293
 - Basic Yellow 40, 135, 170
 - DFO, 135, 236
 - DMAC, 267
 - europium chelate, 305
 - fluorescamine, 249
 - genipin, 256
 - 1,2 indandione, 242
 - lawsone, 259
 - 5-methylthioninhydrin–zinc, 246
 - Natural Yellow 3, 307
 - Nile Red, 310
 - o-phthalaldehyde, 252
 - theory, 127–128
 - use in fluorescence examination, 131
 - zinc-toned ninhydrin, 231
- Empty marks, 177
- Energy levels, 126
- Environment
 - effect on fingerprints and surface, 78
 - during fingerprint enhancement, 105–108
 - importance during fingerprint
 - interpretation, 482
 - during initial examination, 105
 - variable during research, 434
- Epidermal lipids, 41
- Epidermis, 17
- Epithelial cells, 41, 46, 292
- Erythrocytes *see* Red blood cells
- Etching, 384, 386
- Ethanol
 - fluorescent dye stain solvent, 170
 - role in Basic Violet 3 process, 293
 - role in DMAC process, 279
 - role in ninhydrin process, 229
 - role in protein stain process, 365
 - role in Solvent Black 3 process, 288
- Ethyl acetate
 - role in 1,2 indandione process, 239
 - role in ninhydrin process, 229
- Ethyl cyanoacrylate, 159, 167
- Ethylene glycol, 334
- Europium chelate
 - operational use, 285, 302
 - outline history, 302
 - processing of exhibits, 304
 - theory, 302
- Europium chloride, 304
- Excitation spectrum
 - Acid Yellow 7, 368
 - Basic Red 14, 171
 - Basic Violet 2, 313
 - Basic Violet 3, 295
 - Basic Yellow 40, 135, 170

- DFO, 135, 236
- DMAC, 267
- europium chelate, 305
- genipin, 256
- 1,2 indandione, 242
- lawsone, 259
- 5-methylthioninhydrin–zinc, 246
- Natural Yellow 3, 307
- Nile Red, 310
- theory, 127
- zinc-toned ninhydrin, 231
- Excited state, 126
- Exogenous compounds *see* contaminants
- Explosives, 46

- Fabric surfaces, 76
- False positives, 358, 373
- Fast Fourier transform, 484
- Fatty acids, 41–45, 47
- Ferric ions
 - constituents of apocrine sweat, 37
 - role in multimetal deposition, 350
 - role in physical developer, 337
- Ferrous ions
 - role in multimetal deposition, 350
 - role in physical developer, 337
- Fibre analysis
 - impact of fingermark processes on, 463
 - impact of recovery on fingermarks, 463
- Filters
 - bandpass, 131, 141
 - camera, 127
 - coloured, 145
 - linear, 147
 - long pass, 131, 143
 - tunable, 149
 - viewing, 127, 133
- Fingermark
 - adhesion, 58
 - ageing, 12
 - biological properties, 55
 - chemical composition, 35
 - deposition dependent variables, 47
 - donor dependent variables, 46
 - role during fingermark formation, 70
 - eccrine, 100, 424
 - electrical resistivity, 60
 - enhancement, 12
 - formation, 12
 - groomed, 36
 - impressions, 14
 - initial examination, 12, 104–105
 - location, 471–473
 - migration, 474
 - multiple contacts, 4
 - natural, 36, 100, 424, 427
 - negative marks, 14
 - physical properties, 57
 - positive marks, 13
 - quality, 429
 - quartered, 425
 - refractive index, 61
 - relative permittivity, 60
 - sebaceous, 100, 424
 - simulants, 424
 - slippage, 4
 - surface potential, 60
 - topography, 58
 - Fingerprint
 - bifurcation, 5
 - comparison, 6, 470
 - identification, 1, 470
 - level 1 detail, 5
 - level 2 detail, 5
 - level 3 detail, 6, 21
 - pattern, 5
 - arch, 5
 - loop, 5
 - whorl, 5
 - ridge ending, 5
 - Fixing solution, 36
 - Fluorescamine
 - outline history, 222, 246
 - processing of exhibits, 248–249
 - theory, 247–248
 - Fluorescein, 370
 - operational use, 362
 - processing of exhibits, 378–379
 - theory, 370
 - Fluorescence, 126
 - Fluorescence examination
 - constituents targeted, 101
 - operational use, 116
 - outline history, 115, 125
 - processing of exhibits, 130–138
 - theory, 126–130
 - use in sequence, 445, 448, 453
 - Fluorescent dye stain, 169

- Fluorescent powders, 211
- Focus, 485
- Foodstuff, 285
- Footwear marks
 - impact of fingerprint processes on, 459
 - impact of recovery on fingerprints, 459
- Force, during fingerprint formation, 18, 24
- Friction ridge, 55
- Fuchsin *see* Basic Violet 2
- Fungi, 55
- Galton details *see* Fingerprint, level 2 detail
- Gas chromatography-mass spectrometry (GC-MS), 39, 48
- Gelatin lifting
 - operational use, 403, 459
 - processing of exhibits, 406–407
 - theory, 402, 404–406
- Genipin
 - operational use, 253
 - outline history, 252
 - processing of exhibits, 254–256
 - theory, 253–254
- Gentian Violet *see* Basic Violet 3 (BV3)
- Glass surfaces, 72
- Gloves
 - marks, 7
 - prevention of fingerprint deposition, 450
 - sweat migration through, 7
- Glucose, 40
- Glycine, 39
- Gold
 - metal surface, 71
 - vacuum metal deposition, 173, 179
- Gold (III) chloride hydrate, 349
- Grading scheme, 430
- Grease, 285
- Greyscale inversion, 483
- Ground state, 126
- Gun blueing
 - operational use, 385
 - processing of exhibits, 396
 - theory, 393
- Gunshot residue, 4, 465
- Haem molecule, 359
- Haemoglobin, 358
- Haem reagent *see* Peroxidase reagents
- Hair follicles, 37
- Hemiketal, 232, 238
- Heptane, 298
- HFC4310mee, 299, 300
- HFE7100
 - role in DFO process, 236
 - role in 1,2 indandione process, 241
 - role in ninhydrin process, 230
- HFE71DE, 236
- Humidity
 - factor in environmental exposure, 79, 90, 93
 - role in cyanoacrylate fuming process, 162
 - role in ninhydrin process, 229
 - role in radioactive sulphur dioxide process, 186, 188
- Hungarian Red *see* Acid Violet 19
- Hydrindantin, 227
- Hydrochloric acid fuming, 191
- Hydrofluoric acid fuming, 189
- Hydrofluorocarbons (HFC), 225
- Hydrofluoroethers (HFE), 225
- Hydrogen peroxide
 - acidified etching solutions, 387
 - role in peroxidase reagents, 370
- Hypochlorite, 343
- Hypodermis, 17
- Illumination conditions
 - fluorescence examination, 130–138
 - visual examination, 118–124
- Image cube, 149
- Image processing, 483
- Impressions, 14
- Incipient ridges, 20
- 1,2-indandione
 - constituents targeted, 101
 - metal toning, 222, 238
 - operational use, 224
 - outline history, 222, 237
 - processing of exhibits, 239–242
 - theory, 238–239
- Infrared reflection
 - operational use, 117
 - outline history, 115, 141
 - processing of exhibits, 142–144
 - theory, 142
- Infrared spectroscopy, 45

- Initial contact, 12
Initial examination, 12, 99
Ink running, 247, 463
Inorganic compounds, 40–41
Interactions
 between environment and surface, 92
 between finger and surface, 12
 between fingermark and environment, 87
 between fingermark and surface, 81
 metallic surfaces, 83
 non-porous surfaces, 81
 porous surfaces, 81
 semi-porous surfaces, 83
Iodide toning, 344
Iodine fuming
 constituents targeted, 101
 fixing marks, 183
 operational use, 157
 outline history, 155, 181
 processing of exhibits, 184–185
 theory, 182–183
 use in sequence, 446
Iodine solution
 operational use, 285
 outline history, 297–298
 processing of exhibits, 298–299
 theory, 298
Iron (III) nitrate, 342, 350
Iron oxide, powder suspension, 334
ISO 17025 standard, 421, 440

Joullie's pink, 238

Kastle-Meyer test, 104

Lactate
 cyanoacrylate polymerisation initiator, 162
 fingermark constituent, 40
Lactic acid, 40, 276
Laser
 use in fluorescence examination,
 116, 130
 use in MALDI, 51
Latent marks, 14
Lawsone
 outline history, 256
 processing of exhibits, 257
 theory, 256–257

Lead, 72
Leather surfaces, 76
Lens, 486
Leuco Crystal Violet
 operational use, 362, 462
 processing of exhibits, 376–377
 theory, 370
Leuco Malachite Green
 operational use, 362, 462
 processing of exhibits, 375–376
 theory, 370
Leukocytes *see* white blood cells
Levels of ridge detail, 5
Lifting, 212
Light source, output characteristics, 130
Lipid reagents, 283–286
Lipids
 fingermark constituents, 41–43, 61
 targets for fingerprint enhancement,
 283–284
Liquid chromatography-mass spectrometry
 (LC-MS), 45, 48
Lobules, 18
Locard's exchange principle, 2
Luminol
 operational use, 362, 462
 processing of exhibits, 377–378
 theory, 372
Lysochrome, 287, 296

Magnetic flake powders, 210
Magnetic granular powders, 208
Magnetic wand applicator, 210
Maleic acid, 341
Matrix assisted laser desorption/ionisation
 (MALDI), 414
 analysis of blood, 360
 analysis of fingermarks, 38, 45, 51
 operational use, 404
Matrix enhancer, 218
Mechanical properties
 finger, 17
 surface, 24
2-mercaptoethanol, 251
Mercury vapour lamp, 141
Metabolites, 45
Metal flake powders, 205
Metal surfaces, 71, 383–386

- Methanol
 role in DFO process, 234
 role in europium chelate process, 302, 304
 role in 1,2 indandione process, 241
 role in Oil Red O process, 297
 role in silver nitrate process, 281
- 5-methoxyninhydrin, 243, 245
- Methoxy-nonafluorobutane *see* HFE 7100
- 1-methoxy-2-propanol, 290, 307
- Methyl cyanoacrylate, 159
- 5-methylthioninhydrin, 243–246
- Micelles, 294, 321, 327, 332, 338–339
- Microbes, 42, 55
- Migration, 90, 474
- Minutiae *see* Fingerprint, level 2 detail
- Modulus, 25
- Molybdenum disulfide, 327, 329
- Monochromatic illumination
 operational use, 117
 outline history, 115, 144
 processing of exhibits, 147–149
 theory, 144–147
- Multi-metal deposition (MMD)
 constituents targeted, 101
 operational use, 325
 outline history, 322, 345
 processing of exhibits, 347–352
 theory, 345–347
- Multispectral imaging
 detection of blood, 360
 operational use, 117
 outline history, 116, 149
 processing of exhibits, 151
 theory, 149–151
- Nanoparticles, 216
 processing of exhibits, 218
 theory, 216–218
- Naphthalene, 190
- Natural Yellow 3
 operational use, 285
 outline history, 305
 processing of exhibits, 306–307
 theory, 305
- NBD chloride *see* 4-chloro-7-nitrobenzofuran
 (NBD) chloride
- n-dodecylamine acetate, 341
- Negative marks, 14
- Nile Blue A, 308–310
- Nile Red
 operational use, 285
 outline history, 308
 processing of exhibits, 309–310
 theory, 308
- Ninhydrin
 analogues
 metal toning, 246
 operational use, 243
 outline history, 242
 processing of exhibits, 244–246
 theory, 243–244
 constituents targeted, 101
 metal toning, 222, 225, 228, 230
 operational use, 224
 outline history, 221, 224
 processing of exhibits, 229–231
 theory, 226–229
 use in sequence, 445
- Nitric acid, 191, 340
- Non-ionic surfactant, 338
- Non-porous surfaces, 71, 81
- Nonylphenol ethoxylate *see* Tergitol 7
- Normal development, 173, 480
- Oblique lighting, 118, 459, 477
- Oil Red O
 constituents targeted, 101
 operational use, 285
 outline history, 284, 295
 processing of exhibits, 297
 theory, 296
 use in sequence, 446
- Oleic acid, 43
- Operational trial, 439
- o-phthalaldehyde
 outline history, 222, 250
 processing of exhibits, 250–252
 theory, 250
- Optical brighteners, 222, 247
- Osmium tetroxide, 155, 284, 301–302
- o-tolidine, 362, 370
- Oxidation
 fingerprints, 89
 surfaces, 92

- Painted surfaces, 75
- Palladium deposition
 - operational use, 385
 - processing of exhibits, 396
 - theory, 394
- Palm, 2
- Palmitic acid, 43, 173
- Paper surfaces, 74–5
- Particulates
 - from environment, 80, 91
 - gelatin lifting of, 405
 - surface contaminants, 30
- Patent marks, 14
- Peptides, 39
- Peroxidase reagents
 - constituents targeted, 101
 - operational use, 361
 - outline history, 362, 369
 - theory, 370–373
- Petroleum ether, 463
- Phenol, 293
- Phospholipids, 41
- Phosphomolybdic acid, 315–316
- Phosphorescence, 126
- Photographic toner, 344
- Photoluminescence, 126
- Physical developer
 - constituents targeted, 101
 - operational use, 324
 - outline history, 322, 336
 - processing of exhibits, 340–344
 - stage in multi-metal deposition, 347
 - theory, 336–340
 - use in sequence, 445
- Pixels per inch, 485
- Plasma, 358
- Plastic
 - deformation, 27, 30
 - mark, 27
- Platelets, 358
- Polyaniline, 394–396
- Polycyanoacrylate
 - microstructure, 163–165
 - one step cyanoacrylate system, 164
- Polyethylene, 73, 176
- Poly-3,4-ethylenedioxythiophene, 396
- Polymer surfaces, 72
- Pores, 6, 426
- Porous surface, 71, 81
- Positive mark, 13
- Potassium iodide, 344
- Powders
 - constituents targeted, 101
 - operational use, 200
 - outline history, 199, 201
 - processing of exhibits, 205–213
 - theory, 202–205
 - use in sequence, 448
- Powder suspensions
 - constituents targeted, 101
 - enhancement of blood, 360
 - operational use, 323
 - outline history, 323, 330
 - processing of exhibits, 334–335
 - theory, 332–333
- Pressure, fingermark deposition, 12
- Proteins, 39
- Protein stains
 - constituents targeted, 101
 - operational use, 361
 - outline history, 361, 363
 - processing of exhibits, 364–369
 - theory, 364
- Proximal pulp, 18
- Prussian Blue, 396
- Pseudo-operational trial, 437, 452

- Quality, 428, 430–431

- Radioactive bromine, 91
- Radioactive sulphur dioxide
 - operational use, 157
 - outline history, 155, 185
 - processing of exhibits, 187–189
 - theory, 186–187
- Radioactive toning, 343
- Raman spectroscopy, 48
- Red blood cells, 358
- Redox reaction, 342
- Reflection
 - diffuse, 112
 - scattering, 112
 - specular, 112
- Refraction, electromagnetic radiation, 61, 112

- Removal, finger from surface, 30
- Resolution, 485
- Reverse development
 - cyanoacrylate fuming, 481
 - vacuum metal deposition, 174, 480
- Reverse orientation, 474–475
- Rhodamine 6G *see* Basic Red 1
- Ridge detail, 4
- Ridges, 19
- Rubeanic acid, 313
- Ruhemann's purple, 221, 226
- Ruthenium chloride, 300
- Ruthenium tetroxide (RTX)
 - operational use, 286
 - outline history, 284, 299
 - processing of exhibits, 300
 - theory, 300
- Scale, 486
- Scalp, 37
- Scanning electron microscopy
 - operational use, 403
 - processing of exhibits, 409–410
 - theory, 402, 407–409
- Scanning Kelvin probe (SKP)
 - operational use, 385, 466
 - processing of exhibits, 390–391
 - theory, 389–390
- Scattering, 112–113
- Schiff base, 278
- Sebaceous glands, 37
- Sebaceous sweat, 37, 41–43
- Sebum *see* sebaceous sweat
- Secondary electron imaging, 408, 409
- Secondary ion mass spectroscopy (SIMS), 413
 - analysis of fingerprints, 45, 53
 - operational use, 403
- Selective deposition, 321
- Selectivity, 358–360, 423
- Selenious acid, 393
- Semi-porous surface, 82
- Sensitivity, 358–360, 425
- Sequential processing
 - experimental methodology, 449
 - fingermark recovery, 444
 - integrated forensic evidence recovery, 453
- Serine, 39
- Sharpening, 485
- Silver
 - ions, 337, 350
 - nuclei, 337
 - vacuum metal deposition, 177, 179
- Silver bromide, 343
- Silver chloride, 280
- Silver iodide, 344
- Silver nitrate
 - constituents targeted, 101
 - electrodeposition process, 393
 - operational use, 277
 - outline history, 276, 279
 - processing of exhibits, 281
 - role in multi-metal deposition process, 350
 - role in physical developer process, 341
 - theory, 280–281
- Silver sulfide, 343
- Single metal deposition, 325, 345
- Skin
 - structure, 17
 - surface for fingerprint deposition, 77
- Skin cells, 7, 30, 104, 292
- Small particle reagent
 - constituents targeted, 101
 - operational use, 323
 - outline history, 322, 326
 - processing of exhibits, 327–330
 - theory, 327–328
- Sodium chloride
 - fingermark constituent, 40
 - in Natural Yellow 3 formulation, 307
 - role in cyanoacrylate polymerisation, 162
- Sodium citrate, 349
- Sodium hydroxide
 - role in Oil Red O process, 297
 - use in Nile Red process, 310
- Sodium perborate, 371
- Sodium sulfide, 343
- Solid particulates, factor in environmental exposure, 92, 94
- Solvent Black 3
 - constituents targeted, 101
 - operational use, 285
 - outline history, 284, 286
 - processing of exhibits, 288–290
 - role in biological development, 57
 - theory, 287–289
- Solvent Red 27 *see* Oil Red O
- Specular lighting, 119

- Specular reflection, 112–113, 119–120
Split depletion, 429–430, 451
Spot test, 424
Squalene
 fingermark constituent, 41
 oxidation, 89
 role in iodine fuming, 182
Squirrel hair brush, 208
Standard operating procedure, 440
Stearic acid, 43, 173, 203
Strain, 25
Stress
 mechanical property, 25
 physiological, 37
Substrate, 433–434, 473
Sudan black *see* Solvent Black 3
Sulfide toning, 343
5-sulphosalicylic acid
 role in DMAC process, 279
 role in fixing blood, 364
Sunlight, factor in environmental exposure, 80
Superglue *see* cyanoacrylate fuming
Surface
 chemistry, 71
 during initial examination, 104
 porosity, 71
 role during fingermark ageing, 71
 texture, 28, 106, 477
Surface assisted laser desorption/ionisation (SALDI), 45, 53
Surfactant, 327, 332, 335, 338, 347, 350
Swabbing
 DNA, 454, 458
 gunshot residue, 4
Sweat glands, 37
Synperonic N, 341

Technology Readiness Level (TRL), 422
Temperature
 factor in environmental exposure, 79, 87, 92
 finger, 22
 shrinkage of substrate, 106, 482
 surface, 30
Tergitol 7, 304
Test strip, 427
Tetrachloroauric acid *see* Gold (III) chloride hydrate
3,3',5,5' tetramethylbenzidine, 362, 370

Thenoyltrifluoroacetone, 304
Thermal paper, 264
Thiourea, 187, 343
Thrombocytes *see* Platelets
Time, factor in environmental exposure, 94
Titanium dioxide, powder suspension, 334
trans-1,2-dichloroethylene, 236
Transfer
 between finger and surface, 12
 fingermarks between surfaces, 475–476
Transparent substrate, 476
Triangle of interaction, 69, 103, 105
Triethylamine, 248
1,1,2-trifluorotrchloroethane *see* CFC113
Triglycerides, 41
Trioctylphosphine oxide, 304
Triton X-100, 332, 335
Tween 20, 350

Ultraviolet radiation
 absorption by fingermarks, 139
 component of sunlight, 80
 excitation of fluorescent powders and reagents, 115
 factor in environmental exposure, 91, 93
 long wave, 453, 459
 role in silver nitrate process, 281
 scattering by fingermarks, 139–141
 short wave, 139–141, 453
Ultraviolet reflection
 constituents targeted, 101
 operational use, 117
 outline history, 115, 138
 processing of exhibits, 139–141
 theory, 138–139
 use in sequence, 446, 453
Urea, 40
Uric acid, 40, 276
UVA *see* ultraviolet radiation, long wave
UVC *see* ultraviolet radiation, short wave

Vacuum cyanoacrylate fuming, 164
Vacuum metal deposition
 constituents targeted, 101
 enhancement of blood, 360
 operational use, 156
 outline history, 155, 172
 processing of exhibits, 177–181
 theory, 172–178

Vacuum stage, 215
Validation, 422
Visible fingerprint *see* patent mark
Visual examination, 114
 constituents targeted, 101
 operational use, 116
 outline history, 114, 117
 processing of exhibits, 124–125
 theory, 118–124
 use in sequence, 445, 448, 453
Vitamins, 40
Volta potential, 389
Water
 blood constituent, 358
 cyanoacrylate polymerisation
 initiator, 161
 factor in environmental exposure, 79,
 90, 93
 fingerprint constituent, 39
 role in Basic Violet 3 process, 293
 role in iodine fuming process, 182
 role in Natural Yellow 3 process, 307
 role in ninhydrin process, 229
 role in powders process, 204
 role in powder suspensions process, 335
 role in protein stain process, 365
 role in radioactive sulphur dioxide
 process, 186

 role in small particle reagent process, 329
 role in Solvent Black 3 process, 290
Wax esters, 41, 43
Wax surfaces, 323
White blood cells, 358
White granular powder, 207
White light, 114
White powder suspension, 334
Wind, factor in environmental exposure, 79
Wood surfaces, 75

X-ray electronography, 410
X-ray emission, 409, 410
X-ray fluorescence
 analysis of fingerprints, 55
 operational use, 403
 processing of exhibits, 411
 theory, 402, 410–411
X-ray photoelectron spectroscopy, 55
X-ray spectroscopy, 409
X-ray transmission, 411

Zephyr style brush, 206
Zinc
 metal surface, 72
 vacuum metal deposition, 173, 179
Zinc chloride
 role in 1,2 indandione process, 238, 241
 role in ninhydrin toning, 230