

Appendix 1 List of BSI and ISO Standards relating to surfactant analysis

British Standards BS 3762 and 6829 deal respectively with the analysis of formulated detergent products and raw materials. Some parts are identical with ISO Standards. Conversely some of the ISO Standards relating to surfactant analysis correspond with parts of these British Standards. The following list shows which Standards from either organisation correspond with those of the other. The words given here describe the subject matter but are only occasionally the official title of either Standard.

<i>BS 3762: Analysis of formulated products</i>		<i>ISO</i>
Part 1	Methods of sample division	607
Part 2, Tests 3.2 and 3.3	Qualitative tests for type of surface active matter	—
Part 2, Test 3.4	Qualitative test for nonionic surfactants—cobalthiocyanate	—
Part 3.1	Anionic-active matter by two-phase titration	2271
Part 3.2	Alkali-hydrolysable and non-hydrolysable active matter	2869
Part 3.3	Acid-hydrolysable and non-hydrolysable active matter	2870
Part 3.4	Cationic-active matter by two-phase titration	2871–2
Part 3.5	Total organic matter by ethanol extraction	—
Part 3.6	Non-detergent organic matter (neutral oil, petroleum ether solubles)	—
Part 3.7	Total nonionic matter by ion exchange	—
Part 3.8	Alkanolamides—Kjeldahl nitrogen	—
Part 3.9	Soap content	—
Part 3.10	Short-chain alkylbenzene sulphonates	—
<i>BS 6829: Analysis of raw materials</i>		<i>ISO</i>
Part 1.1	Inorganic sulphate—volumetric	6844
Part 2.1	Total alkane sulphonates	6122
Part 2.2	Mean molecular weight and alkane monosulphonate content by extraction	6845
Part 2.3	Alkane monosulphonate content by two-phase titration	6121

Part 3.1	Mean molecular weight of alkylbenzene sulphonates by gas chromatography	6841
Part 4.1	Cloud point of nonionics	1065
Part 4.2	Total nonionic active and polyethylene glycols—Weibull method	2268
Part 4.3	Total ethylene oxide groups—iodometric method	2270
Part 4.4	Cloud point—volumetric method	4320
Part 4.6	Hydroxyl value—acetic anhydride	4326
Part 5.1	Alkylether and alkylphenylether sulphates—total active matter	6842
Part 5.2	Alkylether and alkylphenylether sulphates—mean molecular weight	8799
Part 5.3	Alkylether and alkylphenylether sulphates—unsulphated matter	6843
<i>Other ISO Standards relating to surfactant analysis having no corresponding British Standard</i>		<i>ISO</i>
—	Technical alkane sulphonates—Methods of analysis	893
—	Technical primary alkyl sulphates—analysis	894
—	Technical secondary alkyl sulphates—analysis	895
—	Technical alkylarylsulphonates excluding benzene derivatives—analysis	1104
—	Anion-active stable to acid hydrolysis—trace amounts	2868
—	Hydroxyl value—phthalic anhydride	4327
—	Technical ethoxylated fatty amines—methods of analysis	6384

Other Standards dealing with the analysis of soaps and soap products and the determination of non-surfactant components of detergent products are omitted.

Appendix 2 List of relevant ASTM Methods

All ASTM Methods have titles of the form 'Standard Test Method(s) for ...'. These words are omitted in the following list, which includes all methods for the analysis of surfactants, excluding soaps and soap products and the determination of non-surfactant constituents. All these Methods are in the Annual Book of ASTM Methods, Section 15, Volume 15.04, apart from Methods D 2071 to D 2080 inclusive, which are in the same Book, Section 6, Volume 6.03.

<i>Method No.</i>	<i>Title</i>
D 500-89	Chemical Analysis of Sulfonated and Sulfated oils
D 1568-63	Sampling and Analysis of Alkylbenzene Sulfonates
D 1570-89	Sampling and Chemical Analysis of Fatty Alcohol Sulfates
D 1681-83	Synthetic Anionic Active Ingredient in Detergents by Cationic Titration Procedure
D 1768-89	Sodium Alkylbenzene Sulfonates in Synthetic Detergents by Ultraviolet Absorption
D 2023-89	Analysis for Sodium Toluene Sulfonate in Detergents
D 2024-65	Cloud Point of Nonionic Surfactants
D 2071-87	Fatty Nitrogen Products
D 2073-66	(Reapproved 1987) Total, Primary, Secondary and Tertiary Amine Values of Fatty Amines, Amidoamines and Diamines by Referee Potentiometric Method
D 2074-66	(Reapproved 1987) Total, Primary, Secondary and Tertiary Amines by Alternative Indicator Method
D 2075-89	Iodine Value of Fatty Amines, Amidoamines and Diamines
D 2076-64	(Reapproved 1987) Acid Value and Amine Value of Fatty Quaternary Ammonium Chlorides
D 2078-86	Iodine Value of Fatty Quaternary Ammonium Chlorides
D 2080-64	Average Molecular Weight of Fatty Quaternary Ammonium Chlorides
D 2357-74	Qualitative Classification of Surfactants by Infra-red Spectroscopy
D 2358-89	Separation of Active Ingredient from Surfactants and Syndet Compositions

- D 2959-89 Ethylene Oxide Content of Polyethoxylated Nonionic Surfactants
- D 3049-89 Synthetic Anionic Ingredient by Cationic Titration
- D 3673-89 Chemical Analysis of Alpha Olefin Sulfonates
- D 4224-89 Anionic Detergent by *p*-Toluidine Hydrochloride
- D 4251-89 Active Matter in Anionic Surfactants by Potentiometric Titration
- D 4252-89 Chemical Analysis of Alcohol Ethoxylates and Alkylphenol Ethoxylates
- D 4337-89 Analysis of Linear Detergent Alkylates
- D 5070-90 Synthetic Quaternary Ammonium Salt in Fabric Softeners by Potentiometric Titration

ASTM publications may be obtained from: American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103, USA.

Index

- accuracy 12
acid–base titration 48
Acid Blue 1 59, 60
acid hydrolysis 113
 amides 113
 amidopropylbetaines 179
 determination of fatty acid 140
 determination of fatty amine 140
 determination of methyltaurine 140
 determination of sulphosuccinic acid 140
 determination of taurine 140
 glyceride *see* acid hydrolysis
 sulphates *see* alkyl sulphates; alkylether sulphates; alkylphenylether sulphates
acid mixed indicator 61, 106, 172
acid value 53, 54
acyl isethionates 19, 129, 196
 determination of active content 129
 determination of sodium isethionate 130
acyl methyltaurates 20, 194, 196
 determination of fatty acids 140
 determination of methyltaurine 140
 determination of soap 141
 determination of taurine 140
 methyltaurates 139
acyl sarcosinates 20
acyl taurates 139, 194
 determination of fatty acid 140
 determination of methyltaurine 140
 determination of soap 141
 determination of taurine 140
alcohol ethoxylates 216, 224, 322, 324
alcohol sulphates 216
alcohols 269
alkali value 55
alkaline mixed indicator 61
alkane monosulphonates 224
alkane sulphonates 19, 109, 119, 229
 determination of alkane mono- and disulphonates 121
 determination of mean molecular weight 120
 determination of total alkane sulphonate 119
alkanolamides 21, 29, 164, 275, 340
 amide diester 165
 amide ester 165, 168
 amide monoester 165
 composition 164
 di(*N*-hydroxyethyl)-piperazine 165
 diester amine 165
 ester amine 165, 167
 ethanolamide 168
 ethoxylated 164, 198
 free ethanolamine 167
 free fatty acid 167
 glycerides 168
 glycerol 167
 methyl ester 168
 monoester amine 165
 total amide 166
 total ethanolamide 165
 total fatty acid 165
alkene monosulphonates *see* alpha-olefin sulphonates
alkoxyates 269
alkylamidobetaines 23
alkyl amidopropyl betaine, infrared spectrum 287
alkylamidopropyl-*N*-(2,3-dihydroxy)-*NN*-dimethylammonium chloride 226
alkylamines 22
alkylaminodipropionates 23
alkylaminopropionates 23
alkylbenzene sulphates 109
alkylbenzene sulphonates 19, 116, 231, 275
 desulphonation 116
 infrared spectrum 279
 in sewage effluents 331
 short-chain
 determination 118
alkylbenzene sulphuric acids
 determination of sulphuric acids 117
alkyl betaines 280
alkyl diethanolamide, infrared spectrum 278
alkyldiglycinates 23
alkyldimethyl betaines 23
alkylether phosphates 20, 29, 143
 see also phosphate esters
alkylether sulphates 19, 27, 110, 193, 196, 217, 223, 226, 229, 280, 331
 acid hydrolysis 110
 determination of sulphate ion 112
 extraction of active matter 113
 extraction of alcohol ethoxylates 111
 infrared spectrum 283
alkyl ethoxy carboxylates 20
alkylethoxylated sulphates 216
alkylglycinates 23
alkyl group, identified by mass spectrometry 322
alkyl monoethanolamide, infrared spectrum 277
alkylnaphthalene sulphonates 19, 129
alkyl phenols 269
alkyl phenol ethoxylates 20, 216, 225, 229, 269, 324
 infrared spectrum 274
 in drinking water 330
alkylphenylether sulphates 110, 193
 acid hydrolysis 110
 determination of sulphate ion 112
 extraction of active matter 113
 extraction of alkylphenol ethoxylates 111
alkyl phosphate mixtures by ³¹P-NMR 314
alkyl phosphates 20, 29, 143
 see also phosphate esters
alkyl polyglycosides 21, 164, 198
alkylpyridinium salts 22, 198
alkyl sulphates 19, 27, 110, 193, 224, 229, 230, 280, 325, 331
 acid hydrolysis 110
 determination of sulphate ion 112
 extraction of fatty alcohol 111
alkyl sulphonates 231, 275, 331
 infrared spectrum 281, 282
alkyl sulphosuccinates 20
 determination of fatty amine 140
 determination of sulphosuccinic acid 140
alkylsulphosuccinates
 determination of free fatty amine 141
 determination of soap 141
alkyl (C₁₀–C₁₄) sulphosuccinates 224
alkyltrimethylammonium cationics 216
alpha-olefin sulphonates 19, 24, 109, 218, 224, 331
alpha-olefin sulphonic acids 325
 composition 124
 determination of disulphonate 128
 determination of sultones 128

- determination of total sulphate 125
 disulphonate (sulphatosulphonate) 124
 alpha-sulphonated fatty ester 194, 195, 196
 Amberlite XAD-2 121
 amidopropyl betaines 179, 280
 amine oxides 22, 182, 189, 280, 335
 free tertiary amine 189
 infrared spectrum 285
 titration with sodium dodecyl sulphate 189
 titration with sodium tetraphenylborate 189
 amines 183, 335
 apparent molecular (equivalent) weight 184
 ethoxylated amines 22
 molecular weight 183
 primary amine 183, 184
 secondary amine 183, 184
 tertiary amine 183, 184
 total amine 183, 184
 amines, ethoxylated
 determination of primary plus secondary amine 187
 determination of equivalent weight 187
 determination of ethylene oxide chain length 188
 determination of polyethylene glycol 188
 determination of total amine 187
 see also diamines, ethoxylated
 ammonium salts of anionics 324
 amphopropyl sulphonates 23
 amphoteric surfactant *see* surfactant, definition
 amphoteric surfactants
 common types 22
 FAB/LSIMS 337
 amphoteric 30, 180, 324
 acid-base titration 180
 titration with benzethonium chloride 180
 titration with NaTPB 180
 titration with sodium dodecyl sulphate 180
 analysis of mixtures 325
 anion-exchange resins 78
 anionic surfactant *see* surfactant, definition
 anionic surfactants 275
 common types 18
 mass spectrometry 323
 anionics 325
 analysis by GC 214
 analysis by HPLC 222
 analysis by HPTLC 229
 analysis of mixtures 193
 para-toluidine method 107
 potentiometric titration 106
 two-phase titration 106
 anionics and cationics, analysis of mixtures 202
 AntaroX CO-430 153
 apodisation 243
 array detector 328
 ASTM methods, list 344
 attenuated total reflectance 251
 ATR crystals 252
 ATR effect 252
 ATR spectrum 252
 autotitrator 69
 average alkyl chain length by ¹H-NMR 310
 base value 55
 beam splitter, infrared 239, 245
 benzalkonium salts 22, 198
 benzethonium chloride 59, 60, 61
 benzylic cleavage 334, 340
 betaines 226
 determination of free amine 179
 potentiometric acid-base titration 178
 titration with sodium dodecyl sulphate 178
 titration with sodium tetraphenylborate 178
 two-dimensional (2D) NMR 304
 biguanidinium 173
 block copolymers 21, 161
 Boltzmann energy levels 299
 branched-chain alkylbenzene sulphonate 331
 bromocresol green 63, 161
 bromophenol blue 64, 106
 BSI and ISO standards, list 342
 calcium palmitate 266
 calculations 9
 molecular weight 10, 11
 volumetric 9
 see also direct potentiometry
 calibration curves 70
 capillary zone electrophoresis 231
 carboxybetaines 177, 182
 see also betaines
 carboxylates 20, 29, 142
 acid-base titration 142
 solvent extraction 142
 titration with benzethonium chloride 142
 carboxylic acid/ester mixture by ¹³C-NMR 314
 cation attachment 323
 cation-exchange resins 78
 cationic surfactant *see* surfactant, definition
 cationic surfactants 325
 common types 21
 FAB/LSIMS 325
 in environmental samples 330
 mass spectrometry 323
 quantitation 335
 cationics 229, 324
 analysis by GC 216
 analysis by HPLC 225
 cationics and amphoteric, analysis of mixtures 198
 chain length distribution 334
 determination by mass spectrometry 319
 chemical noise in mass spectrometry 323
 chromatography 38
 gas liquid
 chromatography 38
 high-performance liquid chromatography 38
 ion chromatography 38
 open-column chromatography 40, 73
 thin-layer chromatography 38
 CID 331
 cocoamidopropyl betaine 178, 337
 mass spectrum 339
 cocodimethylbetaine 178
 collisionally induced decomposition 328
 competitors' products 13
 date codes 14
 samples 15
 Connes advantage 243
 contaminants
 determination by GC 217
 determination by HPLC 226
 continuous flow FAB 331
 in LC-MS 323
 COSY spectrum 305, 306
 cross-peaks 307
 data-reduction techniques
 factor loadings 290
 in infrared spectroscopy 290
 scores matrix 290
 deconvolution of infrared spectra 262
 degree of ethoxylation 334
 determined by mass spectrometry 322
 degree of polymerisation by ¹⁵C-NMR 312
 deionisation 96
 derivatisation 222
 detectors, infrared
 deuterated triglycine sulphate 245
 mercury cadmium telluride 245
 determination of equivalent weight 187
 determination of homologue distribution 330
 determination of total amine 187

- deuterated NMR solvents,
costs 302
- dialkanolamides 21
- dialkylammonium salts 198
- dialkyl aspartate 136
isolation and
determination 138
- dialkyl dimethyl ammonium
chloride, infrared
spectrum 284
- dialkyldimethylammonium
cationics 216
- dialkyldimethylammonium
salts 22
dialkylmethylammonium
quaternaries 225, 226
- dialkylmethylamines 22
- dialkylsulphonates 109
- dialkylsulphosuccinates 20,
136
alkaline hydrolysis 137
anion-active matter and
aspartate 136
composition 136
extraction of fatty
alcohols 137
- dialkyltetralin
sulphonates 215, 338
- dialkyltetralins 226, 227
- diamines, ethoxylated
see also amines,
ethoxylated
determination of equivalent
weight 187
determination of total
amine 187
- diethanolamides 165, 275
see also alkanolamides
- diffuse reflectance,
infrared 253
- digitisation 243
- diglycerides 275
- dimethyl yellow 64
- dimidium blue 61
- dimidium bromide 24, 59, 60
- 1,4-dioxane 217, 226
- direct potentiometry 70
see also calibration curves,
standard additions
- discrimination 323, 325, 329,
335
- disulphine blue 61
- disulphine blue V 24
- disulphine blue VN 59, 60
- EIMS of anionic
surfactants 338
- EI spectra 329
- electron impact ionisation
(EI) 321
- electrospray 323, 329
- electrospray MS
limit of detection 325
sensitivity
- elution 80, 94
- empirical formulae by mass
spectrometry 319
- environmental samples 334
- ester value 53, 54
- esters 21, 275
nonionic esters 29
- ethanolamides 21, 164
- ethoxylate number
determination by
¹H-NMR 310
- ethoxylate-propoxylate
copolymer, infrared
spectrum 273
- ethoxylate/propoxylate ratio by
¹H-NMR 311
- ethoxylated alcohols 149,
197, 231, 340
- ethoxylated alkylamines 340
- ethoxylated alkylphenols 149,
197, 340
- ethoxylated
dialkanolamides 21
- ethoxylated fatty acids 20,
149, 225, 341
free fatty acid 160
mono- and diester 160
polyethylene glycols 160
- ethoxylated fatty alcohols 338
- ethoxylated fatty amines 340
- ethoxylated
monoalkanolamide
sulphate 194
- ethoxylated
monoalkanolamides 21
- ethoxylated quaternary
amines 335
- ethoxylates
see also ethoxylated
alcohols, ethoxylated
alkylphenols, ethoxylated
fatty acids
cobalthiocyanate
method 154
composition 149
determination of
oxyethylene groups 157
direct potentiometry 153
polyethylene glycols,
volumetric determination
of 157
pseudocationic
complexes 150, 151
spot test 156
total nonionics and
polyethylene glycols 156
two-phase titration 150
Weibull method 156
- ethylene oxide 217
in alcohol ethoxylates 217
- evaporative light scattering
detector 222
- extraction 37
liquid-liquid extraction 38,
45, 47
liquid-solid extraction 37,
42
- extraction columns 47
- FAB 329, 330
- FAB/LSIMS of anionic
surfactants 330
- fatty acids 226, 324, 325, 331,
337
- infrared spectroscopy 266
- fatty alcohol ethoxylates 20
infrared spectrum 272
- fatty alcohols 20, 324
- fatty diamines
determination 186
equivalent weight 187
- fatty ester α -sulphonates 19,
130
composition 130
determination of α -
sulphonated ester 133
determination of low-
molecular-weight alkyl
sulphate 134
determination of soap 131
- determination of
sulphonated surfactant
species 132
- determination of total
unesterified
carboxylate 134
- determination of
unsulphonated ester 131
- saponification 133
- Fellgett advantage 240
- fingerprinting *see* infrared
spectra, fingerprint region
- flow FAB 334
- Fourier transformation 238
- free induction decay 300
- FT process 299
- gas cells, infrared 255
- gas chromatography 207, 209
column temperature 212
columns 210
detectors 212
injection 211
resolution 209
solid supports 210
stationary phase 211
- gas chromatography detectors
FT infrared 213
mass spectrometer 213
- gas chromatography-mass
spectrometry (GC-MS) 320,
327, 329
quantitation 330
- gel permeation
chromatography 207, 231
- glyceride sulphate 115, 194,
196
acid hydrolysis 115
determination of
glycerol 115
determination of
sulphate 115
extraction of fatty acid 115
- glycerides 324
- glycerol 269
infrared spectrum 271
- glycerol trioleate, infrared
spectrum 276
- glycolic acid, in
amphoterics 179, 180
- heavy atom effect 236
- HECTOR spectrum 306, 307

- high performance liquid chromatography (HPLC) 207, 218
 column packings 219
 columns 219
 detectors 221
 diode array detector 221
 electrochemical detectors 222
 fluorescence detectors 222
 injection 221
 mass spectrometric detection 225
 mass spectrometry 222, 226
 mobile phase 220
 pumps 220
 refractive index 221
 UV photometric 221
- HPTLC 227
 developing solvents 228
 quantitation 228
 visualisation 228
- Hyamine 1622 60
- hydrobe distribution of LAS 223
- hydroxyalkane sulphonates 109, 124
 hydroxyl value 55
 phthalic anhydride method 57
- hydroxypropyl sulphonates 23
- hydroxysultaines 23
- imidazoline 24
 imidazoline derivatives 23
 imidazoline-type cationics 226
 imidazolium 24, 280
 imidazolium quats 198
 imidazolium salts 22, 30, 229, 324
 infrared spectrum 288
- infrared absorptions, origin 235
- infrared spectra
 curve-fitting 260
 differentiation 260
 fingerprint region 264
- infrared spectroscopy
 baseline corrections 256
 buying a spectrometer 293
 instrumentation 239
 liquids 249
 mulls 249
 pressed halide disc method 248
 source 244
- iodine value 57
- ion chromatography 78, 207, 229
- ion exchange 39, 122
 amphoteric: loss of liberated ions 103
 analysis of column effluents 101
 definition 77
 elution 88
 multicolumn systems 92
 preparation of column 90
 solvent composition 90
- ion-exchange membrane 78, 79
- ion-exchange resins 78
 anion exchange resins, strongly basic 82
 apparatus 85
 conversion to another ionic form 91
 cross-linking 80
 exchange capacity 79
 mixed-bed resins 84, 87
 particle size 80
 selectivity 83
 selectivity coefficient 83
 strongly acidic 81
 strongly acidic cation exchanger 82, 87, 88
 strongly basic 81
 strongly basic anion exchanger 87, 88
 weakly acidic 81
 weakly acidic cation exchanger 82, 87, 88
 weakly basic 81
 weakly basic anion exchanger 82, 87, 88
- ion-exchange silicas 79
- ionic surfactants, mass spectrometry 325
- ionisation techniques in mass spectrometry 320
 chemical ionisation (CI) 321
 collisionally induced decomposition (CID) 322
 electron impact (EI) 320
 electrospray (ES) 321
 fast atom bombardment (FAB) 321, 322
 gas chromatography (GC) 322
 hard ionisation 320
 liquid chromatography (LC) 322
 liquid secondary ionisation MS (LSIMS) 321, 322
 particle beam (PB) 322
 soft ionisation 320, 321
 supercritical fluid chromatography (SFC) 322
 thermospray (TS) 321
- ISO standard *see* BSI and ISO standards, list
- isolation of amphoteric 98
 isolation of anionics 96
 isolation of cationics 97
 isolation of nonionics 95
- isopropanol, infrared spectrum 270
- isopropanolamides 21, 164
- isoquinolinium 173
- Jacquot advantage 240
- k matrix method 289
- Kubelka–Munck function 254
- lauryliminopropionic acid 182
 LC–MS 329
 quantitation 330
- LC–MS interfaces
 electrospray 329
 particle beam interface 338
 plasma discharge 324, 329
 thermospray 329
- limitation of NMR 297
- linear alkyl benzenesulphonates 214, 222, 229, 325, 330, 338
- liquid chromatography–mass spectrometry (LC–MS) 320, 323
 interfaces 323
 soft ionisation 323
- lock solvents 303
- low-resolution mass spectrum 319
- LSIMS 330
 spectrum 331
- magnetic dipole 298
- magnetic field scanning 326
- magnetic flux 300
- mass analyser, magnetic sector 326
 mass chromatograms 334
 mass measurement by mass spectrometry 326
 mass spectra, libraries 321, 329
- mass spectrometer, types
 ion trap mass analyser 327
 magnetic sector mass analyser 326
 quadrupole mass analyser 327
 sector mass spectrometer 318
 triple quadrupole instruments 318
- mass spectrometry 215, 318
 quantitation 331
 sensitivity 319
- matrix effects 71, 72
- metastable ions 328
- method of standard additions 153
- methylene blue 64
- Michelson interferometer 239
- microscope, infrared 255
- mixed anhydride reagent 145, 159
- mixed-bed resins 87, 88
- mixed surfactants, two quats together 198
 amphoteric 200
 anionics with amphoteric 204
 anionics with quats 202
 anionics with weak bases 204
 any three species together 196
 carboxylates with amphoteric 205

- mixed surfactants,
 two quats—*contd.*
 carboxylates with
 cationics 205
 carboxylates with quats 205
 carboxylates with weak
 bases 205
 combinations of species
 other than sulphonated
 hydrocarbons 194
 nonionics 197
 quats with amphoteric 201
 quats with weak bases 200
 sulphate or sulphonate with
 carboxylates 197
 sulphobetaines with any
 other nonionic 197
 sulphonated hydrocarbons
 with any other
 anionics 193
 weak bases with
 amphoterics 202
- mixtures,
 multicomponent 205
 molecular ion 320
 mono- and
 dialkylsulphosuccinates,
 separation 139
 monoalkanolamide
 sulphates 113, 194
 determination of
 alkanolamine 114
 determination of fatty
 acid 114
 ethoxylated 113
 monoalkanolamides 21
 monoalkyl aspartate 136
 isolation and
 determination 138
 monoalkylammonium
 salts 198
 monoalkylsulphosuccinates 20,
 109, 136
 alkaline hydrolysis 137
 anion-active matter and
 aspartate 136
 composition 136
 determination 137
 extraction of fatty
 alcohols 137
 monoalkyltrimethylammonium
 salts 22
 monoalkyl
 methylammonium
 quaternaries 225
 monochloroacetic acid, in
 amphoterics 179, 180
 monoethanolamides 164,
 275
 see also alkanolamides
 monoglyceride sulphates 19
 monoglycerides 275
 monosulphonates and
 hydroxyalkane
 sulphonates 126
 monosulphonic acids,
 extraction of 109
 multicomponent analysis 289
 multiply charged ions 324
- N*-lauroylmethyltaurine 182
N-lauroylsarcosine 182
 near-infrared
 spectroscopy 237
 negative chemical ionisation
 MS 218
 Nernst equation 52, 70
 neutral fatty matter 45, 109
 neutral oil 47, 109
 NFM 47
 nitrogen, determination of 31
 Kjeldahl method 31
 NMR sample 301
 NMR solvents 301
 NMR spectrometer 299
 costs 302
 NMR spectrum 303
 ¹³C 313, 315
 ¹H 304, 311
 ³¹P 316
 NMR tube 300, 303
 NMR, identification of an
 unknown surfactant 308
 nonionic surfactant *see*
 surfactant, definition
 nonionic surfactants 322, 329,
 331
 common types 20
 mass spectrometry 325
 trace analysis 325
 nonionics
 analysis by HPLC 224
 analysis by HPTLC 229
 analysis of mixtures 197
 nonyl phenols 340
 Nyquist frequency 243
 aliasing 243
 foldover 243
- octyl phenols 340
 oleic acid, infrared
 spectrum 267
 one-dimensional (1D)
 NMR 303
 outliers 292
- p* matrix method 289
 partial least squares
 analysis 290
 particle beam 330
 particle beam MS,
 sensitivity 325
 peak-picking 257
 perchloric acid 166, 169, 190
 petroleum sulphonates 19,
 129
 phenol red 63
 phosphate esters 143
 alkali titration 145
 composition 143
 conversion to alkyl or
 alkylether phosphoric
 acids 144
 degradation 145
 determination in formulated
 products 146
 determination of total
 organic phosphate 143
 phosphates 20
- phosphorus, determination
 of 34
 phosphotungstate 176
 phosphotungstate
 electrode 176
 phosphotungstic acid 157
 photoacoustic
 spectroscopy 255
 PLS *see* partial least squares
 analysis
 Polonovski reaction 190
 polyethoxylated alcohols 331, 334
 polyethoxylated alkyl
 phenols 334
 polyethoxylated fatty
 acids 335
 polyethoxylated quaternary
 ammonium salts, mass
 spectrum 336
 polyethoxylates 269
 polyethylene glycol esters 20
 polyhydroxy esters 162
 ethoxylates 162
 polypropoxylates 269
 potassium tetrakis(4-
 chlorophenyl) borate 151
 potentiometric titration 52,
 53, 151
 amphoterics 69
 betaines 69
 titration procedure 68
 weak bases 69
 with surfactants of opposite
 charge 65
 precision 12
 principal components
 regression 290
 propoxylates
 polypropoxylates 154
 spot test 156
 pyridinium 173
 2-pyridinium fatty acids 178
- quadrupole moment 298
 quaternary ammonium
 salts 21, 30, 229, 335
 ethoxylated 22
 quats 171
 determination of amine
 hydrochloride 177
 determination of free
 amine 177
 high molecular weight 171
 low molecular weight 171
 potentiometric titration with
 sodium dodecyl
 sulphate 172
 potentiometric titration
 with sodium
 tetraphenylborate 175
 single-phase titration with
 sodium
 tetraphenylborate 174
 two-phase titration with
 sodium dodecyl
 sulphate 171
 two-phase titration with
 sodium
 tetraphenylborate 172

- quinolinium 173
- Raman effect 237
- raw materials analysis by mass spectrometry 319
- repeatability 12
- reproducibility 12
- resolution 327
- in mass spectrometry 326
- riffers *see* sampling devices
- sampling 3
- containers 5
- in the laboratory 7
- labelling 5
- liquids 6
- particulate solids 5
- pastes 6
- sample dividers 4
- sampling devices 4
- solid products 5
- saponification value 53, 54
- sarcosinates 331
- Savitzky-Golay algorithm 257, 260
- sector mass spectrometer 318
- selected ion monitoring 328
- selectivity 84
- sensitivity 328
- Septonex 64, 129
- SFC-MS 329
- signal averaging 244
- signal-to-noise ratio, NMR 302
- smoothing 257
- soaps 20
- analysis by gas chromatography 217
- determination in fatty products 143
- infrared spectroscopy 266
- sodium alkylbenzene sulphionate, mass spectrum 332, 333
- sodium dodecanesulphonate as titrant 178
- sodium dodecyl sulphate 331
- sodium dodecylbenzene sulphionate 331
- sodium isethionate 230
- sodium palmitate 266
- sodium stearate, infrared spectrum 268
- sodium tetrakis(4-fluorophenyl)borate 151, 161
- sodium tetraphenylborate 150, 151, 152, 199, 201, 203
- soft ionisation techniques 325, 328
- solid-phase extraction 39
- sorbitan esters 20, 162
- determination of sorbitan 163
- ethoxylated 197
- total fatty acid contents 163
- Soxhlet apparatus 43
- SPE *see* solid-phase extraction
- spectral search 263
- spectroscopy 36
- infrared 36
- mass spectroscopy 37
- nuclear magnetic resonance (NMR) spectroscopy 36
- specular reflection, infrared 253
- standard additions, methods of 71
- stearyl stearate 275
- strongly acidic cation exchanger 82, 87, 88
- strongly basic anion exchanger 87, 88
- structured bleaches 46
- sucrose 21
- sucrose esters 162
- ethoxylated 197
- sulphated alkanolamides 19
- sulphated alkylphenol ethoxylates 19, 27
- sulphated esters 28
- sulphated mono- and diglycerides 27
- sulphated monoalkanolamides 27
- sulphatosulphonate 125
- sulphobetaines 182, 197
- strongly basic 23
- weakly basic 23
- sulphonated amides 20, 28, 139, 194
- sulphonated esters 19
- sulphonated hydrocarbons 19, 29
- sulphonates, oil-soluble 129
- sulphosuccinamates 139, 194, 196
- sulphosuccinates 331
- sulphur, determination of 33
- sultones 109, 124, 217, 226
- 1, 3-sultones 218, 226
- alkaline hydrolysis 125
- see also* α -olefin sulphonates
- supercritical fluid chromatography 230
- supercritical fluid chromatography-mass spectrometry 340
- surfactant
- amphoteric surfactant 17
- anionic surfactant 17
- cationic surfactant 17
- definition 17
- nonionic surfactant 17
- surfactant concentration by $^1\text{H-NMR}$ 316
- surfactant-sensitive electrodes 65
- coated graphite rod type 67
- coated wire type 68
- concentration cell type 65
- construction 65
- titration procedure 68
- surfactants
- classification by acid and alkaline hydrolysis 26
- classification using indicators 24
- titration with surfactants of opposite charge 59
- weakly acidic 18
- weakly basic 18
- tertiary amines, determination of primary plus secondary amines 185
- tesla 300
- tetrabromophenolphthalein 64
- tetramethylsilane 303
- tetraphenylborate 153
- theory of NMR 298
- thermospray 323
- soft ionisation 323
- thin layer chromatography 207, 227
- time domain 238
- titration with surfactants of opposite charge 59
- TLC 329
- trace analysis by mass spectrometry 329
- transmission cells, infrared 250
- trialkylmethylammonium salts
- trialkyl methylammonium quaternaries 225
- triglycerides 275
- triolein 275
- triple quadrupole instruments 318
- triple quadrupole mass spectrometer 328, 331, 341
- TSP-d₄ 304, 316
- two-phase titration 59, 199, 201, 204
- Epton method 63
- mechanical apparatus for 62
- variants 63
- two-phase titration, indicators 59
- Acid Blue 1 59
- bromocresol green 63, 161
- bromophenol blue 64, 173
- dimethyl yellow 64, 129
- dimidium bromide 59
- disulphine blue VN 59
- hydrophobic indicators 64
- methyl orange 173
- methylene blue 64, 172
- phenol red 63
- tetrabromophenolphthalein 64
- tetrabromophenolphthalein ethyl ester 174, 203
- Victoria Blue B 150, 151, 203
- two-sector mass spectrometer 318
- Victoria Blue B 150, 151
- volatility discrimination in mass spectrometry 319

- volumetric solutions,
concentrations of 11
- weak acids and bases,
determination of 50
- weak acids and bases,
hydrolysis of 48
- weakly acidic cation
exchangers 82, 87, 88
- weakly basic anion
exchangers 82, 87, 88
- Weibull method 156
- whole product analysis by mass
spectrometry 319
- Wij's reagent 57
- Zephiran 64
- zero filling 244
- zwitterionic surfactants, mass
spectrometry 325