

Ullmann's Encyclopedia of Industrial Chemistry

Fifth, Completely Revised Edition

Index to Volumes A 1 to A 28, B 1 to B 8
(Abrasives to Zirconium and Zirconium
Compounds, Fundamentals of Chemical
Engineering, Unit Operations I and II,
Principles of Chemical Reaction Engineering and
Plant Design, Analytical Methods I and II,
Process Control Engineering, and Environmental
Protection and Industrial Safety I and II)

Index Editors: Hertha Buchholz, Wolfgang Gerhartz,
Monika Pikart-Müller, Christina Thümmeler



Contents of Volumes A 1 to A 28, B 1 to B 8

A 1

Abrasives	1	Adipic Acid	269
Acaricides	17	Alcohols, Aliphatic	279
Acetaldehyde	31	Alcohols, Polyhydric	305
Acetic Acid	45	Aldehydes, Aliphatic and Araliphatic	321
Acetic Anhydride and Mixed Fatty Acid Anhydrides	65	Alkaloids	353
Acetone	79	Alkyd Resins	409
Acetylene	97	Allyl Compounds	425
Acridine	147	Aluminothermic Processes	447
Acrolein and Methacrolein	149	Aluminum	459
Acrylic Acid and Derivatives	161	Aluminum Alloys	481
Acrylonitrile	177	Aluminum Compounds, Inorganic	527
Acylation and Alkylation	185	Aluminum Compounds, Organic	543
Adhesives	221	Aluminum Oxide	557

A 2

Amines, Aliphatic	1	Anorexiant	313
Amines, Aromatic	37	Antacids and Peptic Ulcer Treatment	321
Amino Acids	57	Anthelmintics	329
Aminophenols	99	Anthracene	343
Amino Resins	115	Anthraquinone	347
Ammonia	143	Anthraquinone Dyes and Intermediates	355
Ammonium Compounds	243	Antiallergic Agents	419
Analeptics	267	Antiarrhythmic Drugs	439
Analgesics and Antipyretics	269	Antiasthmatic Agents	453
Anesthetics, General	289	Antibiotics	467
Aniline	303		

A 3

Antidiabetic Drugs	1	Aziridines	239
Antiemetics	9	Azo Dyes	245
Antiepileptics	13	Barium and Barium Compounds	325
Antifreezes	23	Batteries	343
Anti-inflammatory - Antirheumatic Drugs	33	Bearing Materials	399
Antimony and Antimony Compounds	55	Beer	421
Antimycotics	77	Benzaldehyde	463
Antioxidants	91	Benzene	475
Arsenic and Arsenic Compounds	113	Benzenesulfonic Acids and Their Derivatives	507
Artists' Colors	143	Benzidine and Benzidine Derivatives	539
Asbestos	151	Benzoic Acid and Derivatives	555
Asphalt and Bitumen	169	Benzoquinone	571
Automobile Exhaust Control	189	Benzoquinone and Naphthoquinone Dyes	575
Aviation Turbine Fuels	201		
Azine Dyes	213		

A 4

Benzyl Alcohol	1	Boron Compounds	309
Benzylamine	9	Bread and Other Baked Products	331
Beryllium and Beryllium Compounds	11	Bromine	391
Beverages, Nonalcoholic	35	Bromine Compounds	405
Biological Control	77	Butadiene	431
Biomass Chemicals	99	Butanals	447
Biotechnology	107	Butanediols, Butenediol, and Butynediol	455
Bismuth, Bismuth Alloys, and Bismuth Compounds	171	Butanols	463
Bleaching	191	2-Butanone	475
Blood	201	Butenes	483
Blood Pressure Increasing Agents	229	Butyrolactone	495
Blood Pressure Lowering Agents	235	Cadmium and Cadmium Compounds	499
Boric Oxide, Boric Acid, and Borates	263	Calcium and Calcium Alloys	515
Boron and Boron Alloys	281	Calcium Antagonists	519
Boron Carbide, Boron Nitride, and Metal Borides	295	Calcium Carbide	533
		Calcium Chloride	547
		Calcium Sulfate	555

A 5

Cancer Chemotherapy	1	Carboxylic Acids, Aromatic	249
Candles	29	Carcinogenic Agents	261
Caprolactam	31	Cardiac Glycosides and Synthetic Cardiotonic Drugs	271
Carbamates and Carbamoyl Chlorides	51	Cardiovascular Drugs	289
Carbazole	59	Catalysis and Catalysts	313
Carbides	61	Cationic Dyes	369
Carbohydrates	79	Cellulose	375
Carbon	95	Cellulose Esters	419
Carbon Dioxide	165	Cellulose Ethers	461
Carbon Disulfide	185	Cement and Concrete	489
Carbonic Acid Esters	197	Cements, Chemically Resistant	539
Carbon Monoxide	203	Ceramic Colorants	545
Carbonylation	217		
Carboxylic Acids, Aliphatic	235		

A 6

Ceramics, General Survey	1	Chitin and Chitosan	231
Ceramics, Advanced Structural Products	43	Chlorinated Hydrocarbons	233
Ceramics, Ceramic-Metal Systems	55	Chlorine	399
Ceramics, Electronic	79	Chlorine Oxides and Chlorine Oxygen Acids	483
Cereals and Cereal Products	93	Chloroacetaldehydes	527
Cerium Mischmetal, Cerium Alloys, and Cerium Compounds	139	Chloroacetic Acids	537
Cesium and Cesium Compounds	153	Chloroamines	553
Charcoal	157	Chloroformic Esters	559
Cheese, Processed Cheese, and Whey	163	Chlorohydrins	565
Chemotherapeutics	173		

A 7

Chlorophenols	1	Coal Liquefaction	197
Chlorophenoxyalkanoic Acids	9	Coal Pyrolysis	245
Chlorosulfuric Acid	17	Cobalt and Cobalt Compounds	281
Chocolate	23	Coffee	315
Choline	39	Colloids	341
Chromium and Chromium Alloys	43	Composite Materials	369
Chromium Compounds	67	Confectionery	411
Cinnamic Acid	99	Construction Ceramics	425
Citric Acid	103	Contraception	461
Clays	109	Copper	471
Cleansing Agents	137	Copper Alloys	525
Coal	153	Copper Compounds	567

A 8

Coronary Therapeutics	1	Cyclopentadiene and Cyclopentene	227
Cough Remedies	13	Dairy Products, Imitation	239
Cresols and Xylenols	25	Dental Materials	251
Crop Protection	61	Dermatotherapeutic Agents	301
Crotonaldehyde and Crotonic Acid	83	Detergents	315
Crown Ethers	91	Dextran	449
Crystal Growth	99	Diagnostic Reagents	455
Cyanamides	139	Dialkyl Sulfates and Alkylsulfuric Acids	493
Cyanates, Inorganic Salts	157	Diazo Compounds and Diazo Reactions	505
Cyano Compounds, Inorganic	159	Dicarboxylic Acids, Aliphatic	523
Cyanuric Acid and Cyanuric Chloride	191	Dimethyl Ether	541
Cyclododecanol, Cyclododecanone, and Lauro lactam	201	Dioxane	545
Cyclododecatriene and Cyclooctadiene	205	Disinfectants	551
Cyclohexane	209	Disperse Dyes	565
Cyclohexanol and Cyclohexanone	217	Disperse Systems and Dispersants	577
		Display Technology	603

A 9

Dithiocarbamic Acid and Derivatives	1	Electroluminescent Materials and Devices	255
Diuretics	29	Electronic Chemicals	265
Drawing and Writing Materials	37	Emulsions	297
Dry Cleaning	49	Enzymes	341
Drying Oils	55	Epoxides	531
Dyes, General Survey	73	Epoxy Resins	547
Electrochemical and Chemical Deposition	125	Esters, Organic	565
Electrochemistry	183	Ethanol	587

A 10

Ethanolamines and Propanolamines	1	Fatty Acids	245
Ethers, Aliphatic	23	Fatty Alcohols	277
Ethylbenzene	35	Felts	297
Ethylene	45	Ferroalloys	305
Ethylenediaminetetraacetic Acid and Related Chelating Agents	95	Ferroelectrics	309
Ethylene Glycol	101	Fertilizers	323
Ethylene Oxide	117	Fiber Optics	433
2-Ethylhexanol	137	Fibers, 1. Survey	451
Explosives	143	Fibers, 2. Structure	477
Fats and Fatty Oils	173	Fibers, 3. General Production Technology	511
		Fibers, 4. Synthetic Organic	567

A 11

Fibers, 5. Synthetic Inorganic	1	Fluorine Compounds, Organic	349
Fibers, 6. Testing and Analysis	67	Fluoropolymers, Organic	393
Films	85	Fluorosulfuric Acid	431
Fire Extinguishing Agents	113	Foamed Plastics	435
Flame Retardants	123	Foams and Foam Control	465
Flavors and Fragrances	141	Foods, 1. Survey	491
Flocculants	251	Foods, 2. Food Technology	523
Floor Coverings	263	Foods, 3. Food Additives	561
Fluorescent Dyes	279	Foods, 4. Food Packaging	583
Fluorine	293	Formaldehyde	619
Fluorine Compounds, Inorganic	307		

A 12

Formamides	1	Glass Ceramics	433
Formic Acid	13	Gluconic Acid	449
Foundry Technology	35	Glucose and Glucose-Containing Syrups ..	457
Fructose	47	Glycerol	477
Fuel Cells	55	Glyoxal	491
Fungicides, Agricultural	85	Glyoxylic Acid	495
Furan and Derivatives	119	Gold, Gold Alloys, and Gold	
Furs	135	Compounds	499
Gallbladder and Liver Therapy	143	Gout Remedies	535
Gallium and Gallium Compounds	163	Guanidine and Derivatives	545
Gas Production	169	Hafnium and Hafnium Compounds	559
Gelatin	307	Hair Preparations	571
Genetic Engineering	319	Hard Materials	603
Germanium and Germanium Compounds ..	351	Heating Oil	617
Glass	365	Hexamethylenediamine	629

A 13

High-Performance Fibers	1	Hydrogen Peroxide	443
High-Temperature Materials	25	Hydrogen Sulfide	467
Holography	79	Hydrogenation and Dehydrogenation ..	487
Hormones	89	Hydroquinone	499
Hydraulic Fluids	165	Hydroxycarboxylic Acids, Aliphatic	507
Hydrazine	177	Hydroxycarboxylic Acids, Aromatic	519
Hydrazoic Acid and Azides	193	Hydroxylamine	527
Hydrides	199	Hypnotics	533
Hydrocarbons	227	Ice Cream and Frozen Desserts	563
Hydrochloric Acid	283	Imaging Technology	571
Hydrogen	297	Imidazole and Derivatives	661

A 14

Immobilized Biocatalysts	1	Insect Control	263
Immunotherapy and Vaccines	49	Insulation, Electric	321
Inclusion Compounds	119	Interferons	365
Indicator Reagents	127	Iodine and Iodine Compounds	381
Indigo and Indigo Colorants	149	Ion Exchangers	393
Indium and Indium Compounds	157	Iron	461
Indole	167	Iron Compounds	591
Information Storage Materials	171	Isocyanates, Organic	611
Inorganic Polymers	241	Isoprene	627

A 15

Isotopes, Natural	1	Lecithin	293
Ketenes	63	Leuco Esters of Vat Dyes	299
Ketones	77	Lignin	305
Lactic Acid	97	Lime and Limestone	317
Lactose and Derivatives	107	Liquefied Petroleum Gas	347
Lamps	115	Liquid Crystals	359
Laser Dyes	151	Lithium and Lithium Compounds	393
Lasers	165	Local Anesthetics	415
Laxatives	183	Lubricants and Related Products	423
Lead	193	Luminescent Materials	519
Lead Alloys	237	Magnesium	559
Lead Compounds	249	Magnesium Alloys	581
Leather	259	Magnesium Compounds	595
Leather Imitates	283		

A 16

Magnetic Materials	1	Methacrylic Acid and Derivatives	441
Maleic and Fumaric Acid	53	Methane	453
Malonic Acid and Derivatives	63	Methanol	465
Manganese and Manganese Alloys	77	Methine Dyes and Pigments	487
Manganese Compounds	123	Methylamines	535
Margarines and Shortenings	145	Methyl <i>Tert</i> -Butyl Ether	543
Matches	163	Mica	551
Melamine and Guanamines	171	Microbiocides	563
Membranes and Membrane Separation Processes	187	Microencapsulation	575
Mercaptoacetic Acid and Derivatives	265	Milk and Dairy Products	589
Mercury, Mercury Alloys, and Mercury Compounds	269	Mirrors	641
Metal-Complex Dyes	299	Molluscicides	649
Metallic Glasses	335	Molybdenum and Molybdenum Compounds	655
Metallic Soaps	361	Monoclonal Antibodies	699
Metallurgy	375	Monosodium Glutamate	711
Metal-Matrix Composites	389	Motor Fuels	719
Metals, Surface Treatment	403	Mutagenic Agents	755

A 17

Naphthalene and Hydronaphthalenes	1	Nitrides	341
Naphthalene Derivatives	9	Nitriles	363
Naphthalimide Dyes and Pigments	59	Nitrilotriacetic Acid	377
Naphthoquinones	67	Nitro and Nitroso Dyes	383
Natural Gas	73	Nitro Compounds, Aliphatic	401
Nematocides	125	Nitro Compounds, Aromatic	411
Neuropharmacology	135	Nitrogen	457
Nickel	157	Nitrogen Fixation	471
Nickel Alloys	221	Noble Gases	485
Nickel Compounds	235	Nonlinear Optics	541
Niobium and Niobium Compounds	251	Nonwoven Fabrics	565
Nitrates and Nitrites	265	Nuclear Technology	589
Nitric Acid, Nitrous Acid, and Nitrogen Oxides	293		

A 18

Nucleic Acids	1	Oxalic Acid	247
Octane Enhancers	37	Oxidation	261
Oil, Oil Refining	51	Oxocarboxylic Acids	313
Oil Shale	101	Oxo Synthesis	321
Ophthalmological Preparations	127	Oxygen	329
Optical Brighteners	153	Ozone	349
Optically Active Compounds	177	Paints and Coatings	359
Optical Materials	191	Paper and Pulp	545
Oral Hygiene Products	209	Parasympatholytics and Para- sympathomimetics	693
Organometallic Compounds and Homogeneous Catalysis	215		

A 19

Parkinsonism Treatment	1	Phenol Derivatives	313
Peat	15	Phenolic Resins	371
Pentanol	49	Phenothiazine and Derivatives	387
Peptide and Protein Hormones	61	Phenylacetic Acid	403
Peptide Synthesis	157	Phenylene- and Toluenediamines	405
Perfumes	171	Phosgene	411
Peroxo Compounds, Inorganic	177	Phosphate Fertilizers	421
Peroxy Compounds, Organic	199	Phosphoric Acid and Phosphates	465
Petroleum Coke	235	Phosphorus	505
Pharmaceutical Dosage Forms	241	Phosphorus Compounds, Inorganic	527
Pharmaceuticals, General Survey and Development	273	Phosphorus Compounds, Organic	545
Phase-Transfer Catalysis	293	Photochemistry	573
Phenol	299	Photoelectricity	599

A 20

Photography	1	Plasma Reactions	427
Photovoltaic Cells	161	Plasticizers	439
Phthalic Acid and Derivatives	181	Plastics, Additives	459
Phthalocyanines	213	Plastics, Analysis	509
Pigments, Inorganic	243	Plastics, General Survey	543
Pigments, Organic	371	Plastics, Processing	663
Plant Growth Regulators	415		

A 21

Plastics, Properties and Testing	1	Polymerization Processes	305
Plastics, Recycling	57	Polymers, Electrically Conducting	429
Platinum Group Metals and Compounds ..	75	Polymers, High-Temperature	449
Plutonium and Plutonium Compounds ..	133	Polymethacrylates	473
Polyacrylamides and Poly(Acrylic Acids) .	143	Polyolefins	487
Polyacrylates	157	Polyoxyalkylenes	579
Polyamides	179	Polyoxymethylenes	591
Polycarbonates	207	Poly(Phenylene Oxides)	605
Polyester Resins, Unsaturated	217	Polystyrene and Styrene Copolymers	615
Polyesters	227	Polyurethanes	665
Polyimides	253	Poly(Vinyl Chloride)	717
Polymer Blends	273	Polyvinyl Compounds, Others	743

A 22

Poly(Vinyl Esters)	1	Proteins	289
Poly(Vinyl Ethers)	11	Psychopharmacological Agents	341
Poly(Vinylidene Chloride)	17	Purine Derivatives	383
Potassium and Potassium Alloys	31	Pyrazolone Derivatives	389
Potassium Compounds	39	Pyridine and Pyridine Derivatives	399
Powder Metallurgy and Sintered Materials	105	Pyrimidine and Pyrimidine Derivatives ..	431
Printing Inks	143	Pyrotechnics	437
Propanal	157	Pyrrole	453
Propanediols	163	2-Pyrrolidone	457
Propanols	173	Quinoline and Isoquinoline	465
Propellants	185	Radiation Chemistry	471
Propene	211	Radionuclides	499
Propionic Acid and Derivatives	223	Radiopaque Media	593
Propylene Oxide	239	Rare Earth Elements	607
Prostaglandins	261	Reactive Dyes	651
Protective Gases	275	β -Receptor Blocking Agents	665
		Reduction	687

A 23

Refractory Ceramics	1	Rubber, 6. Testing	463
Reinforced Plastics	49	Rubidium and Rubidium Compounds ...	473
Release Agents	67	Salicylic Acid	477
Resins, Natural	73	Saponins	485
Resins, Synthetic	89	Sealing Materials	499
Resorcinol	111	Seasonings	515
Resources of Oil and Gas	117	Sedatives	519
Rhenium and Rhenium Compounds	199	Selenium and Selenium Compounds	525
Rodenticides	211	Semiconductors	537
Rubber, 1. Survey	221	Shoe Polishes	575
Rubber, 2. Natural	225	Silica	583
Rubber, 3. Synthetic	239	Silicates	661
Rubber, 4. Chemicals and Additives	365	Silicon	721
Rubber, 5. Technology	421	Silicon Carbide	749

A 24

Silicon Compounds, Inorganic	1	Sodium Carbonates	299
Silicon Compounds, Organic	21	Sodium Chloride	317
Silicones	57	Sodium Compounds, Organic	341
Silk	95	Sodium Hydroxide	345
Silver, Silver Compounds, and Silver Alloys	107	Sodium Sulfates	355
Single Cell Proteins	165	Solar Technology	369
Sintered Steel and Iron	185	Soldering and Brazing	427
Skeletal Muscle Relaxants	209	Solvents	437
Skin Cosmetics	219	Sorbic Acid	507
Soaps	247	Spasmolytics	515
Sodium Amide	267	Specialty Plastics	529
Sodium and Sodium Alloys	277	Spirits	551
		Stains, Microscopic	567

A 25

Starch and Other Polysaccharides	1	Sulfites, Thiosulfates, and Dithionites ...	477
Steel	63	Sulfones and Sulfoxides	487
Steroids	309	Sulfonic Acids, Aliphatic	503
Strontium and Strontium Compounds ...	321	Sulfur	507
Styrene	329	Sulfur Dioxide	569
Sugar	345	Sulfur Dyes	613
Sugar Alcohols	413	Sulfur Halides	623
Sulfamic Acid	439	Sulfuric Acid and Sulfur Trioxide	635
Sulfides, Polysulfides, and Sulfanes	443	Superconductors	705
Sulfinic Acids and Derivatives	461	Surfactants	747

A 26

Surgical Materials	1	Tetrahydrofuran	221
Sweeteners	23	Textile Auxiliaries	227
Sympatholytics and Sympathomimetics	45	Textile Dyeing	351
Talc	47	Textile Printing	489
Tall Oil	57	Textile Technology	553
Tantalum and Tantalum Compounds	71	Thallium and Thallium Compounds	607
Tapes, Adhesive	85	Thermoelectricity	621
Tar and Pitch	91	Thermoplastic Elastomers	633
Tar Sands	129	Thermosets	665
Tartaric Acid	163	Thin Films	681
Tea	171	Thiocyanates and Isothiocyanates, Organic	749
Tellurium and Tellurium Compounds	177	Thiocyanates, Inorganic	759
Teratogenic Agents	189	Thiols and Organic Sulfides	767
Terephthalic Acid, Dimethyl Terephthalate, and Isophthalic Acid	193	Thiophene	793
Terpenes	205	Thiourea and Thiourea Derivatives	803

A 27

Thorium and Thorium Compounds	1	Turpentine	267
Thyrotherapeutic Agents	39	Uranium, Uranium Alloys, and Uranium Compounds	281
Tin, Tin Alloys, and Tin Compounds	49	Urea	333
Tires	83	Vanadium and Vanadium Compounds	367
Titanium and Titanium Alloys	95	Veterinary Drugs	387
Tobacco	123	Vinegar	403
Toluene	147	Vinyl Esters	419
Toluidines	159	Vinyl Ethers	435
Transuranium Elements	167	Vitamins	443
Triarylmethane and Diarylmethane Dyes	179		
Tungsten, Tungsten Alloys, and Tungsten Compounds	229		

A 28

Water	1	Wool	395
Waxes	103	Xanthates	423
Weed Control	165	Xylenes	433
Welding and Cutting	203	Xylidines	455
Whiskers	229	Yeasts	461
Whitewares	243	Zeolites	475
Wind Energy	259	Ziegler Processes	505
Wine	269	Zinc	509
Wood	305	Zinc Alloys	531
Wood, Preservation	357	Zinc Compounds	537
Wood, Surface Treatment	385	Zirconium and Zirconium Compounds	543

B1

1. Mathematics in Chemical Engineering
2. Mathematical Modeling
3. Dimensional Analysis
4. Transport Phenomena
5. Fluid Mechanics
6. Estimation of Physical Properties
7. Construction Materials in Chemical Industry
8. Corrosion
9. Abrasion and Erosion
10. Mechanical Properties and Testing of Metallic Materials
11. Nondestructive Testing
12. Information and Documentation
13. Patents

B2**Particle Technology**

1. Solids Technology, Introduction
2. Particle Size Analysis and Characterization of a Classification Process
3. Crystallization and Precipitation
4. Drying of Solid Materials
5. Size Reduction
6. Spraying and Atomizing of Liquids
7. Size Enlargement
8. Solids Handling

Separation and Classification*Solid-Liquid Separation*

9. Solid-Liquid Separation, Introduction
10. Filtration
11. Centrifugation and Hydrocyclone Separation
12. Sedimentation

Diffusional Separation Processes

1. Separation Processes, Introduction
2. Heat Exchange
3. Evaporation
4. Distillation and Rectification
5. Sublimation
6. Liquid-Liquid Extraction
7. Liquid-Solid Extraction
8. Absorption
9. Adsorption

Separations in Biotechnology

10. Process-Scale Chromatography
11. Biochemical Separations

Energy Management and Heat Generation

12. Energy Management

Solid-Gas Separation

13. Dust Separation

Solid-Solid Separation

14. Solid-Solid Separation, Introduction
15. Screening
16. Elutriation
17. Air Classifying
18. Mineral Sorting
19. Magnetic Separation
20. Electrostatic Separation
21. Gravity Concentration
22. Dense-Medium Separation
23. Flotation

Mixing

24. Mixing, Introduction
25. Stirring
26. Mixing of Highly Viscous Media
27. Mixing of Solids

B3

13. Pinch Technology
14. Combustion
15. Electrically Generated Heat
16. Radiation Heating
17. Cooling Tower Technology
18. Direct Heating with Circulating Heat Carriers

Low-Temperature Technology

19. Refrigeration Technology
20. Cryogenic Technology

Vacuum Technology

21. Vacuum Technology

B4

Part A	Principles of Chemical Reaction Engineering	5	Bubble Columns	275
Part B	Reactor Design and Optimization		Three-Phase Trickle-Bed Reactors	309
	Reactor Types and Their Industrial Applications	87	Reaction Columns	321
	Model Reactors and Their Design Equations	121	Thin-Film Reactors	329
	Industrial Reactors and Their Applications		Metallurgical Furnaces	339
	Stirred-Tank and Loop Reactors	167	Bioreactors	381
	Tubular Reactors	181	Part C	Process Development and Plant Design
	Fixed-Bed Reactors	199		Process Development
	Fluidized-Bed Reactors	239		Chemical Plant Design and Construction
			Part D	Continuous Mixing of Fluids ...
				High-Pressure Technology

B5

Analytical Chemistry: Purpose and Procedures	1	Electrophoresis	319
Weighing	27	Structure Analysis by Diffraction	341
Chemometrics	35	Ultraviolet and Visible Spectroscopy	383
Sampling	59	Infrared and Raman Spectroscopy	429
Sample Preparation for Trace Analysis ..	65	Nuclear Magnetic Resonance and Electron Spin Resonance Spectroscopy	471
Trace Analysis	95	Mass Spectrometry	515
Radionuclides in Analytical Chemistry ...	111	Atomic Spectroscopy	559
Enzyme and Immunoassays	129	Laser Analytical Spectroscopy	653
Basic Principles of Chromatography	155	X-Ray Fluorescence Spectrometry	675
Gas Chromatography	181	Activation Analysis	689
Liquid Chromatography	237	Analytical Voltammetry and Polarography	705
Thin Layer Chromatography	301		

B6

Thermal Analysis and Calorimetry	1	Rheometry	279
Surface Analysis	23	Laboratory Information and Management Systems (LIMS)	307
Chemical and Biochemical Sensors	121	Process Control Engineering	317
Microscopy	213		

B7

Ethics and Industrial Chemistry	1	Environmental Management in the Chemical Industry	359
Ecology and Ecotoxicology	19	Noise and Vibration	383
Toxicology	155	Air	403
Legal Aspects	299	Soil	613

B8

Water	1	Plant and Process Safety	311
Raw Materials and Energy	153	Occupational Health and Safety	431
Products	181	Transport, Handling, and Storage	497
Production-Integrated Environmental Protection	213	Waste	559

Index

The letter-by-letter method is used in this index for alphabetization. Umlaut and accented letters, such as ö, ä, é, ç, or æ, are treated as unaccented for alphabetization: o, a, e, c, or a, respectively.

Volume numbers are always printed in bold face, followed by a colon, e.g., **A 2**:. Page numbers printed in bold face indicate major treatment of the entry subject, e.g., the index entry is the title of an article in the Encyclopedia.

Synonyms for names of chemical compounds can be found by cross reference (does not apply to trade names). The index uses "see" and "see also" cross references:

- 1) Ethanal, *see Acetaldehyde*
(to be found as: Acetaldehyde (ethanal) [75-07-0] **A 1**: 31, 303)
- 2) Alizarin [8005-35-4] ...
see also 1,2-Dihydroxyanthraquinone
also to be found as:
1,2-Dihydroxyanthraquinone [8005-35-4] ...
see also Alizarin

Abbreviations are generally avoided in the index. Element names may be abbreviated by their official symbols.

Genus and species names are **not** printed in italics.

Locants on aromatic rings such as *o*-, *m*-, and *p*- are replaced by 2-, 3-, and 4-, respectively, whenever possible.

Colour Index names of dyes are indexed under both the Colour Index names and the C. I. numbers, e.g.:

Direct Yellow 21, C. I. 40045 [1325-46-89] **A 3**: 255
and
C. I. 40045 [1325-46-8] **A 3**: 255

Registered names and trademarks are not specifically marked as such, but they are not to be considered unprotected.