

INDEX

A

- A horizon, soil, 694
- Abiotic factors in life systems, 796
- ABS. *See* Alkyl Benzene Sulfonate (ABS)
 - surfactant
- Absolute temperature, 24
- Absolute uncertainty, 1129
- Absorbance, 1137
- Absorption spectrophotometry, 1137
 - for water analysis, 1161
- Absorptivity, 1138
- Abstraction reaction, 636
 - of hydroxyl radical, 1015
- Acceptor layer in photovoltaic cell, 292
- Accuracy of analytical data, 1129
- Accuracy of number, 15
- Acetone, 319
 - solvent, 247
- Acetonitrile
 - atmospheric, 591
 - toxicity, 869
- Acetylene, 273
- Acid, 210
 - deposition, 617
 - mine water, 385, 406, 430
 - names and properties, 170
 - naming, 228
 - preparation, 222
 - rain, 617
 - rain effects, 620
 - salts, 227
 - soils, 702
 - water pollutant, 430
- Acid hydrolysis in rock weathering, 667
- Acid–base equilibrium, 262
- Acid–base reactions
 - in the atmosphere, 561
 - of soil, 701
- Acidic solutions, 220, 256
- Acidity
 - analysis, 1160
 - in water, 381, 430
- Acrolein, 320
- Acrylonitrile toxicity, 869
- Actinomycetes, 1018
- Activated carbon, 73, 101, 476, 1040
 - preparation, 487
- Activated sludge wastewater treatment, 472
- Active metabolite, 848
- Active parent compound, 848
- Activity of radioactive materials, 453
- Acute exposure to toxicants, 839
- Adaptation to global warming, 611
- Addition reaction, 636
 - of hydroxyl radical, 1015
 - of unsaturated compounds, 314
- Adducts analysis in biological samples, 1192
- Adenine, 357
- Adenosine triphosphate (ATP), 360
- Adipic acid, 818
- Advanced wastewater treatment, 474
- Aeration of water, 467
- Aerobic (oxic) bacteria in water, 397
- Aerobic (oxic) respiration, 401
- Aerobic respiration, 360
- Aerobic waste treatment, 1054
- Aerosol, 564
- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles, 857

1206 Index

- Aggregation of colloidal particles, 268
- Aggregation of colloids, 1013
- Aggressive water, 666
- Agricultural management, 721
- Agriculture, 687, 903
- Agroforestry, 723
- Air
 - current, 535
 - masses, 535
 - masses, movement, 536
 - pollutant analysis methods, 1177
- Airglow, 545
- Albedo, 532
- Alcohols
 - atmospheric, 586
 - toxicities, 865
- Aldehydes
 - atmospheric, 585
 - toxicities, 866
- Algae, 396
- Algal nutrients, 428
- Algicides in water, 439
- Alien species, 801
- Aliphatic hydrocarbons, 308
- Alkali metals, 106
- Alkaline
 - earth metals, 106
 - soils, 702
- Alkalinity
 - analysis, 1160
 - water, 381
 - water pollutant, 431
- Alkanes, 308
 - atmospheric, 582
 - reactions, 312
 - toxicities, 862
- Alkenes, 314
 - atmospheric, 582
 - toxicities, 863
- Alkenyl halides, 322
- Alkyl benzene sulfonate (ABS)
 - surfactant, 436
- Alkyl halides, 322
- Alkylating agents in carcinogenesis, 855
- Alkylation, 947
 - in mutagenesis, 852
- Alkynes, 314
 - toxicities, 863
- Allergy from toxicant exposure, 857
- Alloys, 100
- Alluvium, 379
 - from streams, 671
- Alpha helix structure of proteins, 346
- Alpha particles, 452
- Alum, filter, 383
- Aluminum, 105
 - resources, 773
- Amides, atmospheric, 591
- Amines
 - atmospheric, 590
 - toxicities, 868
- Amino acids, 343
- Ammonia
 - in the atmosphere, 562
 - synthesis, 710
 - water pollutant, 427
- Ammonium
 - ion, 10
 - nitrate fertilizer, 710
 - perchlorate, explosive, 1000
- Amphiphiles, 699
- Amphiphilic structure of surfactants, 436
- Amphoteric substances, 212
- Anabolism, 360, 1016
- Anaerobic
 - digester for sewage sludge, 473
 - respiration, 360
 - waste treatment, 1054
- Anaerobic (anoxic) bacteria in water, 397
- Anaerobic (anoxic) respiration, 401
- Analog signal, 893
- Analysis, chemical, 1127
- Analyte isolation for organics
 - analysis, 1171
- Analytical chemistry, 1125
- Anhydrous salts, 228
- Aniline toxicity, 869
- Anions, 10
- Anode, 282
- Anoxic bacteria in water, 397
- Anoxic respiration, 360
- Antagonism in exposure to
 - toxicants, 841
- Antarctic ozone hole, 625
- Anthrosphere, 883
 - conduits, 883
 - constructs, 883
 - flows, 883
- Aquatic chemistry, 381
- Aquiclude, 670

- Aquifer, 670
 Argon, 105
 Aromatic
 amines toxicities, 869
 aryl compounds, 317
 compounds, atmospheric, 582
 halides, 322
 hydrocarbons (aryl), 316
 Aromaticity, 317
 Arsenic
 compounds in water, 423
 herbicidal, 446
 removal from water, 486
 toxicity, 859
 Artificial habitats, 806
 Artificial intelligence, 912
 Aryl
 aromatic compounds, 317
 aromatic hydrocarbons, 316
 Arylating agents in carcinogenesis, 855
 Asbestos, 568
 toxicity, 860
 in water, 428
 Asphyxiants, 862
 Assembly with robotics, 914
 Association colloids, 265
 Asthenosphere, 658
 Ataxia, 850
 Atmosphere, 519
 chemistry, 555
 composition, 524
 as a green resources, 641
 monitoring, 1176
 particles, inorganic, composition, 566
 Atom, 5, 87
 Atom economy in green chemistry, 943
 Atomic absorption analysis, 1138
 Atomic emission analysis, 1138
 Atomic mass, 6, 90
 Atomic mass unit, 6, 89
 Atomic number, 6, 91
 Atomic orbital shapes, 116
 Atomic spectrophotometric water analysis, 1162
 Atomic structure, 107
 Atomic theory, 87
 ATP. *See* Adenosine triphosphate
 Atrazine, 445
 Attenuation of hazardous wastes in mineral strata, 1010
 Automated analysis, 1145
 Automated analyzer, 1146
 Automation, 909, 911
 Autotrophic organisms, 395
 Avogadro's law, 58
 Avogadro's number, 50
 Azimuthal quantum number, 112
- ## B
- B horizon, soil, 694
 Bacillus bacteria, 396
 Bacteria in water, 396
 Baghouses, 602
 Balancing chemical equations, 12, 183, 184–188
 Bamboo materials, 911
 Barometer, 27, 28
 Bases, 211
 characteristics and names, 171
 naming, 228
 preparation, 223
 Basic salts, 227
 Basic solutions, 220, 256
 Basic-need industries, 907
 Basicity, water, 382
 Batch reactor, 976
 Batholiths, 767
 Batteries, storage, 283
 lead storage, 283
 lithium ion, 285
 nickel–metal hydride, 286
 Beach nourishment, 749
 Bed load, 378
 in streams, 670
 Beer's law, 1138
 Beneficiation of ores, 762
 Benzene, 316
 solvent, 247, 951
 toxicity, 863, 869
 Benzo(a)pyrene, 318, 999
 carcinogenic, 864
 Berm, 672
 Berylliosis, 100, 858
 Beryllium, 99
 atmospheric, 569
 electron configuration, 120
 toxicity, 858
 Bhopal industrial accident, 870
 Binary molecular compound names, 167
 Biobased feedstocks, 816

- Biocumulation, 1016
 Biochemical oxygen demand (BOD), 432
 Biochemical processes on hazardous wastes, 1013
 Biochemical response to toxicants, 849
 Biochemistry, 339
 Bioconversions of synthetic chemicals, 825
 Biodegradation, 402, 1016, 1053
 of pesticides in soil, 717
 of wastes, 1053
 Biodiesel fuel, 1109
 Biogas, 1113
 Biogenic hydrocarbons, atmospheric, 580
 Biogeochemical cycles, 655
 Biogeochemical prospecting, 780
 Biogeochemistry, 655
 Biological chemistry, 339
 Biological communities, 797
 Biological feedstocks, 945
 Biological materials analysis, 1185
 Biological monitoring, 1186
 Biomass
 degradation, 401
 energy, 1107
 fuel to minimize carbon dioxide emissions, 609
 Biomaterials, 807
 agricultural production, 906
 processing, 811
 Biome, 797
 Biomolecules, 340
 Biorefractory organic water pollutants, 437
 Biorefractory substances, 1053
 Bioremediation, 1053
 Biosphere, 795
 resources, 795
 Biosynthesis, 823
 Biota, living organisms in water, 395
 Biotechnology, 920
 Biotic factors in life systems, 796
 Biotransformation, 1016
 BLEVE. *See* Boiling liquid expanding vapor explosion (BLEVE)
 Blood pressure, 850
 Blood-brain barrier, 859
 BOD. *See* Biochemical oxygen demand (BOD)
 Bohr theory, 109
 Boiling liquid expanding vapor explosion (BLEVE), 997
 Boiling point, 66
 elevation, 259
 temperature, 26
 Bond
 chemical, 8, 139
 length, 155
 order, 154
 strength, 155
 Boron, 100
 electron configuration, 120
 Boyle's law, 57
 Branched-chain alkanes, 309
 Breakpoint in water chlorination, 499
 Breeder reactors, 1098
 Bridging groups in colloid flocculation, 268
 Bromine toxicity, 858
 Bronchiolitis fibrosa obliterans, 615
 Brownfields, 765
 Bruce Ames test for carcinogenicity, 856
 Buffers, 219
 solution, standard, for electrode calibration, 299
 Builders, detergent, 437
 Buret, 258, 1132
- ## C
- C horizon, soil, 695
 CAD. *See* Computer-aided design (CAD)
 CAD/CAM. *See* Computer-aided design/computer-aided manufacturing (CAD/CAM)
 Cadmium
 toxicity, 858
 in water, 420
 Calcination of limestone, 194
 Calcium, 105
 removal from water, 480
 in soil, 703
 in water, 384, 386
 Calorie, 1079
 Calving of glaciers, 673
 CAM. *See* Computer-aided manufacturing (CAM)
 Cap and trade to minimize carbon dioxide emissions, 610
 Capping of landfills, 1061
 Captive breeding programs, 806
 Carbamates, 443

- Carbaryl, 443
- Carbofuran, 443
- Carbohydrates, 347
 - biomaterial, 808
 - metabolism, interference by toxicants, 850
- Carbon, 101
 - black, 192
 - cycle, 401
 - electron configuration, 120
 - microbial transitions, 400
 - sequestration, 609, 1094
 - taxes, 610
- Carbon dioxide
 - atmospheric, 570
 - global warming, 605
 - solvent, 952
 - water pollutant, 427
- Carbon disulfide, atmospheric, 579
- Carbon monoxide
 - analysis, 1181
 - atmospheric, 569
 - in blood analysis, 1188
 - emissions control, 605
 - toxicity, 859
- Carbon oxides in the atmosphere, 569
- Carbon tetrachloride, 322
 - toxicity, 870
- Carbonyl, 424
 - sulfide, atmospheric, 579
 - toxicity, 962
- Carboxylic acid group, 320
- Carboxylic acids, atmospheric, 586
- Carcinogenesis, 853
- Carcinogens, 854
 - testing, 856
- Carnivores, 799
- Carnot equation, 1084
- Carrying capacity, 801
- Cat clays, 701
- Catabolism, 360, 1016
- Catalyst, 190
 - converters, 631
 - reagents, 949
- Catechol, 818
- Cathode, 282
- Cation exchange sites in soil, 703
- Cation exchanger, 331
- Cation-exchange capacity
 - in clays, 675
 - of soil, 701
- Cell
 - living, 340
 - membrane, 340
 - alteration by toxicants, 850
 - bacterial, 397
 - walls, 342
 - bacterial, 397
- Cellular respiration, 342, 354
- Cellulase enzyme, 396
- Cellulose, 348
 - acetate, 820
 - feedstock, 819
 - nitrate, 821
 - wastes for feedstocks, 821
- Celsius degrees, 24
- Celsius temperature, 23
- Cement, Portland, for waste solidification, 1059
- Cementation, 226, 279, 1043
- Centimeter, 21
- Central atom, 153
- Central nervous system effects by toxicants, 850
- Centrifugal collectors, 601
- Centrifugation, 1038
- Ceramics, 909
- CERCLA. *See* Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Cereals, 689
- Certainty of number, 15
- Cetyl palmitate, 351
- CFCs. *See* Chlorofluorocarbons (CFCs)
- Chain reactions, 314
 - in waste treatment, 1048
- Chain terminating reaction, 559
- Channelization, 758
- Characteristics that define hazardous
 - wastes, 992
- Charles' law, 58
- Chelate, 389
- Chelating agent, 389, 390
- Chelation treatment of water, 484
- Chemical analysis process, 1126
- Chemical bonds, 8, 139
- Chemical compound, 9
- Chemical compound names, 167
- Chemical degradation of pesticides on soil, 717
- Chemical energy, 1078
- Chemical engineering, 899
- Chemical equation, 12
 - information in, 182

- Chemical extraction in waste treatment, 1047
- Chemical fixation of wastes, 1060
- Chemical formula, 8, 161
- Chemical formulas, calculation, 163
- Chemical kinetics, 899
- Chemical leaching in waste treatment, 1047
- Chemical methods of analysis, 1127
- Chemical precipitation in waste treatment, 1042
- Chemical reactions, 12, 182
 - classification, 190
 - occurrence and tendency, 188
- Chemical sedimentary rocks, 663
- Chemical structure and reactivity, 1000
- Chemical symbol, 6
- Chemical treatment of wastes, 1041
- Chemically stabilized water, 481
- Chemiluminescence, 558
- Chernobyl nuclear accident, 1099
- Chlordane, 441
- Chloric acid, 229
- Chloride analysis, gravimetric, 1130
- Chlorine, 105
 - atmospheric, 577
 - from electrolysis, 289
 - oxyacids, 229
 - toxicity, 858
 - for water disinfection, 498
- Chlorine dioxide for water treatment, 500
- Chlorofluorocarbons (CFCs), 325, 589
 - compounds, 103
 - stratospheric ozone depletion, 623
- Chloroplasts, 342
- Chlorous acid, 229
- Chromatography, 1142
 - analysis of water, 1163
- Chromium resources, 773
- Chronic exposure to toxicants, 839
- Cis-trans* isomerism, 315
- Classical methods of chemical analysis, 1127
- Claus reaction, 614
- Clausius–Clapeyron equation, 264
- Clay, 661, 673
 - resources, 775
- Cleavage in minerals, 661
- Climate, 534, 540
 - human modifications, 541
 - bioproductivity, 799
- Cloning vehicles, 359
- Clouds, 534
- Coagulants, 1038
- Coagulation
 - of colloidal particles, 268
 - of colloids, 394
 - of solids, 478
- Coagulation–filtration, 478
- Coal, 1093
 - conversion, 1093
 - gasification, 1093
 - rank, 1093
- Coastal erosion, 747
- Coastline, preservation, 749
- Coasts, vulnerable to destructive forces, 745
- Cobalt
 - radioactive, transport in soil by EDTA, 1011
 - resources, 773
- Coccus bacteria, 396
- Coenzymes, 353
- Cold front, 538
- Colligative properties, 259
- Colloid stability, 266
- Colloidal particles, 265
 - in water, 394
- Colloidal suspensions, 265
- Colloids in water, 394
- Color, 53
 - of minerals, 661
 - removal from water, 489
- Coma, 850
- Combination reaction, 191
- Combined available chlorine, 499
- Combined power cycles, 1115
- Combustible liquid, 996
- Combustible substances, 939, 996
- Combustion products, toxic, 998
- Cometabolism, 1017
- Common names, 310
- Communications, 907
 - revolution, 892
- Complex coordination compound, 389
- Complex ions, 262
- Complexation
 - effects, 390
 - in rock weathering, 667
 - in water, 389
- Complexes
 - metal, 262
 - in water, 384
- Complexing agent, 262

- Composites, 910
 samples, 1159
- Composting of wastes, 1056
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 990
- Compression fractures, 659
- Computer-aided design (CAD), 915
- Computer-aided design/computer-aided manufacturing (CAD/CAM), 915
- Computer-aided manufacturing (CAM), 915
- Computers and technology, 915
- Computers in manufacturing, 909, 915
- Concentrate, 1041
- Concentrated solution, 65
- Concentration
 factor of ores, 769
 of solutions, 251
 of wastes, 1004
- Condensation
 aerosol, 564
 nuclei, 520, 534
- Condensed structural formulas, 315
- Conditioning sludge, 495
- Conductance of electricity by solutes, 214
- Conduction in the atmosphere, 531
- Conductivity of ionic solutions, 214
- Conduits in the anthroposphere, 883
- Conservation
 of energy, law, 1079
 of mass, law, 87, 195
 tillage, 719, 906
- Constancy of populations, 804
- Constant composition, law, 89
- Construction, 907
- Constructs in the atmosphere, 883
- Consumable products, 970
- Consumer sector, 960
- Consumers, biological, 798
- Continental drift, 657
- Continuous flow reactor, 976
- Contour representations of orbital's, 116
- Control system in automation, 911
- Convection
 in the atmosphere, 531
 column, 536
 currents, 535
- Convergent boundaries, 658
- Convulsions, 850
- Coordinate covalent bonds, 158
- Coordination compound, 389
- Copper resources, 773
- Coprecipitation of metals in waste treatment, 1044
- Coriolis effect, 537
- Corrosion, 299
- Corrosive substances, 939, 1001
- Corrosivity characteristic of wastes, 992
- Coulomb's law, 92
- Counteracting measures to global warming, 611
- Covalent bond, 8, 150
 in compounds, 152
 in methane, 142
 principles, 150
- Cradle to reincarnation, 966
- Crick, Francis, and DNA structure, 357
- Crop farming, 688, 903
- Crust (Earth), 660
- Crutzen, Paul, 625
- Cryogenics, 96, 523, 642
- Crystal form of minerals, 661
- Crystal lattice, 146
- Crystal structure of minerals, 660
- Crystalline lattice, 10
- Curie, measurement of radioactivity, 453
- Cyanide
 in biological systems analysis, 1188
 salts toxicity, 859
 water pollutant, 426
- Cyanobacteria, 676, 811
- Cyanovaleramide, biosynthesis, 827
- Cycles, elemental, 400
- Cyclization of materials, 966
- Cycloalkanes, 309
- Cyclones, 746
- Cyclonic storms, 539
- Cytoplasm, 341, 398
- Cytoplasmic membrane, bacterial, 397
- Cytosine, 357
- D**
- Dalton, John, 87
- Dalton's atomic theory, 87
- Dams, 759
- Data handling in chemical analysis, 1128
- Dative bond, 158
- DDT. *See* Dichlorodiphenyltrichloroethane (DDT)

1212 Index

- Decanting, 1038
- Decimal form of number, 13
- Decomposers (reducers) in water, 395
- Decomposition reaction, 191
- Deep-well disposal, 1062
- Deforestation, 714
- Degradation of biomass, 401
- Dehalogenation, 406
 - of wastes, 1054
- Dehydration of minerals, 666
- Dehydroshikimic acid, 3-, 819
- Denaturation of proteins, 346
- Denitrification, 404
 - treatment of water, 492
- Dense phase fluid, 953
- Density, 51
- Deoxyribonucleic acid (DNA), 355
- Deposition of sediments, 379
- Derelict lands, 765
- Desalination, 261
- Desertification, 713
- Design for environment, 974
- Destruction removal efficiency,
 - incineration, 1052
- Detergents, 436
- Determinate errors, 1128
- Determination (chemical analysis), 1127
- Detoxification, 1016, 1053
- Detoxified metabolite, 848
- Detrital rocks, 663
- Deuterium, 93
 - atom, 5
- Dew, 542
- Dew point, 534
- Dewatering sludge, 495
- Dibromoethane, 1-2-, 323
- Dichlorodiphenyltrichloroethane (DDT), 441
- Dichlorodifluoromethane, 589
- Dichloromethane, 588
- Dichlorophenoxyacetic acid, 2,4- (2,4-D), 445
- Diesel fuel from soybean oil, 906
- Diethyl ether toxicity, 867
- Digestion of samples, 1170
- Digital number, 13
- Dilute solution, 65
- Dilution of solutions, 254
- Dimethylsulfoxide (DMSO), 328
- Dimethyl sulfide, atmospheric, 573
- Dimethylcarbonate alkylating agent, 948
- Dimethylformamide in the atmosphere, 591
- Dimethylmercury, 423
 - in water, 393
- Dimethylnitrosamine, 321
 - mutagen, 852
- Dimethylsulfate toxicity, 871
- Dioxin (TCDD), 447
- Dipole water molecule, 247
- Diquat, 444
- Direct-acting carcinogens, 854
- Disaccharides, 347
- Discharge, stream, 667
- Discrete communications signals, 893
- Disinfection byproducts, 486
- Disinfection of water, 497
- Dispersion aerosol, 564
- Disposal above ground of wastes, 1060
- Disposal of wastes, 1060
- Dissociation of acids and bases, 216
- Dissolution in rock weathering, 666
- Dissolved air flotation, 479, 1038
- Dissolved load, 378
 - in streams, 670
- Dissolved organics removal from water, 486
- Distillation, 70
 - bottoms, 71, 1039
 - effect on organic air pollutants, 621
 - in waste treatment, 1038
- Distribution between phases, 262
- Distribution coefficient, 263
- Distribution coefficient and hazardous wastes, 1010
- Distribution law, 263
- District heating, 1115
- Divergent boundaries, 658
- Diversity of organisms, 803
- DNA. *See* Deoxyribonucleic acid (DNA)
 - modified, 359
- Dolomite, 663
- Dominant plant species, 798
- Donor layer in photovoltaic cell, 291
- Dose of toxicants, 841
- Dose-response relationships, 841
- Double covalent bond, 155
- Double helix, structure in DNA, 357
- Downs cell, 289
- Drainage basin, 667
- Dredging, 762
- Drought from global warming, 608
- Drowned valleys, 672
- Dry cell, 281
- Drying in waste treatment, 72
- Drying waste, 1039

Durability of products, 974

Durable products, 970

Dust

 bowl, 714

 explosions, 997

Dynamic phase, 848

Dystrophic lakes, 376

E

E horizon, soil, 694

E^0 , measurement, 293

E^0 , standard electrode potential, 292

Earth science, 654

Earthquakes, 736

Economic geology, 655

Ecosystem, 797

EDTA. *See* Ethylenediaminetetraacetate (EDTA)

 radioactive cobalt transport, 1011

 water hardness determination, 1161

Effectiveness of hazardous waste

 management, 1029

Effects of hazardous wastes, 1007

Elastomers, 909

Electric current, 19

Electrical energy, 1078

Electrical engineering, 898

Electricity and chemistry, 275

Electricity to cause chemical reactions

 to occur, 955

Electrochemical cell, 280, 294

Electrochemical methods of analysis, 1141

Electrochemical phenomena, 275

Electrochemistry, 275

Electrodeposition removal of metals

 from water, 485

Electrodes, 281

 potential, E, 294

Electrodialysis, 494, 1041

Electrolysis

 in waste treatment, 1045

 of water, 286

Electrolytes, 215

Electrolytic cell, 286

Electrolytic manufacture of chemicals, 288

Electrolytic reaction, 286

Electromagnetic radiation, 53, 107

Electron, 90

 activity, 275

 in water, 387

 affinity, 145

 configuration, 117

 of elements, 2–20, 119, 125

 of the first 20 elements, figure, 122

 of helium, 118

 of hydrogen, 118

 of monatomic ions, 142

 and the periodic table, 122

 shell, 96

Electron-dot formulas, 94

Electron-dot symbols, 94

Electronegativity

 and covalent bonding, 156

 of the first, 20 elements, 157

Electronically excited molecule, 556

Electronics, 896

 engineering, 898

Electroplating, 289

Electrostatic precipitators, 603

Elements, 5

 pollutants in water, 419

 toxic, 858

 transitions and bacteria, 400

Eluviation, soil, 694

Embedded utility, 968

Empirical formula, 163

 from percentage composition, 164

Emulsions, 1038

 breaking, 1038

Encapsulation of wastes, 1059

End point, 257, 1132

Endocrine glands, 351

Endogenous substances, 845

Endoplasmic reticulum, 342

Energy, 19, 1078

 conservation, 1088

 devices, 1083

 efficiency, 1084, 1087

 generators, 959

 levels

 of atomic orbitals, 113

 for electrons in atoms, 111

 materials pyramid, 968

 problem, 1077

 sources, 1079

 transfer in the atmosphere, 530

Engineering, 895, 897

Engineering geology, 655, 750

English system of measurement, 18

Environmental analysis, 1157

Environmental biochemistry, 340

- Environmental chemistry definition, 2
 Environmental chemistry of hazardous wastes, 1004
 Environmental geochemistry, 665
 Environmental geology, 654
 Environmental impacts in industrial ecology, 964
 Enzymes, 351
 function impairment by toxicants, 849
 substrate complex, 352
 Eolian materials, 693
 Epicenter, earthquake, 736
 Epigenetic carcinogen, 854
 Epilimnion, 377
 Equilibrium constant (expression), 261
 Equilibrium solution, 221
 Equivalence point, 1132
 Erosion, 379
 of soil, 714
 stream, 671
 Error in chemical analysis, 1128
 Esters, atmospheric, 582
 Estrogenic substances, 857
 Estuaries, 376, 672
 Ethanol
 from corn, 906
 fuel, 1108
 toxicity, 865
 Ethene (ethylene), 314
 Ethers
 atmospheric, 587
 toxicities, 867
 Ethylene
 atmospheric, from plants, 580
 ethane, 314
 glycol
 solvent, 951
 toxicity, 866
 oxide, 319, 588, 1000
 synthesis, 949
 toxicities, 865
 Ethylenediaminetetraacetate (EDTA), 391
 Ethylsulfuric acid, 328
 Eukaryotic cells, 340
 Eutrophic lakes, 376
 Eutrophication, 428
 Evaporation
 of liquids, 62
 in waste treatment, 1039
 Evaporites, 661, 768
 Evolution, 800
 of gas reaction, 193
 Excavations on the geosphere, 753
 Exchangeable cations in clays, 675
 Excited singlet state, 557
 Excited state, 108, 557
 Excited triplet state, 557
 Exhaust hydrocarbons control, 628
 Exosphere, 528
 Expansive soil, 745
 Exponential notation, 12
 Exposure reduction, 938
 External recycle streams, 960
 External treatment of water, 469
 Extractive energy industry, 907
 Extractive metallurgy, 771, 902
 Extractive mineral industries, 907
 Extractive resources, 656
 Extractive sources of raw materials, 901
- ## F
- F-type wastes, 992
 Fabric filters, 601
 Facilities, 973
 Facultative bacteria, 397
 Fahrenheit temperature, 23
 Farming, 903
 Fates of hazardous wastes, 1008
 Fault, 659
 Federal Insecticide, Fungicide, and Rodenticide (FIFRA) Act, 690
 Feedback mechanisms in global warming, 607
 Feedstocks, 943
 Fermentation, 360, 823
 reaction, 402
 Ferrate water treatment, 488, 502
 Ferrobacillus iron bacteria, 406
 Fertile crescent, 688
 Fertilizers, 710
 Fibrous proteins, 346
 FIFRA. *See* Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
 Filled electron shell, 96
 Fillers, 777
 Filter alum, 383
 Filtration, 1038
 of solids from water, 477

- First law of thermodynamics, 1079
 Fischer–Tropsch fuel synthesis, 1111
 Fixation of wastes, 1057
 Fixed automation, 912
 Fixed-hearth incinerators, 1051
 Flagella, 398
 Flammability range, 996
 Flammable compressed gas, 996
 Flammable liquid, 996
 Flammable substances, 996
 Flash point, 996
 Flexible automation, 912
 Flocculants, 268
 Flocculation
 of colloidal particles, 268
 of colloids, 394
 Flood, 757
 crest, 758
 Floodplain, stream, 668
 Flotation, 1038
 Flowing water, 378
 Flows in the anthrosphere, 883
 Fluid flow, 900
 Fluidized bed
 coal combustion, 613
 incinerators, 1051
 Fluorapatite, 711
 phosphate source, 776
 Fluorescence, 558
 Fluoride
 atmospheric, 576
 ion-selective electrode, 298
 Fluorine, 103
 atmospheric, 576
 electron configuration, 121
 resources, 776
 toxicity, 858
 Fluorspar, 776
 Fly ash, 567, 604
 Focus, earthquake, 736
 Fog, 564
 Food
 chain, 798
 production industries, 907
 web, 798
 Forest floor, 693
 Formaldehyde
 atmospheric, 585
 toxicity, 866
 Formalin toxicity, 867
 Formation constant (expression), 262
 Formic acid toxicity, 867
 Formula
 chemical, 161
 mass, 50, 193
 unit, 50
 Four-cycle internal combustion engine, 629
 Fractional distillation, 71
 Fractionating column, 71
 Fracture of minerals, 661
 Free available chlorine, 499
 Free mineral acid in water, 383
 Free radicals, 557, 559
 in smog formation, 634
 species, 314
 Free-flowing rivers, 379
 Freeze drying
 and liquid nitrogen, 101
 waste, 1039
 in waste treatment, 72
 Freezing point depression, 259
 Freon, 103, 589, 623
 Frequency of electromagnetic radiation, 107
 Frequency of radiation, 54
 Fresh water, 370
 Freundlich equation, 1010
 Fronts, weather, 535
 FTIR air analysis, 1185
 Fuel cells, 290, 1086
 Fuel economy, U.S. auto fleet, 1090
 Fulvic acid, 391
 Functional groups, 318, 947
 table, 319
 Fungi, 396
 Fungicides in water, 439
 Fusion, nuclear, 1099
- G**
- Gallionella* bacteria in water, 397
Gallionella iron bacteria, 406
 Gamma radiation, 452
 Gas chromatography, 1143
 Gas emissions from wastes, 1063
 Gas laws, 57
 Gases, 54
 Gasohol, 1108
 Gelbstoffe, 392
 Gene, 358

- General gas law, 59
 Genetic diversity, 800
 Genetic engineering, 359
 Genetically engineered crops, 829
 Genotoxic carcinogens, 854
 Geochemical prospecting, 780
 Geochemistry, 665
 Geology, 654
 Geomorphology, 657
 Geophysical prospecting, 780
 Geosphere, 553
 Geothermal energy, 1100
 Gigawatts, 1079
 Glaciers, 672
 Glass electrode, 298, 1141
 Glass recycling, 1033
 Glassification of wastes, 1058
 Globular proteins, 346
 Glucose, 347
 biomaterials, 808
 feedstock, 817, 946
 Glucuronide, 846
 Glycogen, 348
 Glycol ether solvent, 951
 Glycoproteins, 349
 Glyphosate (Roundup) herbicide, 690
 Gold resources, 773
 Golgi bodies, 342
 Gram, 21
 Graphite furnace atomic absorption, 1139
 Grasslands, 714
 Gravel, 777
 Gravimetric analysis, 1130
 Green chemistry, 4, 934
 of matter, 74
 twelve principles, 935
 Green revolution, 720, 903
 Green sources of minerals, 779
 Greenhouse effect, 532, 573
 Greenhouse gas from various fossil
 fuels, 1081
 Gripper in robotics, 913
 Grit removal from water, 470
 Groins, beach, 749
 Groundwater, 373, 379, 669
 depletion, 373
 Groups, periodic table, 8, 93
 Guanine, 357
 Guanine methylation, 856
 Gypsum, 662
- H**
 Haber process for ammonia synthesis, 710
 Habitat restoration, 806
 Hadley cells, 537
 Half-cells, 281
 Half-life
 of hazardous wastes in the atmosphere,
 1015
 of radioactive materials, 453
 Half-reaction, 98, 281
 Halite, 661
 Hallucinations, 850
 Halogenated organic compounds, natural,
 in water, 438
 Halons, 325, 589
 Hardness
 of minerals, 661
 removal from water, 480
 water, 385, 386
 Hazard reduction, 938
 Hazardous and Solid Wastes Amendments
 Act (HSWA), 990
 Hazardous materials in design for
 environment, 974
 Hazardous substance, 988
 Hazardous waste, 988
 in anthrosphere, 1008
 in the biosphere, 1016
 fuel, 1049
 generators, 995
 in geosphere, 1009
 in the hydrosphere, 1011
 management, 1029
 number, 992
 Haze, 564
 Headspace analysis, 1172
 Heat, 22
 of condensation, 68
 energy, 27
 of fusion, 69
 transfer, 900
 of vaporization, 68
 Heavy metals, 940
 removal from water, 485
 toxicity, 858
 in water, 420
 Heirloom species, 802
 Helium, 95
 electron configuration, 118

- Henry's law, 263
 Heptachlor, 441
 Herbicides in water, 443
 Herbivores, 799
 Heterogeneous mixture, 48
 Heterosphere, 545
 Heterotrophic
 bacteria in water, 397
 organisms, 395
 Hexachlorobenzene, 447
 Hexachlorobutadiene, 324
 Hexane solvent, 951
 Hexane, *n*-, toxicity, 862
 High tech, 919
 High-level radioactive wastes, 765
 High-performance liquid chromatography, 1144
 Hippuric acid from toluene, 864
 Hi-Vol sampler, 1183
 Hollow cathode lamp, 1139
 Homogeneous mixture, 48
 Homogenized colloidal suspension, 265
 Homosphere, 545
 Horizons, soil, 693
 Hormones, 351
 HSWA. *See* Hazardous and Solid Wastes Amendments Act (HSWA)
 Humic acid, 391
 Humic materials in soil, 699
 Humic substances in water, 391
 Humidity, 534
 Humification, 699
 Humin, 391
 Humus, soil, 699
 Hund's rule of maximum multiplicity, 115
 Hurricanes, 746
 Hybrid vehicle, 1090
 Hybrids (plant), 904
 Hydrated ion, 213
 Hydration
 of colloids, 266
 of minerals, 666
 of salts, 227
 Hydrocarbons, 308
 atmospheric pollutant, 582
 biodegradation, 402
 determination in air, 1182
 Hydrochloric acid toxicity, 860
 Hydrochlorofluorocarbons, 626
 Hydrofluoric acid toxicity, 860
 Hydrofluorocarbons, 626
 Hydrogen
 bond, 249, 368
 chloride
 atmospheric, 577
 toxicity, 860
 cyanide toxicity, 859
 electron configuration, 118
 elemental, 95
 fuel, 1114
 production, 95
 fluoride
 atmospheric, 576
 toxicity, 860
 fuel, 287
 ion, 210
 sulfide
 atmospheric, 578
 toxicity, 861
 Hydrogenation reaction, 314
 Hydrohaloalkanes, 626
 Hydrohalocarbons, 325
 Hydrologic cycle, 371
 Hydrolysis
 reaction, 225
 reactions of hazardous wastes, 1012
 in waste treatment, 1046
 Hydrolyzing enzymes, 353
 Hydronium ion, 250
 Hydroperoxyl radical, 560
 in smog formation, 635
 Hydrophilic colloids, 265
 Hydrophobic
 colloids, 265
 effect, 952
 Hydrosphere, 367, 370
 pollution, 417
 Hydrothermal mineral deposits, 768
 Hydroxide ion, 210
 Hydroxyapatite phosphate source, 776
 Hydroxybenzoic acid, *p*-, by
 bioconversion, 825
 Hydroxybutyric acid, 3-, biosynthesis, 828
 Hydroxyl radical, 560
 reaction with wastes in the atmosphere, 1015
 in smog formation, 635
 Hydroxyquinoline, 8-, 1131
 Hyperaccumulators of metals, plants, 709
 Hyperfiltration, 1041
 Hypersensitivity to toxicants, 844, 857

1218 Index

- Hypochlorous acid, 229
 - in water disinfection, 499
- Hypolimnion, 377
- Hyposensitivity to toxicants, 844
- I**
- Ice, effects on geosphere, 672
- Ice age, 541
- Ideal gas, 57
- Ideal gas constant, 59
- Igneous rock, 663
- Ignitability characteristic of wastes, 992
- Illite, 674
- Illuviation, soil, 695
- Immigrant species, 801
- Immobilization of wastes, 1056
- Immune system response to toxicants, 857
- Immunoassay
 - analysis of water, 1166
 - screening, 1146
- Immunological methods of xenobiotics analysis, 1193
- Immunosuppression by toxicants, 857
- Impact analysis, 969
- Impactors, air sampling, 1183
- Impoundments of liquid wastes, 1061
- Improvement analysis, 969
- Incinerable wastes, 1049
- Incineration
 - systems, 1050
 - of wastes, 1049
- Indeterminate errors, 1128
- Indicator, 257
 - of exposure analysis, 1186
 - species, 801
 - titration, 1132
- Inductively coupled plasma atomic emission analysis, 1140
- Industrial ecology, 4, 934, 956
- Industrial ecosystem components, 958, 959
- Industrial metabolism, 961
- Industrial process, 908
- Industrial wastewater treatment, 475
- Industries, 906
- Inertia of biological communities, 803
- Inertial mechanisms for particle removal, 601
- Infiltration of groundwater, 379
- Influent streams, 669
- Infrared radiation, 53
 - in the atmosphere, 531
- Infrastructure, 887
 - rebuilding, 988
- Inherent safety, 975
- Initiation stage of carcinogenesis, 854
- Inner electrons, 97
- Inner shell of electrons, 97
- Inoculum in composting wastes, 1056
- Inorganic
 - compounds toxicity, 859
 - pollutants in water, 426
 - removal from water, 490
 - soil components, 697
 - species in the atmosphere, 563
 - substances, 47
- Insecticides in water, 439
- In situ* immobilization, 1064
- In situ* thermal treatment processes, 1066
- In situ* treatment of wastes, 1064
- Insoluble substances, 64, 244
- Inspection with robotics, 914
- Instrumental methods of chemical analysis, 1127
- Integrated circuit, 899
- Interconnectedness, 897
- Interferences, 1127
- Intermolecular energy transfer, 558
- Internal (geological) structures, 660
- Internal combustion piston engine, 1086
- Internal treatment of water, 469
- International System of Units, 18
- Inventory analysis, 969
- Inversions and air pollution, 539
- Inversions atmospheric, 539
- Iodine toxicity, 858
- Ion, 142
 - absorption and colloidal particle charge, 267
 - in the atmosphere, 496
 - attraction, energy, 147
 - chromatography for water analysis, 1163
 - exchange
 - in soil, 703
 - treatment of water, 482
 - in waste treatment, 1047
 - monatomic, electron configurations, 142
 - replacement and colloidal particle charge, 267

replacement in clays, 674
 selective electrodes, 297, 1141
 size, 147
 Ionic bonding, 142
 energetics, 145
 Ionic bonds, 10
 Ionic compound formation, 149
 Ionic compound names, 168

Ionization
 of acids and bases, 216
 energy, 145
 Ionizing radiation, 452
 Ionosphere, 528
 Iron
 bacterial action on, 406
 removal from water, 484
 resources, 773
 in soil, 697

Irreversible toxic effects, 844, 849
 Isocyanates toxicities, 870
 Isomerase enzymes, 354
 Isoprene atmospheric, 581
 Isotonic solution, 261
 Isotope, 6, 91, 93

J

Jaundiced skin, 850
 Jet streams, 538
 Joint, 659
 Joule, 1078

K

K-type wastes, 992
 Kalundborg industrial ecosystem, 963
 Kaolinite, 674
 Kelvin temperature, 24
 Kenaf materials, 911
 Kepone, 448
 Ketones
 atmospheric, 585
 toxicities, 866
 Keystone species, 801
 Kiln dusts, 604
 Kilogram, 21
 Kilometer, km, 21
 Kinetics chemical, 899
 Kinetics energy, 1078

Kinetics phase, 847
 Krakatoa volcano, 740
 Krebs cycle, 360
 Kyoto treaty, 610

L

Lactic acid from fermentation, 823
 Lactoferrin protein, 815
 Land saving, 718
 Land surface movement,
 destructive, 742
 Land treatment of wastes, 1055
 Landfill of wastes, 1060
 Landslides, 742
 Lapse rate, 535
 LAS. *See* Linear alkyl sulfonate (LAS)
 surfactant
 Lasers, 920
 Lattice energy, 147
 Lava, 739
 Le Châtelier's principle, 261
 Leachate, 1062
 from hazardous wastes, 1010
 treatment, 1063
 Leaching in waste treatment, 73, 1040
 Lead
 resources, 774
 storage battery, 283
 toxicity, 859
 in water, 421
 Leaf
 alcohol, 587
 necrosis from sulfur dioxide, 613
 Legumes, 706
 Length, units, 21
 Levees, 758
 Lewis formulas, 94
 Lewis symbols, 94
 Lidar air analysis, 1185
 Life cycle
 assessment, 969
 in industrial systems, 966
 Life systems, 797
 Ligand, 262, 389
 Ligase enzymes, 355
 Lignin
 biomaterial, 908
 feedstock, 822

- Lignocellulose
 - fuels, 1110
 - materials, 910
 - Lime-soda softening of water, 481
 - Limestone, 663
 - calcination, 194
 - Limonene, atmospheric, 581
 - Lindane, 441
 - Linear alkyl sulfonate (LAS) surfactant, 437
 - Lipid, 349
 - metabolism, interference by toxicants, 850
 - oils, 809
 - Liquefaction of earth during
 - earthquakes, 737
 - Liquid injection incinerators, 1051
 - Liquids, 54, 62
 - Listed wastes, 992
 - Liter, 22
 - Lithification, 663
 - Lithium, 97
 - in batteries, 99
 - electron configuration, 119
 - in green technology, 99
 - ion battery, 285
 - Lithosphere, 660
 - Livestock farming, 688, 903
 - Local exposure to toxicants, 839
 - Love canal waste site, 989
 - Lower flammability limit, 996
 - Low-excess-air firing for NO_x control, 616
 - Low-level radioactive wastes, 764
 - Luminescence, 558
 - Luminous intensity, 19
 - Luster
 - of metals, 97
 - of minerals, 661
 - Lyase enzymes, 354
 - Lysosome, 342
 - Lysozyme protein, 816
- M**
- Machines, 895
 - Macronutrients, plant, in water, 429
 - Macronutrients in soil, 703
 - Magma, 663
 - Magnesium, 105
 - removal from water, 481
 - in soil, 704
 - Magnetic quantum number, 112
 - Magnitude, earthquake, 737
 - Malathion, 442, 872
 - Malleable, metals, 97
 - Manganese
 - removal from water, 484
 - resources, 774
 - in soil, 697
 - Manipulators in robotics, 913
 - Manufacturing, 908
 - Margin of safety, 843
 - Marine inversion, 539
 - Mass action effect, 262
 - Mass number, 91
 - Mass spectrometry, 1145
 - Mass transfer, 900
 - Mass units, 20
 - Materials
 - flow in industrial ecosystems, 962
 - manufactured, 902
 - processing and manufacturing sector, 960
 - science, 909
 - Matter, 45
 - Mean free path in the atmosphere, 527
 - Meanders, stream, 668
 - Measurements in chemistry, 18
 - Measuring electrode, 297
 - Mechanical energy, 1078
 - Mechanical engineering, 897
 - Mechanization, 912
 - Media, 950
 - Medium in communication, 893
 - Megagram, 21
 - Megawatts, 1079
 - Melting point, 66
 - temperature, 26
 - Membrane processes, 74, 1041
 - for water treatment, 493
 - Mercaptans, 326
 - Mercapturates analysis, 1191
 - Mercury
 - atmospheric, 568
 - methylated, toxicities, 862
 - resources, 774
 - toxicity, 859
 - in water, 421
 - Mesosphere, 528
 - Messenger RNA, 359
 - Metabolic processes, 360
 - Metabolism, 360, 795, 1016

- Metal**, 47, 97
 in biological samples analysis, 1187
 complexes, 384
 from geosphere, 771
 heavy, toxicity, 858
 ions
 as acids, 212
 in water, 384
 recycling, 1033
 toxic, in the atmosphere, 568
- Metalloids**, 47, 100, 420
- Metallurgy**, 771, 895, 902
- Metamorphic deposits of minerals**, 769
- Metamorphic rock**, 663
- Metathesis reaction**, 192
- Meteoritic water**, 379, 669
- Meteorology**, 532
- Meter**, 21
- Methanation reaction**, 196
- Methane**
 atmospheric, 580
 forming bacteria, 402
- Methanol**, 320
 toxicity, 865
- Methemoglobinemia**, 869
- Methyl isocyanate toxicity**, 870
- Methyl parathion**, 442
- Methyl radical**, 560
- Methylamine**, 321
- Methylmercury compounds in water**, 393
- Methylmercury water pollutant**, 422
- Methylperoxyl radical**, 560
- Methylphosphine**, 328
- Methylsulfuric acid**, 328
- Methylsulfuric acid toxicity**, 871
- Methyltertiarybutyl ether (MTBE)**, 320, 438
- Metric system of measurement**, 18
- Metric ton (tonne)**, 21
- Micelles**, 266
- Microclimate**, 541
- Microfiltration**, 493
- Microgram**, 21
- Microliter**, 22
- Micromachines**, 917
- Micrometer**, 21
- Micronutrients**
 plant, in water, 429
 in soil, 708
- Microorganisms in water**, 395
- Microstraining water treatment**, 477
- Microwaves to enhance reactions**, 954
- Mileage standards**, 610
- Milligram**, 21
- Milliliter**, 22
- Millimeter**, 21
 of mercury pressure, 27
- Mineral**, 660
- Mineralization**, 1016
- Minamata Bay, pollution by mercury**, 422
- Minimization**
 of global warming, 608
 in processes, 976
- Mining**, 901
 surface, 761
- Minor-use pesticides**, 690
- Mist**, 564
- Mitochondria**, 342
- Mixture**, 48
- Modeling with computers**, 915
- Molar concentration**, 65, 252, 258
- Molar mass**, 50, 193
- Molar volume of gas**, 59
- Mole**, 50, 193
- Mole ratio method**, 196
- Mole ratios**, 197
- Molecular formula**, 163, 310
- Molecular geometry in organic chemistry**, 307
- Molecular mass**, 11
- Molecular separation**, 74, 1041
- Molecules**, 8
- Molina, Mario**, 625
- Molybdenum resources**, 774
- Monomers**, 330
- Monosaccharides**, 347
- Monsoon**, 371, 540
- Montmorillonite**, 674
- Moraines**, 673
- Mountaintop removal strip mining**, 770
- MTBE. See Methyltertiarybutyl ether (MTBE)**
- Muconic acid**
 cis,cis-, 818
 trans,trans-, from benzene, 863
- Multiple bonds, covalent**, 154
- Multiple proportions, law**, 89
- Municipal refuse disposal**, 763
- Municipal water treatment**, 467
- Mutagenesis**, 851
- Mutagens**, 851
- Mutation**, 359, 800

N

- Names of chemical compounds, 167
Naming acids, bases, and salts, 228
Naming ionic compounds, 168
Nanofiltration, 493
Nanometer, 21
Nanoscience, 918
Nanotechnology, 917
Naphthalene, 317
Naphthylamines toxicities, 869
Naphthylthiourea, 1- (ANTU), 328
Native species, 801
Natural capital of the atmosphere, 523
Natural gas, 1092
Natural selection, 800
Natural water purification
 processes, 502
Neon, 103
 electron configuration, 121
Nernst equation, 296, 1141
Nerve gas, 872
Neutral solutions, 256
Neutralization
 acid–base, in waste treatment, 1042
 reaction, 210
Neutron, 90
New scrap, 782
Nicaid battery, 284
Nickel resources, 774
Nickel–metal hydride battery, 286, 1090
Nitrate
 in farm wells, 707
 radical in atmospheric chemistry, 639
 reduction, 404
Nitric oxide
 atmospheric, 575
 production from engines, 615
Nitrification, 403
Nitriles toxicity, 869
Nitrilotriacetate (NTA), 322, 389
Nitrite ion water pollutant, 428
Nitro compounds toxicities, 869
Nitrobenzene toxicity, 869
Nitrogen, 101
 in the atmosphere, 546
 compounds, organic, toxicities, 868
 cycle, 102, 402
 cycle and soil, 704
 electron configuration, 120
 fixation, 403
 in soil, 706
 microbial transformations, 402
 removal from water, 492
 in soil, 704
Nitrogen oxides
 analysis, 1179
 atmospheric, 575
 control, 616
 harmful effects, 615
 principal atmospheric reactions, 576
Nitroglycerin, 975
 reactivity, 1000
Nitromethane toxicity, 869
Nitrosamines (N-nitroso) compounds
 toxicities, 869
Nitrous oxide
 atmospheric, 575
 toxicity, 860
N-nitroso (nitrosamine) compounds
 toxicities, 869
Nobel Prize in environmental
 chemistry, 625
Noble gas, 103, 106
 electron configuration, 104
Nomenclature of organic
 compounds, 310
Nondispersive infrared analyzer, 1181
Nonlethal effects of toxicants, 842
Nonmetals, 47
 mineral resources, 772
Nonpoint sources of water pollution, 761
Nonpolar covalent bond, 158
Normal boiling point, 66
Normals in response to toxicants, 844
NO_x, atmospheric, 575
NTA. *See* Nitrilotriacetate (NTA)
NTA (trisodium nitrilotriacetate), 322
Nuclear body, 398
Nuclear energy, 1097
Nuclear fission, 1097
Nuclear fusion, 1099
Nuclear powerplant, 1098
Nucleic acids, 355
Nucleoside, 356
Nucleotide, 356
Nucleus, atomic, 6
Nuée ardente, 739
Nutrients, plant, in water, 429
Nuts, 903

O

- O horizon, soil, 693
- Observable effects of toxicant exposure, 850
- Octahedral sheets in clay, 674
- Octet of electrons, 104
- Octet rule
 - in chemical bonding, 141
 - in covalent bonding, 152
 - exceptions, 158
- Odor
 - removal from water, 489
 - from toxicant exposure, 850
- Ogallala aquifer, 373, 374
- Oil shale, 1092
- Old scrap, 782
- Oligotropic lakes , 376
- Omnivores, 799
- Open-pit mining, 762
- Operator in wave function, 110
- Optical
 - communication, 894
 - fiber, 894
 - memory, 894
- Orange County Water District water project, 506
- Orbitals, 111
- Ore, 769
- Organelles in cells, 341
- Organic
 - air pollution, 621
 - atmospheric, 579
 - chemicals, 307
 - chemistry, 307
 - compounds, atmospheric, from natural sources, 580
 - determination in air, 1182
 - matter in soil, 698
 - sedimentary rocks, 663
 - substances, 47
 - water pollutants, 433
- Organohalide
 - atmospheric, 588
 - compounds, 322
 - degradation by bacteria, 405
 - toxicities, 870
- Organometallic compound
 - toxicities, 861
 - in water, 393, 424
- Organonitrogen compounds, 321
 - atmospheric, 590
- Organooxygen compounds, 319
- Organophosphate insecticides, 442
- Organophosphorus compounds, 328
 - toxicities, 871
- Organosulfur compounds, 326
 - atmospheric, 590
 - toxicities, 871
- Organotin compounds, 425
- Oriental quantum number, 112
- Osmosis, 259
- Osmotic pressure, 261
- Osteomalacia, 858
- Outer electrons, 97
- Outer shell of electrons, 97
- Overburden, 762
- Overturn in bodies of water, 377
- Oxic bacteria in water, 397
- Oxic respiration, 360
- Oxidants analysis, 1180
- Oxidase enzymes, 354
- Oxidation, 276, 947
 - half-reaction, 281
 - numbers, 277
 - in rock weathering, 666
 - in water treatment, 467
- Oxidation–reduction, 276
 - of hazardous wastes, 1013
 - reaction, 262, 277
 - redox in water, 387
 - in solution, 279
 - in waste treatment, 1044
- Oxides, organic, toxicities, 865
- Oxidized species in water, 387
- Oxidizers, 939, 997
- Oxidizing medium in water, 387
- Oxidoreductase enzymes, 354
- Oxyacids of chlorine, 229
- Oxygen, 102
 - in the atmosphere, 543
 - electron configuration, 121
 - organic compounds
 - toxicities, 865
 - sag curve, 433
 - in water, 432
- Ozone, 102, 545
 - depletion, stratospheric, 621
 - layer, 102
 - toxicity, 858
 - for water treatment, 500
- Ozonide, 636

P

- p* orbital shapes, 121
- P-type acute hazardous wastes, 992
- P-waves, earthquake, 737
- PAH compounds in soil, 699
- Paleontology, 676
- PAN. *See* Peroxyacetyl nitrate (PAN)
- Paper recycling, 1033
- Paraffins, 268
- Paralysis, 850
- Paralytic ileus, 850
- Paramagnetic compounds, 161
- Paraquat, 444
- Parathion, 329, 442, 872
- Part per billion, ppb, 252
- Part per million, ppm, 251
- Particle
 - in the atmosphere, 563
 - effects in the atmosphere, 600
 - emissions control, 601
 - reactions in the atmosphere, 565
- Particulates, 563
 - matter determination in air, 1182
- Partition coefficient, 263
- Pascal unit of pressure, 27
- PCB. *See* Polychlorinated biphenyl (PCB)
- pE, 387
- Pedology (soil science), 692
- Pegmatite, 767
- Penicillin by fermentation, 824
- Pentachlorophenol, 326
- pE–pH diagram for iron
 - in water, 388
- Percentage composition from chemical formulas, 162
- Perched water table, 670
- Perchloric acid, 229
- Perchloroethylene solvent, 247
- Periodic table, 7, 8
 - development, 93
- Periods, periodic table, 93
- Permafrost, 745
- Permeability
 - of groundwater aquifers, 380
 - of rock formations, 668
- Permeable-bed treatment, 1066
- Permeate, 493, 1041
- Peroxyacetyl nitrate (PAN), 632
- Persistent nonbiodegradable organic materials, 940
- Pervious rock, 670
- Pesticides
 - and agriculture, 615
 - degradation on soil, 717
 - in water, 439
- Petroleum, 1092
- pH, 220
 - definition, 255
 - and hydrogen ion concentration, 255
 - meter, 299
- Phanaerochaete chrysosporium*, 1017
- Pharmaceuticals in water, 466
- Pharmaceuticals metabolites in water, 466
- Phase
 - change material, 69
 - distribution, 262
 - interactions in water, 393
 - separations in waste treatment, 1038
 - transfer in waste treatment, 1039
 - transition in waste treatment, 72, 1038, 1039
- Phase I analytes in biological samples, 1189
- Phase I reactions of toxicants, 846
- Phase II reaction products analysis, 1191
- Phase II reactions of toxicants, 846
- Phenol, 319
 - atmospheric, 587
 - from benzene metabolism, 863
 - toxicity, 866
- Phenylthiourea, 328
- Phosphate
 - minerals, 711
 - water pollutant, 429
- Phosphine toxicity, 861
- Phosphoglycerides, 350
- Phosphorescence, 558
- Phosphorothionate insecticides, 329
- Phosphorus, 105
 - microbial transformations, 405
 - removal from water, 491
 - in soil, 708
 - water pollutant, 429
 - white, toxicity, 858
- Phosy jaw, 858
- Photochemical
 - process, 313
 - reactions, 520, 556

- in green chemistry, 955
- of pesticides on soil, 717
- smog, 627
- formation process, 634
- Photoionization, 559
- Photolysis
 - reactions of hazardous wastes, 1014
 - treatment of water, 489
 - in waste treatment, 1048
- Photolytic reactions in waste treatment, 1048
- Photonics, 894
- Photosensitized reaction, 558
- Photosynthesis, 360, 401
 - productivity, 810
 - pulse of atmospheric carbon dioxide, 572
- Photovoltaic cells, 291
- Phraetic eruption, 740
- Phthalate toxicities, 867
- Physical forms of wastes, 1003
- Physical methods
 - of analysis, 1127
 - of waste treatment, 1036
- Physical precipitation, 72
 - waste treatment, 1039
- Physical processes, 48
- Physical properties
 - of matter, 50
 - of wastes, 1006
- Physical–chemical wastewater treatment, 475
- Phytoremediation, 709
- Pi (π) electrons, 317
- Pigments, 777
- Pili, 398
- Pinene, α -, atmospheric, 581
- Pinonic acid, atmospheric, 582
- Piston engine, internal combustion, 1086
- Placer deposits of minerals, 768
- Plasma
 - blood, 259
 - incinerators, 1051
- Plastic recycling, 1033
- Plate tectonics, 657
- Point sources of water pollution, 761
- Polar
 - covalent bond, 158
 - molecule, 368
- Polishing treatment of wastes, 1037
- Pollutants
 - in soil, 716
 - water, 417, 418
- Pollution potential of hazardous wastes in the atmosphere, 1014
- Pollution Prevention Act of, 1990, 990
- Polychlorinated biphenyl (PCB), 448
 - atmospheric, 589
 - in Hudson River sediment, 1018
 - in soil, 716
- Polycyclic aromatic hydrocarbons, 318
 - atmospheric, 584
- Polyethylene, 330
- Polymers, 330, 909
 - biosynthesis, 828
- Polyneuropathy, 862
- Polypeptides, 343
- Polysaccharides, 347
- Polyvinylchloride, 330
- Pompeii, 739
- Population, 797
 - crash, 801
- Porosity
 - of groundwater aquifers, 380
 - of rock formations, 668
- Positive hole in semiconductor, 291
- Potassium, 105
 - resources, 778
 - in soil, 708
- Potential energy, 1078
- Potential in exposure to toxicants, 841
- Potentiometry, 297
- Pott, Sir Percival, and cancer of the scrotum, 841
- POTW. *See* Publicly owned treatment works (POTW)
- Power, 1079
- Poza Rica, Mexico, hydrogen sulfide poisoning, 578
- ppb, part per billion, 252
- ppm, part per million, 251
- Precipitation
 - of metals in waste treatment, 1043
 - reaction, 193
 - of hazardous wastes, 1013
- Prefixes (on units), 18, 20
- Preservation of water samples, 1159
- Pressure, 27
 - of gases, 56
- Primary air pollutants, 599
- Primary carcinogens, 854
- Primary materials producers, 959

- Primary photochemical reaction in smog formation, 633
 Primary reaction of toxicants, 848
 Primary recovery of crude oil, 1092
 Primary structure, geological, 658
 Primary structure of protein, 345
 Primary treatment of wastes, 470, 1037
 Principal organic hazardous constituents, 1052
 Principal quantum number, 111
 Procarcinogens, 854
 Process, 973
 intensification in agriculture, 720
 recycle streams, 960
 Processing operations with robotics, 914
 Producers,
 biological, 798
 organisms in water, 395
 Productivity of organisms, 803
 Products, 973
 of chemical reactions, 12
 stewardship, 967
 Programmable automation, 912
 Prokaryotic bacterial cell, 397
 Prokaryotic cells, 340
 Promotional stage of carcinogenesis, 854
 Propionic acid, 320
 Propylene oxide, 588
 Proteins, 342
 biosynthesis, interference by toxicants, 850
 structure, 344
 types, table, 345
 Proton, 6, 90
 Protoxicant, 847
 Proximate carcinogens, 854
Pseudomonas bacteria, 1018
 Publicly owned treatment works (POTW), 470
 Pulse rate, 850
 Pure substance, 48
 Purification of water, 465
 Pyrethrins, 440
 Pyrethroids, 440
 Pyrite, source of atmospheric carbon dioxide, 574
 Pyrite in soil, 701
 Pyroclastics, 739
 Pyrophoric substances, 997
- Q**
- Qualitative analysis, 1125
 Quanta, 54
 Quantitative information from chemical reactions, 193
 Quantum of electromagnetic radiation, 557
 Quantum numbers, 111
 Quantum states, 109
 Quantum theory, 107, 108
 Quaternary structure of proteins, 346
- R**
- Radiation
 in the atmosphere, 531
 budget, Earth, 532, 533
 Radioactive decay, 7
 Radioactive isotopes, 7
 Radioactive particles in the atmosphere, 569
 Radioactivity, 7
 measurement in water, 1166
 Radionuclides, 7
 water pollutant, 450
 Radium in water, 453
 Radon, atmospheric, 569
 Random errors, 1128
 Rapid sand filter, 479
 Rate of reaction, 190
 Raw materials, 901
 acquisition, 900
 Rayleigh scattering, 600
 RCRA. *See* Resource Conservation and Recovery Act (RCRA)
 Reactants, 12
 Reaction in solution, 244
 Reaction rate, 190
 Reaction speed, 190
 Reaction tendency, 292
 Reactive substances, 939
 Reactivity characteristic of wastes, 992
 Reactivity of hydrocarbons, 639
 Reagents, 946
 Recalcitrant substances, 1053
 Recarbonation of water, 481
 Receiver in communication, 893
 Recharge zones, groundwater, 380
 Recombinant DNA, 359
 technology, 920
 Recovery systems for sulfur dioxide removal, 614
 Recyclability of product, 974
 Recyclable commodity, 970

- Recyclables, desirable characteristics, 971
 Recycle streams, 960
 Recycling, 75
 in industrial ecosystems, 962
 mineral commodities, 782
 of wastes, 1032
 water, 504
 Redox compounds, 1001
 Redox reaction, 277
 Reduction, 277, 947
 Reduction half-reaction, 281
 Reductive dehalogenation of wastes, 1054
 Reference electrode, 297
 Regeneration of activated carbon, 488
 Regolith, 693
 Regulatory processes, interference by
 toxicants, 850
 Relative humidity, 534
 Relative toxicities, 842
 Relative uncertainty, 1129
 Remote sources of minerals, 780
 Renewable energy, 1091
 Renewable energy industry, 907
 Renewable resources, 656
 industries, 907
 Renewable sources of raw materials, 901
 Repairability of products, 974
 Repeater in optical communications, 894
 Replacement reaction, 192
 Representative sample, 1126
 Reservoirs, 376
 Residuals in water treatment, 466
 Resilience in organisms, 803
 Resilience of populations, 804
 Resonance
 stabilization, 317
 structures, 160
 Resource Conservation and Recovery
 Act (RCRA), 990
 Respiration, 360, 401
 interference by toxicants, 850
 Respiratory rate, 850
 Response to toxicants, 841, 850
 Restoration ecology, 805
 Retentate, 493
 Reuse of water, 504
 Reverse osmosis, 74, 261, 494, 1041
 Reversibility of toxicity, 844, 849
 Reversible effects of toxicants, 844, 849
 Reversible reactions, 221, 261
 Rheology, 659
 Rhizobium, soil, 707
 Rhizosphere and pesticide degradation, 717
 Ribonucleic acid (RNA), 355
 Ribosomes, 342, 398
 Richter scale, 737
 Risk reduction, 938
 Risks of no risks, 940
 RNA. *See* Ribonucleic acid (RNA)
 Robotics, 909, 913
 Rock cycle, 664
 Rock-forming minerals, 661
 Rotary kiln incinerators, 1051
 Rotating biological reactors for wastewater
 treatment, 471
 Rounding numbers, 17
 Roundup (glyphosate) herbicide, 690
 Route of toxicant exposure, 839
 Rowland, F. Sherwood, 625
 Run-of-the-river reservoirs, 376
- S**
- s* orbital shapes, 119
 S-waves, earthquake, 737
 Salinity, water pollutant, 431
 Salinization of soil, 714
Salmonella bacteria in testing for
 carcinogenicity, 856
 Salt dome storage, 756
 Salts, 211
 as acids, 213
 as bases, 213
 characteristics and names, 171
 naming, 229
 preparation, 225
 Sample, 1126
 cleanup, 1172
 processing, 1126
 Sand, 777
 Sanitary landfills, 763
 Santa Ana wind, 529
 SARA. *See* Superfund Amendments and
 Reauthorization Act (SARA)
 Sarin, 872
 Sasol synthetic fuel plant, 1094
 Saturated solution, 65, 256
 Sawgrass, fuel source, 1111
 Schrödinger equation, 110
 Scoping in life-cycle analysis, 970
 Scrubbers, 602

- Sea levels rising, 749
- Seawalls, 749
- Secondary air pollutants, 599
- Secondary minerals, 661
- Secondary recovery of crude oil, 1092
- Secondary structure
 - geological, 659
 - of protein, 345
- Secondary treatment of wastes, 1037
- Secondary wastewater treatment, 471
- Secure landfills, 764
- Sedimentary deposits of minerals, 684
- Sedimentary rocks, 663
- Sedimentation, 1038
 - by flowing water, 378
 - for particle removal, 601
 - in wastewater treatment, 470
- Sediments, 394, 670
- Segregation of wastes, 1003
- Seismic testing, 754
- Seismic waves, 736
- Seismograph, 737
- Self-regulating industrial systems, 962
- Sensible heat, 531
- Sentences of chemistry, 181
- Service products, 972
- Servomechanisms in robotics, 914
- Settling solids from water, 477
- Sewage, 433
 - sludge, 474
 - treatment, 470
- Shale oil, 1092
- SHE, standard hydrogen electrode, 294
- Shifting cultivation, 712
- SI units of measurement, 18
- Significant figures (digits), 15
 - in calculations, 17
- Silent Spring book, 2
- Silica toxicity, 860
- Silicates, 661
 - for waste solidification, 1059
- Silicon, 105
 - integrated circuit, 899
- Silicon tetrafluoride, atmospheric, 577
- Silo-fillers disease, 615
- Silver resources, 774
- Simple asphyxiants, 862
- Single covalent bond, 155
- Site evaluation for construction on the geosphere, 751
- Site of toxicant exposure, 839
- Slash and burn agriculture, 712
- Slime layer, bacterial, 397
- Sludge
 - sewage, 433
 - in water treatment, 495
- Smart growth, 766
- Smog
 - forming process, 632
 - harmful effects, 640
 - photochemical, 627
- Smoke, 564
- Soap micelles, 267
- Soaps, 435
- Sodium, 105
- Sodium chloride
 - as an ionic compound, 142
 - molten, electrolysis, 288
- Sodium from electrolysis, 289
- Softening water, 481
- Soil, 691
 - acidity, adjustment, 702
 - buffer, 701
 - components, inorganic, 623
 - conservation, 718
 - degradation, 713
 - deterioration, 712
 - erosion, 714
 - geographical pattern in continental U.S., 715
 - fine structure, 692
 - flushing, 1066
 - horizons, 693
 - loss, 712
 - moisture, 669
 - organic matter, 698, 713
 - resilience, 713
 - resistance, 713
 - restoration, 719
 - science (pedology), 692
 - solution, 700
 - sustainability, 713
 - and water resources, 715
 - washing, 1067
- Solar cells, 291
- Solar constant, 530
- Solar energy, 1101
- Solar flux, 530
- Solar voltaic cells, 1103
- Solid state, 65

- Solidification of wastes, 1057
- Solid-phase extractors, 1159
- Solids, 54, 65
 - removal from water, 477
 - wastes analysis, 1166
- Solubility, 64, 256
 - equilibria, 263
 - factors affecting, 256
 - of gases, 263
 - product, 263
- Solute, 63, 243
- Solutions, 49, 63, 243
 - chemistry, 244
 - concentrations, 251
 - in the environment, 245
 - equilibrium, 221, 261
 - industrial uses, 246
 - in living systems, 245
 - process, 249
 - physical properties, 259
 - reactions, 244
- Solvation, 950
- Solvent, 63, 243, 246, 950
 - extraction, 72
 - of samples, 1171
 - in waste treatment, 1039
- Sonolysis treatment of water, 490
- Soot, 567
- Sorption, 73
 - in waste treatment, 1040
- Sorting of sedimentary materials, 379, 671
- Soxhlet extractor, 349
- Soybean and nitrogen fixation, 706
- Speciation of metals in water, 384
- Species, 797
- Specific gravity, 52
 - of minerals, 661
- Specific heat, 67
- Spectrophotometric analysis of air pollutants,
 - direct, 1184
- Spectrophotometric methods of
 - analysis, 1137
- Spectrophotometry, 1137
- Sphaerotilus iron bacteria, 406
- Spin quantum number, 113
- Spoil, 762
- Spoil banks, 770
- Spontaneous ignition, 997
- Stabilization of wastes, 1056
- Stacked filter unit, air sampling, 1183
- Stage, stream, 758
- Standard buffer solution, 299
- Standard electrode potential, E^0 , 292
- Standard hydrogen electrode, SHE, 294
- Standard solution, 257, 1132
- Standard temperature and pressure, STP, 59
- Standing waves for electrons in atoms, 110
- Starch, 348
- Starch grains, 342
- States of matter, 54
- Steam reforming methane, 95
- Stearate ions in soap, 267
- Steroids, 351
- Stirling engine, 1101
- Stoddard solvent, 247
- Stoichiometric reagents, 949
- Stoichiometry, 195
- Storage batteries, 283
- Storage reservoirs, 376
- Storm surge, 746
- Storms, 538
- STP. *See* Standard temperature and pressure (STP)
- Straight-chain alkanes, 309
- Strain in geological structures, 659
- Strategic petroleum reserve, 756
- Stratification of the atmosphere, 527
- Stratosphere, 520, 528
- Stratum corneum, 840
- Stream, 667
- Stress in geological structures, 659
- Stringfellow Acid Pits, 989
- Stripping in waste treatment, 72
- Stripping waste, 1039
- Strong acid, 216
- Strong base, 216
- Structural formulas, 310
- Structural geology, 658
- Structural isomers, 310
- Structure–activity relationships, 940
- Subatomic particles, 5, 90
- Subduction zone, 658
- Sublethal effects of toxicants, 843
- Sublimates, volcanic, 662
- Sublimation, 65
- Subsidence inversions, 539
- Subsidence of land surface, 744
- Subsidence, underground mines, 762
- Substitution reaction, 192
 - of alkanes, 313

- Substrate concentration, and bacterial metabolism, 399
 - Substrates (and enzyme action), 352
 - Sugars, simple, 347
 - Sulfate reduction, bacterial, 404
 - Sulfide
 - metal, precipitation in waste treatment, 1043
 - organic, 326
 - oxidation, 404
 - Sulfite ion water pollutant, 428
 - Sulfones, 328
 - Sulfonic acids, 328
 - Sulfoxides, 328
 - Sulfur, 105
 - compound biodegradation, 405
 - cycle, 574
 - microbial transformations, 404
 - resources, 777
 - in soil, 704
 - Sulfur dioxide
 - analysis, 1177
 - atmospheric, 573, 574
 - effects of atmospheric, 575
 - reactions in the atmosphere, 574
 - removal, 613
 - toxicity, 861
 - Sulfur hexafluoride, atmospheric, 577
 - Sulfuric acid
 - atmospheric, 564
 - toxicity, 861
 - waste, 1002
 - Sun, energy from, 1101
 - Supercritical fluid, 73, 817, 953
 - in waste treatment, 1040
 - Superfund Amendments and Reauthorization Act (SARA), 990
 - Superphosphate fertilizer, 711
 - Supersaturated solutions, 256
 - Surface (geological) structures, 660
 - Surface charge of colloids, 266
 - Surface mining, 761
 - Surface water, 376
 - Surfactant, 386
 - Suspended load, 378
 - Suspended load in streams, 670
 - Suspensions, 265
 - Sustainability, 1
 - Sustainable agriculture, 721
 - Switchgrass, fuel sources, 1110
 - Symbols in chemical equations, 183
 - Synergism in exposure to toxicants, 841
 - Synthesis gas, 1112
 - Synthetic chemistry and green chemistry, 942
 - Systematic names, 310
 - Systemic exposure to toxicants, 839
- ## T
- Tailings, 762
 - Tambora volcano, 740
 - Taste removal from water, 489
 - TBT. *See* Tributyltin
 - TCDD (dioxin). *See* Tetrachlorodibenzo-*p*-dioxin, 2,3,7,8-(TCDD)
 - TCLP. *See* Toxicity Characteristic Leaching Procedure (TCLP)
 - Technology, 883, 895
 - Technology and engineering, 895
 - Tectonic cycle, 658
 - Telecommuter society, 891
 - Telematics, 894
 - Temperature, 23, 850
 - Temperature and bacterial metabolism, 399
 - Temperature inversions, 539
 - Tension fractures, 659
 - Teratogenesis, 851
 - Teratogens, 851
 - Terawatts, 1079
 - Terpenes, 580, 809
 - Tertiary structures of proteins, 346
 - Tertiary wastewater treatment, 474
 - Tetrachlorodibenzo-*p*-dioxin, 2,3,7,8-(TCDD), 447
 - Tetrachloroethylene, 324
 - toxicity, 871
 - Tetraethyllead toxicity, 861
 - Tetraethylpyrophosphate, 329
 - Tetrahedral sheets in clays, 674
 - Tetraphosphorus decoxide toxicity, 861
 - Thermal properties, 66
 - Thermal stratification, 377
 - Thermal treatment methods of wastes, 1048
 - Thermodynamics, 899, 1079
 - Thermoplastics for waste solidification, 1058
 - Thermosphere, 528
 - Thin-film evaporation, 1039
 - in waste treatment, 72
 - Thiobacillus*, 404

- Thioethers, 326
 Thiols, 326
 atmospheric, 590
 toxicities, 871
 Thiourea, 328
 Three Gorges hydroelectric project,
 China, 1106
 Three Gorges project, China, 760
 Three Mile Island nuclear accident, 1099
 Three-layer clays, 674
 Threshold limiting value, 247
 Thymine, 357
 Till, glacial, 673
 Times Beach
 dioxin pollution, 448
 Missouri, waste site, 989
 Tin resources, 775
 Titanium resources, 775
 Titration, 257, 1132
 curve, 1133
 TNT. *See* Trinitrotoluene, 2,4,6-
 TOC. *See* Total organic carbon (TOC)
 Toluene
 metabolism, 864
 solvent, 247, 951
 Ton, English units, 21
 Tonne, 21
 Top carnivores, 799
 Topographical effects on atmospheric
 conditions, 536
 Topography, 536
 Topsoil, 694
 Torr, 27
 Total organic carbon (TOC), 433
 analysis of water, 1165
 Toxic substances and wastes, 1003
 Toxic Substances Control Act, 990
 Toxicity Characteristic Leaching Procedure
 (TCLP), 1003, 1173
 Toxicity characteristic of wastes, 992
 Toxicity rating, 843
 Toxicological chemistry, 839, 845
 Toxicology, 839
 Trace elements in water, 419
 Trace gases in the atmosphere, 525
 Trace substance, 419
Trans,trans-muconic acid for benzene
 analysis, 1189
 Transcription in protein synthesis, 359
 Transferase enzymes, 354
 Transform fault boundaries, 658
 Transistor, 899
 Translation in protein synthesis, 359
 Transmitter in communication, 893
 Transmutation of elements, 1098
 Transpiration, 260, 370, 695
 Transport of hazardous wastes, 1006
 Transportation, 889, 907
 Transuranic elements, 453
 Treatment of water, 465
 Triazine herbicides, 444
 Tributyltin (TBT)
 compounds, 426
 toxicity, 862
 Trichloroethylene, 324
 solvent, 247
 Trichlorophenoxyacetic acid, 2,4,5-
 (2,4,5-T), 445
 Trickling filter wastewater treatment, 471
 Triglycerides, 350
 Trihalomethanes, 392
 Trimethylphosphate, 329
 Trinitrotoluene, 2,4,6- (TNT), 321
 Triphenylphosphine, 328
 Triple covalent bond, 155
 Tritium, 93
 Tropopause, 528, 547
 Troposphere, 520, 527
 True-breeding strains, 904
 Tsunamis, 747
 earthquakes, 738
 Tungsten resources, 775
 Turbine engine, 1085
 Twelve principles of green chemistry, 935
 Two-layer clays, 674
 Tyndall effect, 265
 Typhoons, 746
- U**
- U-type miscellaneous hazardous
 wastes, 992
 Ultimate carcinogen, 854
 Ultrafiltration, 493, 1041
 Ultraviolet radiation, 53
 harmful, 522
 Uncertainties in numbers, 15
 Uncertainties of numbers, 1129
 Underground storage, 754

Unidentate ligand, 389
 Unit, 28
 Unit conversion factors, 29
 Unit layers in clays, 674
 Unsaturated organic compounds, 314
 Unsaturated solution, 65
 Unsaturated zone, 669
 Unshared pair of electrons, 152
 Upper flammability limit, 996
 Uracil, 357
 Urea
 from animal wastes, 707
 fertilizer, 710
 Utilities, 907
 UV-A radiation, 623
 UV-B radiation, 623
 UV-C radiation, 623
 UV-enhanced wet oxidation, 1052

V

Vacuoles in plant cells, 342
 Vacuum tubes, 896
 Valence electrons, 119
 and chemical bonds, 140
 Valley of the Drums waste site, 989
 Van Allen belts, 529
 Vanadium oxide in the atmosphere, 564
 Vanadium resources, 775
 Vapor extraction, 1065
 Vapor pressure, 63
 Vegetables, 689
 Vehicle, for coatings, 247, 950
 Venturi scrubbers, 602
 Vesuvius, Mt., 739
 Vinyl chloride, 324, 589
 toxicity, 871
 Vital signs, 850
 Vitrification of wastes, 1058
 Volatile liquid, 247
 Volcanic sublimate, 662
 Volcanoes, 738
 Voltage difference between electrodes, 281
 Voltaic cell, 281
 Voltammetric analysis, 1141
 Volume, units, 22
 Volume measurement, glassware for, 24
 Volumetric analysis, 1132
 VX, 872

W

Warm front, 539
 Wastes, 988
 analysis, 1166
 disposal, 763
 minimization, 1031
 mining, 782
 oil fuel, 1034
 oil recycling, 1033
 prevention and green chemistry, 941
 processing sector, 960
 reduction, 1031
 in soil, 716
 solvent recovery, 1034
 solvent recycle, 1034
 sources, 993
 Water, 367
 analysis, 1158
 by classical methods, 1160
 in the atmosphere, 534, 547
 conservation, 507
 the greenest solvent, 951
 of hydration, 227
 important properties, 369
 management on the geosphere, 757
 molecule, 368
 pollutants, 417, 418
 power, 1106
 purification, 465
 recovery from wastewater, 1035
 resources and soil, 715
 sampling, 1158
 in soil, 695
 table, 374, 380, 669
 treatment, 465
 for industrial use, 468
 municipal, 467
 unique solvent, 247
 Waterlogged soil, 696
 Watershed, 378
 Watson, James D., and DNA structure, 357
 Watt, 1079
 Wave character of electromagnetic radiation, 107
 Wave function, 110
 Wave mechanical model of atomic structure, 109
 Wavelength of electromagnetic radiation, 107

Waxes, 350
Weak acid, 216
Weak base, 216
Weather, 532
 global, 536
Weathering, 663
 physical, 665
 of rock, 663
 stages, 664
Weight, 20
Wells, water, 380
West–Gaeke method, 1177
Wet air oxidation, 1052
Wetlands, 376
White rot fungus, 1017
Wind, 535
Wind power, 1104

X

Xenobiotic substances, 845
Xenobiotics analysis, 1185

Y

Yield and green chemistry, 943

Z

Zeolites, 482
Zinc resources, 775
Zone of aeration, 669
Zone of saturation, 669