

# Table of Contents

## Volume 1

TABLE OF CONTENTS . . . . .	v	Artificial Sweeteners . . . . .	61
PREFACE . . . . .	xi	Ascorbic Acid . . . . .	64
TOPICAL OUTLINE . . . . .	xiii	Astatine . . . . .	65
FOR YOUR REFERENCE . . . . .	xvii	Astrochemistry . . . . .	66
CONTRIBUTORS . . . . .	xxiii	Atmospheric Chemistry . . . . .	71
Acetaminophen . . . . .	1	Atomic Nucleus . . . . .	74
Acetylcholine . . . . .	2	Atomic Structure . . . . .	78
Acetylsalicylic Acid . . . . .	3	Atoms . . . . .	87
Acid-Base Chemistry . . . . .	4	Avery, Oswald . . . . .	96
Acne Medication . . . . .	12	Avogadro, Amadeo . . . . .	98
Actinides . . . . .	15	Baekeland, Leo . . . . .	100
Actinium . . . . .	15	Balmer, Johann Jakob . . . . .	103
Active Site . . . . .	16	Bardeen, John . . . . .	104
Adhesives . . . . .	17	Barium . . . . .	105
Agricultural Chemistry . . . . .	21	Base Pairing . . . . .	105
Air Pollution . . . . .	27	Bases . . . . .	107
Alchemy . . . . .	30	Becquerel, Antoine-Henri . . . . .	109
Alkali Metals . . . . .	32	Berg, Paul . . . . .	111
Alkaline Earth Metals . . . . .	33	Berkelium . . . . .	112
Allosteric Enzymes . . . . .	34	Berthollet, Claude-Louis . . . . .	113
Allotropes . . . . .	36	Beryllium . . . . .	115
Al-Razi, Abu-Bakr Muhammed ibn Zakariya . . . . .	41	Berzelius, Jöns Jakob . . . . .	116
Aluminum . . . . .	42	Bioluminescence . . . . .	117
Americium . . . . .	43	Bismuth . . . . .	122
Amino Acid . . . . .	44	Black, Joseph . . . . .	122
Analytical Chemistry . . . . .	45	Bleaches . . . . .	123
Anfinsen, Christian . . . . .	48	Bohr, Niels . . . . .	129
Antibiotics . . . . .	49	Boltzmann, Ludwig . . . . .	130
Antimony . . . . .	52	Bonding . . . . .	132
Argon . . . . .	53	Boron . . . . .	142
Aromaticity . . . . .	54	Boyle, Robert . . . . .	142
Arrhenius, Svante . . . . .	58	Bragg, William Henry . . . . .	144
Arsenic . . . . .	60	Bragg, William Lawrence . . . . .	146
		Bromine . . . . .	148
		Brønsted, Johannes Nicolaus . . . . .	149
		Bunsen, Robert . . . . .	150

Cadmium	152	Combinatorial Chemistry	252
Caffeine	153	Computational Chemistry	253
Calcium	155	Concentration Gradient	257
Caldwell, Mary	156	Coordination Compounds	259
Californium	157	Copper	266
Calvin, Melvin	159	Cori, Carl and Gerty	267
Cannizzaro, Stanislao	160	Corrosion	269
Carbohydrates	161	Cortisone	271
Carbon	166	Cosmetic Chemistry	272
Carcinogen	167	Cottrell, Frederick	279
Careers in Chemistry	168	Coulomb, Charles	280
Carnot, Sadi	172	Cryogenics	281
Carothers, Wallace	172	CT Scans	284
Carver, George Washington	174	Curie, Marie Sklodowska	289
Catalysis and Catalysts	177	Curium	291
Cavendish, Henry	180	PHOTO CREDITS	293
Cellulose	181	GLOSSARY	303
Ceramics	182	INDEX	323
Cerium	187		
Cesium	188	<b>Volume 2</b>	
Chadwick, James	189	TABLE OF CONTENTS	v
Chalcogens	190	PREFACE	xi
Chappelle, Emmett	191	TOPICAL OUTLINE	xiii
Chardonnet, Hilaire	193	FOR YOUR REFERENCE	xvii
Charles, Jacques	194	CONTRIBUTORS	xxiii
Chemical Engineering	195	Dalton, John	1
Chemical Informatics	198	Davy, Humphry	3
Chemical Reactions	199	de Broglie, Louis	4
Chemiluminescence	206	Denaturation	6
Chemistry and Energy	209	Deoxyribonucleic Acid	7
Chemotherapy	211	Detergents	8
Chevreur, Michel	217	Dewar, James	11
Chirality	218	Digital X Ray	13
Chlorine	224	Disaccharides	14
Cholecalciferol	225	Disposable Diapers	17
Cholesterol	226	DNA Replication	20
Chromium	227	Dopamine	22
Chromosome	228	Double Helix	23
Cleve, Per Theodor	229	du Pont, Éleuthère Irénée	24
Clones	230	Dyes	26
Coal	232	Dysprosium	29
Cobalt	237	Ehrlich, Paul	30
Codon	237	Einstein, Albert	32
Coenzyme	239	Einsteinium	33
Cofactor	240	Electrochemistry	34
Collagen	242	Elion, Gertrude Belle	39
Colligative Properties	243	Endorphins	41
Colloids	247		

Energy	44	Globular Protein	171
Energy Sources and Production	46	Glycolysis	173
Environmental Pollution	49	Glycoprotein	174
Enzymes	54	Gold	176
Epinephrine	56	Goodyear, Charles	177
Equations, Chemical	57	Green Chemistry	178
Equilibrium	63	Haber, Fritz	182
Erbium	65	Hafnium	184
Estrogen	66	Hair Dyes and Hair Treatments	184
Ethics	68	Hall, Charles	191
Europium	73	Halogens	193
Explosions	74	Heat	194
Fahrenheit, Gabriel	76	Heavy Metal Toxins	195
Faraday, Michael	77	Heisenberg, Werner	196
Fats and Fatty Acids	80	Helium	199
Fermi, Enrico	85	Hemoglobin	200
Fermium	87	Herbicides	201
Fertilizer	87	Hess, Germain Henri	204
Fibers	89	Heyrovský, Jaroslav	205
Fibrous Protein	95	Hodgkin, Dorothy	208
Fire, Fuels, Power Plants	96	Holmium	209
Fireworks	98	Hydrogen	210
Fischer, Emil Hermann	101	Hydrolase	211
Fleming, Alexander	103	Hydrolysis	211
Fluorine	104	Ibuprofen	213
Food Preservatives	105	Indium	214
Forensic Chemistry	108	Industrial Chemistry, Inorganic	215
Formulation Chemistry	114	Industrial Chemistry, Organic	222
Fossil Fuels	119	Inhibitors	232
Francium	123	Inorganic Chemistry	233
Franklin, Rosalind	123	Insecticides	237
Freons	125	Insulin	241
Fullerenes	128	Interferon	244
Gadolin, Johan	130	International System of Units	245
Gadolinium	131	Iodine	248
Gallium	132	Ion Channels	249
Gardening	133	Iridium	250
Gases	139	Iron	251
Gasoline	145	Irradiated Foods	252
Gay-Lussac, Joseph-Louis	149	Isomerism	255
Gemstones	151	Julian, Percy	262
Genes	155	PHOTO CREDITS	265
Genetic Engineering	157	GLOSSARY	275
Genome	159	INDEX	295
Germanium	160		
Gibbs, Josiah Willard	161	<b>Volume 3</b>	
Glass	162	TABLE OF CONTENTS	v
Global Warming	169	PREFACE	xi

TOPICAL OUTLINE . . . . .	xiii	Menten, Maud . . . . .	80
FOR YOUR REFERENCE . . . . .	xvii	Mercury . . . . .	81
CONTRIBUTORS . . . . .	xxiii	Methylphenidate . . . . .	83
Kekulé, Friedrich August . . . . .	1	Meyer, Lothar . . . . .	84
Kelsey, Frances Kathleen Oldham . . . . .	2	Millikan, Robert . . . . .	86
Khorana, Har Gobind . . . . .	4	Minerals . . . . .	87
Kinase . . . . .	6	Mole Concept . . . . .	92
Kinetics . . . . .	6	Molecular Geometry . . . . .	96
Krebs, Hans Adolf . . . . .	9	Molecular Modeling . . . . .	104
Krebs Cycle . . . . .	11	Molecular Orbital Theory . . . . .	106
Krypton . . . . .	13	Molecular Structure . . . . .	109
Lanthanides . . . . .	14	Molecules . . . . .	114
Lanthanum . . . . .	14	Molybdenum . . . . .	119
Lavoisier, Antoine . . . . .	15	Morgan, Agnes Fay . . . . .	120
Lawrence, Ernest . . . . .	18	Moseley, Henry . . . . .	122
Lawrencium . . . . .	21	Mutagen . . . . .	123
Lead . . . . .	22	Mutation . . . . .	123
Le Bel, Joseph-Achille . . . . .	23	Nanochemistry . . . . .	125
Leblanc, Nicolas . . . . .	24	Neodymium . . . . .	129
LeChâtelier, Henri . . . . .	25	Neon . . . . .	130
Leclanché, Georges . . . . .	26	Neptunium . . . . .	130
Leloir, Luis . . . . .	27	Nernst, Walther Hermann . . . . .	131
Lewis, Gilbert N. . . . .	28	Neurochemistry . . . . .	134
Lewis Structures . . . . .	30	Neurotoxins . . . . .	135
Liebig, Justus von . . . . .	34	Neurotransmitters . . . . .	137
Lipid Bilayers . . . . .	35	New Battery Technology . . . . .	140
Lipids . . . . .	37	Newton, Isaac . . . . .	144
Liquid Crystals . . . . .	41	Nickel . . . . .	145
Liquids . . . . .	44	Nicotinamide . . . . .	146
Lister, Joseph . . . . .	47	Nicotinamide Adenine Dinucleotide (NAD) . . . . .	147
Lithium . . . . .	49	Nicotine . . . . .	150
Lonsdale, Kathleen . . . . .	50	Niobium . . . . .	151
Low Density Lipoprotein (LDL) . . . . .	51	Nitrogen . . . . .	152
Lucretius . . . . .	53	Nobel, Alfred Bernhard . . . . .	154
Lutetium . . . . .	54	Nobelium . . . . .	156
Magnesium . . . . .	54	Noble Gases . . . . .	157
Magnetism . . . . .	55	Nomenclature of Inorganic Chemistry . . . . .	158
Manganese . . . . .	57	Norepinephrine . . . . .	165
Manhattan Project . . . . .	58	Northrop, John . . . . .	166
Marsden, Ernest . . . . .	61	Nuclear Chemistry . . . . .	167
Martin, Archer John Porter . . . . .	61	Nuclear Fission . . . . .	171
Materials Science . . . . .	62	Nuclear Fusion . . . . .	173
Maxwell, James Clerk . . . . .	66	Nuclear Magnetic Resonance . . . . .	176
Measurement . . . . .	68	Nuclear Medicine . . . . .	179
Meitner, Lise . . . . .	73	Nucleic Acids . . . . .	182
Membrane . . . . .	75	Nucleotide . . . . .	186
Mendeleev, Dimitri . . . . .	77	Nylon . . . . .	187
Mendelevium . . . . .	79		

Oppenheimer, Robert	192	Potassium	28
Organic Chemistry	193	Praseodymium	29
Organic Halogen Compounds	200	Priestley, Joseph	29
Organometallic Compounds	205	Primary Structure	32
Osmium	208	Promethium	33
Ostwald, Friedrich Wilhelm	208	Protactinium	33
Oxygen	210	Proteins	34
Ozone	212	Protein Solubility	38
Palladium	213	Protein Synthesis	39
Paracelsus	213	Protein Translation	43
Particles, Fundamental	216	Quantum Chemistry	44
Pasteur, Louis	219	Quaternary Structure	48
Pauli, Wolfgang	221	Radiation	49
Pauling, Linus	223	Radiation Exposure	54
Penicillin	225	Radioactivity	56
Peptide Bond	227	Radium	59
Periodic Table	227	Radon	60
Perkin, William Henry	232	Raman, Chandrasekhara	61
Pesticides	233	Ramsay, William	62
Petroleum	237	Reaction Rates	64
Pharmaceutical Chemistry	243	Recombinant DNA	68
Phospholipids	246	Recycling	71
Phosphorus	248	Remsen, Ira	75
Photography	248	Residue	77
Photosynthesis	253	Restriction Enzymes	77
Physical Chemistry	256	Retinol	78
Pigments	259	Rhenium	80
Planck, Max	262	Rhodium	82
Plastics	263	Riboflavin	83
Platinum	267	Ribonucleic Acid	84
Plutonium	268	RNA Synthesis	85
PHOTO CREDITS	271	Robinson, Robert	86
GLOSSARY	281	Rocketry	87
INDEX	301	Röntgen, Wilhelm	91
		Rubber	92
		Rubidium	96
		Ruthenium	98
		Rutherford, Ernest	98
		Rutherfordium	100
		Rydberg, Johannes	101
		Salt	102
		Samarium	105
		Sanger, Frederick	105
		Scandium	107
		Scheele, Carl	108
		Schrödinger, Erwin	109
		Seaborg, Glenn Theodore	110
		Secondary Structure	113
<b>Volume 4</b>			
TABLE OF CONTENTS	v		
PREFACE	xi		
TOPICAL OUTLINE	xiii		
FOR YOUR REFERENCE	xvii		
CONTRIBUTORS	xxiii		
Polonium	1		
Polyesters	2		
Polymerase Chain Reaction (PCR)	8		
Polymers, Natural	10		
Polymers, Synthetic	13		
Polysaccharides	26		

Seibert, Florence	114	Thermodynamics	221
Selenium	116	Thiamin	224
Semiconductors	117	Thomson, Joseph John	225
Silicon	123	Thorium	227
Silicone	124	Thulium	228
Silver	126	Tin	229
Soap	128	Titanium	230
Soddy, Frederick	130	Todd, Alexander	231
Sodium	131	Toxicity	232
Solar Cells	133	Transactinides	233
Solid State	138	Transmembrane Protein	238
Solid-State Devices	142	Transmutation	240
Solution Chemistry	148	Transport Protein	244
Spectroscopy	153	Travers, Morris	244
Stanley, Wendell	156	Triglycerides	245
Starch	157	Tungsten	247
Staudinger, Hermann	158	Uranium	248
Steel	160	Urey, Harold	249
Steroids	164	Valence Bond Theory	250
Stimulants	168	Vanadium	251
Stoichiometry	170	van der Waals, Johannes	252
Storage Protein	174	Van Helmont, Johann Baptista	254
Strontium	175	Van't Hoff, Jacobus Hendricus	256
Strutt, John (Lord Rayleigh)	175	Venom	258
Substrate	177	Volta, Alessandro	260
Sulfa Drugs	177	Waksman, Selman	262
Sulfur	178	Water	264
Sumner, James	179	Water Pollution	268
Superconductors	181	Water Quality	271
Surface Chemistry	185	Watson, James Dewey	274
Sustainable Energy Use	190	Weizmann, Chaim	276
Svedberg, Theodor	193	Werner, Alfred	277
Syngé, Richard Laurence Millington	194	Willstätter, Richard	279
Synthesis, Chemical	195	Wöhler, Friedrich	280
Szent-Györgyi, Albert	199	Woodward, Robert	282
Tantalum	201	Xenon	283
Taste Receptors	202	Yalow, Rosalyn	285
Technetium	203	Ytterbium	286
Tellurium	204	Yttrium	287
Temperature	206	Yukawa, Hideki	288
Teratogen	209	Zeolites	289
Terbium	210	Zinc	291
Terpenes	211	Zirconium	292
Tertiary Structure	213	Zsigmondy, Richard Adolf	293
Testosterone	214	Zwitterions	294
Thallium	214	PHOTO CREDITS	297
Theoretical Chemistry	216	GLOSSARY	307
Thermochemistry	219	INDEX	327