



Kentucky Core Content for Science

Assessment Correlations

Physical Science Standards	Student Edition Pages
STRUCTURE OF ATOMS	
1.1.1: Matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together.	7, 41, 54, 61-63, 65-70, 78, 80, 230-231, 252, 313
1.1.2: The atom's nucleus is composed of protons and neutrons that are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	62-63, 65-68, 80-82, 130, 230, 252
1.1.3: The forces that hold the nucleus together, at nuclear distances, are usually stronger than the forces that would make it fly apart. Nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions. Fission is the splitting of a large nucleus into smaller pieces. Fusion is the joining of two nuclei at extremely high temperature and pressure. Fusion is the process responsible for the energy of the Sun and other stars.	82, 761-763, 766, 780
STRUCTURE AND PROPERTIES OF MATTER	
1.2.1: Atoms interact with each other by transferring or sharing outermost electrons. These outer electrons govern the chemical properties of the element.	69, 96, 105-106, 113-114, 130-132, 138-140, 142, 148-149, 156-158, 273, 283, 296, 302-306, 308-311, 313-314, 318-319, 321-325, 485, 493, 554-562, 577, 629
1.2.2: An element is composed of a single type of atom. When elements are listed according to the number of protons, repeating patterns of physical and chemical properties identify families of elements with similar properties. The periodic table is a consequence of the repeating pattern of outermost electrons.	24, 54-55, 61, 66, 79, 85-86, 88-96, 98-99, 101-106, 113-117, 156-157, 161, 174, 184, 243, 252, 257-258, 261, 283, 296, 304
1.2.3: Bonds between atoms are created when outer electrons are paired by being transferred or shared. A compound is formed when two or more kinds of atoms bind together chemically.	10, 30, 80, 113, 130-145, 148-150, 154, 156-158, 283, 296, 302-306, 308-311, 313-314, 318-319, 321-325, 485, 493, 554-562, 577, 629
1.2.4: The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecule including the constituent atoms.	5, 7, 10, 30, 44, 119, 122, 126, 134-135, 143-145, 147-150, 154-156, 170-172, 174, 313-314, 330-333, 438-442, 451-455, 474, 483, 485-486, 488-489, 492-494, 496, 509, 629, 647, 662, 673
1.2.5: Solids, liquids, and gases differ in the distances between molecules or atoms and therefore the energy that binds them together. In solids, the structure is nearly rigid; in liquids, molecules or atoms move around each other but do not move apart; and in gases, molecules or atoms move almost independently of each other and are relatively far apart.	134, 154, 340-341, 345, 360, 366
1.2.6: In conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons.	111-112, 114



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CHEMICAL REACTIONS	
1.3.1: Chemical reactions occur all around us and in every cell in our bodies. These reactions may release or consume energy.	19, 42-43, 46, 57, 189-191, 195-196, 211, 215, 218-220, 222-227, 439, 553, 574-575, 584-585, 668-669, 676-677, 680-685, 690-705, 708-714, 722, 736
1.3.2: Rates of chemical reactions vary. Reaction rates depend on concentration, temperature, and properties of reactants. Catalysts speed up chemical reactions.	218-220, 222-227, 460, 674, 676
MOTIONS AND FORCES	
1.4.1: Objects change their motion only when a net force is applied. Laws of motion are used to describe the effects of forces on the motion of objects.	
1.4.2: Gravity is a universal force that each mass exerts on every other mass.	
1.4.3: The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.	
1.4.4: Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces. This idea underlies the operation of electric motors and generators.	
CONSERVATION OF ENERGY AND INCREASE IN DISORDER	
1.5.1: The total energy of the universe is constant. Energy can be transferred in many ways, but it can neither be created nor destroyed.	711, 716, 720, 728, 730, 738
1.5.2: All energy can be considered to be either kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational).	342-343, 348, 351, 366, 392
1.5.3: Heat is the manifestation of the random motion and vibrations of atoms, molecules, and ions. The greater the atomic or molecular motion, the higher the temperature.	348-349, 374, 392
1.5.4: The universe becomes less orderly and less organized over time. Thus, the overall effect is that the energy is spread out uniformly. For example, in the operation of mechanical systems, the useful energy output is always less than the energy input; the difference appears as heat.	716, 730-732, 736-738
INTERACTIONS OF MATTER AND ENERGY	
1.6.1: Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter. Apparent changes in frequency can provide information about relative motion.	70-71, 81, 233
1.6.2: Electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays, result when a charged object is accelerated.	



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Scientific Inquiry Standards	Student Edition Pages
SIa: Students will formulate testable hypotheses and demonstrate the logical connections between the scientific concepts guiding a hypothesis and the design of an experiment.	226, 275, 285, 336, 369, 381, 423, 471, 476, 505, 512, 592, 600, 618, 630, 632, 646, 652, 663-664
SIb: Students will use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications.	8-9, 16-17, 21-22, 25, 30, 37-40, 56-57, 63, 77, 81-83, 94, 100-101, 115-117, 122, 134, 136-137, 158, 162, 165, 166, 169, 171-173, 181, 185-187, 194, 196, 201, 205-207, 209, 220, 223-227, 234, 236-237, 245, 253-255, 262, 266-267, 275, 280, 285, 298, 312, 314, 328-329, 343, 357, 362-363, 375, 381, 384-385, 388, 389, 393, 396, 399-401, 408, 412-413, 416, 418, 420, 422-423, 429-433, 443, 452, 456-457, 462-464, 473, 475-477, 482, 486, 489, 496, 502-505, 509-513, 517-518, 521, 525, 529-530, 532, 541-544, 546-551, 557, 562, 568, 570, 577-581, 587, 598, 600, 606-607, 610, 612, 616-619, 626-627, 630, 639, 646-647, 650-653, 661-665, 674-675, 688, 699, 702-705, 712, 718, 720-723, 726, 732, 738-741, 750-753, 758, 763, 767, 775, 781-783
SIc: Students will use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models	9, 17, 19, 21, 25-26, 32-33, 39-40, 44, 47-49, 57, 68, 77, 83, 89, 97, 101, 116, 122, 128-129, 134, 137, 141, 147, 149-151, 160, 171, 173, 186, 207, 209, 220, 223, 237, 242, 245, 249, 251, 254, 262, 267, 285, 296-297, 314, 325, 329, 335-337, 363, 366-369, 375, 381, 385, 388, 400-401, 413, 420, 422-423, 431-433, 443, 452, 457, 473, 474-477, 482, 496, 503, 505, 510-513, 530, 532, 543, 545-551, 557, 562, 577-581, 587, 598, 600, 607, 616-619, 630, 632, 639, 646, 647, 652-653, 657, 661-665, 675, 688, 691, 699, 700, 702-705, 712, 715, 718, 723, 726, 732, 737-741, 753, 755, 760, 763, 767, 775, 781-783
SI d: Students will design and conduct different kinds of scientific investigations.	57, 186, 234, 275, 284, 327, 336, 423, 432, 581, 664, 665, 675, 704, 782
SIe: Students will communicate and defend the designs, procedures, observations, and results of scientific investigation	9, 17, 21-22, 25, 39-40, 49, 57-58, 63, 77, 82-83, 100-101, 122, 137, 171, 186, 237, 254, 262, 267, 329, 343, 357, 363, 385, 408, 457, 505, 513, 543, 561, 619, 652, 675, 699, 704, 723, 753
SIf: Students will review and analyze scientific investigations and explanations of other investigators, including peers.	39, 57-58, 68, 254, 366, 505, 513, 561, 619, 704, 775



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Applications/Connections Standards	Student Edition Pages
SCIENCE AND TECHNOLOGY:	
ACa: Students will apply scientific theory and conceptual understandings to solve problems of technological design and examine the interaction between science and technology.	10-11, 30, 39-40, 55, 60-61, 68, 82, 103-104, 106-109, 111, 121, 127, 151, 153, 160, 163, 167, 197, 203, 241, 253, 268, 277, 279, 284, 286-289, 320, 335, 347, 354-355, 359, 410, 424-425, 429, 447, 465, 468-471, 477, 484, 487, 495, 537, 564-566, 569, 571, 590-592, 594-595, 602, 612, 614, 619, 657, 659, 710, 728-729, 739, 754-755, 768-770
SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES:	
ACb: Students will explore the impact of scientific knowledge and discoveries on personal and community health; recognize how science influences human population growth, use science to analyze the use of natural resources by an increasing human population; investigate how science can be used to solve environmental quality problems, use science to investigate natural and human-induced hazards; and analyze how science and technology are necessary but not sufficient for solving local, national, and global issues.	11-13, 31-33, 47, 55, 60, 103, 104, 141, 146, 175, 181, 216, 271, 278, 307, 320, 335, 390, 447, 455, 469-471, 476-477, 487, 494-495, 501, 535, 537, 551, 571-584, 610, 614, 639, 659, 687, 712, 715, 728-729, 739, 741, 748, 765, 767-770, 777
HISTORY AND NATURE OF SCIENCE:	
ACc: Students will analyze the role science plays in everyday life and compare different careers in science; recognize that scientific knowledge comes from empirical standards, logical arguments, and skepticism, and is subject to change as new evidence becomes available; and investigate advances in science and technology that have important and long-lasting effects on science and society.	1-13, 32-33, 47, 52-54, 57-58, 60-65, 76, 79-83, 86-91, 103, 106-109, 111, 113, 114, 121, 128, 131, 144, 146, 151, 160, 163, 167, 194, 197-198, 212-213, 216-217, 221, 227, 232, 241, 248-249, 253, 265, 268-270, 272-275, 277, 279, 284, 286-287, 290-291, 307, 316-317, 320, 335, 342, 347, 353-355, 359, 377, 417, 429, 447-449, 455, 465-466, 468, 471, 477, 480-481, 484, 487, 490, 495, 500-501, 511-513, 515-516, 519, 524, 534, 537, 553-554, 558, 564-566, 569, 571, 573, 583, 590-592, 594-596, 601, 604, 612, 614, 619, 630, 632, 634-636, 641-646, 648, 659, 661, 669, 678-679, 683, 693, 710, 715, 728-729, 739, 745, 748, 754-755, 768-770, 772

Correlation to Kentucky Core Content for Science Assessment

By Chapter and Program Content

Contents	Student Edition Pages	Chemistry CATS
Chapter 1 Chemistry: The Science of Matter		
1.1 The Puzzle of Matter	4–33	1.1.1, 1.2.2, 1.2.3, 1.2.4, 1.3.1; Slb, Slc, Sle; ACa, ACb, ACc
1.2 Properties and Changes of Matter	34–49	1.1.1, 1.2.4, 1.3.1; Slb, Slc, Sle, Slf; ACa, ACb, ACc
Chapter 2 Matter is Made up of Atoms		
2.1 Atoms and Their Structure	52–68	1.1.1, 1.1.2, 1.2.2, 1.3.1; Slb, Slc, Sld, Sle, Slf; ACa, ACb, ACc
2.2 Electrons in Atoms	69–83	1.1.1, 1.1.2, 1.1.3, 1.2.1, 1.2.2, 1.2.3, 1.6.1; Slb, Slc, Sle; ACa, ACc
Chapter 3 Introduction to the Periodic Table		
3.1 Development of the Periodic Table	85–94	1.2.2; Slb, Slc; ACc
3.2 Using the Periodic Table	95–117	1.2.1, 1.2.2, 1.2.3, 1.2.6; Slb, Slc, Sle; ACa, ACb, ACc
Chapter 4 Formation of Compounds		
4.1 The Variety of Compounds	119–129	1.2.4; Slb, Slc, Sle; ACa, ACc
4.2 How Elements Form Compounds	130–151	1.1.2, 1.2.1, 1.2.3, 1.2.4, 1.2.5; Slb, Slc, Sle; ACa, ACb, ACc
Chapter 5 Types of Compounds		
5.1 Ionic Compounds	153–169	1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5; Slb, Slc; ACa, ACc
5.2 Molecular Substances	170–187	1.2.2, 1.2.4; Slb, Slc, Sld, Sle; ACb
Chapter 6 Chemical Reactions and Equations		
6.1 Chemical Equations	189–201	1.3.1; Slb; ACa, ACc
6.2 Types of Reactions	202–209	Slb, Slc; ACa
6.3 Nature of Reactions	210–227	1.3.1, 1.3.2; Sla, Slb, Slc; ACb, ACc
Chapter 7 Completing the Model of the Atom		
7.1 Expanding the Theory of the Atom	229–242	1.1.1, 1.1.2, 1.6.1; Slb, Slc, Sld, Sle; ACa, ACc
7.2 The Periodic Table and Atomic Structure	243–255	1.1.1, 1.1.2, 1.2.2; Slb, Slc, Sle, Slf; ACa, ACc
Chapter 8 Periodic Properties of the Elements		
8.1 Main Group Elements	257–281	1.2.1, 1.2.2; Sla, Slc, Sld, Sle; ACa, ACb, ACc
8.2 Transition Elements	282–299	1.2.1, 1.2.2, 1.2.3; Sla, Slb, Slc, Sld; ACa, ACc
Chapter 9 Chemical Bonding		
9.1 Bonding of Atoms	301–314	1.1.1, 1.2.1, 1.2.2, 1.2.3, 1.2.4; Slb, Slc; ACb, ACc
9.2 Molecular Shape and Polarity	315–337	1.2.1, 1.2.3, 1.2.4; Sla, Slb, Slc, Sld, Sle; ACa, ACb, ACc

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By Chapter and Program Content

Contents	Student Edition Pages	Chemistry CATS
Chapter 10 The Kinetic Theory of Matter		
10.1 Physical Behavior of Matter	339–347	1.2.5, 1.5.2; Slb, Slc, Sle; ACa, ACc
10.2 Kinetic Energy and Changes of State	348–369	1.2.5, 1.5.2, 1.5.3; Sla, Slb, Slc, Sle, Slf; ACa, ACc
Chapter 11 Behavior of Gases		
11.1 Gas Pressure	371–381	1.5.3; Sla, Slb, Slc; ACc
11.2 The Gas Laws	382–401	1.5.2, 1.5.3; Slb, Slc, Sle; ACb
Chapter 12 Chemical Quantities		
12.1 Counting Particles of Matter	403–413	Slb, Slc, Sle; ACa
12.2 Using Moles	414–433	Sla, Slb, Slc, Slb; ACa, ACc
Chapter 13 Water and its Solutions		
13.1 Uniquely Water	435–450	1.2.4, 1.3.1; Slb, Slc; ACa, ACb, ACc
13.2 Solutions and Their Properties	451–477	1.2.4, 1.3.2; Sla, Slb, Slc, Sle; ACa, ACb, ACc
Chapter 14 Acids, Bases, and pH		
14.1 Acids and Bases	479–496	1.2.1, 1.2.3, 1.2.4; Slb, Slc; ACa, ACb, ACc
14.2 Strengths of Acids and Bases	497–513	1.2.4; Sla, Slb, Slc, Sle, Slf; ACb, ACc
Chapter 15 Acids and Bases React		
15.1 Acid and Base Reactions	515–530	Slb, Slc; ACc
15.2 Applications of Acid-Base Reactions	531–551	Slb, Slc, Sle; ACa, ACb, ACc
Chapter 16 Oxidation-Reduction Reactions		
16.1 The Nature of Oxidation-Reduction Reactions	553–562	1.2.1, 1.2.3; Slb, Slc, Sle, Slf; ACc
16.2 Applications of Oxidation-Reduction Reactions	563–581	1.2.1, 1.2.3, 1.3.1; Slb, Slc, Slc; ACa, ACb, ACc
Chapter 17 Electrochemistry		
17.1 Electrolysis: Chemistry from Electricity	583–598	1.3.1; Sla, Slb, Slc; ACa, ACb, ACc
17.2 Galvanic Cells: Electricity from Chemistry	599–619	Sla, Slb, Slc, Sle, Slf; ACa, ACb, ACc
Chapter 18 Organic Chemistry		
18.1 Hydrocarbons	621–639	1.2.1, 1.2.3, 1.2.4; Sla, Slb, Slc; ACb, ACc
18.2 Substituted Hydrocarbons	640–647	1.2.4; Sla, Slb, Slc; ACc
18.3 Plastics and Other Polymers	648–665	1.2.4; Sla, Slb, Slc, Slc, Sle; ACa, ACb, ACc

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By Chapter and Program Content

Contents	Student Edition Pages	Chemistry CATS
Chapter 19 The Chemistry of Life		
19.1 Molecules of Life	667–691	1.2.4, 1.3.1, 1.3.2; Slb, Slc, Sld, Sle; ACb, ACc
19.2 Reactions of Life	692–705	1.3.1; Slb, Slc, Sld, Sle, Slf; ACc
Chapter 20 Chemical Reactions and Energy		
20.1 Energy Changes in Chemical Reactions	707–718	1.3.1, 1.5.1, 1.5.4; Slb, Slc; ACa, ACb, ACc
20.2 Measuring Energy Changes	719–732	1.3.1, 1.5.1, 1.5.4; Slb, Slc, Sle; ACa, ACb, ACc
20.3 Photosynthesis	733–741	1.3.1, 1.5.1, 1.5.4; Slb, Slc; ACa, ACb, ACc
Chapter 21 Nuclear Chemistry		
21.1 Types of Radioactivity	743–760	Slb, Slc, Sle; ACa, ACb, ACc
21.2 Nuclear Reactions and Energy	761–767	1.1.3; Slb, Slc; ACb
21.3 Nuclear Tools	768–783	1.1.3; Slb, Slc, Sld, Slf; ACa, ACb, ACc