Active Chemistry Correlation to the Virginia Standards of Learning

CHEMISTRY

Standard	Location/Page where Standard is found
CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed, and evaluated produce observations and verifiable data. Key concepts include:	
a) designated laboratory techniques;	7-8, 15-18, 35-38, 101-103, 110-113, 120-121, 126-127, 134-137, 144-146, 152-153, 157-158, 162-164, 182-184, 193-195, 201-214, 224-227, 233-236, 255-258, 287-291, 308-311, 318-320, 329-331, 353-356, 369-371, 379-382, 390-392, 401-404, 416-418, 433-435, 441-444, 448-451, 456-460. 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 551-554, 560-562, 575-577, 608-610, 618-622, 632-634, 641-643, 650-653, 659-662, 677-679, 685-686, 693-697, 703-704, 712-713, 727-728, 743-754, 766-768, 779-783, 790-792, 812-816, 826-827, 843-848, 857-858, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921,
b) safe use of chemicals and equipment;	102, 111, 121, 135, 145, 158, 163, 194-5, 202, 211, 225, 234, 242, 256, 288, 309, 311, 330, 354, 370, 391, 402, 434,442, 450, 459, 468, 477, 486, 512, 523,533, 545, 553, 576, 600, 609, 618, 633, 642, 651, 660,

	679, 686, 694, 703, 712, 727, 766, 802, 845, 858, 868, 878, 893, 903, 910, 920
c) proper response to emergency situations;	102, 111, 121, 135, 145, 158, 163, 194-5, 202, 211, 225, 234, 242, 256, 288, 309, 311, 330, 354, 370, 391, 402, 434,442, 450, 459, 468, 477, 486, 512, 523,533, 545, 553, 576, 600, 609, 618, 633, 642, 651, 660, 679, 686, 694, 703, 712, 727, 766, 802, 845, 858, 868, 878, 893, 903, 910, 920,
d) manipulation of multiple variables, using repeated trials;	119, 125, 131, 143, 151,156, 240, 286, 297, 307,317,328, 343,360, 400, 440, 476, 484, 541, 574, 617, 640, 649, 658, 667, 709, 778, 833, 901, 909,
e) accurate recording, organization, and analysis of data through repeated trials;	7-10, 15-18, 35-37, 101-103, 113-113, 120-121, 126-127, 134-137, 144-146, 152-153, 157-158, 162-164, 182-184, 193-195, 201-203, 210-214, 224-227, 233-236, 241-242, 255-258, 287-291, 300-301, 308-311, 318-320, 329-332, 353-356, 369-371, 379-382, 390-392, 401-404, 408-410, 416-418, 433-435, 441-444, 448-451, 456-460, 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 551-554, 560-562, 568-569, 575-577, 599-602, 608-610, 618-520, 632-634, 641-643, 659-661, 677-679, 685-686, 693-697, 703-704, 712-713, 727-728, 743-745, 766-768, 779-783, 790-792, 799—803, 812-816, 843-848, 857-858, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921
f) mathematical and procedural error analysis;	7-10, 26-28, 46-50, 58-62, 101-103, 113-113, 120-121, 134-137, 144-146, 182-184, 193-195, 201-203, 210-214, 224-227, 233-236, 241-242, 255-258, 287-291, 300-301, 308-311, 329-332, 353-356, 361-364, 369-371, 379-382, 390-392, 401-404, 416-418, 433-

	435, 441-444, 448-451, 456-460, 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 560-562, 575-577, 599-602, 608-610, 618-520, 632-634, 641-643, 659-661, 677-679, 685-686, 693-697, 703-704, 712-713, 727-728, 743-745, 779-783, 790-792, 799—803, 812-816, 843-848, 857-858, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921
g) mathematical manipulations (SI units, scientific notation, linear equations, graphing, ratio and proportion, significant digits, dimensional analysis);	111, 121, 135, 370, 391, 402, 442, 468, 477,533, 545, 553, 576, 600, 609, 618, 633, 642, 660, 679, 686, 694, 712, 727, 802, 845, 858, 868, 878, 893, 903, 910, 920,
h) use of appropriate technology including computers, graphing calculators, and probeware, for gathering data and communicating results; and	111, 121, 135, 370, 391, 402, 442, 468, 477,533, 545, 553, 576, 600, 609, 618, 633, 642, 660, 679, 686, 694, 712, 727, 802, 845, 858, 868, 878, 893, 903, 910, 920,
i) construction and defense of a scientific viewpoint (the nature of science).	18-22, 30, 34, 39-40, 54, 63-64, 82, 150, 156, 186-188, 199, 239, 244, 306, 315, 340, 359, 367, 376, 386, 398, 406, 421, 446, 454, 493,500, 519, 540, 549, 557, 573, 581, 606, 615, 648, 683, 690, 701, 708, 719, 763, 776, 786, 796824, 832, 864, 874, 899, 916, 926,
CH.2 The student will investigate and understand that the placement of elements on the periodic table is a function of their atomic structure. The periodic table is a tool used for the investigations of:	
a) average atomic mass, mass number, and atomic number;	29-33, 39, 47, 49, 54, 77, 78, 79-85, 89-91, 96, 159, 196, 304, 366, 448, 499, 611, 763, 772-774
b) isotopes, half lives, and radioactive decay;	80-91
c) mass and charge characteristics of subatomic particles;	29-31, 39, 78, 79-85, 159, 196, 304, 448, 499, 611, 763
d) families or groups;	20-23, 26-28, 32-34, 42-44, 48-52, 54, 104-107, 139, 148, 164-165

e) series and periods;	20-23, 26-28, 32-34, 42-44, 48-52, 54, 104-107, 139, 148, 164-165
f) trends including atomic radii, electronegativity, shielding effect, and ionization energy;	2, 3, 6, 7, 10, 13, 19-23, 24, 26-28, 32-34, 42-44, 48-52, 54, 56, 66, 93, 196-197, 199, 250, 292, 297, 356, 366, 595, 641, 643-647, 772-774, 851
g) electron configurations, valence electrons, and oxidation numbers;	36-41, 49-56, 58, 59-62, 64-65, 70, 71, 72-74, 96, 196, 197, 200, 646, 838
h) chemical and physical properties; and	12, 96, 112, 126-128, 141, 146-147, 159-161, 204, 292, 339, 476, 595-596, 599, 602-604, 606, 654, 672
i) historical and quantum models.	19-20, 24, 29-30, 33, 34, 39-41, 43, 54, 82,
CH.3 The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations. Key concepts include:	
a) nomenclature;	13, 65, 69, 71, 83, 104-106, 164, 215, 217, 452, 457, 570, 595, 754, 759,-762, 885
b) balancing chemical equations;	21, 96, 102, 154, 163, 166, 186-190, 213-218, 222, 228-232, 256-258, 266-273, 276, 325, 356-360, 392-397, 445, 456-463, 525-526, 608, 613, 616, 619, 626-629, 636, 642-647, 672, 680-682, 725, 738, 761, 838
c) writing chemical formulas (molecular, structural, and empirical; and Lewis diagrams);	13, 71-74, 83, 65, 69, 104-106, 109, 164, 196, 200 215, 250, 595, 760
d) bonding types (ionic and covalent);	71-76, 364-368, 451-455, 622-629, 757-765, 769-777, 838, 850-853,
e) reaction types (synthesis, decomposition, single and double replacement, oxidation-reduction, neutralization, exothermic, and endothermic); and	21, 96, 147-148, 154, 166, 222, 228-231, 292-293, 322, 357, 358, 392-397, 445, 457, 461-463, 470, 498, 506, 525-526, 537-538, 608, 613, 616, 626, 637, 645, 646, 672, 644-646, 672, 680-682, 725, 738, 761, 838,
f) reaction rates and kinetics (activation energy, catalysis, and degree of randomness).	166, 170, 266, 272, 321, 324-325, 341, 348, 393, 457-462, 470, 478-481, 506, 525, 528, 538-539, 613-614, 706, 860

CH.4 The student will investigate and understand that quantities in a chemical reaction are based on molar relationships. Key concepts include:	
a) Avogadro's principle and molar volume;	19-21, 78, 82, 96, 212, 215-216, 279, 394, 411, 412, 437, 570, 885
b) stoichiometric relationships;	19-21, 78, 82, 96, 212, 215-216, 278, 280-283, 286, 394, 411, 412, 437, 570, 885
c) partial pressure;	113, 280, 370-377, 383-387, 401-407, 411-412, 579-580, 714-719
d) gas laws;	373, 383-387, 403-405, 410-415, 428, 577, 578, 580, 698-702, 714-721
e) solution concentrations;	115, 312, 405, 436-437, 476, 480, 490, 633, 774, 821-823, 870, 848, 873, 884, 888, 914,
f) chemical equilibrium; and	877, 880-884, 886-888, 932
g) acid/base theory: strong electrolytes, weak electrolytes, and nonelectrolytes; dissociation and ionization; pH and pOH; and the titration process.	10, 13, 182, 184-190, 210, 213, 215, 233-234, 250, 257, 424, 445, 488-490, 491, 539, 570, 588, 625, 687-689, 703, 706, 754, 817, 820-824, 828-829, 868, 870-871,
CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. Key concepts include:	
a) pressure, temperature, and volume;	383-387, 404-407, 410-415, 428, 697-702, 714-720,
b) vapor pressure;	372-377, 384-385, 405, 579-580, 717,
c) phase changes;	114-119, 260, 364, 404-406, 410-413, 546-550, 555-558, 714-719
d) molar heats of fusion and vaporization;	547, 548, 553-555, 557, 588
e) specific heat capacity; and	118, 174, 328, 334-335, 472, 534-536, 548, 556, 563, 566, 588, 860-861,
f) colligative properties.	115, 312, 476, 774, 873