LAUSD - High School Instructional Guide
Integrated Coordinated Science One
Chemistry – Instructional Component 3 - Matrix

Standard Group 1

1a. ***Students know*** how to relate the position of an element in the periodic table to its atomic number and atomic mass.
1b. ***Students know*** how to use the periodic table to identify metals, semimetals, non-metals, and halogens.
1c. ***Students know*** how to use the periodic table to identify alkali metals, alkaline earth metals and transition metals, trends in ionization energy, electronegativity, and the relative sizes of ions and atoms.
1d. ***Students know*** how to use the periodic table to determine the number of electrons available for bonding.
1e. ***Students know*** the nucleus of the atom is much smaller that the atom yet contains most of its mass.
1f. ****Students know*** how to use the periodic table to identify the lanthanide, actinide, and transactinide elements and know that the transuranium elements were synthesized and identified in laboratory experiments through the use of nuclear accelerators.

Standard Group 1 Key Concept – Atomic and Molecular Structure

Analyzed Standards 1a, 1b, 1c, 1d, 1e, 1f*	**Instructional Activities, Resources, and Performance Tasks**	**Integrated Connections**	**Materials (underlined are in LAUSD kit)**
1a Relate the position of an element in the periodic table to its atomic number and atomic mass (distinguish between atomic number and atomic mass). **1b** Classify elements as metals, semi-metals, and nonmetals using the periodic **1c** Classify elements as alkali metals, alkaline earth metals, and transition metals using the periodic table. • Infer patterns in the periodic table based on the sizes of the atoms and ions, electronegativities, and ionization energies.	**Performance Task: Students will create a game based on the Periodic** **Table of the Elements. See Performance Task 3.** **Chapter 7 – The Periodic Table; pp. 358-432** **Activity 1 – Organizing a Store; pp. 358-359 [1a]** • What Do You Think?; p. 358 • Investigate; pp. 358-359 • Chemistry to Go; p. 359 • **Activity Debrief** **Activity 2 – Elements and Their Properties; pp. 360-365 [1b]** • What Do You Think?; p. 360 • Investigate; pp. 360-363 • ChemTalk; *Physical and Chemical Properties;* pp. 363-364 • Chemistry to Go; p. 365 • **Activity Debrief**		Paper and pencil Aluminum Sulfur Copper Zinc Iron Tin Magnesium Silicon or charcoal/graphite Combination spot plate Steel wool 1M HCl Nails or copper wire Dropper bottle 60 ml

Analyzed Standards **1a, 1b, 1c, 1d, 1e, 1f***	**Instructional Activities, Resources, and Performance Tasks**	**Integrated Connections**	**Materials (underlined are in LAUSD kit)**
1d Demonstrate how electrons are arranged into different energy levels and how this arrangement relates to their location on the periodic table. Determine the bonding capacity of atoms by using valence numbers. **1e** Identify the components of atoms and describe the spatial organization of these subatomic particles. **1f*** Describe how synthetic elements are made and locate their positions in the periodic table.	**Activity 4 – Are Atoms Indivisible?; pp. 377-384 [1a, 1e]** • What Do You Think?; p. 377 • Investigate; pp. 377-379 • ChemTalk; *The Changing Model of an Atom;* pp. 380-382 • Chemistry to Go; p. 383 • Inquiring Further; p. 383 • **Activity Debrief** **Activity 5 – The Chemical Behavior of Atoms; pp. 385-394 [1c, 1d]** • What Do You Think?; p. 385 • Investigate; pp. 385-389 • ChemTalk; *Bohr's Model of an Atom;* pp. 390-392 • Chemistry to Go; pp. 393-394 • Inquiring Further; p. 394 • **Activity Debrief** **Activity 6 – Atoms with More Than One Electron; pp. 395-403 [1c, 1d]** • What Do You Think?; p. 395 • Investigate; pp. 396-399 • ChemTalk; *A Periodic Table Revealed;* pp. 400-401 • Chemistry to Go; pp. 402-403 • Inquiring Further; p. 403 • **Activity Debrief** **Activity 7 – How Electrons Determine Chemical Behavior; pp. 404-411 [1d, 2a, 2b]** • What Do You Think?; p. 404 • Investigate; 404-408 • ChemTalk; *The Noble Gases;* pp. 409-410 • Chemistry to Go; pp. 410-411 • Inquiring Further; p. 411 • **Activity Debrief**	Rutherford's experiment on the web http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/ruther14.swf	Cathode ray tube High-voltage power supply Horseshoe magnet Paper with 8X10 grid (at least two per student) High-voltage power supply Gas discharge tubes • He • Ne • Ar Spectroscope Diffraction grating or mylar High-voltage power supply Gas discharge tubes • He • Ne • Ar Spectroscope Diffraction grating or mylar Graph paper Periodic Table

Analyzed Standards 1a, 1b, 1c, 1d, 1e, 1f*	Instructional Activities, Resources, and Performance Tasks	Integrated Connections	Materials (underlined are in LAUSD kit)
	Activity 8 – How Atoms Interact with Each Other; pp. 412-418; [2a, 2b, 2c] • What Do You Think?; p. 412 • Investigate; pp. 412-414 • ChemTalk; *Forming Compounds;* pp. 414-415 • Chemistry to Go; pp. 416-418 • Inquiring Further; p. 418 • **Activity Debrief** **Supplemental Activities/Resources** Case Studies: Field Trips: Guest Speakers:		

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Standard Group 2

2a. *Students know* atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds.
2b. *Students know* chemical bonds between atoms in molecules such as H_2, CH_4, NH_3, H_2CCH_2, N_2, CI_2, and many large biological molecules are covalent.
2c. *Students know* salt crystals, such as NaCI, are repeating patterns of positive and negative ions held together by electrostatic attraction.
5a. *Students know* the observable properties of acids, bases, and salt solutions.
5c. *Students know* strong acids and bases fully dissociate and weak acids and bases partially dissociate.
7b. *Students know* chemical processes can either release (exothermic) or absorb (endothermic) thermal energy.
7c. *Students know* energy is released when a material condenses or freezes and is absorbed when a material evaporates or melts.

Standard Group 2 Key Concept – Chemical Bonds, Acids and Bases, and Chemical Thermodynamics

Analyzed Standards **2a, 2b, 2c, 5a, 5c, 7b, 7c**	**Instructional Activities, Resources, and Performance Tasks**	**Integrated Connections/Notes**	**Materials (underlined are in LAUSD kit)**
2a • Use models or diagrams and periodic table location to show how atoms combine according to "the octet rule." • Use physical models to: 1) classify binary compounds, 2) explain how covalent, ionic and metallic bonding occurs, and 3) to predict if covalent bonding is polar or nonpolar (electronegativity). **2b** • Use models of biological molecules to demonstrate and explain; 1) how the bonding capacity is based on the number of valence electrons and	**Chapter 8 – Cool Chemistry Show; pp. 434-496** **Activity 2 – More Chemical Changes; pp. 443-448; [5a, 7b]** • What Do You Think?; p. 443 • Investigate; pp. 443-446 • ChemTalk; *Tests for Chemicals;* pp. 446-447 • Chemistry to Go; p. 448 • Inquiring Further; p. 448 • **Activity Debrief**	**Chemistry at Work; p. 496** **(Small Scale Lab Manual pp 34-38)** Distinguishing the processes of physical and chemical changes are foundations to the acquisition of other chemistry concepts. If you may want to review physical and chemical changes, which are 8th grade standards, do A1, steps 1-4. Otherwise, use some parts of A1 as demo or let students read Chem. Talk (p 439) to set the tone for A2. In Activity 2 you need to emphasize the difference between strong and week acids.	❑ $Ba(NO_3)_2$ crystals ❑ NaOH crystals ❑ $NaHCO_3$ crystals ❑ $CuSO_4$ crystals ❑ KI crystals ❑ $AgNO_3$ crystals ❑ $Fe(NO_3)_3$ crystals ❑ HCl ❑ Microplate (24-well) ❑ Resealable plastic bag (sandwich size) ❑ $CaCl_2$ (1tsp) ❑ Phenol red indicator ❑ $Ca(OH)_2$ solution

Analyzed Standards 2a, 2b, 2c, 5a, 5c, 7b, 7c	Instructional Activities, Resources, and Performance Tasks	Integrated Connections/Notes	Materials (underlined are in LAUSD kit)
∗ 2) that chemical bonding occurs in order for atoms to attain the electron configuration of the nearest noble gas (in the periodic table). **2c** • Describe crystal formation in ionic compounds. **5a** • Compare the observable properties of acids, bases, and salts. • Explain the use of the pH scale and indicator dyes. **5c** • Relate the strength of acids and bases to the degree of dissociation in water. **7b** • Distinguish between endothermic and exothermic reactions by illustrating these processes using thermochemical equations, potential energy diagrams and evidence from lab procedures. 7c • Explain the relationship between energy and phase changes in solid, liquid and gaseous substances.	**Activity 3 – Chemical Names and Formulas; pp. 449-455; [2a]** • What Do You Think?; p. 449 • Investigate; pp. 449-452 • ChemTalk; *Forming Compounds;* pp. 452-454 • Chemistry to Go; pp. 454-455 • **Activity Debrief** **Activity 5 – Chemical Energy; pp. 466-472; [7b, 7c]** • What Do You Think?; p. 466 • Investigate; pp. 466-467 • ChemTalk; *Endothermic and Exothermic Reactions;* pp. 468-471 • Chemistry to Go; p. 471 • Inquiring Further; p. 472 • **Activity Debrief**	**(Small Scale Lab Manual pp 39-42)** Standard 3a: ICS 2 std (3.3 %) **Emphasize binary compounds** Steps 1- 5 are paper activities Steps 6-8 are teacher demo Steps 9-10 students do unknown (if time permits) **(Small Scale Lab Manual pp 51-52)** Inv. Steps 1-4, Inquiring Further P2 ❑ Ss observe energy changes when matter changes. Inv. Steps 1-4, Chem. to Go Qs 1-5 ❑ Ss determine whether energy changes are endothermic or exothermic. Step 3 and 4 (p467 or pp51-52 in SSLM) for **DEMO only because of NaOH and extreme temperature changes.**	Alka-Seltzer tablets Baking soda Baking powder 50 ml test tube Test tubes Test tube racks Vinegar Ammonia Wood splints Hot plate 250 ml beaker ❑ resealable bag (sandwich size) ❑ 125 mL Erlenmeyer flask with rubber stopper ❑ test tubes ❑ wood board ❑ NH_4NO_3 ❑ $CaCl_2$ ❑ NH_4SCN ❑ $Ba(OH)_2$ ❑ NaOH pellets

Analyzed Standards 2a, 2b, 2c, 5a, 5c, 7b, 7c	Instructional Activities, Resources, and Performance Tasks	Integrated Connections/Notes	Materials (underlined are in LAUSD kit)
	Activity 7 – Acids, Bases, and Indicators – Colorful Chemistry; pp. 480-489; [5a, 5c] • What Do You Think?; p. 480 • Investigate; pp. 481-483 • ChemTalk; *Acids and Bases;* pp. 483-487 • Chemistry to Go; p. 488 • Inquiring Further; p. 489 • **Activity Debrief** **Supplemental Activities/Resources** Case Studies: Field Trips: Guest Speakers:	Inv Steps 2, 5, Inq Further Part 3 ❑ Ss identify common household acids and bases Inv Steps 1, 3, Checking Up Q 1, Chem. to Go Qs 1-5, 7, Inq. Further Part 2 ❑ Ss identify characteristic properties of acids and bases and learn to differentiate between acids and bases. Inv Steps 4-5 ❑ Ss see how strong acids and bases behave differently from weak acids and bases. **Connect pH with strength of acids and bases.**	❑ microplate 24 well ❑ Mg or zinc ❑ Steel wool ❑ 1 M HCl ❑ Lemon juice ❑ Vinegar ❑ 1 M H_2SO_4 ❑ mineral water ❑ carbonated beverage ❑ orange juice ❑ milk ❑ dishwashing solution ❑ 1 M NaOH ❑ 0.1 M NaOH ❑ milk of Magnesia ❑ apple juice ❑ 1 M KOH ❑ $Ca(OH)_2$ ❑ Red and blue litmus paper ❑ Phenolphthalein solution ❑ Baking soda ❑ Red cabbage water solution ❑ Universal indicator solution ❑ Large sheet of paper ❑ Window cleaner with ammonia ❑ Stirring rod ❑ 4- 100 mL beakers ❑ 2- 250 mL beakers