Chemistry Curriculum Bundle #9

Title	Suggested Dates
Stoichiometry and Energy Changes	2/22 – 3/11 (14 days)

Big Idea/Enduring Understanding	Guiding Questions
Mathematical calculations can be used to determine quantitative relationships between reactants and products.	How are stoichiometry and cooking similar?

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the district curriculum.

Knowledge & Skills with Student Expectations	District Specificity/Examples	Suggested Resources (See note above)
Allow one day for College Board MyRoads activities within this bundle. 10th Grade—I. D. Me 11th Grade—Major Search		
8 Science concepts. The student can quantify the changes that occur during chemical reactions. The student is expected to: 8A define and use the concept of a mole; 8E perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield.	Understand the mole concept. CCRS *a. Use Avogadro's number and molar mass to convert to moles of a substance.* Determine the percent composition of a compound. Calculate the empirical formula of a compound from mass or percent composition data. CCRS Understand molar relationships in reactions, stoichiometric calculations, and percent yield. CCRS *a. Construct mole ratios for a reaction to calculate the reactant amounts needed or product amounts formed in terms of moles or mass.* b. Calculate percent yield, theoretical yield, or actual yield for a reaction. CCRS Including • Use stoichiometry of chemical equations to calculate molar conversions • Calculate o Mole ratio o Limiting reactant • Calculate Percent Yield • Calculate the amount of excess reagent after the reaction (PAP)	**Stoichiometry Activities** http://devacaf.caes.uga.edu/main/lessonPlan/SMoreLP.pdf **Limiting Reactant Activity** **http://scidiv.bellevuecollege.edu/jm/C140/C140%20F06/worksheets/lr_activity.pdf** **Stoichiometry Lab** See chemistry resource folder **Mole Relationship Lab** See chemistry resource folder

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11 Science concepts. The student understands the energy changes that occur in chemical reactions. The student is expected to:
 	
11A understand energy and its forms, including kinetic, potential, chemical, and thermal energies;
 	
11B understand the law of conservation of energy and the processes of heat transfer;
 	
11D perform calculations involving heat, mass, temperature change, and specific heat; and
	Understand energy changes in chemical reactions. CCRS
	a. Distinguish between endothermic and exothermic reactions. Draw energy diagrams for endothermic and exothermic reactions.
	b. Describe the Law of Conservation of Energy. CCRS
	
	Understand the Law of Conservation of Energy and processes of heat transfer. CCRS
	a. Distinguish among radiation, convection, and conduction as means of heat transfer.
	b. Describe processes of heat transfer.
	c. Perform calculations involving heat transfer, using specific heat and latent heat (phase changes). CCRS
	
	Including
	• Analyze changes in state, Including
	  • Freezing
	  • Melting
	  • Condensation
	  • Evaporation
	  • Sublimation
	  • Deposition
	• Identify the changes in state with regard to the change in heat energy.
	• Understand the law of conservation of energy in relation to physical changes in matter.
	• Describe and interpret phase change diagrams (PAP)
	• Describe the critical temperature and pressure for substances including water (PAP)
	• Define and identify normal boiling point and freezing point of water and other substances on phase diagrams (PAP)
		Interactive Phase Diagrams
		David N. Blauch
		http://www.chm.davidson.edu/ChemistryApplets/PhaseChanges/PhaseDiagram.html
		
		Interactive Phase Diagrams
		http://www.sciencegeek.net/Chemistry/taters/phasediagram.htm
		
		Heating and Cooling Curves
		http://library.thinkquest.org/C006669/data/Chem/colligative/phase.html

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11 Science concepts. The student understands the energy changes that occur in chemical reactions. The student is expected to: 11C use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic; 11E use calorimetry to calculate the heat of a chemical process.	Understand energy changes in chemical reactions. CCRS *a. Distinguish between endothermic and exothermic reactions. Draw energy diagrams for endothermic and exothermic reactions.* *b. Describe the Law of Conservation of Energy. CCRS* Understand energy changes and chemical reactions. CCRS *a. Describe and give examples of renewable and non-renewable energy resources.* *b. Describe endothermic and exothermic reactions.* c. Know that systems naturally tend to move in a direction that increases disorder or randomness (entropy). CCRS Including • Explain the energy that are associated with phase changes and the specific heat of substances • Predict if ΔH is positive or negative (PAP)	**Lab: Observing Energy Changes During Phase Changes** http://hrsbstaff.ednet.ns.ca/dawsonrj/11%20Chem/Labs/Phase%20Change%20PDCB.htm **Lab: Measuring the Specific Heat of Metals** http://www.iit.edu/~smart/martcar/lesson5/id37.htm **Online Lab: Calculate the Heat Capacity of Copper** http://www.chm.davidson.edu/ChemistryApplets/calorimetry/SpecificHeatCapacityOfCopper.html