OPRFHS-NGSS Curriculum Alignment **Chemistry 577** **Unit: Chapter 16**

Big Idea(s)/ Unifying Q(s):	
DCI-NGSS	•
SEP-NGSS	
CCC-NGSS	

16.1	16.1	16.2	16.2
• Kinetic energy	• q=mc^t	• Combustion reactions	• Spontaneous reactions
• Temperature	• Enthalpy	• Enthalpy of formation	• Non-spontaneous reactions
• Celsius-Kelvin conversions	• Entropy	• Enthalpy of reaction	• Driving force
• Calorimeter	• Gibbs Free Energy	• Forward Reactions	
• Specific Heat	• Endothermic reactions	• Reverse Reactions	
• Reaction Kinetics	• Exothermic reactions	• Hess's Law	

DCI, EOB and	Student Learning Targets (coded to DCI, EO or OPRF Objectives)
1.	• I can define kinetic energy as well as potential chemical energy
	• I can define temperature in terms of kinetic energy
	• I can describe how a calorimeter works and how it is used to measure changes in energy that take place during a chemical reaction
	• I have memorized the q=mc^t equation and can use it to solve for any of the variables
	• I have memorized the equation for Gibbs free energy and can use it to solve for any of the variables
	• I can use Hess's Law to calculate the heat of a chemical reaction by adding heats of formation, or by adding chemical reactions
	• I can calculate the total entropy of a chemical reaction by adding and subtracting entropies of products and reactants
	• I know how to use the concept of "products-reactants" with enthalpy as well as entropy
	• I can convert temperature between degrees C and Kelvins
	• I can use Gibbs free energy calculations to predict if reactions will be spontaneous or non-spontaneous
	• I can look at a chemical equation and determine qualitatively if entropy is increasing or decreasing
	• I can list factors that increase and decrease entropy
	• I can convert kilojoules to joules
	• I can use coefficients in a balanced chemical equation to calculate the total enthalpy of a chemical reaction (Given a table of thermochemical values)
	• I can predict if forward or reverse reactions will be favored based on enthalpy and entropy and Gibbs free energy
	• I can calculate the enthalpy of formation using Hess's Law and enthalpies of formation and combustion tables

Classroom Instructional Activity Bank	Resource Bank
Labs/Lab Activities/Videos/Demonstrations • Demo day: Potassium Permanganate, making water, breaking water • Cheetos-burning food/calorimetry • Lab 9E: Hess's Law Lab	Worksheets/Reading Guides/Formative Assessments/On-line Homework • Boezman AP Chemistry: • Boezman AP Chemistry: • Boezman AP Chemistry: • Watch methanol safety video • Bozeman AP Chem #59: Gibbs Free energy (7:00) • Bozeman AP Chem #57: Entropy (7:00) • Bozeman AP Chem #58: Spontaneous processes (8:00) • 2. Bozeman AP Chem #60: Driving non-spontanious processes (5:00)-Take notes in black notebook • Khan Academy: Gibbs free energy sample problem • Science Geek: AP Chem Hess's Law
Investigations/Engineering Projects: • Biodiesel-Reducing your carbon footprint • Cheetos-calorimetry	Summative Common Unit Assessment: • Chapter 16 test