FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Pre – AP Chemistry **Unit Name:** **Thermal Chemistry** **Days: 8**

Quality Core Objectives:

Unit 8 Thermal Chemistry		
I.A.1.	Scientific Inquiry	c. Collect, organize, and analyze data accurately and use techniques and equipment appropriately
		d. Interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations
		e. Write and speak effectively to present and explain scientific results, using appropriate terminology and graphics
		f. Safely use laboratory equipment and techniques when conducting scientific investigations
		g. Routinely make predictions and estimations
I.A.2.	Mathematics and Measurement in Science	a. Distinguish between precision and accuracy with respect to experimental data
		b. Use appropriate SI units for length, mass, time, temperature, quantity of matter, area, volume, and density; describe the relationships among SI unit prefixes (e.g., centi-, milli-, kilo-); recognize commonly used non-SI units
		c. Use the correct number of significant figures in reporting measurements and the results of calculations
		d. Use appropriate statistical methods to represent the results of investigations
		e. Express numbers in scientific notation when appropriate
		f. Solve for unknown quantities by manipulating variables
		g. Use graphical, mathematical, and/or statistical models to express patterns and relationships inferred from sets of scientific data
I.A.3.	Science in Practice	e. Use a variety of appropriate sources (e.g., Internet, scientific journals) to retrieve relevant information; cite references properly
		f. Identify and analyze the advantages and disadvantages of widespread use of and reliance on technology
V.B.3.	Chemical Processes and Heat; Calorimetry	a. Explain the law of conservation of energy in chemical reactions
		b. Describe the concept of heat, and explain the difference between heat energy and temperature
		c. Explain physical and chemical changes as endothermic or exothermic energy changes
		d. Solve heat capacity and heat transfer problems involving specific heat, heat of fusion, and heat of vaporization
		e. Calculate the heat of reaction for a given chemical reaction when given calorimetric data

V.B.4. Enthalpy and Entropy	a. Define enthalpy and explain how changes in enthalpy determine whether a reaction is endothermic or exothermic
	b. Compute ΔH_{rxn} from ΔH_f^o values and explain why the ΔH_f^o values for elements are zero
	c. Explain and apply, mathematically, the relationship between ΔH_{rxn}^o (forward) and ΔH_{rxn}^o (reverse)

Purpose of the Unit: Students will be able to explain the law of conservation of energy for chemical reactions. Students will also be able to differentiate between heat and temperature and be able to calculate the heat released or absorbed by a chemical reaction by a variety of means (ex: data tables or experimentally). Students will also be able to distinguish between exothermic and endothermic reactions and be able to predict this characteristic of a reaction.

Prerequisites: Students should be able to:

- use a data table to retrieve information
- distinguish between endothermic and exothermic reactions
- use the law of conservation of matter
- differentiate between chemical and physical (phase) changes

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
1	*** Law of conservation of E * heat & heat vs. temperature * enthalpy and endothermic vs. exothermic V.B.3.a, b, c V.B.4.a**	*** How are heat energy and temperature related? * What does change in enthalpy tell me about a reaction or phase change?**	*** Summarizing and note taking * Analysis/ Application * Advanced organizers * Identifying similarities and differences**	*** Pre test * ACT bell ringer * Modeled notes * Venn Diagram (formative) * Article on using garbage to make electricity**	*** Evaluate pre test * Evaluate Venn diagram and understanding of article Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative**

2-3	*** heat capacity and transfer problems with specific heat, H_{fus} and H_{vap} V.B.3.d**	*** How can I calculate heat capacity and heat transfer for a reaction?**	*** Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Working with others * Advanced organizers**	*** ACT bell ringer * Modeled notes * Work problems together (formative) * Math notes**	*** Evaluate sample problems and math notes for understanding Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative**
3-4	*** Compute ΔH_{rxn} from ΔH_f° * Compute ΔH_{rxn} from experimental data * ΔH_{rxn}° (forward) & ΔH_{rxn}° (reverse) relationship V.B.3.e V.B.4.b, c**	*** How can ΔH_{rxn} be calculated?**	*** Summarizing and note taking * Application * Authenticity * Working with others**	*** ACT bell ringer * Modeled notes * Work problems together (formative) * Math notes**	*** Evaluate sample problems and math notes for understanding Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative**
5-6	*** Laboratory: Experimentally determining ΔH_{rxn} I.A.1.c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.e, f V.B.3.a, b, c, d, e V.B.4.a, b, c**	*** How can I use what I know to separate a mixture and classify the substance at each step of the separation?**	*** Synthesis * Application/ Analysis * Identifying similarities and differences * Learning with others * Authenticity * Novelty and Variety * Generating and testing hypotheses**	*** ACT bell ringer * Conduct lab according to procedures provided (summative)**	*** Evaluate lab report Enrichment: Student development of lab procedures with less guidance**
7	*** Review I.A.1.c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.e, f V.B.3.a, b, c, d, e V.B.4.a, b, c**	*** What can I do to be better prepared for the exam?**	*** Use clickers to test students' knowledge and clarify and misconceptions before the exam with immediate feedback.**	*** ACT bell ringer * Use clickers to review with exam like questions (summative)**	*** Students participate in review Enrichment: Less time to solve problems and limited use of aides**

8	*** Exam** **I.A.1.c, d, e, f, g** **I.A.2.a, b, c, d, e, f, g** **I.A.3.e, f** **V.B.3.a, b, c, d, e** **V.B.4.a, b, c**	*** Can I demonstrate my knowledge on the exam?**	*** Evaluation** *** Analysis** *** Application** *** Synthesis**	*** ACT bell ringer** *** Students take exam (summative)**	*** Evaluate exam** **Enrichment: No use of supports with exemption of periodic table, periodic table only has element symbols, not names**