International Baccalaureate
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MYP/3D Science Unit Planner

Marietta City Schools

MARIETTA CITY SCHOOLS

Grade & Course: 9 -12 Chemistry	**Topic:** Gasses and Thermodynamics	**Duration:5** weeks

Georgia Standards and Content:

SC5. Obtain, evaluate, and communicate information about the Kinetic Molecular Theory to model atomic and molecular motion in chemical and physical processes.

a. Plan and carry out an investigation to calculate the amount of heat absorbed or released by chemical or physical processes. (*Clarification statement*: Calculation of the enthalpy, heat change, and Hess' Law are addressed in this element.)
b. Construct an explanation using a heating curve as evidence of the effects of energy and intermolecular forces on phase changes.
c. Develop and use models to quantitatively, conceptually, and graphically represent the relationships between pressure, volume, temperature, and number of moles of a gas.

SC2. Obtain, evaluate, and communicate information about the chemical and physical properties of matter resulting from the ability of atoms to form bonds.

g Develop a model to illustrate the release or absorption of energy (endothermic or exothermic) from a chemical reaction system depends upon the changes in total bond energy.

Narrative / Background Information

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

SPS5. Obtain, evaluate, and communicate information to compare and contrast the phases of matter as they relate to atomic and molecular motion.
a. Ask questions to compare and contrast models depicting the particle arrangement and motion in solids, liquids, gases, and plasmas.
b. Plan and carry out investigations to identify the relationships among temperature, pressure, volume, and density of gases in closed systems. (Clarification statement: Using specific Gas laws to perform calculations is beyond the scope of this standard; emphasis should focus on the conceptual understanding of the behavior of gases rather than calculations.)

SPS7. Obtain, evaluate, and communicate information to explain transformations and flow of energy within a system.
c. Analyze and interpret specific heat data to justify the selection of a material for a practical application (e.g., insulators and cooking vessels).
d. Analyze and interpret data to explain the flow of energy during phase changes using heating/cooling curves.

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

Changes to the measurement of chemicals added to Flint Michigan's water supply created dangerous levels of lead contamination in the drinking water.

Unit Phenomena (LEARNING PROCESS)

Mood rings change color based on the temperature of the wearer's skin, which reflects changes in their body temperature, influenced by their emotional state. These color changes are a direct result of the behavior of liquid crystals in response to temperature variations.

OR

Neon signs emit light due to the excitation of neon gas atoms by an electric current. The light emitted is a result of the energy transitions of electrons within the neon atoms, as explained by the Kinetic Molecular Theory.

MYP Inquiry Statement:

Chemical reactions are governed by the energy changes and feasibility of the reactions.

MYP Global Context:

Scientific and Technical Innovation

Approaches to Learning Skills:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
		● Systems and System Models ● Stability and Change ● Scale, Proportion, and Quantity

● Communication skills
● Social skills
● Self Management skills
● Research skills
● Thinking skills
	● Gas Laws
	  ● Pressure
	  ● Ideal Gas Law
	  ● Combined Gas Law
	  ● Boyle's Law
	  ● Charles' Law
	● Molar Volumes of Gases
	  ● Heat (formation, vaporization, fusion)
	  ● Specific Heat
	  ● Enthalpy
	  ● Heat Change
	  ● Hess' Law
	  ● Phase Changes
	  ● Heating Curves
	● Energy
	  ● Calorie and Calorimetry
	  ● Joule
	  ● Endothermic
	  ● Exothermic
		● Cause and Effect
		
		MYP Key and Related Concepts:
		Key Concept(s)
		● Systems
		● Change
		
		Related Concept(s)
		● Models
		● Balance
		● Interaction
		● Transfer

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

All gases behave the same.
Gases are non-reactive.
All gases are clear.
Heat is the same as temperature.

Key Vocabulary: (KNOWLEDGE & SKILLS)

- Heat
- Enthalpy
- Standard enthalpy of formation
- Hess's Law
- Heating curve
- Energy
- Calorie
- Joule
- Specific heat
- Calorimeter
- Phase change
- Heat of vaporization
- Heat of fusion
- Intermolecular forces
- Pressure
- Ideal gas law
- Combined gas law
- Boyle's law
- Charles's Law

Inquiry Questions:

Factual - What determines if a reaction has a positive or negative delta H value?

Conceptual - What implications does thermodynamic properties have in our daily lives?

Debatable - When should people manipulate the laws of thermodynamics in order to start or stop a reaction from being spontaneous and proceeding forward?

MYP Objectives	Summative assessment	
Sciences	Criterion A: Knowing and Understanding ● Common Summative Assessment Criterion B: Inquiring and Designing Criterion C: Processing and Evaluating ● Common Laboratory Experience	Relationship between summative assessment task(s) and statement of inquiry: Students will perform tasks and respond to assessment items that will gauge their mastery of reactions as required by the Georgia Standards of Excellence. Mastery of these concepts is necessary to move forward in our student of chemical behavior.

Unit Objectives:			
Learning Activities and Experiences	**Inquiry & Obtain: (LEARNING PROCESS)**	**Evaluate: (LEARNING PROCESS)**	**Communicate: (LEARNING PROCESS)**
Week 1 **Week 2** **Week 3** **Week 4**	**Engage:** ● Core Interactive Text: Gas Laws ● Video: Gas Laws ● Core Interactive Text: Heat, Temperature, Endothermic and Exothermic ● Video: Heat vs. Temperature ● Core Interactive Text: Heat, Temperature, Endothermic and Exothermic ● Video: Heat vs. Temperature ● Core Interactive Text: Phase Changes and Heating/Cooling curves ● Video: Phase Changes and Curves ● Core Interactive Text: Specific Heat and Calorimetry ● Video: Calorimetry **Explore:** ● Core Interactive Text: Gas Laws ● Exploration: pHET simulation of gas law properties ● Exploration: Gas Laws Demo/Lab ● Core Interactive Text: Heat, Temperature, Endothermic and Exothermic ● Exploration: Temperature Demo/Lab ● Core Interactive Text: Phase Changes and Heating/Cooling curves ● Exploration: Phase Changes and Heating/Cooling Curves Demo/Lab ● Core Interactive Text: Specific Heat and Calorimetry	**Evaluate:** ● Common Formative Assessment ● Common Writing Task on Thermodynamics ● Common Summative Assessment	**Explain:** ● Core Interactive Text: Gas Laws and Thermodynamic Principles **Elaborate:** ● Core Interactive Text: Applying Gas Laws and Thermodynamic Principles ● Writing Tasks: Heat vs Temperature ● Airbag Investigation ● Research Application of Thermodynamics and Gas Laws

	● Exploration: Calorimetry Demo/Lab		

Resources (hyperlink to model lessons and/or resources):
Discovery Education Science Techbook

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
(click here)	(click here)	(click here)