

UNIT OF STUDY

Unit 2

Title: Classification and Kinetic theory Subject/Course: Physical Science Length: 3 weeks	
Topic: Properties of matter, kinetic theory, energy Grade: 9 th Designer: Kathryn Melnick	
UNIT GOALS AND EXPECTATIONS	
IMPORTANT CONCEPTS/UNDERSTANDINGS: Big Idea: Matter can be identified based on its properties and behavior. Matter has physical and chemical properties. Matter can undergo physical or chemical changes. Matter can be in difference phases which are determined by Kinetic theory. The phases of matter can be graphed to show the boundaries between solid, liquids, and gases. The amount of heat needed to change phases is called heat of fusion (solid to liquid) and heat of vaporization (liquid to gas).	ESSENTIAL QUESTIONS: Which properties are physical and chemical? How can we tell if a change is physical or chemical? What is the kinetic theory? What is a triple point and how does it relate to the kinetic theory? What causes matter to expand? How does heat affect the density of an object? What are Charles' and Boyle's Laws? How do we determine if a reaction is exothermic or endothermic?
STUDENT LEARNING EXPECTATIONS: C.1.PS.1 Compare and contrast chemical and physical properties of matter, including but not limited to flammability, reactivity, density, buoyancy, viscosity, melting point and boiling point C.1.PS.2 Compare and contrast chemical and physical changes, including but not limited to rusting, burning, evaporation, boiling and dehydration C.2.PS.1 Identify the kinetic theory throughout the phases of matter	C.2.PS.2 Create and label heat versus temperature graphs (heating curves): -solid -liquid -gas -triple point -heat of fusion -heat of vaporization C.2.PS.3 Relate thermal expansion to the kinetic theory C.2.PS.4 Compare and contrast Boyle's law and Charles' law C.2.PS.5 Compare and contrast endothermic and exothermic reactions as energy is transferred
SPECIFIC DECLARATIVE KNOWLEDGE – What I know Identify the physical and chemical properties of matter. Understand that density is a constant. Identify changes as chemical or physical. Apply the kinetic theory to the phases of matter. Explain how thermal expansion relates to the kinetic theory. Explain Boyle's and Charles' Law. Give everyday examples. Explain how you can tell if a reaction is exothermic or endothermic.	SPECIFIC PROCEDURAL KNOWLEDGE – What I need to do Determine physical and chemical properties and changes in the laboratory. Determine if liquids are solutions, suspensions, or colloids. Determine the density of different materials. Draw and label heat vs. temperature graphs to show solid, liquid, gas, triple point, melting point, boiling point, and sublimation point. Work problems using Boyle's and Charles' Laws.

UNIT ASSESSMENTS (Include tasks related to Dimensions 3 and 4 and Bloom's Taxonomy)	
Classify matter in to substances and mixtures. Classify substances in to elements and compounds. Perform lab to learn the difference between solutions, colloids, and suspensions. Classify mixtures into solutions, colloids, suspensions. Perform lab to determine physical properties (ie. Viscosity, conductivity, malleability, buoyancy, melting point, boiling point, hardness) Perform virtual labs on density. Perform labs to determine the density of water at different volumes and the density of various objects. Lab test to determine the density of different liquids and create a density column. Perform lab to separate salt, sand, and iron filings. Reading activity on how to distinguish between chemical and physical changes (It Says, I Say, and So) Perform lab to determine which changes are chemical and physical. Virtual labs on phase changes Solve density problems. Solve problems using Charles's Law, Boyle's Law and the Combined Gas Law. Classify phase changes as endothermic or exothermic Perform lab on heating curves.	
Traditional Assessments: Test on classification, properties, and changes. Element quizzes Daily quizzes Test on phases and gas laws.	Other Evidence of Learning: Line of learning. Writing: Explain how a mixture can be separate using physical changes. Writing: Why do hot air balloons float?

ACTIVITIES AND LEARNING EXPERIENCES	Resources
<p>Activity: Students will be given a list of materials. They will group them into things which can be separated and things which cannot be separated. They will then do vocabulary on the terms substance and mixture. They will then break the substances down into elements and compounds.</p> <p>Lab: The students will take mixture and determine if they are solutions, suspensions, or colloids based on the Tyndall Effect and settling. They will then filter the mixture and reevaluate their classification. A relationship between particles size and type of mixture will be determined. The students will then take the mixtures from the previous activity and further classify these by particle size.</p> <p>Physical Properties: The students will pairs read to list and define physical properties. Vocabulary sheet will be completed for the definitions of these terms (viscosity, conductivity, malleability, buoyancy, melting point, boiling point, hardness, and density).</p> <p>Lab: The students will perform a lab to test the physical properties of various substances. (example: different liquids will run down a glass plate to rate viscosity)</p> <p>Lab: A virtual lab will be used to introduce the methods for measuring density.</p> <p>Lab: The density of water will be calculated at different volumes.</p> <p>Lab: The density of various materials will be determined.</p> <p>Lab Test: The density of three liquids will be determined and density column will be created</p>	<p>Note cards and butcher paper</p> <p>Milk mixture, cupric sulfate solution, water with food coloring, muddy water, filter paper, beakers, funnels, laser pointers.</p> <p>Vocabulary sheets</p> <p>Lab materials Virtual lab sheets, smart board, software. Water, balances, 10 and 100 ml graduated cylinders Metal rods of various materials, salt, block of</p>

<p>by the students. Practice problems on density. Quiz on density problems. Physical Changes Lab: Salt, sand, and iron filing will be separated by physical changes of magnets, dissolving, filtering, and distillation. Activity: Separating colors by chromatography.</p> <p>Discuss the chemical properties of reactivity and flammability. It Says, I Say, and So sheets to determine how we tell the difference between physical and chemical changes. Lab: Which changes are physical and which are chemical? Test on classification, properties, and changes.</p> <p>Discuss three phases of matter. What factors affect gas pressure? Brainstorming activity Teacher demos: Crush can and place heated flask upside down in water. What causes these things to happen? Explain in notebook. Virtual labs on gas laws. Vocabulary on Charles's Law, Boyle's Law, and the Combined gas law. Work problems using these laws. Do homework and quiz on these problems.</p> <p>Discuss thermal expansion and its relationship to density.</p> <p>Writing: Why do hot air balloons float?</p> <p>Pairs read to define the six types of phase changes. Demonstrate the difference between exothermic and endothermic reactions. Use root terms to define these words. Classify the six phase changes as endothermic or exothermic reactions.</p> <p>Lab: Measure the temperature of solids as they melt and reach their boiling points. Draw heating curves to show these changes.</p> <p>Show phase diagrams and label the phase changes and triple point.</p> <p>Test on phase changes and gas laws.</p>	<p>wood, glycerin, food coloring, alcohol, pipettes Practice problems Salt, sand, iron filing, filter papers, Bunsen burners, test tubes, funnels, magnets Water soluble markers, coffee filters, cups, water It Says, I Say, and So sheets Various lab materials Test</p> <p>Soda cans, flasks, Bunsen burners, sink of water Virtual lab sheets, software Practice problems</p> <p>Writing prompt</p> <p>Books Ammonium chloride solution, sodium hydroxide solution, water, beakers</p> <p>Ice, beakers, thermometers, Bunsen burners, ring stands, etc...</p> <p>Test</p>
Career Connections	
<p>Sculptor Water treatment technician Meteorologist</p>	