

RAMP UP - REACT Lesson Plan

Title of Lesson:	Physical or Chemical? Identifying Reactions with a Coke and Mentos Experiment
Grade Level:	5th grade science or grades 3-5 STEM
AL COS Standard:	SC15.5.4 - Investigate whether the mixing of two or more substances results in new substances (e.g., mixing of baking soda and vinegar resulting in the formation of a new substance, gas; mixing of sand and water resulting in no new substance being formed).
NGSS:	5-PS1-4 - Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
Learning Targets/Objectives:	<ul style="list-style-type: none"> ● Students understand that when two or more different substances are mixed, a new substance with different properties may be formed ● Students can identify chemical changes vs. physical changes
Materials Needed:	<ul style="list-style-type: none"> ● RAMP UP REACT Kit (for Extend phase) <ul style="list-style-type: none"> ○ All materials needed for the REACT experiment are included in the kit ● Videos <ul style="list-style-type: none"> ○ Physical and Chemical Changes - BrainPOP Jr. -https://www.youtube.com/watch?v=JjPCoOQ0LIE ● Handouts <ul style="list-style-type: none"> ○ What is Chemistry/Sort ○ Physical vs. Chemical Changes: Reflection Sheet ● Other Materials (for Explore phase) <ul style="list-style-type: none"> ○ Skittles (small bag per group) ○ plastic plate (one per group) ○ water (½ cup per group) ○ funnel (one per group) ○ baking soda (⅓ cup per group) ○ empty plastic water bottle (one per group) ○ paper towels ○ aluminum trays (one per group for to hold supplies) ○ latex balloon (one per group)

	Links to the video and handouts can also be found on the REACT Kit Resources page https://uahrapup.org/react/
Preparation:	<ul style="list-style-type: none"> • Have all the materials prepared in an aluminum pan for each group to grab as they go to their tables to perform the experiment in the Engage phase • Select an open space outside to conduct the RAMP UP REACT experiment in the Extend phase
Lesson Logistics:	<ul style="list-style-type: none"> • 3-day lesson (can be lengthened or shortened) • Students will begin on the carpet (or they may stay in their chairs) for a whole group discussion (Engage phase). • Students will be divided into groups of 3-4 • The students will grab their materials from a central location to take to their tables for their investigations (Engage phase).
Vocabulary Words:	<ul style="list-style-type: none"> • physical change - involves a change in the size, shape, and sometimes color of matter. • chemical change - any change that causes a new substance to be formed
Safety Considerations:	<ul style="list-style-type: none"> • Check for any allergies: balloons, skittles, baking soda (Explore phase) • Students in charge of placing mentos in the soda bottles may need safety goggles and ponchos (Extend phase) (materials provided in REACT kit)
Engage: Day 1	<p>Step 1: Explain to the class they will be doing chemistry. Using the What is Chemistry/Sort handout, record what the students think when they use the word CHEMISTRY.</p> <p>Step 2: Give examples of changes (examples included with handout). Have students predict if the change is physical or chemical. Add predictions to the chart.</p> <p>Step 3: Watch the video, Chemical vs. Physical Change (link in Materials Needed section), and ask the students if they want to make any changes to the chart after watching the video.</p>

<p>Explore: Day 2</p>	<p>Students will complete two experiments to observe a chemical and physical change. After each experiment, they will record their observations on the Physical vs. Chemical Changes: Reflection Sheet handout. Time frame is approx. 25 mins.</p> <p>Experiment #1: Skittles in Water - Sugar Dissolving</p> <p>Simply arrange the skittles on a paper plate, add water, and watch as the colored sugar coating dissolves.</p> <p>Experiment #2: Inflate a Balloon</p> <p>Instructions:</p> <ul style="list-style-type: none"> ● Use a funnel to add 1/3 cup baking soda to the inside of a balloon. ● Fill a plastic bottle with approximately 1 cup vinegar. ● Attach the balloon to the mouth of the plastic bottle, then lift the balloon upright so the baking soda falls and causes the reaction.
<p>Explain: Day 2</p>	<p>Bring the class together on the carpet or back to their chairs to facilitate a whole group discussion. Ask the class which experiment represented a physical change (Skittles in Water) and which experiment represented a chemical change (Inflate a Balloon). Have students discuss their findings. Encourage the groups to support their claims with evidence gathered from the experiments.</p>
<p>Extend: Day 3</p>	<p>Step 1: Take the students to the chosen location for the RAMP UP REACT experiment. Follow the REACT guide for preparations and detailed instructions for the experiment. All materials needed for the experiment are included in the kit. Students may record variables used and outcomes for each experiment. An experiment matrix is provided in the kit.</p> <p>Step 2: Following the experiment, take the students inside and hold a whole group discussion. The objective of the discussion is for the students to decide if the mentos and coke experiment is a chemical or physical change. They must be able to defend their answers.</p>

	<p>Background Information to Guide Discussion:</p> <ul style="list-style-type: none">● The coke and mentos experiment represents a physical reaction.● Soda is carbonated, meaning it has carbon dioxide forced into it. The carbon dioxide wants to escape the liquid, but it needs a place to collect in order to escape the liquid soda's surface tension.● Mentos look smooth on the outside, but in fact, they have tiny bumps and cracks all along their surface.● These bumps and cracks offer a perfect home for the carbon dioxide to collect in a bubble and then float to the surface, making lots of foam very quickly!
<p>Evaluate:</p>	<p>The Physical vs. Chemical Changes: Reflection Sheet may serve as an assessment.</p>