7.2 Chemical Reactions

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **6 weeks**
Status: **Published**

Course Pacing Guide

Unit	Marking Period	Length
Chemical Reactions and Matter Transformation	1	6 weeks
Cells and Systems (2019 only)	1	6 weeks
Metabolic Reactions	2	6 weeks
Genetics (2019 only)	2,3	4 weeks
Evolution (2019 only)	3	4 weeks
Photosynthesis and Matter Cycling	4	8 weeks
Ecosystems	4	6 weeks

Unit Overview

The unit on chemical reactions and matter transformations begins as students consider what happens to a bath bomb when it is added to water. They develop a model, at a scale smaller than they can see, to try to explain what they think happened to the matter that was in the bath bomb and what caused the gas bubbles to appear. This and related phenomena (Where adding a solid to water resulted in gas bubbles appearing) leads to a broader set of students' questions around. How can we make something new that was not there before? Students analyze data about the bath bomb, including what happens to the amount of matter in the bath bomb and water before, during, and after gas bubbles appear, the properties of the substance that make up the bath bomb, the water, and the gas that is produced. Students develop models to account for how new types of particles can be appearing from old particles. They compare their models to historical models developed by Dalton and other scientists, and they conduct investigations on water to determine if it has undergone a physical change or a chemical reaction. Finally, students revisit their initial model and explanations of the bath bombs to explain what substances could have been produced in the chemical reaction, why the mass of the matter in the system wouldn't change when this happens and conduct property tests that could be done to determine whether a particular substance was produced or not.

Enduring Understandings

- Gases are matter, which is made of particles that are spread far apart. Liquids and solids are matter, which is made of particles that are closely packed together.
- Substances have properties that can help us identify them (e.g. solubility, odor, state of mater at room

temperature, melting point, density, flammability, and color).

- When new substances form from old substances, the particles of old substances might break apart and/or stick together to form new combinations of particles.
- Molecules are made of atoms and all the substances in our world are made of very few types of atoms.
- A substance is made of the same type of molecules (or atoms throughout). The number, type, and arrangement of atoms in the molecules that make up a substance are unique to that substance.
- In a chemical reaction, the particles that make up old substances can be broken apart and the atoms that make them up can be rearranged into new compound particles to make new substances. The amount of matter at the beginning (in the reactants)is the same amount of matter at the end of the reaction (in the products).
- Atoms in the molecules of the reactants rearrange to form new molecules in different combinations.
- Matter in all states is made of atoms and molecules that take up space and have mass.
- The mass of the matter in a closed system does not change when something dissolves (breaks into pieces too small to be seen).
- Materials that are less dense float upwards when surrounded by matter that is more dense; materials that are more dense sink downward when surrounded by matter that is less dense.

Essential Questions

- What happens when a bath bomb is added to water (And what causes it to happen)?
- Where is the gas coming from?
- What is in a bath bom?
- Which combinations of the substances in a bath bomb produce a gas?
- What gas(es) could be coming from the bath bomb?
- How can particles for a new substance be formed from the old particles we started with?
- How can I make new particles from old particles?
- Does heating liquid water produce a new substance in the gas bubbles that appear?
- Is the gas(es) produced from water using a battery made of the same particles that were produced from heating the water?
- Can the molecules that make up other substance be broken down into smaller pieces to make new

substances with old properties?

- How is the possible that a new substance (the gas) was produced and the total mass of the closed system didn't change?

New Jersey Student Learning Standards (No CCS)

SCI.MS-PS1-2	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
SCI.MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
SCI.MS-PS1-5	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Interdisciplinary Connections

LA.SL.7.1.C	Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

Technology Standards

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

21st Century Themes/Careers

CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.

Instructional Strategies & Learning Activities

- Students will engage with the phenomenon through hands-on lab activities, data sets, readings, or videos or images.
- Plan and carryout investigations and analyze data to determine whether the matter that was in the gas bubbles produced was already part of the matter that was there before hand.
- Analyze data to determine the properties (Density, melting point, boiling point, solubility, flammability) of substances and use these properties to argue from evidence with candidate substances the gas in the bubbles from the bath bomb could be made of.
- Develop and use models to describe the atomic composition of simple molecules and extended

structures.

- Analyze and interpret data on the properties of a substance (water) before and after energy is added to the substance and use these to argue from evidence for whether a chemical reaction has occurred.
- Construct an explanation of describe how the total number of atoms does not change in a chemical reaction and the mass is conservation.
- Construct an explanation to describe to describe possible products in a chemical reaction from a set of known reactants by considering that the type of atoms in the chemical reactions should not change.

Differentiated Instruction

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Meaningful Student Voice & Choice
- Relationship-Building & Team-Building
- Self-Directed Learning
- LMS use
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Grouping
- Rubrics
- Jigsaws
- Assessment Design & Backwards Planning

Formative Assessments

Including, but not limited to:

- Science notebook entries
- Scientist circle discussions
- Initial models
- Google reflection forms/exit tickets

Summative Assessment

- Final Model and final Scientific Explanation (CER)

Benchmark Assessments

- Fall/Winter LinkIt Assessments

Resources & Technology

Adapted from OpenSciEd Chemical Reactions and Matter Transformations unit

BOE Approved Texts

N/A

Closure

Individual classes and lessons will end with a closure activity that reinforces what students figured out during class, and helps navigate toward next steps.
Closure activities may include:

- Scientists' Circle
- Post-it reflection
- Google form exit ticket
- Group performance reflection
- Science notebook jot

ELL

- Alternate Responses
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- Google Translate

Special Education

Accomodations will be made in accordance with students' IEPs. The following list provides examples:

- Shorten assignments to focus on mastery of key concepts.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Keep workspaces clear of unrelated materials.
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Allow the student to complete an independent project as an alternative test.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits

At Risk

Examples may include:

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart

Gifted and Talented

Examples may include:

- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking