Feb. 4B Gr.8: Characteristic Properties of Matter

Content Area: **Science**
Course(s):
Time Period: **February**
Length: **1 Week**
Status: **Published**

Unit Overview

All objects maintain a certain color, odor, density, and reactivity regardless of their sample size. This concept will show you how an objects physical and chemical properties make up its everyday traits.

Enduring Understandings

Lesson Objectives

By the end of the lesson, students should be able to:

- Define matter.
- Identify the characteristic physical properties of matter.
- Identify the characteristic chemical properties of matter.

Essential Questions

- **Overarching Question**
    - How can one explain the structure, properties, and interactions of matter?
- **Focus Question**
    - How do particles combine to form the variety of matter one observes?
- **Lesson Questions**
    - Why are certain physical properties of matter characteristic properties?
    - How do scientists investigate the characteristic chemical properties of a substance?
    - How are characteristic properties of matter used to differentiate matter?

- **Can You Explain?**
    - How are characteristic chemical and physical properties alike, and how are they different?

Instructional Strategies & Learning Activities

Science 8th grade Periods 2,4,6
Law of Conservation of Mass
Atoms, Elements, Bonding and Compounds
Conservation of Mass- Dalton's Atomic Theory in Action

Objective(s)
Students will learn about the fundamental forces which create and control the interactions between atoms to form all matter. Students will understand how scientists prove mathematically chemical reactions do not create or destroy mass.

Goal(s)
Students will recognize how the physical construction of an atom through its subatomic particle count and configuration dictates its placement on the periodic table of the elements and consequently controls its interactions with other elements. These interactions include various types of bond formation which lead to the creation of compounds both natural and synthetic.

Students will be able to name reaction types according to the products that are created (synthesis, decomposition and replacement). Additionally, students will be able to prove that atoms are not created or destroyed during the chemical reaction process, only rearranged according to Dalton's Atomic theory.
Procedures
Students will use their informational packets and handouts in order to complete their lessons.
students will use a variety of informational sources including text, video, demonstrations, labs and online research.
Course Material TCI Bring Science Alive- Matter- Unit 1:2 Molecules and Extended Structures
Assessment
class discussion
review of assignments
quizzes
tests
projects/ labs

Differentiation

Change the Pace:

pre-testing

curriculum compacting

tiered activities (start with more difficult activities and skip the easier ones)

independent study

learning centers (skip centers that student has mastered)

Change the Delivery/Content:

mini-lessons for small groups

use different resources (higher level books, higher level response questions, open ended questions/problems…)

curriculum compacting

independent study

open-ended questions

teacher conferences

reading journals

Change the Product:

choice boards or Tic Tack Toe menus

student choice options

game creation

technology-based products/presentations

Change the Process - Add Depth:

tiered activities

open-ended activities

higher-level questions

student experts

increase complexity, decrease structure

Change the Process - Add Breadth:

choice boards or Tic Tack Toe menus

interdisciplinary units

Integration of Career Readiness, Life Literacies and Key Skills

Students will work in small groups or partnerships to conduct investigations, build models or prototypes and present findings.

9.2.5.CAP	Career Awareness and Planning
9.4.8.CI	Creativity and Innovation
	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
9.2.5.CAP.1	Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
9.2.5.CAP.2	Identify how you might like to earn an income.
9.4.8.CI.3	Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.
9.4.8.CT	Critical Thinking and Problem-solving
	An essential aspect of problem solving is being able to self-reflect on why possible solutions for solving problems were or were not successful.
	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.5	Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.
9.4.8.GCA	Global and Cultural Awareness

	Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.
9.4.8.GCA.1	Model how to navigate cultural differences with sensitivity and respect (e.g., 1.5.8.C1a).
9.4.8.GCA.2	Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
	Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.
CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology Integration

Technology is fully integrated using Discovery Techbook.

Interdisciplinary Connections

MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
LA.RST.6-8	Reading Science and Technical Subjects
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RI.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

LA.RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
LA.RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LA.RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LA.RI.8.7	Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to present a particular topic or idea.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.RI.8.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
LA.RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LA.RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LA.RI.8.10	By the end of the year read and comprehend literary nonfiction at grade level text-complexity or above, with scaffolding as needed.
LA.WHST.6-8.1	Write arguments focused on discipline-specific content.
LA.W.8.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.WHST.6-8.1.A	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.WHST.6-8.4	Produce clear and coherent writing in which the development, organization, voice, and style are appropriate to task, purpose, and audience.
LA.WHST.6-8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LA.WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LA.WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LA.WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
LA.W.8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

LA.SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:

Differentiation

Struggling Students	ELL	Accelerated Students
1. Have the students compare and contrast the three states of matter. 2. Have the student summarize the process of examining a substance's chemical properties.	1. Assist students in identifying familiar prefixes and/or words within words (e.g. "composition" within "decomposition") for each term. 2. Discuss the definition of these prefixes and words, using this information to help define the terms. 3. Print and copy the Scientific Explanation before class. Have students use the printed document as they progress through the lesson. The Scientific Explanation handout is chunked. Chunking is an effective strategy to make the learning progression through the Scientific Explanation easier for students who are struggling or who are English Language Learners.	1. Using their previous knowledge of chemical properties and physical properties, ask students to brainstorm further S.T.E.M. connections to other disciplines.

Differentiation in science can be accomplished in several ways. Once you have given a pre-test to students, you know what information has already been mastered and what they still need to work on. Next, you design activities, discussions, lectures, and so on to teach information to students. The best way is to have two or three groups of students divided by ability level.

While you are instructing one group, the other groups are working on activities to further their knowledge of the concepts. For example, while you are helping one group learn the planet names in order, another group is researching climate, size, and distance from the moon of each planet. Then the groups switch, and you instruct the second group on another objective from the space unit. The first group practices writing the order of the planets and drawing a diagram of them.

Here are some ideas for the classroom when you are using differentiation in science:

- Create a tic-tac-toe board that lists different activities at different ability levels. When students aren't involved in direct instruction with you, they can work on activities from their tic-tac-toe board. These boards have nine squares, like a tic-tac-toe board; and each square lists an activity that corresponds with the science unit. For example, one solar system activity for advanced science students might be to create a power point presentation about eclipses. For beginning students, an activity might be to make

a poster for one of the planets and include important data such as size, order from the sun, whether it has moons, and so on.

- Find websites on the current science unit that students can explore on their own.
- Allow students to work in small groups to create a project throughout the entire unit. For example, one group might create a solar system model to scale. Another group might write a play about the solar system. This is an activity these groups can work on while they are not working directly with you.

Differentiation in science gets students excited to learn because it challenges them to expand their knowledge and skills, instead of teaching the whole group concepts they have already mastered

Modifications & Accommodations

Refer to QSAC EXCEL SMALL SPED ACCOMMOCATIONS spreadsheet in this discipline.

Modifications and Accommodations used in this unit:

In addition to differentiated instruction, IEP's and 504 accommocations will be utilized.

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Benchmark Assessments

Benchmark Assessments are given periodically (e.g., at the end of every quarter or as frequently as once per month) throughout a school year to establish baseline achievement data and measure progress toward a standard or set of academic standards and goals.

Schoolwide Benchmark assessments:

Aimsweb benchmarks 3X a year

Linkit Benchmarks 3X a year

Additional Benchmarks used in this unit:

Pre and post assessments to measure growth.

Formative Assessments

Assessment allows both instructor and student to monitor progress towards achieving learning objectives, and can be approached in a variety of ways. **Formative assessment** refers to tools that identify misconceptions, struggles, and learning gaps along the way and assess how to close those gaps. It includes effective tools for helping to shape learning, and can even bolster students' abilities to take ownership of their learning when they understand that the goal is to improve learning, not apply final marks (Trumbull and Lash, 2013). It can include students assessing themselves, peers, or even the instructor, through writing, quizzes, conversation, and more. In short, formative assessment occurs throughout a class or course, and seeks to improve student achievement of learning objectives through approaches that can support specific student needs (Theal and Franklin, 2010, p. 151).

Formative Assessments used in this unit:

See assessments located in links above.

Summative Assessments

Summative assessments evaluate student learning, knowledge, proficiency, or success at the conclusion of an instructional period, like a unit, course, or program. Summative assessments are almost always formally graded and often heavily weighted (though they do not need to be). Summative assessment can be used to great effect in conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches.

Summative assessments for this unit:

See assessments located in links above.

Instructional Materials

See materials located in links above.

Discovery Techbook

Teacher made materials

Additional labs are available through NJCTL on-line curriculum

Standards

MS-PS1	Matter and its Interactions
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. Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride. Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. Analyze and interpret data to determine similarities and differences in findings.
PS1.A	Structure and Properties of Matter Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.
PS1.B	Chemical Reactions Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. Patterns
6-8.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.
6-8.MS-PS1-1.PS1.A	Structure and Properties of Matter
6-8.MS-PS1-1.PS1.A.1	Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.
6-8.MS-PS1-1.PS1.A.2	Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).
6-8.MS-PS1-2.PS1.B	Chemical Reactions
6-8.MS-PS1-2.PS1.B.1	Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.