

Activity Book



Science Odyssey

VOLUME 2



Dear Reader,

Embark upon an epic *Science Odyssey* through the realms of knowledge, where each chapter unfolds like a superhero's saga, and every lesson is a daring adventure waiting to be conquered! In this heroic quest, *Science Odyssey Grade 7* awaits, armed with 18 mighty chapters.

Prepare yourself as each chapter unveils its secrets, starting with an Introduction—a beacon lighting the way to the wonders within.

Within the cosmic structure of each lesson, discover your mission and delve into the comprehensive structure:

1. Lesson Components:

- **Objectives:** Clearly outlined goals for the lesson.
- **Key Vocabulary:** Important terms you'll encounter during the lesson.
- **NGSS Standards:** The lesson aligns with Next Generation Science Standards, ensuring a comprehensive educational experience.

2. Lesson Flow:

- **Engage Questions:** Thought-provoking queries to spark your interest and set the tone.
- **Explore:** Dive into the core concepts through engaging activities.
- **Investigate (Lab Work - STEM):** Hands-on exploration and experimentation in the realm of Science, Technology, Engineering, and Mathematics.
- **Evaluate (Lesson Self-Check):** Assess your understanding through identification, explanation, comparison, contrast, description, summarization, and prediction.

In addition to this structured approach, each lesson follows a holistic educational philosophy:

- **5E Approach:** Embracing the Engagement, Exploration, Explanation, Elaboration, and Evaluation stages to ensure a comprehensive learning experience.
- **Bloom's Taxonomy:** Fostering cognitive skills by encouraging activities that span the cognitive domains—remembering, understanding, applying, analyzing, evaluating, and creating.
- **STEM and STEAM Integration:** Emphasizing Science, Technology, Engineering, and Mathematics (STEM), and seamlessly incorporating the Arts (STEAM) for a well-rounded and interdisciplinary educational journey.



But that's not all! Each lesson in the *Textbook* corresponds with a parallel lesson in the *Activity Book*. In this supplementary resource, you'll find:

- **Explain and Elaborate:** Delve deeper into the subject matter with projects that integrate Science, Technology, Engineering, Arts, and Mathematics (STEAM).
- **Activity Worksheets:** Practical sheets to reinforce your learning and apply the knowledge gained.

And to further solidify your grasp of the material, each chapter concludes with a rigorous **Standardized Practice Test**, featuring three essential components:

- **Multiple Choice Questions:** Test your understanding with a variety of options.
- **Short Answer Questions:** Demonstrate your knowledge concisely and precisely.
- **Long Essay Questions:** Engage in in-depth analysis and expression of your understanding.

So, don your cape, wield your intellectual sword, and embark upon this superheroic odyssey through *Science Odyssey Grade 7*. May your mind be as unyielding as a damantium, and your journey as legendary as the heroes of old. Onward, noble reader, to the stars of knowledge!

With heroic regards,
Regal Education



Chapter Odyssey



Lesson Objectives

Key Vocabulary

NGSS Standards

Engage

Explore

Investigate. Lab Work. STEM.

Evaluate. Self-check

Revision.

Activity book

Explain and Elaborate. Project. STEAM.

Activity Worksheets.





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Chemical Adventures From Reactions to Solutions

CHAPTER

12



LESSON 1 Chemical Reactions Revealed



EXPLAIN AND ELABORATE



EVERYDAY REACTIONS PROJECT

Task: Explore and explain everyday chemical reactions around you.

Steps:

1. Look Around:

- Pay attention to things happening around you, like in the kitchen, during cleaning, or when enjoying your favorite drink.

2. Write it Down:

- Grab a notebook or paper and jot down two to three things you notice changing—colors, fizz, or anything interesting.

3. Create Equations:

- Try making a simple equation for each observation. Don't worry about making it perfect; just give it a go! You can use the Net or books to help you out.

4. Explain What's Happening:

- Write a short explanation for each equation. What's going on? Why does it happen?

5. Share (Optional):

- If you want, share what you discovered with the class. You might find others noticed similar things!

Have fun exploring
the science in your everyday
life, and don't be afraid
to ask questions!





Activity Worksheet

ACTIVITY WORKSHEET 1

Multiple Choice Questions:

1. What is a chemical reaction?

- a. A physical change
- b. A change in state
- c. A transformation where substances change into new ones
- d. A change in temperature

2. In a chemical reaction, what are the starting substances called?

- a. End products
- b. Reactants
- c. Catalysts
- d. Inhibitors

3. What are the substances formed as a result of a chemical reaction called?

- a. Catalysts
- b. Reactants
- c. Products
- d. Indicators

4. What is an example of an indicator of a chemical reaction?

- a. A change in state
- b. Change in temperature
- c. Color change
- d. Change in pressure

5. What do catalysts do in a chemical reaction?

- a. Slow down the reaction
- b. Speed up the reaction
- c. Stop the reaction
- d. Change the color of the reaction

6. Inhibitors are substances that:

- a. Speed up reactions
- b. Slow down or stop reactions
- c. Change color
- d. Produce heat

7. What do balanced chemical equations represent?

- a. Random quantities of reactants and products
- b. The conservation of mass in a reaction
- c. The speed of a reaction
- d. The color changes in a reaction

8. What is the chemical equation for the reaction of iron with oxygen to produce rust?

- a. $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
- b. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- c. $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$
- d. $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$

9. What is the role of enzymes in chemical reactions?

- a. Slow down reactions
- b. Speed up reactions
- c. Change color in reactions
- d. Produce gas in reactions

10. Why might inhibitors be used in a chemical reaction?

- a. To speed up the reaction
- b. To slow down or stop the reaction
- c. To change color in the reaction
- d. To produce heat in the reaction





11. What is dissolution?

- a. The production of gas in a reaction
- b. The change of color in a reaction
- c. The process of a solid dissolving in a liquid
- d. The change in state of a substance

12. Which of the following is an example of combustion?

- a. Rusting of iron
- b. Dissolving sugar in water
- c. Burning wood
- d. Mixing oil and water

13. What is the purpose of pH indicators in chemical reactions?

- a. To produce heat
- b. To signal the occurrence of a reaction
- c. To slow down reactions
- d. To change color in reactions

14. How can you control the rate of a chemical reaction?

- a. By changing the color of the reactants
- b. By using catalysts
- c. By manipulating variables like temperature and concentration
- d. By avoiding inhibitors

15. Why are chemical reactions important in our daily lives?

- a. They change the color of substances
- b. They produce heat
- c. They are crucial for life processes, industry, and transformation
- d. They slow down reactions





Activity Worksheet

ACTIVITY WORKSHEET 2

Instructions: Create a summary table to capture the essence of our chemical reactions lesson. In each cell, provide a brief definition or explanation for the given concept, and include an example to reinforce your understanding. This will be a handy reference to revisit the key points we've explored.

Chemical Reactions Summary Table		
Concept	Definition/Explanation	Example
Chemical Reactions		
Reactants		
Products		
Indicators		
Catalysts		
Inhibitors		
Balanced Chemical Equations		
Dissolution		
pH Indicators		
Combustion		
Everyday Importance		





LESSON 2

Balancing Act of Chemical Equations



EXPLAIN AND ELABORATE



RESEARCH PROJECT: EXPLORING THE HISTORY OF CHEMICAL EQUATIONS

Objective: Discover how chemical equations were developed over time and the key contributors who shaped our understanding of chemical reactions.

Steps:

1. Introduction:

- Learn about early chemists and their role in discovering chemical principles.

2. Antoine Lavoisier:

- Investigate how Lavoisier's work led to the Law of Conservation of Mass.

3. John Dalton:

- Explore Dalton's atomic theory and its impact on understanding elements and compounds.

4. Berzelius:

- Discover Berzelius's symbolic notation for chemical elements.

5. August Kekulé:

- Learn about Kekulé and his introduction of structural formulas.

6. Early Notations:

- Explore how scientists represented reactions before standardized equations.

7. 19th and 20th Century Advances:

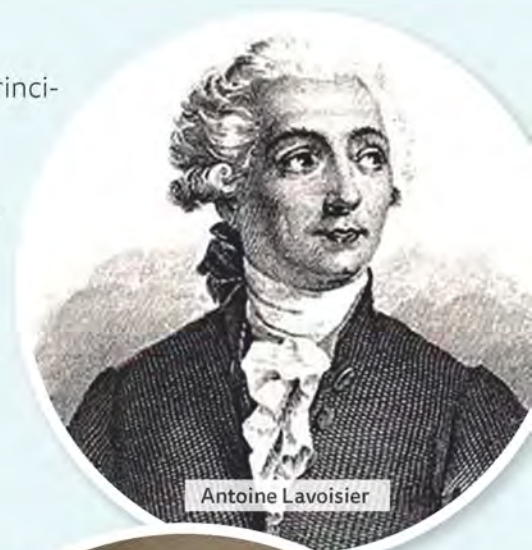
- Investigate technological advancements shaping the understanding of chemical reactions.

8. Contemporary Applications:

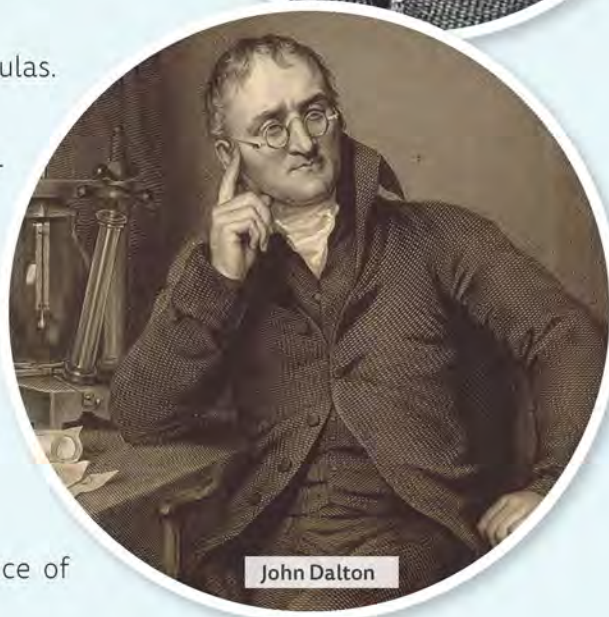
- Understand how modern tools and software contribute to chemical equation representation.

9. Conclusion:

- Summarize key milestones and reflect on the importance of chemical equations today.



Antoine Lavoisier



John Dalton



Activity Worksheet

ACTIVITY WORKSHEET 1

Instructions: answer the following multiple-choice questions to test your knowledge and understanding of chemical equations, balancing reactions, and the fascinating history behind their discovery

1. What is the purpose of a chemical equation?

- a. To confuse students
- b. To represent chemical reactions
- c. To hide information
- d. To showcase artistic skills

2. In the chemical equation $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, what do the coefficients represent?

- a. The number of atoms
- b. The temperature of the reaction
- c. The color of the substances
- d. The phase of matter

3. What is the Law of Conservation of Mass?

- a. Mass can be created in a chemical reaction
- b. Mass is destroyed in a chemical reaction
- c. Mass is conserved in a chemical reaction
- d. Mass is irrelevant in chemistry

4. Who is known for the discovery of the Law of Conservation of Mass?

- a. John Dalton
- b. Antoine Lavoisier
- c. August Kekulé
- d. Jöns Jacob Berzelius

5. What does the Law of Conservation of Mass state?

- a. Matter is created in a chemical reaction
- b. Matter is destroyed in a chemical reaction
- c. Matter is rearranged, but its total mass remains constant
- d. Matter disappears in a chemical reaction

6. Which scientist contributed to the development of symbolic notation for chemical elements?

- a. Antoine Lavoisier
- b. John Dalton
- c. Jöns Jacob Berzelius
- d. August Kekulé

7. What is the purpose of balancing a chemical equation?

- a. To make it look pretty
- b. To follow a trend
- c. To ensure the conservation of mass
- d. To confuse students

8. What is the role of coefficients in a chemical equation?

- a. To add colors
- b. To balance the equation
- c. To indicate temperature
- d. To create confusion

9. Which of the following is a reactant in the chemical equation $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$?

- a. CO_2
- b. H_2O
- c. O_2
- d. C_3H_8

10. In the equation $4\text{HCl} + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 2\text{Cl}_2$, what needs to be adjusted to balance the equation?

- a. Coefficients
- b. Colors
- c. Names
- d. Fonts





11. What does a structural formula represent in a chemical reaction?

- a. The arrangement of atoms in a molecule
- b. The temperature of the reaction
- c. The color of the substances
- d. The phase of matter

12. Who introduced structural formulas for organic compounds?

- a. Antoine Lavoisier
- b. John Dalton
- c. August Kekulé
- d. Jöns Jacob Berzelius

13. What does the coefficient 2 in front of H_2O signify in the equation $2H_2 + O_2 \rightarrow 2H_2O$?

- a. Two oxygen atoms
- b. Two water molecules
- c. Two hydrogen atoms
- d. Two oxygen molecules

14. Which equation represents the Law of Conservation of Mass?

- a. $2H_2 + O_2 \rightarrow H_2O$
- b. $H_2O \rightarrow H_2 + O_2$
- c. $2H_2 + O_2 \rightarrow 2H_2O$
- d. $H_2O + CO_2 \rightarrow H_2CO_3$

15. What is the total number of hydrogen atoms in the product side of the balanced equation: $2H_2 + O_2 \rightarrow 2H_2O$?

- a. 2
- b. 4
- c. 6
- d. 8

16. In the equation $Mg + O_2 \rightarrow MgO$, what does MgO represent?

- a. Oxygen gas
- b. Magnesium
- c. Magnesium oxide
- d. Water

17. Which statement best describes the Law of Conservation of Mass?

- a. Mass can be created in a chemical reaction.
- b. Mass is destroyed in a chemical reaction.
- c. Mass is conserved in a chemical reaction.
- d. Mass is irrelevant in chemistry.

18. What is the purpose of a lab experiment in the context of chemical reactions?

- a. To create chaos
- b. To observe transformations
- c. To avoid learning
- d. To showcase fashion

19. What should students do to balance a chemical equation?

- a. Guess the coefficients
- b. Change the names of substances
- c. Adjust the coefficients to equalize the number of atoms
- d. Ignore the equation

20. How does the concept of potential energy relate to chemical reactions?

- a. Potential energy is not involved in chemical reactions
- b. Potential energy decreases in chemical reactions
- c. Potential energy increases in chemical reactions
- d. Potential energy remains constant in chemical reactions



LESSON 3

Chemical Wonders in the Environment



EXPLAIN AND ELABORATE



INVESTIGATING THE IMPACT OF ACID RAIN ON LIMESTONE STRUCTURES

Objective: Explore and demonstrate the impact of acid rain on limestone, highlighting its potential effects on buildings and monuments.

Materials Needed:

- Two jars
- Tap water
- Vinegar
- Two identical chalk pieces

Project Procedure:

1. Prepare the Experiment:

- Fill two jars with tap water.
- Introduce a few drops of vinegar into one jar to simulate the effects of acid rain.

2. Testing the Materials:

- Place one chalk piece in each jar, ensuring they are identical.

3. Observation Period:

- Observe the chalk pieces daily over the course of a week.
- Document any changes you observe in each chalk piece.

4. Analysis:

- Analyze the observations to understand how the chalk in vinegar (simulating acid rain) deteriorates compared to the chalk in clean water.

5. Project Conclusion:

- Summarize your findings and draw conclusions about the impact of acid rain on limestone structures.
- Relate your results to real-world scenarios, emphasizing how acid rain can pose a threat to buildings and monuments.

Safety Note: Always exercise caution when handling materials for the project. Seek adult supervision when necessary to ensure a safe and enjoyable exploration of the acid rain experiment.

By turning the lab work into a project, you have the opportunity to delve deeper into the implications of acid rain on limestone structures and present your findings in a more comprehensive manner.



17 Health Detectives Solving the Mysteries of Wellness

LESSON 1

The Scientific Approach to Health



EXPLAIN AND ELABORATE



EXPLORING PHYSICAL ACTIVITIES

1. Research different physical activities that can be done for fun and fitness. Examples include dancing, cycling, swimming, hiking, or playing team sports.
2. Create a survey to find out which physical activities your classmates enjoy the most.
3. Organize a class vote to determine the top three most popular activities.
4. Plan a field trip or outdoor activity day based on the top three choices. Each student should have the opportunity to try at least one of the activities and share their experience with the class afterward.
5. Reflect on the benefits of regular physical activity and discuss how it contributes to overall well-being.





LESSON 2

Nutritional Wizards and Dietary Detectives



EXPLAIN AND ELABORATE



PHYTONUTRIENT RECIPE BOOK

- **Step 1:** Get a small notebook or paper.
- **Step 2:** Research and find three recipes that incorporate phytonutrient-rich ingredients. You can search online or ask your family members for suggestions.
- **Step 3:** In your notebooks, write down the recipes, including the list of ingredients and step-by-step instructions.
- **Step 4:** Draw or find pictures of the finished dishes to accompany each recipe.
- **Step 5:** Once everyone has completed the recipe books, share your favorite recipes with the class. You can even bring in samples for everyone to try if possible.
- **Step 6:** Discuss the importance of trying new foods and experimenting with different flavors. Explain that by incorporating phytonutrient-rich ingredients into your meals, you are nourishing your bodies with beneficial compounds.
- **Step 7:** Continue adding new recipes to your books and explore the world of phytonutrients through delicious and healthy cooking.



Remember to have fun and enjoy the journey of discovering the wonderful world of phytonutrients!





Activity Worksheet

ACTIVITY WORKSHEET 1

Sugar became widely popular in Europe during the 18th century, and its popularity continued to grow into the 19th century. The rise of sugar consumption can be attributed to several factors:

1. Colonial Expansion and Plantations: The cultivation of sugar cane was introduced to the Americas, particularly in the Caribbean and South America, through colonial expansion and the establishment of plantations. The ideal climate in these regions was conducive to sugar cane cultivation, leading to large-scale production.

2. Triangular Trade: The Triangular Trade routes between Europe, Africa, and the Americas facilitated the exchange of goods, including sugar. The labor-intensive cultivation of sugar cane on plantations relied heavily on enslaved labor, leading to the emergence of the Atlantic slave trade.

3. Cost Reduction and Accessibility: As sugar production increased, technological advancements in refining processes made sugar more affordable. It transformed from being a luxury item for the elite to a widely available commodity for the general population.

4. Shift in Culinary Trends: The increasing availability of sugar coincided with changing culinary preferences. Sweetened beverages, pastries, and desserts gained popularity, contributing to the widespread use of sugar in various culinary applications.

5. Industrial Revolution: The Industrial Revolution further played a role in the popularity of sugar. Technological advancements in transportation and manufacturing made the distribution of sugar more efficient, and sugar became a common ingredient in processed foods.

6. Marketing and Advertising: The sugar industry also invested in marketing and advertising, promoting the versatility and desirability of sugar in various forms. This contributed to the cultural perception of sugar as a symbol of indulgence and sweetness.

Overall, a combination of economic, social, and technological factors contributed to the surge in sugar consumption and its establishment as a staple in the diets of people around the world.





1. What contributed to the rise of sugar consumption in the 18th and 19th centuries?

- a. Technological advancements
- b. Enslaved labor
- c. Culinary preferences
- d. All of the above

2. Where was sugar cane cultivation introduced through colonial expansion?

- a. Europe
- b. Asia
- c. Americas
- d. Africa

3. What facilitated the exchange of goods, including sugar, between Europe, Africa, and the Americas?

- a. Silk Road
- b. Trans-Pacific Partnership
- c. Triangular Trade
- d. The Great Silk Way

4. Why did sugar transform from a luxury item to a widely available commodity?

- a. Increase in production costs
- b. Introduction of import taxes
- c. Technological advancements in refining processes
- d. Decline in demand



5. Which industry played a role in the popularization of sugar in processed foods during the Industrial Revolution?

- a. Textile industry
- b. Steel industry
- c. Sugar industry
- d. Mining industry

6. What contributed to the affordability of sugar during the 18th and 19th centuries?

- a. Decrease in production
- b. Increase in demand
- c. Technological advancements in refining processes
- d. Expansion of trade routes

7. How did the marketing and advertising of sugar impact its perception?

- a. It promoted sugar as a rare commodity
- b. It portrayed sugar as a symbol of indulgence and sweetness
- c. It discouraged sugar consumption
- d. It focused on the health benefits of sugar



LESSON 3

Preventative Health Heroes



EXPLAIN AND ELABORATE



HEALTHY HABITS CHALLENGE - BUILDING LIFELONG VITALITY

1. Create a checklist of healthy habits you would like to incorporate into your daily routine. Examples include drinking enough water, eating fruits and vegetables, getting enough sleep, and exercising.
2. Set a timer for one week and challenge yourself to follow these healthy habits every day.
3. Use the checklist to keep track of your progress each day. Check off the habits you successfully implement.
4. Stay hydrated by drinking water throughout the day. Aim for at least eight glasses of water per day.
5. Substitute unhealthy snacks with nutritious options like fruits, vegetables, or nuts. Keep them readily available for easy access.
6. Get enough sleep by establishing a consistent bedtime routine. Aim for at least 8 hours of sleep each night.
7. Engage in physical activities you enjoy, such as dancing, biking, or playing a sport. Set aside a specific time each day for exercise.
8. At the end of the week, review your checklist and reflect on how these healthy habits made you feel. Write down any positive changes or improvements you noticed.

