

# Unit 4 Chemistry: How Does Food Provide My Body With Energy?

Content Area: **Science**  
Course(s):  
Time Period: **Full Year**  
Length: **10 weeks**  
Status: **Published**

## **General Overview, Course Description or Course Philosophy**

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*Science and engineering—significant parts of human culture that represent some of the pinnacles of human achievement—are not only major intellectual enterprises but also can improve people’s lives in fundamental ways. Although the intrinsic beauty of science and a fascination with how the world works have driven exploration and discovery for centuries, many of the challenges that face humanity now and in the future—related, for example, to the environment, energy, and health—require social, political, and economic solutions that must be informed deeply by knowledge of the underlying science and engineering.*

## **OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS**

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### **CONTENT AREA STANDARDS**

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| 6-8.MS-PS1-1 | Develop models to describe the atomic composition of simple molecules and extended structures.  |
| 6-8.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.                  |
| 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. |

### **RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)**

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| LA.RST.6-8.1 | Cite specific textual evidence to support analysis of science and technical texts.   |
| 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.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.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.WHST.6-8.1	Write arguments focused on discipline-specific content.
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.WHST.6-8.1.B	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
LA.WHST.6-8.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
LA.WHST.6-8.1.D	Establish and maintain a formal/academic style, approach, and form.
LA.WHST.6-8.1.E	Provide a concluding statement or section that follows from and supports the argument presented.
LA.WHST.6-8.10	Write routinely over extended time frames (time for research, reflection, metacognition/self correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
TECH.9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
TECH.9.4.8.CI.2	Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).
TECH.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).
TECH.9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.

## **STUDENT LEARNING TARGETS**

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### **Declarative Knowledge**

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Students will understand that:

1. Food provides energy and building materials for the cells.
2. Different types of food molecules, when reacting with oxygen, produce different amounts of energy.
3. The difference in the amount of energy that carbohydrates, proteins, and fats have the capacity to provide is due to the differences in the arrangement and number of different types of atoms in the molecules.
4. Large food molecules are broken down through a chemical reaction.
5. Organisms build up new molecules through a chemical reaction. These molecules are used for growth and repair. When food molecules are not used immediately, organisms can store them for short or long periods of time for energy or to be used as building materials.
6. Plants need water and light to grow.

7. Plants convert light energy into chemical energy.
8. Photosynthesis is a chemical reaction that uses energy from the sun and the reactants of carbon dioxide and water to form glucose and oxygen.
9. Burning food requires food molecules and oxygen and produces carbon dioxide and water. In the process, energy is released.
10. Cellular respiration is the chemical reaction that provides energy to the cells of an organism. During cellular respiration, organisms (including plants and animals) use oxygen and food molecules and produce water and carbon dioxide.
11. An ecosystem needs a constant input of light energy. As light energy enters the environment, plants use this for photosynthesis to create food molecules. These food molecules are used by plants and animals in cellular respiration to produce energy for cells.
12. Carbon in the environment can cycle from food molecules to carbon dioxide through photosynthesis and cellular respiration. (During photosynthesis, plants rearrange the carbon atoms in carbon dioxide into carbon-containing food molecules. Then during cellular respiration, plants and animals rearrange the carbon in food molecules back into carbon dioxide.)

## **Procedural Knowledge**

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Students will be able to:

1. Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions
2. Revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions
3. Develop models to describe the atomic composition of simple molecules and extended structures.
4. Analyze data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
5. Interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
6. 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.
7. Use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

## **EVIDENCE OF LEARNING**

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### **Formative Assessments**

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PS1-1: Activity 3.1, Activity 3.2, Reading 3.

PS1-2: Activity 1.1: What Happens in My Body When I Run around the School

PS1-5: Activity 8.1 What does Food need to burn?

LS1-7: Reading 1.1: What Happens in My Body When I Run around the School?, Activity 1.2: How Can I Learn More about How Food Provides Energy to My Body?, Reading 1.2: How Can I Learn More about How Food Provides Energy to My Body?, Activity 3.1: Do Different Types of Food Molecules Have the Capacity to Provide the Body with Different Amounts of Energy per Gram?, Reading 3.1: Do Different Types of Food Molecules Have the Capacity to Provide the Body with Different Amounts of Energy?, Activity 3.3: How Much Do I Need to Exercise to Expend the Energy That Different Food Molecules Have the Capacity to Provide to My Body?, Reading 3.3: How Much Do I Need to Exercise to Convert Energy That Different Food Molecules Can Provide to My Body?, Activity 4.1: How Does My Mouth Change Carbohydrates?, Reading 4.1: How Does My Mouth Change Carbohydrates?, Activity 5.1: Where Do Proteins Go When They Are Eaten?, Reading 5.1: What Allows Organisms to Grow?, Activity 5.2: Do Animals and Plants Store Food for Later?, Reading 5.2A Do Animals and Plants Store Food for Later?, Reading 5.2B: Plants Also Store Food Molecules for Long Periods of Time, Reading 8.1: What Can Burning Food Teach Me about Food Providing Energy to My Body?, Activity 9.1: Does a Reaction Similar to Burning Happen in My Cells?, Reading 9.1: Does a Reaction Similar to Burning Happen in My Cells?, Activity 9.2: How Do Food Molecules Provide Plants with Energy?, Reading 9.2A How Do Food Molecules Provide Plants with Energy?, Reading 9.2B: Do Plants Give Off Carbon Dioxide?, Activity 9.3: How Do Food Molecules Provide Energy?, Reading 9.3: How Can I Tell That Food Molecules Provide My Cells with Energy?, Reading 10.3: What Else Is There to Learn about Energy?

LS2-3: Activity 10.1: How Does Matter Transfer between Organisms?, Reading 10.1: How Does Matter Transfer between Organisms?, Activity 10.2: How Does Energy Move between Organisms?, Reading 10.2: How Does Energy Flow through the Environment?, Activity 10.3: How Can the Flow of Matter and Energy Change?

## **Summative Assessments**

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- Benchmark Assessments
  - Multiple Choice Assessment administered at the end of each marking period.

### Alternative Assessments

- Oral Presentations
- Questions for Comprehension
- Performance Tasks
- Scientific Journals/Notebooks

- Self-Assessment
- WebQuests

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

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IQWST Unit Materials for Chemistry 3 Learning Sets

*A Framework For K-12 Science Education*

*Online Resources provided by IQWST not included in the program (to be used as support/reinforcement/enrichment): [https://docs.google.com/spreadsheets/d/1VpyFCL4\\_50\\_-Iw2NhcGpdNNZ2jj6aJJegcIUNCy\\_uzQ/pubhtml](https://docs.google.com/spreadsheets/d/1VpyFCL4_50_-Iw2NhcGpdNNZ2jj6aJJegcIUNCy_uzQ/pubhtml)*

## **INTERDISCIPLINARY CONNECTIONS**

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Collaboration with Math and Language Arts teachers is an essential part of the IQWST curriculum.

Information Writing

Current Events

Data collection/analysis

Computations

Statistics

Engineering

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

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See link to Accommodations & Modifications document in course folder.

IQWST provides audio recording for all readings in student workbook-available through teacher portal online

Reading differentiation strategies are embedded in the IQWST program and all students prepare for reading through a 'Getting Reading' section which begins each reading.

The sections are designed to engage students, generate interest, activate prior knowledge and provide a purpose for reading. Teachers use advance organizers for desired readings and to encourage students to plan

and annotate the passages.

A word wall is developed through vocabulary acquisition in the program. Students develop the word wall as words are learned in context and through experience in class. This helps to build meaning and understanding which support students when reading text.

Students are encouraged to ask questions and post them to the Driving Question Board. This DQB helps students develop a greater level of understanding and encourages students to work together to solve problems in and outside of class.

Support will be provided to students when writing in the student manual and use of the computer, printing, and pasting into the manual is acceptable if there is a present need.