02 _ Chemical Science 1 – How Can I Smell Things from a Distance?

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **8 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

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

Learning Set 1: How Does an Odor Get from the Source to My Nose?

How can one explain the structure, properties, and interactions of matter? How do particles combine to form the variety of matter one observes? How do organisms live, grow, respond to their environment, and reproduce? How do the structures of organisms enable life's functions?

Learning Set 2: What Makes One Odor Different from Another?

How can one explain the structure, properties, and interactions of matter? How do particles combine to form the variety of matter one observes? How do organisms live, grow, respond to their environment, and reproduce? How do the structures of organisms enable life's functions?

Learning Set 3: How Can a Material Change so You Can Smell It?

How can one explain the structure, properties, and interactions of matter? How do particles combine to form the variety of matter one observes?

Learning Set 4: How Can a Material Change so You Can Smell It?

How can one explain the structure, properties, and interactions of matter? How do particles combine to form the variety of matter one observes?

CONTENT AREA STANDARDS

6-8.MS-LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

6-8.MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
6-8.MS-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

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

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
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.RH.6-8.8	Distinguish among fact, opinion, and reasoned judgment in a text.
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).
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). Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

1. Air has mass and volume.
2. Matter is anything that has mass and volume.
3. Matter can exist in three states (or phases): solid, liquid, and gas.
4. The state (or phase) of matter can be changed by temperature.
5. Gas does not have a definite shape or volume and can be added and removed.
6. Gas can be compressed and expanded.
7. Gas is made of particles and empty spaces are in between each particle of air. All matter is made of particles.
8. Particles in a gaseous state can move.
9. Different materials have different properties because they are made up of different particles.
10. Elements have different properties because they are made up of different types of atoms.
11. Molecules can be made of the same type of atoms or different types of atoms. Air is a mixture of different molecules.
12. Different arrangement of atoms into molecules results in different properties.

13. The higher the temperature the faster the molecules move.
14. Temperature is a measurement of the average speed of molecules.
15. As temperature increases, the volume of gas increases. As temperature decreases, the volume of gas decreases.
16. Evaporation occurs when molecules at the surface of a liquid gain enough energy to enter the gaseous state.
17. Boiling occurs at the temperature in which molecules throughout the liquid change to the gaseous state. The boiling point is the
temperature at which the change of state from liquid to gas occurs.
18. Condensation occurs when water vapor in the air slows down sufficiently to become a liquid.
19. When a substance is heated, the molecules that make up the liquid move faster. The faster movement of the molecules results in higher
temperatures.
20. In a solid, molecules stay in place and can only vibrate.
21. Melting is when a substance changes from a solid state into a liquid state. The opposite process is called freezing.
22. Melting point is the temperature at which a solid substance starts to become a liquid. Melting point is a property of a substance.
23. Sublimation is when a substance changes from the solid state to the gaseous state.

Procedural Knowledge

Students will be able to:

- Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
- Develop models to describe the atomic composition of simple molecules and extended structures.
- Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

EVIDENCE OF LEARNING

Formative Assessments

MS-LS1-8: Introduction to Chemistry 1: Activity 1.1: Can You Smell What I Smell?, Reading 1.1: Can You Smell What I Smell?, Reading 1.2: How Can Models Help Me Understand Odors?, Reading 6.1: In What Ways Do People Use Detectors?

MS-PS1-1: Introduction to Chemistry 1: Reading 6.2, Reading 8.1, Activity 8.2, Activity 8.3, Reading 8.3,

Activity 9.1, Reading 9.1, Activity 10.1, Reading 10.1, Activity 16.1

MS-PS1-4: Introduction to Chemistry 1: Activity 1.2: Developing an Initial Model, Activity 2.1: Can Something Have Mass Even if I Cannot Feel It?, Reading 2.1: Can Something Have Mass Even if I Cannot Feel It?, Activity 2.2: Measuring Volume, Activity 2.3: What Happens to My Lungs When I Breathe in Air?, Reading 2.3: What Happens to My Lungs When I Breathe in Air?, Homework 2.3: Mass and Volume, Activity 3.1: Investigating Matter, Reading 3.1: Three Forms of Matter: Solid, Liquid, Gas, Homework 3.1: Classifying Forms of Matter, Activity 3.2: Why Does Water Have many Names?, Reading 3.2: What Needs to Happen to a Material so that I Can Smell It?, Activity 4.1: How Can I Model the Things Gases Do?, Reading 4.1: How Can I Model the Things Gases Do?, Activity 5.1: What Else Can Gases Do?, Reading 5.1: How Can I Model the Things Gases Do?, Activity 5.2: Developing Models, Activity 5.3: Developing and Using a Consensus Model, Activity 6.1: Comparing Two Clear Liquids, Activity 6.2: How Does the Odor Get to My Nose?, Activity 9.2: Summarizing the Idea "Odors in the Air", Activity 11.1: How Can I Make Molecules Move Faster?, Reading 11.1: How Can I Make Particles Move Faster?, Activity 11.2: How Else Can I Model Odor Moving?, Activity 12.1: What Happens When Gases Are Cooled and Heated?, Reading 12.1: How Can the Volume of a Balloon Change Without Removing or Adding Air?, Activity 12.2: A Physical Model of Heating and Cooling a Gas, Activity 13.1: What Happens to Bromine as It Is Cooled or Heated?, Reading 13.1: How Do Substances Become part of the Air?, Activity 13.2: Modeling the Bromine Tube, Activity 13.3: What Happens When Water Boils?, Activity 13.4, Where Did the Water Come From?, Reading 13.4: Where Do Drops of Water Come From?, Activity 14.1: What Happens to molecules of a Liquid at Higher Temperatures?, Reading 14.1: How Do Odor Molecules Move?, Activity 14.2: Which Liquid Moves Faster?, Reading 14.2: How Does an Oven Make Hot Chocolate Hot?, Homework 14.2: What Happens When Ice Melts?, Activity 15.1: What Happens to the Molecules as a Solid Melts?, Reading 15.1: What Happens to Molecules When a Substance Melts?, Activity 15.2: Does Menthol Have to Melt Before I Smell It?, Reading 15.2: How Can I Smell Something that Is Solid?, Reading 16.1: Summarizing This Unit: What Have I Learned about Matter?, Activity 16.2: what Else Can My Model Explain?

Summative Assessments

- 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)

IQWST Unit Materials for Chemical Science 1 Learning Set 1-4

A Framework For K-12 Science Education

Onlne Resources provided by IQWST not included in the program (to be used as support/reinforcement/enrichment): https://docs.google.com/spreadsheets/d/1VpyFCL4_50_-1w2NhcGpdNNZ2jj6aJJegcIUNCy_uzQ/pubhtml

INTERDISCIPLINARY CONNECTIONS

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

Information Writing

Current Events

Topography

Data collection/analysis

Computations

Statistics

Enginereering

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

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 desgined 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 annote the passages.

A word wall is developed through vocabulary aquisition 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 develp a greater level of understanding and encourages students to work together to solve problems in and outside of class.

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