Salt & Water Molecule

Mid-Valley
STEM-CTE HUB

www.midvalleystem.org
midvalleystemctehub@linnbenton.edu
Linn-Benton Community College
Albany Campus - CC-212

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Salt & Water Molecules

The Water and Salt Molecule kit enables hands-on learning through molecular modeling. Students build models to visualize the structure of water (H_2O) and salt (NaCl) molecules while developing skills in chemistry, spatial reasoning, and scientific inquiry. The kit supports projects that encourage critical thinking and understanding of molecular interactions. Promotes project-based exploration of foundational chemistry concepts.

Grade Level

3rd - 8th grades

Group Size

1 to 4 students

Time Duration

1 hour

Content of Kits

Components

- 12 water molecule sets
- 3 salt molecule sets
- Extra molecule pieces
- Activity guide

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Useage

Getting Started

1. Check that all materials, including molecular models, diagrams, and activity guides, are included.

2. Review Molecular Structures – Introduce the basic structure of water (H_2O) and salt (NaCl) using visual aids or models.

3. Have students build water and salt molecules using the provided model pieces to understand atomic composition.

4. Explore Molecular Interactions – Demonstrate how water dissolves salt by simulating the process with models or hands-on experiments.

5. Discuss how molecular interactions impact everyday phenomena, such as ocean salinity and water purification.

Storage

When storing return all components back to the provided storage container.

Troubleshooting

- **Loose or Missing Pieces –** Check that all molecular model components are present and securely connected; replace any missing parts with similar substitutes if needed.

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Activity Guide

Beginner

Building Water and Salt Molecules
Use molecular models to construct water (H_2O) and salt (NaCl) molecules, learning about atomic composition and bonding. They will identify hydrogen, oxygen, sodium, and chlorine atoms, then assemble the molecules according to their correct structures. After building the models, they will compare their structures to diagrams and discuss how atoms combine to form compounds. This activity introduces basic chemistry concepts in a hands-on, visual way.

Intermediate

How Salt Dissolves in Water
Students will model the dissolution of salt in water by breaking apart NaCl molecules and surrounding them with water molecules. They will explore how the positive sodium (Na^+) and negative chloride (Cl^-) ions interact with water's polar molecules. Then, they will observe the real-life process by dissolving salt in water and comparing it to their models. This activity deepens understanding of molecular interactions and solubility principles.

Advanced

SExploring Concentration and Saturation
Students will investigate how different amounts of salt dissolve in water by modeling various ion-to-water ratios. After making predictions, they will conduct an experiment by gradually adding salt to water and observing at what point no more dissolves (saturation). Using their molecular models, they will explain why saturation occurs and discuss real-world applications like ocean salinity and desalination. This activity applies chemistry concepts to environmental science and engineering.

Extension Activities:

Molecular Interactions in Everyday Life
Building on their understanding of water and salt molecules, students will explore how molecular interactions impact various real-world processes. They will research and present on topics such as how water's polarity affects the way it interacts with other substances (e.g., dissolving sugar or oil), how salt is used in de-icing roads, or how salt affects plant growth. Students can also simulate other dissolving processes with their molecular models and make predictions about what would happen in different environments. This extension activity encourages critical thinking and the application of molecular science to everyday phenomena, bridging classroom learning to real-world contexts.

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Learning Extensions

STEAM Connections: Chemistry

Learning Objectives:

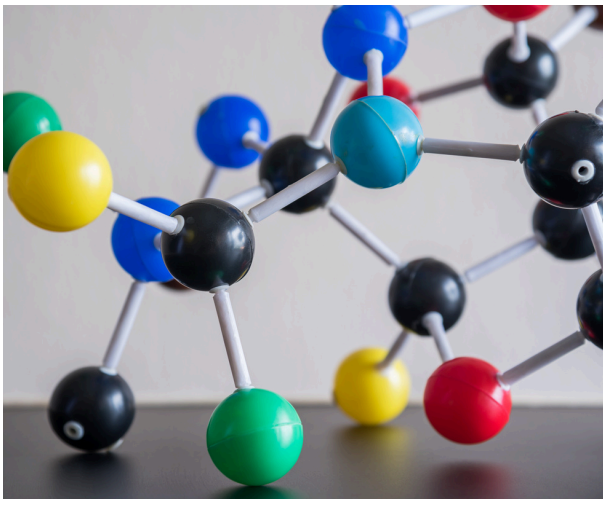
Students using the Salt and Water Molecule Kit will develop a deeper understanding of basic chemistry concepts, including atomic structure, molecular bonding, and solubility. They will learn to identify and model water (H_2O) and salt (NaCl) molecules, recognizing how atoms bond to form compounds. Through hands-on activities, students will explore molecular interactions, such as how salt dissolves in water and how polarity influences solubility. They will also apply these concepts to real-world phenomena, enhancing their problem-solving and critical thinking skills while reinforcing fundamental scientific principles.

Career Connections:

The Salt and Water Molecule Kit introduces students to careers in chemistry, environmental science, and engineering. By exploring molecular interactions, students gain insight into roles such as chemical engineering, materials science, and water treatment. Understanding how substances dissolve and interact is key in fields like pharmaceuticals, where solubility affects drug delivery, and in environmental science, where managing salt levels in water sources is crucial. This kit also connects to careers in research, education, and quality control, providing foundational skills applicable to a variety of STEAM professions.

Essential Employability Skills:

- Communication
- Attention to detail
- Organization
- Critical thinking
- Adaptability



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Resources and Accessibility

Safety Guidelines

- **Work in a Clean Area –** Keep the workspace clear of unnecessary items to avoid mixing materials or losing small parts.
- **Avoid Ingesting Materials –** Do not eat or drink near the kit components to prevent accidental ingestion of small parts.
- **Wash Hands After Handling –** If using any chemicals (like salt solutions), wash hands thoroughly after the activity.
- **Supervise Younger Students –** Ensure younger students are supervised when handling the models to avoid choking hazards with small parts.

Accessibility

- **Provide Visual and Audio Instructions –** Offer step-by-step guides in both written and audio formats to support students with visual or reading difficulties.
- **Offer Modified Tasks –** Allow students with fine motor difficulties to focus on tasks like model arrangement or concept explanation rather than assembly.
- **Allow Alternative Participation –** Encourage students to engage in the project through roles such as note-taking, troubleshooting, or observing if building models is challenging.

Library Catalog

Library Resources

Feedback

QR to feedback survey