NGSS-Aligned Upper Elementary Classroom Resources from the American Association of Chemistry Teachers
What is AACT?

- A membership organization open to anyone with an interest in chemistry education, but primarily serving K–12 teachers
- Funded and brought to you by the American Chemical Society (ACS), the world’s largest scientific society
- AACT membership is separate from ACS membership, though some individuals are dual members

www.teachchemistry.org
• Lesson plans
• Classroom Activities
• Labs
• Demonstrations
• Projects
• Multimedia:
  • Animations
  • Videos
  • Simulations
• Chemistry Solutions
• Webinar Archive
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**NGSS: Upper Elementary Performance Expectations**

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<tr>
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**A Total of 16 Performance Expectations for Upper Elementary Students**
## Five AACT Resources Cover 13 of 16 Performance Expectations

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• Matter, atoms, molecules, and chemical bonding
• 5-E Lesson
  – Engage, Explore, Explain, Elaborate, Evaluate
• Substances are made of tiny parts called atoms and molecules.
• Part A: 60 – 75 minutes
  – Substances are different - they are made of different numbers and types of atoms.
• Part B: 60 minutes
  – Substances are also different because the atoms and molecules are arranged differently

5-PS1-1, 5-PS1-3, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3
Design, Build, and Compare Molecules
<table>
<thead>
<tr>
<th>Property</th>
<th>Water</th>
<th>Hydrogen Peroxide</th>
<th>Rubbing Alcohol</th>
<th>Salt</th>
<th>Silica</th>
<th>Carbon Dioxide</th>
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</thead>
<tbody>
<tr>
<td>Formula composition</td>
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<tr>
<td>Each molecule has what type of atoms?</td>
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<td>State</td>
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<td>Color</td>
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<td>Shape</td>
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<td>Where it is found?</td>
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<td>What we use it for?</td>
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<td>Other things I know about this substance</td>
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Exploring Properties of Molecules
Molecular Structure and Properties
Plant Chemistry Lesson Plan

- Matter, chemical changes, reactions, conservation of matter, photosynthesis
- 5-E Lesson
  - Part A – Engage: 15 minutes – Prior knowledge
  - Part B – Explore: 15 minutes – Molecule Models
  - Part C – Explain: 30 minutes – Plant Cell and Leaf Models
  - Part D – Elaborate: 20 minutes - Photosynthesis Model
  - Evaluate: 20 – 60 minutes – Discussion Questions

5-PS1-1, 5-PS3-1, 5-PS1-4, 5-LS1-1, 5-LS2-1, 5-ESS2-1, 5-ESS3-1, 3-5-ETS1-2
Making Molecules and Modeling Photosynthesis

$\text{CO}_2$
Carbon Dioxide

$\text{H}_2\text{O}$
Water

$\text{O}_2$
Oxygen

$\text{C}_6\text{H}_{12}\text{O}_6$
Glucose

Photosynthesis
Teachers Guide
Making a Model of a Plant Cell and Leaf
Salting Roads in Winter Lesson Plan

• States of Matter, solutions, solubility, solute/solvent, freezing point, freezing point depression
• 5-E Lesson
  – Part A – Engage: 10 minutes – Prior knowledge
  – Part B – Explore: 30 minutes – Spreading Salt on Icy Roads Model
  – Part C – Explain: 15 minutes – Salted Slushy Roads Model
  – Part D – Elaborate: 25 minutes – Freezing Point Depression Activities
  – Evaluate: 30 minutes – Discussion Questions

5-PS1-1, 5-PS1-2, 5-PS1-4, 5-ESS2-1, 5-ESS3-1, 3-5-ETS1-1
Spreading Salt on Icy Roads Activity
Salted Slushy Roads Activity
Now I Can Drink the Water!
Lesson Plan

• States of Matter, solutions, solubility, solute/solvent, freezing point, freezing point depression
• 5-E Lesson: Three 45 minute classes
  – Engage: What is drinkable water?
  – Explore: The water cycle
  – Explain: Water cycle activities
  – Explore: Design a device to remove salt from water
  – Explain: How does your device work?
  – Elaborate: Apply water cycle to your device
  – Evaluate: Discussion questions

5-PS1-1, 5-PS1-2, 5-PS1-4, 5-ESS2-1, 5-ESS3-1, 3-5-ETS1-1
The Water Cycle
How to Survive It
Survival tips to thrive and stay safe in a world that often isn’t. Survival, self-reliance, prepping, self-defense, and more.

How to Make a Solar Still

Investigating, Designing, Building, and Testing a Solar Still
Environmental Problems Lesson Plan

- Chemical reactions, mixtures, solutions, acids
- 5-E Lesson:
  - Engage: 30 minutes – Lake Kamari Information Pack
  - Explore/Explain: 60 minutes – Water testing
  - Explore/Explain: 20 minutes – Water testing
  - Explore/Explain: 45 minutes - Neutralize water
  - Explore/Explain: 45 minutes – Test acidity
  - Elaborate: Variable - Presentations
  - Evaluate: 30 minutes – Discussion questions

5-PS1-1, 5-PS1-2, 5-PS1-4, 5-ESS2-1, 5-ESS3-1, 3-5-ETS1-1
1. What is causing the problems that people and wildlife are experiencing at the lake?

2. How could you stop acidic water from entering the lake?

3. If you can’t prevent the water from becoming acidic in the first place, how could you make the water less acidic?

4. If you can’t change the acidity of the water, what can you do to minimize the negative effects of the acidity?
1. What is causing the problems that people and wildlife are experiencing at the lake?
   • Test “sample” lake water acidity
   • Review fact sheet to find probable causes

2. How could you stop acidic water from entering the lake?
   • Identify paper mill as source of acidity
   • Brainstorm ways to prevent the paper mill from releasing acidic water
   • Incorporate engineering
3. If you can’t prevent the water from becoming acidic in the first place, how could you make the water less acidic?
   • Experiment with ways to reduce acidity
   • Inquiry activity
   • Analyze data and suggest solutions

4. If you can’t change the acidity of the water, what can you do to minimize the negative effects of the acidity?
   • Groups brainstorm and investigate ways to deal with each of the effects of acidic water
   • Test effect of acidity on different materials
Science Coaches

• Educational outreach initiative dedicated to enhancing science skills from ACS/AACT
• One-on-one
• Coach - help teacher with students or behind the scenes
  – Demos, experiments, lessons, help with stockroom, content
• $500 donation to teacher’s school (one-on-one)
• Teams
  – Coach: content, lessons, discussions, real world applications
• All teachers must be AACT members
Science Coaches

• Applications open May 1st
  – AACT website for teachers
  – ACS website for coaches

• For one-on-one
  – Best if you know a local chemists who will be your coach
  – If not, AACT will try to match you with a local coach

• Applications close August 15th

• More Info?
  – Jackie Meyer, Science Coaches Associate – j_meyer@acs.org
Jennifer Smith
Middle School Ambassador
smije@sages.us

To generate your certificate of attendance, visit:

To Download Resources: