



Module at a Glance

| Activity | Concepts, Processes, Issues | NSES 5–8 Content Standards |
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| <p>1. Exploring Hazardous Materials 1–2 CLASS SESSIONS Students begin to learn about hazardous materials as they are introduced to a scenario involving an abandoned barrel of hazardous waste. They watch a video segment that shows how a HAZMAT team responds to potentially hazardous waste. They then make observations of simulated hazardous waste. Students extend the investigation by identifying hazardous materials at home.</p> | <ol style="list-style-type: none"> 1. Hazardous materials are substances that pose a danger to the health and safety of living organisms. 2. Careful observation can provide important information about a substance. 3. Hazardous substances may be present as solids, liquids, or gases. 4. Hazardous materials must be identified before being treated, moved, or disposed of. 5. Hazardous materials are commonly found in homes. | <p>PhysSci: 1 Inquiry: 1 PhysSci: 1 Perspectives: 4 Perspectives: 4</p> |
| <p>2. Identifying Types of Hazards 1 CLASS SESSION Different substances can pose different types of hazards. After being introduced to different hazard categories, students use chemical tests to determine the types of hazards posed by three unidentified liquids. They observe flammability tests of each liquid and conduct tests to determine whether each liquid is corrosive, reactive, or toxic.</p> | <ol style="list-style-type: none"> 1. Hazardous materials are substances that pose a danger to the health and safety of living organisms. 2. Hazardous materials must be identified before being treated, moved, or disposed of. 3. Hazardous materials are commonly found in homes. 4. Substances can be hazardous because they are biohazards, corrosive, flammable, radioactive, reactive, or toxic. 5. Chemical tests are used to identify unknown substances. | <p>PhysSci: 1 Perspectives: 4 Perspectives: 4 PhysSci: 1 Inquiry: 1, PhysSci: 1</p> |
| <p>3. Separating a Mixture 1–2 CLASS SESSIONS This activity introduces students to the idea that the simulated hazardous waste is a mixture. Before the substances in a mixture can be tested and identified, they must first be separated. Students construct a procedure to separate the different substances that compose the simulated hazardous waste. Students develop a three-part plan to (1) separate the liquid and solid substances, (2) separate the different solids, and (3) separate the different liquids.</p> | <ol style="list-style-type: none"> 1. Mixtures may be heterogeneous or homogeneous and may contain substances in more than one phase. 2. A mixture of substances often can be separated into the original substances on the basis of one or more characteristic properties, such as density and solubility. 3. Pure substances are identified by performing qualitative tests to determine their chemical and physical properties. | <p>PhysSci: 1 PhysSci: 1, Inquiry: 1 PhysSci: 1, Inquiry: 1</p> |
| <p>4. Identifying Solids 2–3 CLASS SESSIONS Students perform their procedures to separate the solid and liquid parts of the simulated hazardous waste mixture. They then separate out the different solids. Rather than conduct tests to determine the hazardous nature of the solid substances, they conduct tests to help identify each solid. Identifying solids is another way to gather information about potential hazards.</p> | <ol style="list-style-type: none"> 1. Hazardous materials are substances that pose a danger to the health and safety of living organisms. 2. Careful observation can provide important information about a substance. 3. Hazardous substances may be present as solids, liquids, or gases. 4. Mixtures of pure substances can be separated using techniques based on the different chemical and physical properties of the substances. 5. Pure substances are identified by performing qualitative tests to determine their chemical and physical properties. 6. Scientists evaluate the results of investigations and use evidence to draw conclusions. | <p>PhysSci: 1 Inquiry: 1 PhysSci: 1 PhysSci: 1, Inquiry: 1 PhysSci: 1, Inquiry: 1 History: 2</p> |

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| <p>5. Identifying Liquids 2–3 CLASS SESSIONS</p> <p>Students perform their procedures to separate the different liquids from the simulated hazardous waste. They test each liquid for corrosiveness, reactivity, and toxicity, and observe flammability tests. They then conduct four additional tests on properties of the liquids to help identify them.</p> | <ol style="list-style-type: none"> Hazardous materials are substances that pose a danger to the health and safety of living organisms. Careful observation can provide important information about a substance. Hazardous substances may be present as solids, liquids, or gases. Substances can be hazardous because they are biohazards, corrosive, flammable, radioactive, reactive, or toxic. Mixtures of pure substances can be separated using techniques based on the different chemical and physical properties of the substances. Pure substances are identified by performing qualitative tests to determine their chemical and physical properties. | <p>PhysSci: 1</p> <p>Inquiry: 1</p> <p>PhysSci: 1</p> <p>PhysSci: 1</p> <p>PhysSci: 1, Inquiry: 1</p> <p>PhysSci: 1, Inquiry: 1</p> |
| <p>6. Labeling Hazardous Materials 1 CLASS SESSION</p> <p>Students are introduced to the United States Department of Transportation (DOT) system for labeling hazardous materials. The students decide which DOT placards to use to label the barrel containing the simulated hazardous waste. They extend the activity by collecting data on the transportation of hazardous materials through their community.</p> | <ol style="list-style-type: none"> Hazardous materials are substances that pose a danger to the health and safety of living organisms. Hazardous substances may be present as solids, liquids, or gases. Hazardous materials must be identified and labeled before being treated, moved, or disposed of. Substances can be hazardous because they are biohazards, corrosive, flammable, radioactive, reactive, or toxic. | <p>PhysSci: 1</p> <p>PhysSci: 1</p> <p>Perspectives: 4</p> <p>PhysSci: 1</p> |
| <p>7. Transporting Hazardous Materials 1–2 CLASS SESSIONS</p> <p>Now that students know the hazards that the simulated waste poses, they must think about transporting the material safely. Students read about a highway accident involving hazardous materials and examine hazardous materials transportation data from the federal government. Students select a mode of transportation by analyzing the data and creating a graph to support their recommendation.</p> | <ol style="list-style-type: none"> Hazardous materials are substances that pose a danger to the health and safety of living organisms. Hazardous materials must be identified before being treated, moved, or disposed of. Analysis of data can aid in the assessment of options, risk, and trade-offs and facilitate decision making related to transportation of hazardous materials. Graphing data can reveal information not immediately apparent from data tables. | <p>PhysSci: 1</p> <p>Perspectives: 4</p> <p>Inquiry: 1, SciTech: 1</p> <p>Inquiry: 1</p> |
| <p>8. Evaluating Evidence 1–2 CLASS SESSIONS</p> <p>Students are asked to determine a final transportation route for shipping the barrels of simulated hazardous waste. Students use the DOT data from Activity 7, "Transporting Hazardous Materials," to help them evaluate the different transportation options. In choosing a route, they also consider several other factors in addition to safety. Students are asked to support their recommendation with evidence and identify the trade-offs of their decision.</p> | <ol style="list-style-type: none"> Hazardous materials are substances that pose a danger to the health and safety of living organisms. Hazardous materials must be identified and labeled before being treated, moved, or disposed of. Analysis of data can aid in the assessment of options, risk, and trade-offs and facilitate decision making related to transportation of hazardous materials. Mathematical calculations can provide quantitative evidence. | <p>PhysSci: 1</p> <p>Perspectives: 4</p> <p>Inquiry: 1, SciTech: 1</p> <p>Inquiry: 1</p> |

