

**KIT TITLE:** Reactivity of Metals

**GRADE LEVEL:** 7-10

**OBJECTIVES:**

- Students will be able to: generate evidence regarding the corrosion of metals
- Explain how chemical structure can cause interaction with difference materials
- Students will be able to: draw conclusions regarding which metal(s) would be best for specific applications

**Next Generation Science Standards (NGSS)**

<p>NGSS Performance Task</p>	<p><b>MS-PS1-2 Matter and its Interactions</b></p> <ul style="list-style-type: none"> <li>• Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</li> </ul> <p><b>HS-PS1-2 Matter and its Interactions</b></p> <ul style="list-style-type: none"> <li>• Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.</li> </ul>
<p>NGSS Disciplinary Core Ideas (DCI)</p>	<p><b>MS - PS1.B: Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>• Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.</li> </ul> <p><b>MS – ETS1 Engineering Design</b></p> <ul style="list-style-type: none"> <li>• Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</li> <li>• Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</li> </ul> <p><b>HS-PS1.A: Structure and Properties of Matter</b></p> <ul style="list-style-type: none"> <li>• Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.</li> </ul>

	<p><b>HS – ETS1 Engineering Design</b></p> <ul style="list-style-type: none"> <li>Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</li> </ul>
<p>NGSS Cross Cutting Concepts (CC)</p>	<p><b>MS CC 3 - Scale, Proportion, and Quantity</b></p> <ul style="list-style-type: none"> <li>Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.</li> </ul> <p><b>HS CC1 - Patterns</b></p> <ul style="list-style-type: none"> <li>Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li> </ul>
<p>NGSS Science and Engineering Practices (SEP)</p>	<p><b>MS SEP 2 – Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop a model to predict and/or describe phenomena.</li> <li>Analyze and interpret data to determine similarities and differences in findings.</li> </ul> <p><b>HS SEP 3 – Planning and Carrying out an investigation</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> <li>Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</li> </ul>

## Common Core Standards (CC)

<p>CC-ELA/Literacy Standards</p>	<p><b>RST.11-12.1</b> Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3)</p> <p><b>WHST.9-12.7</b> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-PS1-3)</p> <p><b>WHST.11-12.8</b> Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3)</p> <p><b>WHST.9-12.9</b> Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)</p> <p><b>RST.6-8.7</b> 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). (MS-PS1-1)</p>
<p>CC-Math</p>	<p><b>HSN-Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-3)</p> <p><b>HSN-Q.A.3</b> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-3)</p> <p><b>MP.2</b> Reason abstractly and quantitatively. (MS-PS1-1)</p> <p><b>MP.4</b> Model with mathematics. (MS-PS1-1)</p>



Center for Research on Interface Structure and Phenomena (CRISP)  
CRISP CLASSROOM KITS & DEMONSTRATIONS STANDARD ALIGNMENT



	<p><b>6.RP.A.3</b> Use ratio and rate reasoning to solve real-world and mathematical problems. <i>(MS-PS1-1)</i></p> <p><b>8.EE.A.3</b> Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. <i>(MS-PS1-1)</i></p>
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