

**KIT TITLE:** Amorphous Metals: Atomic Trampoline

**GRADE LEVEL:** 5-12<sup>±</sup>

**OBJECTIVES:**

- Demonstrate properties of amorphous metals
- Explain how chemical structure can cause interaction with difference materials

**Next Generation Science Standards (NGSS)**

<p>NGSS Performance Task</p>	<p><b>MS-PS1-1 Matter and its Interactions</b></p> <ul style="list-style-type: none"> <li>• Develop models to describe the atomic composition of simple molecules and extended structures.</li> </ul> <p><b>HS-PS1-3 Matter and its Interactions</b></p> <ul style="list-style-type: none"> <li>• Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.</li> </ul>
<p>NGSS Disciplinary Core Ideas (DSI)</p>	<p><b>MS - PS1.A: Structure and Properties of Matter</b></p> <ul style="list-style-type: none"> <li>• Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.</li> <li>• Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).</li> </ul> <p><b>HS-PS1.A: Structure and Properties of Matter</b></p> <ul style="list-style-type: none"> <li>• The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.</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> </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> </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> <p><b>6.RP.A.3</b> Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1)</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. (MS-PS1-1)</p>

