

## Alignment of Surface Area to Volume Ratio Module to the Next Generation Science Standards

The Next Generation Science Standards (NGSS) were published in April 2013. They consist of statements that convey the performance expectations for students. Each performance expectation is a single statement that is built from three parts: science and engineering practices (Practices), disciplinary core ideas (DCI) and crosscutting concepts.

Since the Surface Area to Volume Ratio Module was created prior to the release of these standards one would expect that it aligns most readily to the individual statements that articulate the practices, DCIs, and crosscutting concepts. The background material, reading, and the slides from the module address the aspects of the NGSS shown in Table 1.

TABLE 1. ALIGNED PRACTICES, DISCIPLINARY CORE IDEAS, AND CROSSCUTTING CONCEPTS		
<b>PRACTICE</b>	<b>DCI</b>	<b>CROSSCUTTING CONCEPT</b>
<i>HS. Using Mathematical and Computational Thinking: Use mathematical representations of phenomena to support claims.</i>	<i>HS-PS1.B: Chemical Reactions: Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy.</i>	<i>HS: Scale, Proportion, and Quantity: The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.</i>
<b><i>Where is this Practice found in the lesson plan?</i></b>  In the Power Point, students are directed to find surface area to volume ratios and complete a Scaling assignment.	<b><i>Where is this DCI found in the lesson plan?</i></b>  An understanding that the rate of chemical processes can be understood in terms of the collision of molecules is prerequisite to understanding why the amount of exposed	<b><i>Where is this Crosscutting Concept found in the lesson plan?</i></b>  The Background Information, Activity, and Power Point slides all implicitly address this concept.

**TABLE 1. ALIGNED PRACTICES, DISCIPLINARY CORE IDEAS, AND CROSSCUTTING CONCEPTS**

	surface area of a material effects the reaction rate.	
<p><b><i>How well is this Practice aligned?</i></b></p> <p>Weak alignment. While students are asked to use mathematic representations, they are not using the representations to explicitly support a claim. This would be a stronger alignment if the Power Point exercise and the Activity were more explicitly linked, with a claim identified.</p>	<p><b><i>How well is this DCI aligned?</i></b></p> <p>Weak alignment, as the concept is found only implicitly in the lesson, and the concept of chemical energy is not addressed.</p>	<p><b><i>How well is this Cross Cutting Concept aligned?</i></b></p> <p>Strong alignment.</p>