

KIT TITLE: Oil Spill Cleanup

GRADE LEVEL: 9-12

OBJECTIVES:

- Students will understand the way a material behaves on the macroscale is affected by its structure on the nanoscale.
- Work with a complex real-world problem and possible solutions while considering the cost, safety, and effectiveness, as well as possible social, cultural, and environmental impacts

Next Generation Science Standards (NGSS)

<p>NGSS Performance Tasks</p>	<p>MS-ETS1-3</p> <ul style="list-style-type: none"> • 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. <p>MS-ETS1-4</p> <ul style="list-style-type: none"> • Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. <p>HS-ETS1-1</p> <ul style="list-style-type: none"> • Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. <p>HS-ETS1-3</p> <ul style="list-style-type: none"> • 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.
<p>NGSS - (DCI) Disciplinary Core Ideas</p>	<p>MS-ETS1.B: Developing possible solutions</p> <ul style="list-style-type: none"> • A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) • Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) • Models of all kinds are important for testing solutions. (MS-ETS1-4) <p>MS-ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> • Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)

	<p>HS-ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (HS-ETS1-1)
<p>NGSS - (CC) Cross-Cutting Concepts</p>	<p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> • All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ETS1-1) • New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology. (HS-ETS1-1)
<p>NGSS - (SEP) Science and Engineering Practices</p>	<p>SEP 1 - Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> • Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS) • Analyze complex real-world problems by specifying criteria and constraints for successful solutions. (HS) <p>SEP 2 – Developing and Using Models</p> <ul style="list-style-type: none"> • Use models to describe phenomena