



Title: Oil NOT In Rocks	
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Course: Environmental Science Math	Duration: One class period
Grade: 9-12	
Objective: Students will learn that some rocks, like shale, go through a change and instead of acting like a sponge; they become a new rock that has properties that prevent oil from penetrating.	
Summary of Lesson: Students will create a model that demonstrates how particles in shale change to create slate.	
Standards: Common Core State Standards, Arkansas State Frameworks	
CODE	STANDARD
PD.1. ES.1	Describe the structure, origin, and evolution of the Earth's components: <ul style="list-style-type: none"> • atmosphere • biosphere • hydrosphere • lithosphere
PD.1.ES.2	Relate eras, epochs, and periods of Earth's history to geological development
PD.1.ES.3	Determine the relative and absolute ages of rock layers
PD.1.ES.4	Categorize the type and composition of various minerals
PD.1.ES.5	Explain the processes of the rock cycle
PD.1.ES.6	Describe the processes of degradation by weathering and erosion
PD.1.ES.7	Describe tectonic forces relating to internal energy production and convection currents
PD.1.ES.8	Describe the relationships of degradation (a general lowering of the earth's surface by erosion or weathering) and tectonic forces: <ul style="list-style-type: none"> • volcanoes



	<ul style="list-style-type: none"> • earthquakes
PD.1.ES.9	Construct and interpret information on topographic maps
PD.1.ES.10	Describe the characteristics of each of the natural divisions of Arkansas: <ul style="list-style-type: none"> • Ozark Plateau • Arkansas River Valley • Ouachita Mountains • Coastal Plain • Mississippi Alluvial Plain (Delta) • Crowley's Ridge
PD.1.ES.19	Describe the cycling of materials and energy: <ul style="list-style-type: none"> • nitrogen • oxygen • carbon • phosphorous • hydrological • sulfur
SP.3.ES.2	Investigate the relationships between human consumption of natural resources and the stewardship responsibility for reclamations including disposal of hazardous and non-hazardous waste
SP.3.ES.8	Compare and contrast man-made environments and natural environments
NS.4.ES.1	Collect and analyze scientific data using appropriate mathematical calculations, figures and tables
Teacher Excellence Support System (TESS): 3b: Using questioning/prompts and discussion, 3d: Using assessment in instruction	
Instructional Strategies and Practices Experiment, Lab, Model, Visualization and Guided Imagery	
Bloom's Level: Highest Level Only Analyzing and Evaluating	
Materials and Resources: <ul style="list-style-type: none"> • Modeling clay • Plastic knife • Sequins or small beads 	



Formative Assessment:

Exit Slip:

If you find a foliated metamorphic rock that has grains running in different directions, how could you explain this phenomenon?

Student Activity

Procedure:

1. Flatten the clay into a layer about 1 cm thick. Sprinkle the sequins on top of the clay.
2. Roll the clay toward the center to make a ball.
3. Use the plastic knife to cut the ball in half. Observe the position and location of the sequins that were inside the ball.
4. Put the ball back together and smash with cardboard to flatten the ball to about 2 cm thick.
5. Using the plastic knife, carefully slice the clay in several pieces. Document the location of the sequins.
6. Why do you think the mineral grains (sequins) are foliated (in rows)?
7. How would the foliation create a new rock that would not act as a sponge and hold oil?