Chemical Bonds and the Stone Pavilion

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Unit Title:	Chemical Bonds and the Stone Pavilion
Science Area Focus/Grade:	High School Physical Sciences

Statement of Authorship

I, Mary Ferguson, an undergraduate at the University of Connecticut, designed and created this content as an independent study. I used materials found on the Stone Pavilion website to assist in the creation of this content. Dr. Robert Thorson assisted me in finding additional materials for the Stone Pavilion. Meghan Kinkaid assisted in the development of this content.

STAGE 1: PLANNING FOR ENGAGEMENT WITH IMPORTANT SCIENCE IDEAS

PART A: Unpack the Standards. *Review the Framework for K-12 Science Education to identify the Disciplinary Core Ideas (DCI), DCI Progressions, and Performance Expectations that will make up the student learning targets of the unit.*

STEP 1. Based on the science area focus above, identify the appropriate **disciplinary core idea(s)**

HS-PS1-3 (High school - physical science 1-3). Matter and its Interactions

- 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.
- DCI 1 - PS1.A (Physical science 1.A): Structure and Properties of Matter
  - The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.
- DCI 2 - PS2.B (Physical science 2.B): Types of Interactions
  - Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (secondary)

STEP 2. Identify the relevant **Performance Expectations** that you are working toward.

HS-PS1-3: 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.

Develop a **driving question** to frame the aim of the task for students.

How can we determine the strength of bonds in a rock when we look at how it is weathered?

STAGE 2: PLANNING THE TASK

PART A: DevelopTask Outline. *Provide the outline of a purposeful task that includes the introduction and/or highlighting of science ideas to reason with, the task launch, the procedures for the main task, and how students will be supported to the task as part of the task closure.*

Purposeful Task	Outline*
Task: Examine the rocks at the Stone Pavilion and gather evidence to make an inference about bond strength in rocks based on how they have weathered (or not weathered).	Introduction and/or highlighting of science idea to reason with: • Rocks can range from incredibly hard to surprisingly soft. Because of this, some rocks weather faster than others. • Rock hardness is influenced by the chemical structure and bond strength within the rock. Main task (include backpocket questions): Slideshow Worksheet In this unit, students begin by learning about the three types of rocks and how they are formed. Students then theorize about how the weathering of rocks can indicate the strength of the bonds, and are encouraged to draw from their own experiences with 'soft' and 'hard' rocks (sandstone in dunes vs. stones in their driveway/backyard). After this, they practice identifying types of weathering. Students then collect data on the rocks at the Stone Pavilion by filling out the accompanying worksheet. Here they are given a chance to put the above concepts into practice by making inferences about the strength of chemical bonds based on what weathering they can see in the rocks (at the bulk scale). Students brainstorm connections in groups, and look for patterns in their data. Students will apply these patterns to other substances and make inferences about the bond strength of those substances. Task Closure: Students will apply these patterns to other substances and make inferences about the bond strength of those substances. Students should be able to put their newfound understanding into words at the appropriate level using relevant scientific terms.

*Include hyperlinks to tasks, resources, etc. as needed.