Granting the Dam!: Teacher Guide

Subject: Chemistry
Grade Level: High School

Case Summary

Dams are being built around the world resulting in various archeological sites that are being flooded. The deposits on the salvaged artifacts will be investigated and the identity of the salts will be determined.

Credits

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This case was adapted from Salty Ceramics Lab (Smith, Commander, Etre, & Stein, 2013). Smith, T., Commander, J., Etre, K., & Stein, R. (2013). Salty Ceramics lab. Presented at The Science Behind Art Conservation Teacher Workshop, Emory University, July 8-12, 2013.

Learning Objectives

1. Predict formulas for ionic and covalent compounds.
2. Identify the unknown ions present.
3. Making observations.
   a. Identify substances based on physical and chemical properties of ionic and covalent compounds.
4. Conduct an investigation, collect and analyze data, and draw a conclusion.

Georgia Performance Standards

SPS2. Students will explore the nature of matter, its classifications, and its system for naming types of matter.
   b. Predict formulas for stable binary ionic compounds based on balance of charges.
   c. Use IUPAC nomenclature for transition between chemical names and chemical formulas of binary ionic compounds and covalent compounds.

SC1. Students will analyze the nature of matter and its classifications.
   b. Identify substances based on chemical and physical properties.
Assessment

- Box chart Preserving our past scene-1 can be taken up for verification of thought process from images displayed

- Box chart preserving our past scene-2 can be taken up for verification of their action plans.

- Write a lab report of the investigations conducted to identify the unknown salts, conductivity graph and conclusion.

- Write a letter to the Sudan government explaining the identity of the salts and the process of deposition on the surface of the structure. Students will also include the methods to prevent future damages done on the structures.

Implementation Strategy

Day 1:

- Post an image of the Philae Temple partially submerged in water found online. Allow students to complete a Box chart regarding the image independently and then share with a partner or a small group (Think Pair Share- TPS) (10 min).

- Look at the image of the damaged section of stone wall and complete the Preserving our Past Scene 2 box chart regarding the image. Conduct a class discussion regarding the student responses. Discuss student results as a class & write vocabulary terms to research what they mean.
  - Vocabulary terms- cation, anion, salt, ionic compounds, covalent compounds, conductivity, any other terms students are unfamiliar with from the box charts and discussions.

- Next, let the students read the letter provided and then have a mini lecture on the Nomenclature of ionic and covalent compounds.

Day 2:

- Conduct Salty ceramics lab part-1 to identify the unknown ions (45 min). Students begin to write the formal lab report.

Day 3:

- Students will also write a letter to the Sudan government explaining the identity of the salts and the process of deposition on the surface of the structure.

- Students will also include the methods to prevent future damages done on the structures.
Day 4:

• Students should conduct part-2 of the lab. *If conductivity probes are not available, teachers may choose to take a specific quantity of water bath solution to evaporate and measure the mass of the salt residue. The salt content can be used to determine the concentration of the salt solution for each consecutive water bath. Students should continue or finish working on the lab report and the letter.

*Optional: Students could present their findings to the class using power point presentation, talk show or big post-its and have a museum/gallery walk.

*Extension: Students can complete an action project by informing the general public about the loss of artifacts from flooding to create dams around the world. Students can make posters, pamphlets, a television commercial, a YouTube video, a blog, conduct a fundraiser to help support the cause, or students can develop their own action plan.

Facilitator Guide:

• Image Prompt – Write down specific information regarding the image in your box chart.
• *If needed, ask students what they see, what they know about the image, what current events may be related to the image, what is different from what they expected to see in the image?

Resources
Sites regarding the dam and the fourth cataract

http://academia.edu/1363890/Archaeological_Salvage_in_the_Fourth_Cataract_Northern_Sudan_1991-2008


http://archive.archaeology.org/0611/abstracts/sudan.html

http://www.britishmuseum.org/research/research_projects/all_current_projects/merowe_dam_project.aspx

http://www.sudantribune.com/spip.php?article20843
Image Citations

Image of flooded Philae temple:


Images of spalling: