Passport: Day in the Life of a Glass Blower

Grade: *5-8*

Description:
Feel the heat – 2,100 Degrees Farenheit! A day in the life of Geoff Lee, a glass blower in Honolulu, Hawaii, reveals the skill, creativity, teamwork, and sweat involved in creating glass works of art.

Preparation for the Excursion
To ensure the most meaningful learning experience for your students, it is recommended that students engage in activities prior to the excursion. The excursion is intended to complement a comprehensive unit. The video resources provide students with a context for the virtual excursion. The additional resources and activities offer opportunities for curricular connections and integration within your larger unit of study. During the excursion, classes will be asked to share their response to the challenge question and the expert will provide feedback. Select a class response for the challenge question.

Video Link: Use the following link to introduce students to the artist Geoff Lee while he creates glass pumpkins – http://www.21-learn.com/artists/geoff_lee/index.htm

Challenge Question:
As an investigate challenge for students, use the challenge questions to prepare for the introduction of the Passport excursion. Present the questions to the students in advance of the excursion to ensure they have enough time to research the answers to the questions. The presenter will activate student's prior knowledge by eliciting responses from the participants.

1. Where was **glassmaking** first discovered?
   Answer – Mesopotamia (Modern day Iraq and Syria)
2. Where did **glassblowing** develop?
   Answer – Phoenicia (Modern day Lebanon)
3. What is so special about glass?
   Glass' diversity of properties makes it unique. When heated it forms a malleable, elastic substance that hardens. Its thermal property allows it to resist sudden hot or cold temperature changes.
4. Why was the development of glassblowing so influential?
   The transition in the glassmaking industry has enabled glass to be mass produced making it no longer a luxury item.

Lesson at a glance:
Students will be introduced to the different tools used by glassblowers to create their beautiful creations. Through this introduction, students will identify the tools and associate them with their function in the studio. In addition, students will investigate the periodic table and its relationship to glass blowing.

Glassblowing began as a utilitarian method to produce glass 40 centuries ago in Mesopotamia (modern day Iraq and Syria). Today, glass blowing is not only a process to build products but also a magical art form and craft.

Glass is a state of matter, meaning it is produced from the chemical process of melting crystalline materials at high temperatures. Natural glass is formed by volcanic action and it is called ***obsidian***. *Obsidian* is formed when the intense heat of a volcano forms with silica, forming the hard glass. Because of natural impurities, it is usually shiny, black, and opaque, but it can also be very dark red or green; its splinters are often transparent or translucent.

The discovering of glass making is attributed to the Phoenician sailors who made the discovery while cooking on the beach. They noticed the sand beneath the fire melted to form a liquid and later cooled and hardened. However, the true development of glass is hypothesized to have started in western Asia, perhaps ***Mesopotamia***, at least 40 centuries ago. It was later discovered that if the material were thick enough, it would stand by itself. Pieces of solid glass could then be ground to shape by grinding it with stones, or sand and water, to produce vessels.

The tools used 40 centuries ago are still used in glassblowing in modern times. Students will be exposed to the tools used for glassblowing using the *Activity I.* This activity is designed to introduce students to the tools and how they are used to blow glass. Discuss how these tools were used in ancient times to blow glass. Present the images in *Activity 1* and question—*What do you think these tools are used for?* Elicit responses from the students. After students have given their responses, introduce the tools and their function in glassblowing. *Activity 2* is designed to establish the relationship between art and science. This interdisciplinary activity can be utilized to introduce students to chemical bonding and formation.

Vocabulary:

- blow pipe
- glory oven/glory hole
- furnace
- temperature
- anneal
- work bench
- optic mold
- gather
- neck line
- inflation
- glass
- vessel

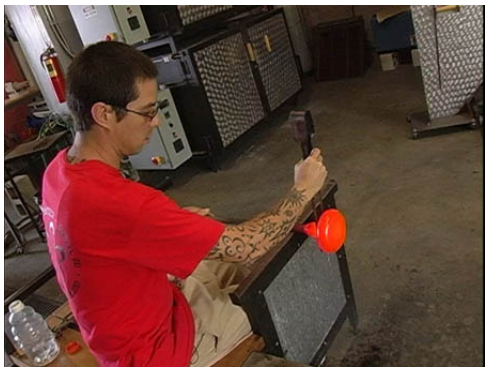
Lesson Outcomes:

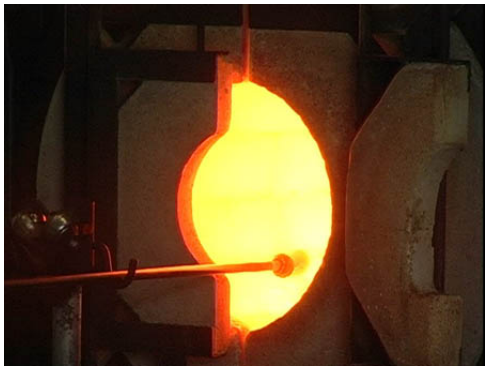
The students will:
- investigate the origins of glassblowing
- understand the tools used for glassblowing
- define the elements used in glassblowing

Activity 1 – Tools of the Glassblowing Trade

Directions: Below are images of tools used to create blown glass. Make copies of the images and ask students to match the tools with the description. After you are finished matching the tools with the description, write a paragraph describing the order of the glassblowing techniques.

a. **Blowpipe**—a hollow metal tube of iron or steel
b. **The Bench**—a glassmaker sits at the bench and must keep rolling the blowpipe back and forth along the two extended arms of the bench
c. **Glory oven**—Oven that is used to reheat glass as it is being worked. Usually the front is open for easy access during the working of a piece. The glory oven temperature is 2200 degrees Fahrenheit.
d. **Pair of jacks** – used to shape the glass and create weak spots
e. **Kiln –** used for annealing, cooling the glass slowly





Activity 2—Glassblowing and Chemistry

Directions: Use the Periodic Table to investigate the different elements used to create glass and its transformation. The letters represent an element found in nature. For example, **He** represents helium.

$$5SiO_2\ (s) + CaCO_3\ (s) + Na_2CO_3\ (s) >>> Na_2SiO_3 \cdot CaSiO_3 \cdot 3SiO_2 + 2CO_2\ (g)$$

Si = _____

O = _____

Ca = _____

C = _____

Na = _____

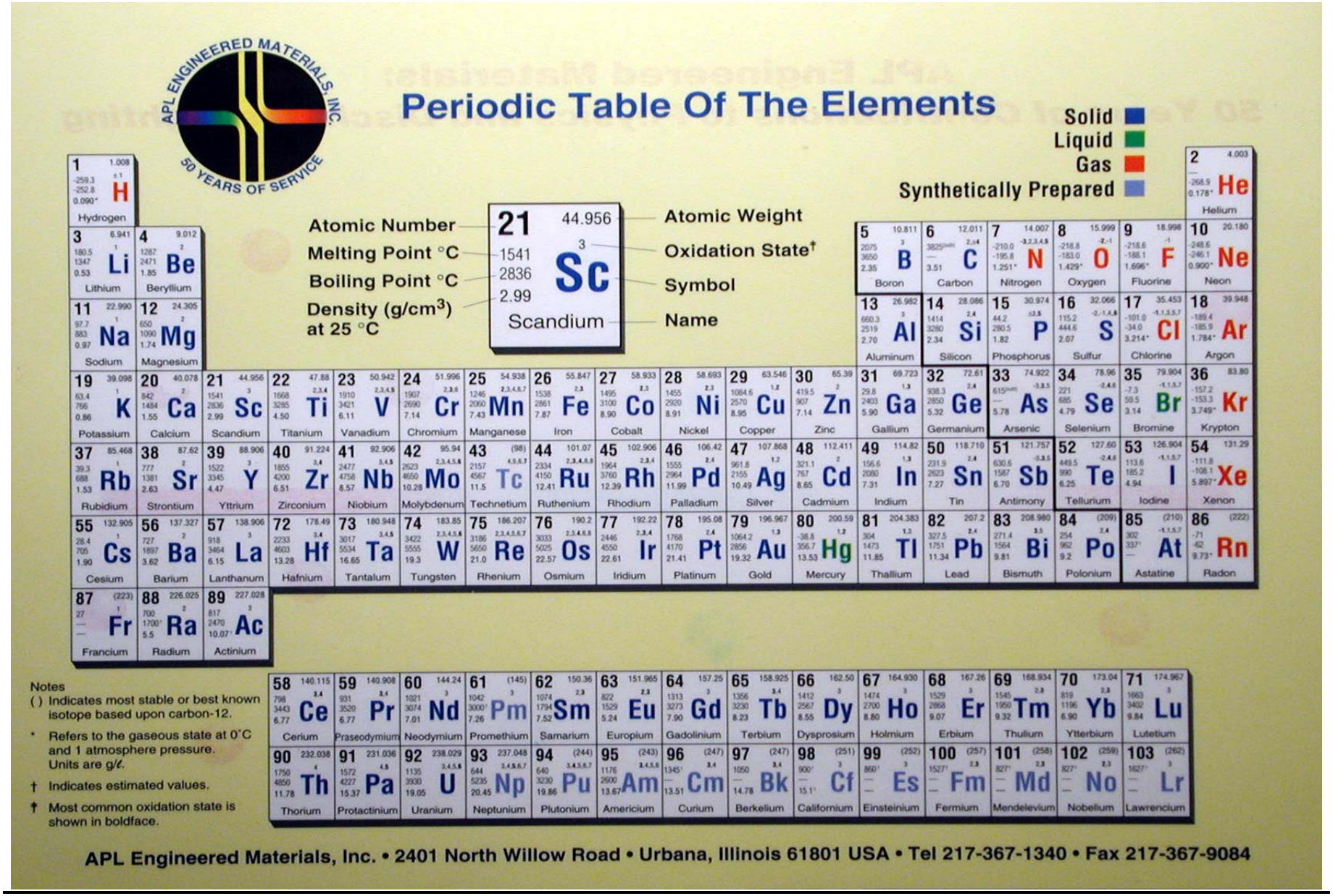
Bonus Question: What chemical changes take place in this transformation?

_____

_____

_____

_____



Glassblowing – A Bibliography

Websites

- *Metropolitan Museum of Art—Blown Glass from Islamic Lands*
  http://www.metmuseum.org/toah/hd/blow/hd_blow.htm
- *Metropolitan Museum of Art—Glass with Mold-Blown Decorations from Islamic Lands*
  http://www.metmuseum.org/toah/hd/mold/hd_mold.htm
- *Corning Museum of Glass http://www.cmog.org/index.asp?pageId=426*
  This website offers the ancient history of glassblowing.
- *Glassblowing.com http://www.glassblowing.com/hotglass/process.php*
  A more advanced interpretation of the history of glassblowing.
- *Museum of Glass http://www.museumofglass.org/s02_virtual_hotshop.jsp*
  This interactive website allows students to use the tools to design blown glass.

Books

- Campbell Geeslin, Ana Juan (Illustrator). *Elena's Serenade (Americas Award for Children's and Young Adult Literature).* Atheneum/Anne Schwartz Books: 2004. ISBN**:** 0689849087
  This book is about a Mexican girl who is ready to prove why she can be a glassblower, even if she is a girl. A winner of *Americas Award for Children's and Young Adult Literature.*