

Welcome to the WSC AIChE Hollowed Earth Pottery Activity!

Western South Carolina



American Institute
of Chemical Engineers

Based on archaeological evidence, pottery making – ceramics – dates back more than 24,000 years in Europe (Czechoslovakia) and 28,000 years in Asia. Today, the chemical formulation, the adjustment of firing temperatures, the optimization of structure and form are still an inherent part of the manufacturing processes of modern use high-tech ceramics and other high-tech industries.

The complexity of the processes is where the chemical engineering discipline meets the world of art. As any working process engineer knows, there are the “knowns” – the things we can put down on paper and then turn into a product – and the “unknowns” – the things that happen, the uncertainties, the things we cannot measure – that create process upsets and eventually lead to new understanding and “breakthroughs”.

So, we hope you enjoy your pottery making experience and glean a little respect for the many generations of people that worked from molding the basic clay to where we are today.

A Deeper Look into Ceramics

Ceramics are classified as inorganic and nonmetallic materials that are essential to our daily lifestyle. Ceramics are all around us. This includes things like tile, bricks, plates, glass, & toilets. Ceramics can be found in products like watches (quartz tuning forks-the time keeping devices in watches), snow skis (piezoelectric-ceramics that stress when a voltage is applied to them), automobiles (sparkplugs and ceramic engine parts found in racecars), and phone lines. They can also be found on space shuttles, appliances (enamel coatings), and airplanes (nose cones). Depending on their method of formation, ceramics can be dense or lightweight. Typically, they will demonstrate excellent strength and hardness properties; however, they are often brittle in nature. Ceramics can also be formed to serve as electrically conductive materials, objects allowing electricity to pass through their mass, or insulators, materials preventing the flow of electricity. Some ceramics, like superconductors, also display magnetic properties.

Ceramics are generally made by taking mixtures of clay, earthen elements, powders, and water and shaping them into desired forms. Once the ceramic has been shaped, it is fired in a high temperature oven known as a kiln. Often, ceramics are covered in decorative, waterproof, paint-like substances known as glazes.

Ceramic processing is used to produce commercial products that are very diverse in size, shape, detail, complexity, and material composition, structure, and cost. The purpose of ceramics processing to an applied science is the natural result of an increasing ability to refine, develop, and characterize ceramic materials.

Ceramics are typically produced by the application of heat upon processed clays and other natural raw materials to form a rigid product. Ceramic products that use naturally occurring rocks and minerals as a starting material must undergo special processing in order to control purity, particle size, particle size distribution, and heterogeneity. These attributes play a big role in the final properties of the finished ceramic. Chemically prepared powders also are used as starting materials for some ceramic products. These synthetic materials can be controlled to produce powders with precise chemical compositions and particle size.

The next step is to form the ceramic particles into a desired shape. This is accomplished by the addition of water and/or additives such as binders, followed by a shape forming process. Some of the most common forming methods for ceramics include extrusion, slip casting, pressing, tape casting and injection molding. After the particles are formed, these "green" ceramics undergo a heat-treatment (called firing or sintering) to produce a rigid, finished product. Some ceramic products such as electrical insulators, dinnerware and tile may then undergo a glazing process. Some ceramics for advanced applications may undergo a machining and/or polishing step in order meet specific engineering design criteria.

Thank-you for attending! WSC AIChE May 12, 2022

Hollowed Earth Pottery - Mug Building Class

hosted by the

Western South Carolina section
of the American Institute of Chemical
Engineers

Ceramics information in this brochure taken
from the website:

https://depts.washington.edu/matseed/mse_resources/Webpage/Ceramics/ceramichistory.htm#:~:text=The%20first%20use%20of%20functional,Upper%20Egypt%20about%208%2C000%20BC.

For questions about this event and future
events please contact

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