

Ceramics Dating Techniques

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Introduction

Ceramics are some of the most common ancient artifacts to be made, used, and found over 28 millennia of human history (The American Ceramic Society, 2023). Due to their wide usage and sometimes specialised shapes, the shape, material, and contents of ceramics can indicate the technological level and living habits of the time period the ceramics come from. Hence, ceramic dating technology is heavily depended upon by the archaeological field. Ceramic dating techniques refers to the methods used to determine the age of a piece of ceramics (StudySmarter, 2024), such as typology dating – the most common and widely used method – and quantitative measures – like the trapped charge and radiocarbon dating of the residual materials within.

Typology analysis dating

Typology analysis dating – the visual comparison of ceramics – is the cheapest and most widely used method to determine the age of ceramics (Introduction to Ceramic Identification, 2026).

One method is through determining the ceramic chronology. Decorated ceramics (Huntley, 2011) can indicate the order the ceramics were made based on comparative analysis of style and production, therefore allowing archaeologists to relatively date the ceramics, and, by extension, the sites through analysis of the frequency of such ceramics of distinct styles. This has allowed archaeologists to determine paths of However as many ceramic pieces are not left behind when settlements are moved or abandoned, and some areas have loosely defined ceramic chronology, this is not a fully accurate method.

Another method is to classify the ceramics based on three primary attributes – paste, surface treatment, and decoration (Introduction to Ceramic Identification, 2026). The “paste” refers to the type of clay the ceramic vessel is made from, generally divided into earthenware, stoneware, and porcelain¹, and can show the heat capacity of the kilns used and materials available. The surface treatment refers to the glaze², slip, enamels, polishing, smoothing, and carving; these traits can be sorted into time periods based on the technological level and popular stylistic choices of those ages.

On the other hand, both are susceptible to misinterpretation and researcher bias, as well as forgeries over the years. Therefore making them difficult to determine whether they are genuine, and the context may be misleading.

¹ Earthenware is made from iron-rich clay and fired at relatively low temperatures, becoming coarse, brittle, and porous. Stoneware is fired at higher temperatures, being stronger and more durable. Porcelain is fired at extremely high temperatures (>1300°C), often with high amounts of feldspar, leading to a translucent ceramic ware.

² These designs are distinctive to different regions and kilns as well as time.

Carbon-14 dating

When typology dating is not accurate enough, the next step would be to measure the level of carbon-14 in organic residue on the ceramic wares. Carbon-14 is a radioactive isotope of carbon found in organic organisms, and begins to decay when the organism dies. By measuring the level of undecayed Carbon-14, archaeologists can find out the time period the object is from based on the time the organism it was made from died.

This method has high accuracy for dating organisms up to 50,000 years ago³ (National Center for Science Education, 2026), however this only works for organic substances, therefore the age of the ceramic itself cannot be measured through this means; it relies on the ceramic wares to have a large amount of residual organic matter that was left inside close to the era the ceramic was used.

Luminescence dating

Ceramics are not perfectly made in terms of anatomical structure. The imperfections lead to electrons becoming trapped in the mesh of atoms, accumulating over time from radioactive elements in the environment. These “electron traps” (Drakopoulos, 2024) open up when heated or exposed to strong light, which is most likely the last firing of the ceramics; in opening up, the electrons are released in the form of light and the luminosity of the ceramic piece can be measured and “reset”. The higher the luminosity, the older the object would be.

First, a few small samples must be taken from the object and cleaned, which requires damaging the object to a certain extent. The luminescent materials must then be isolated in order to be measured. The luminosity can be measured through either thermoluminescence – heating the object – or optically stimulated luminescence – placing the object under strong controlled light (Marks et. al., 2013). Luminescence dating has an error margin of about 10% of the object’s age; an object from 1000BCE could be anywhere between 1300BCE and 700BCE, however it can date back around 500,000 years and be used on many types of ceramics and other fired material.

Luminescence dating does lead to major errors as it does not account for accidental firing or extremely strong sunlight after the object was made, and it cannot detect partial or composite forgeries and mending as only samples are taken. More masterful forgeries may include exposing the ceramics to a high amount of radiation, or the object may be naturally exposed to abnormally high radiation, leading to more energy trapped and the object appearing to be older based on the luminosity reading.

³ After 50,000 years, the carbon-14 left is not sufficient to draw any conclusions.

Electron Spin Resonance

This method is based on the same reasoning of extra electrical charge from trapped electrons, but relies on a machine to directly measure the trapped charge (Bartz, 2024). It has a margin of error of around 15% of the true age, and can date objects from between a few thousand to a million years ago, and the same flaws as luminescence dating.

Conclusion

While many ceramic dating techniques exist, few are stable and accurate enough to be commonly used. Even with the technological advances of the past century, typology analysis dating remains the most commonly used, as environmental cues and the features of ceramics themselves are often reliable and distinguishable enough to determine the time period it was made in. Carbon-14 dating is most reliable in terms of dating organic materials, however luminescence dating is more useful in terms of ceramic dating. All methods listed above have flaws, therefore most archaeologists would use a mix of dating methods and several samples in order to understand the age of the ceramics.

Bibliography

Answers to Creationist Attacks on Carbon-14 Dating | National Center for Science Education. (2026a).

Ncse.Ngo. <https://ncse.ngo/answers-creationist-attacks-carbon-14-dating>

Bartz, M. (2025). Electron spin resonance dating [Review of *Electron spin resonance dating*].

Encyclopedia of Quaternary Science, 6, 792–807.

<https://doi.org/10.1016/b978-0-323-99931-1.00244-0>

Drakopoulos, A. (2024, April 10). *Dating Ancient Pottery: Thermoluminescence*. Ancientcyprus.Com;

Ancient Cyprus. <https://www.ancientcyprus.com/articles/thermoluminescence-dating>

Huntley, D. (2011, November 18). *Learning from Pottery, Part 1: Dating*. Archaeology Southwest.

<https://www.archaeologysouthwest.org/2011/11/18/learning-from-pottery-part-1-dating/>

Introduction to Ceramic Identification. (2026b). Historical Archaeology.

<https://www.floridamuseum.ufl.edu/histarch/ceramic-types/introduction/>

Marks, R. H., Tudela, D. R. G., Mittani, J. C. R., Tatumi, S., & Munita, C. S. (2013, November 24).

Optically Stimulated Luminescence Dating of Archaeological Ceramics from Osvaldo and Lago

Grande sites in Central Amazon. *International Nuclear Atlantic Conference - 2013*.

Pottery Dating: Techniques & Analysis | StudySmarter. (2024). StudySmarter UK.

<https://www.studysmarter.co.uk/explanations/archaeology/ceramics-and-pottery/pottery-dating/>

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The American Ceramic Society. (2023). *A Brief History of Ceramics and Glass - The American Ceramic*

Society. The American Ceramic Society.

<https://ceramics.org/about/what-are-ceramics/a-brief-history-of-ceramics-and-glass/>