Understanding Ceramics

By Siobhán Cool

The word 'ceramic' is derived from the Greek word for baked clay, keramos. It is a generic term that refers to any object shaped from wet clay and fired in a kiln heated to at least 600°C. Through the firing process, the clay undergoes a permanent physical and chemical transformation and hardens for use. The two main categories of ceramic, porous ceramics and hard, vitrified ceramics, depend on the components and density of clays used and whether alone or mixed with other ingredients. Porous ceramics are earthenwares such as faïence and terracotta. The hard, vitrified ceramics are porcelain and stoneware.

Earthenware

Earthenware includes a wide variety of pottery such as terracotta, faïence, majolica, maïolica and delftware. These ceramics are porous after firing until made impervious fired at 900-1000°C. It is a coloured ceramic, dependent on the source of local clay. In Assyria and Persia, terracotta objects were glazed with a tin oxide that fired white opaque and were then decorated with further coloured glazes. The famous Hispano-Moresque ***faïence*** was introduced to Europe from Majorca and other Spanish centres in the 14th century. In Italy it came to be known as ***maïolica*** and local potters began to produce their own version at Faenza (hence the new name: faïence) before other Continental cities and towns developed their own specific designs. Dutch faïence, largely manufactured in the town of Delft during the 16th century, initially appeared as cheap and crude imitations of the Chinese blue and white export porcelain that had taken Europe by storm. For the next 200 years, Dutch artisans developed a more refined ceramic in both design and material that became highly prized in its own right. ***Majolica*** (moulded earthenware in relief, inspired by 16th century Italian and French faïence) became popular in Victorian England and was produced by manufacturers such as Minton and Wedgwood.

Stoneware

Stoneware is a very hard and impenetrable ceramic fired at very high temperatures of between 1200-1300°C. Stoneware can be distinguished from earthenware because it is impervious to liquids, even without a glaze. This is due to the vitrification (fusion of ingredients) that takes place in the firing process. Stoneware is distinct from porcelain because it is opaque and typically made from siliceous (sandy) clay. Chinese artisans developed the first stoneware during the Han period (206 BCE – CE 220) and subsequently perfected this type of ceramic, in the evolution of porcelain. Stoneware, such as *cizhou* and *guanyao*, was widely produced during the Song dynasty and culminated in the beautiful celadon ware, examples of which can be seen in Gallery 6 (China) of the Asian Civilisations Museum. Korea and Japan also have long histories of stoneware production. Stoneware appeared in Continental Europe in the 15th century, England in the late 17th century and was refined by the German alchemist Johann Böttger in the early 18th century, when he produced red jasperware at the Meissen factory. American stoneware was produced from c.1720 and became the most dominant houseware in that country until the turn of the 20th century, when glass vessels began to be mass-produced.

Earthenware Delft jug

Roman earthenware

Porcelain

Originally made in China, ***porcelain*** was made of a mixture of fine white 'china' clay or *kaolin* (considered the 'bones' of porcelain) and feldspar (*petuntse* or 'china' rock) that vitrified at high

Korean stoneware vase

temperatures of 1400-1450°C, giving a glassy quality of translucency. The word 'kaolin' is derived from *gaoling*, the site where the clay was mined outside the Chinese city of Jingdezhen, which by the 9th century was the country's foremost ceramic manufacturing centre and ultimately became the most famous porcelain-producing city in the world. It took more than a millennium for Chinese porcelain-making to evolve; it was ultimately perfected in the Tang Dynasty (CE 618 – 907). Marco Polo is said to have given porcelain its name as its brilliant white, transparent quality resembled the shell of a sea snail (Italian: *porcellana*), which was used as currency in Asia.

Despite centuries of effort, the Europeans were unable to make their own porcelain until Böttger cracked the secret at the Meissen factory in 1713. 'Soft-paste' porcelain, made of white clay and a combination of silica, feldspar and soda called 'frit', was earlier invented in Europe in the quest for true porcelain. However, 'soft-paste', which was made in the European factories of Venice, Sèvres and Chelsea, lacked the strength or beautiful translucency of porcelain and is fired at only 1100°C. True porcelain or 'hard-paste' porcelain is extremely hard, although it chips easily, as those who use porcelain as tableware will certainly know. Today, porcelain has additional use in industrial and medical applications. Modern porcelain contains quartz that helps to bind the other ingredients and also ensures the green (unfired) ware holds its shape during firing.

Bone China

Often shortened to the term 'china' in present day, ***bone china*** was invented in England at the Chelsea factory in the mid-18th century. It is a mixture of indigenous English clays, kaolin and small quantities of animal bone ash, which act to lower the point of fusion during the firing process and also strengthen the ware. The early bone china was initially coarser than soft-paste porcelain and prone to staining but modern techniques have improved the ceramic's aesthetics and usability. Bone china is fired at a lower temperature than porcelain (1200°C) and as a result is less hardy and can only be used for tableware and decorative *objects d'art*. Unlike porcelain that is translucent and white or off-white, bone china is opaque and has a slightly creamier hue. Famous companies, such as Minton, Wedgwood, Royal Crown Derby and Royal Doulton, continue the tradition of English bone china, which ironically have eager export markets in Asia, including China.

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Photo courtesy of the Trustees of the British Museum

Bone china figurine