

Plastic Clay

What is Plastic Clay ?

Plastic clay is an extremely rare mineral found in very few places around the world. It is also sometimes referred to as 'ball' clay, a name which dates back to the early methods of mining when specialised hand tools were used to extract the clay in rough cube shapes of about 30cm. As the corners were knocked through handling and storage these cubes became rounded and 'ball' shaped.

Plastic clays are sedimentary in origin. Ancient rivers and streams washed kaolinite (formed from decomposed granite) from its parent rock. As the streams flowed from upland areas the kaolinite mixed with other clay minerals, sands, gravels and vegetation before settling in low-lying basins to form overlaying seams of plastic clay.

Plastic clays usually contain three dominant minerals: kaolinite, mica and quartz. In addition, there are other 'accessory' minerals and some carbonaceous material (derived from ancient plants) present. The wide variation both in mineral composition and in the size of the clay particles results in different characteristics for individual clay seams within a deposit.



Collecting different plastic clay samples from the quarry face.

Internationally, deposits of high quality plastic clay are much rarer than those of kaolin. The best deposits currently known and exploited commercially are found in South West England, the Westerwald area of Germany, several basins in France, eastern Ukraine around Donetsk and southern parts of the USA. Further important deposits have been identified in Thailand, Indonesia and China.



Extraction and Processing

Plastic clay is extracted using hydraulic 'back-hoe' excavators, working at 'benches' cut into the quarry to access the seams of clay. Individual raw clay selections are carefully blended according to pre-determined recipes to provide a product with a consistent and predictable range of characteristics and behaviour. The first stage in processing is then to shred (or 'kibble') the blended clay into smaller, more regular lumps about the size of a golf ball. Much blended clay is sold in this shredded form.

Further processing through drying and grinding yields powdered plastic clays and treatment by calcination produces chamotte. Ceramics manufacturers (particularly in the sanitaryware sector) have also benefited from the development of refined plastic clays and chamottes which offer improved performance and reduced manufacturing process costs. Refined clays are available in 'noodled' and slurried form.

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Multiple properties – uses

A vital material in ceramics

Plastic clays are used in many different industries, but in particular form a vital component in ceramic manufacturing. Used with kaolin, which has limited plastic properties, plastic clay provides the cohesion and workability necessary for the creation of ceramic parts.

As a result of their sedimentary origin, raw plastic clays have a wide range of colours. However, many of them are valued by the ceramics industry for their white-firing properties which are determined by the amount of metallic oxides within the clay. Ironically, many of the darker raw plastic clays from south west England have the whitest fired colour.

For refractory applications, plastic clays and chamottes with a high alumina content form the base composition for alumino silicate refractories.



- **Sanitaryware:** Sanitaryware typically includes chamotte and plastic clay as essential components, with the plastic clay providing plasticity and workability. In addition sanitaryware also includes kaolin, feldspar and quartz.
- **Tableware:** Ceramic tableware utilises plastic clay to provide high plasticity and a good white-fired colour, combined with Kaolin, feldspar and quartz.
- **Wall and floor tiles:** Again combined with feldspar, kaolin and quartz, plastic clays are utilised for their plasticity and bonding properties.
- **Glazes and engobes:** Plastic clays are also used in the production of coatings for ceramic products to ensure the perfect finish.
- **Refractory clays:** An ability to resist the effects of extremely high temperatures makes plastic clay and chamotte ideal for use in refractory products such as kiln insulation and furniture.
- **Construction ceramics:** Building materials such as bricks, clay pipes and roof tiles all contain plastic clay.
- **Electrical porcelain insulators:** You will find plastic clays in the electrical porcelain components that provide insulation from high voltage currents.
- **Chemical applications:** Plastic clays used as fine fillers and extenders in polymers, adhesives, plastics, fertilisers and insecticides.
- **Sealants:** Plastic clays are also widely used for lining landfill waste disposal sites, and for sealing over them once completed.

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