

Clays

Clays represent one of the largest mineral commodities in the world in terms of mineral and rock production and use. Many people, however, do not recognize that clays are used in an amazingly wide variety of applications. Use continues to increase worldwide as populations and their associated needs increase. Robert Virta, clay and shale commodity specialist for the U.S. Geological Survey, has prepared the following information about clays.

Contrary to popular belief, clays are not just the orange dirt that mars household halls in wet weather. In addition to the more obvious brick, pottery and roofing tile applications, there are also thousands of unseen uses for clays.

Manufacturers use the electric charge on clay surfaces to bind chlorophyll and other organics in semi-processed oil to clay particles that are later removed. Companies are able to make hand lotions and paints that have a smooth, even consistency because the solid clay components stay in suspension due to their edge-to-plate bonds, which form a stable network. Clays also give a glossy surface to this magazine paper by forming a smooth, thin, ink-receptive film over the rough cellulose paper surface. Additionally, clays play a role in lightweight aggregate for construction applications because gases that generate from shale at high temperatures cause the viscous material to expand or bloat into a porous, low-density structure.

Industry uses six types of clays: ball clay, bentonite, common clay and shale, fire clay, fuller's earth and kaolin. Mineral composition, particle size, plasticity, absorption qualities, firing properties and oil clarification properties are a few of the major characteristics used to distinguish among the different industrial clay types. The term "clay" is applied to particles less than 2 micrometers in size, but clay minerals can have particle sizes ranging from tens of angstroms to millimeters.

In 2002, about 39 million metric tons of clays were sold or used in the United States. This averages out to about 270 pounds or 123 kilograms of clay used annually for each man, woman and child in the United States.

Common clay and shale dominated the clay industry with a production of 23 million tons in 2002. Its primary uses were the manufacture of brick, cement and lightweight aggregate. Kaolin ranks next, with about 8 million tons sold or used in 2002, primarily for paper coating and filling applications. Bentonite, with about 4 million tons sold or used in 2002, was the third most used clay. Major uses were in absorbents, drilling mud, foundry sand bond and iron ore pelletizing. Fuller's earth, ball clay and fire clay followed respectively by use. Although there is no accurate accounting of world clay production, it undoubtedly exceeds 150 million tons per year.

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Clay, used to make brick, pottery and roofing tiles, is also used in thousands of other ways.
Image from *Minerals in Your World*.