

CLAY MINERALS

Clay minerals are hydrous aluminum phyllosilicates, sometimes with variable amounts of iron, magnesium, alkali metals, alkaline earths, and other cations found on or near some planetary surfaces.

Clay minerals form in the presence of water and have been important to life, and many theories of abiogenesis involve them. They are important constituents of soils, and have been useful to humans since ancient times in agriculture and manufacturing.

PROPERTIES OF CLAY

Clays form flat hexagonal sheets similar to the micas. Clay minerals are common weathering products (including weathering of feldspar) and low-temperature hydrothermal alteration products. Clay minerals are very common in soils, in fine-grained sedimentary rocks such as shale, mudstone, and siltstone and in fine-grained metamorphic slate and phyllite.

Clay minerals are usually (but not necessarily) ultrafine-grained (normally considered to be less than 2 micrometers in size on standard particle size classifications) and so may require special analytical techniques for their identification and study. These include x-ray diffraction, electron diffraction methods, various spectroscopic methods such as Mossbauer spectroscopy, infrared spectroscopy, Raman spectroscopy, and SEM-EDS or automated mineralogy processes. These methods can be augmented by polarized light microscopy, a traditional technique establishing fundamental occurrences or petrologic relationships.

GEOLOGY OF NIGERIA

The geology of Nigeria formed beginning in the Archean and Proterozoic eons of the Precambrian. The country forms the Nigerian Province and more than half of its surface is igneous and metamorphic crystalline basement rock from the Precambrian. Between 2.9 billion and 500 million years ago, Nigeria was affected by three major orogeny mountain-building events and related igneous intrusions. Following the Pan-African orogeny, in the Cambrian at the time that multi-cellular life proliferated, Nigeria began to experience regional sedimentation and witnessed new igneous intrusions. By the Cretaceous period of the late Mesozoic, massive sedimentation was underway in different basins, due to a large marine transgression. By the Eocene, in the Cenozoic, the region returned to terrestrial conditions.