



## Sustainable Mineral Solutions

### MINORE™ - Clay Mineral

Clay minerals stand out for their remarkable versatility with their advantages recognised by ancient civilisations, who used clay to create pottery, bricks and various construction materials. Today, these minerals permeate our daily lives, used in products across a multitude of sectors, from consumer goods to agriculture, industrial uses, construction and beyond.

MINORE™ offer a range of sustainable mineral solutions to help organisations meet their sustainability goals. In their purest form, we mine primary clay deposits using sustainable techniques and provide these materials as key components for creating low carbon sustainable construction products, adsorption solutions and green landscapes.

The mineral composition comprises of a blend of naturally derived aluminosilicate & mixed layer clay. This versatile mineral offers product developers & formulators the scope & flexibility to blend, chemically or thermally transition to create tailored products for existing applications & new markets.

### Case Study

MINORE™ has collaborated with a leading independent technology innovation centre in UK & a leading European technology centre to demonstrate and validate the versatility and performance of our clay mineral. The centre has expertise in translating research and ideas into marketable products across diverse sectors. The research projects provided validation across a number of industry sectors leading to development opportunities with a leading construction products manufacturers, producers of low carbon cement substitutes, antibiotic free mycotoxin binders for animal feed & rheology control & filler materials for the resin, adhesive & recycled plastic composite sectors.

Relative percentage of clay minerals in the <2µm clay size fraction	
Kaolinite©	>25
Illite©	>17
I/S-ML©	>51
Vermiculite©	<5
Chlorite (Tri)©	<5
% Exp©	30 to 50

Major element geochemistry expressed as wt.% oxides, loss on ignition	
SiO <sub>2</sub>	59.90%
Al <sub>2</sub> O <sub>3</sub>	21.70%
TiO <sub>2</sub>	0.97%
Fe <sub>2</sub> O <sub>3</sub>	6.30%
MgO	1.30%
MnO	0.07%
CaO	0.50%
Na <sub>2</sub> O	0.47%
K <sub>2</sub> O	2.47%
LOI	6.37%

I/S-ML© = Mixed-Layer Illite/Smectite

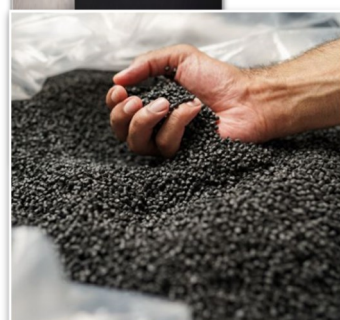
Chlorite (Tri)© = Trioctahedral Chlorite

%Exp© = Percent Expandability (smectite content) of Mixed Layered Illite/Smectite



The mineral demonstrates strong strength activity indices & pozzolanic properties at both low inclusion rates & lower calcination temperatures necessary to produce original Portland Cement (OPC).

Tests were carried out to investigate the toxin adsorption potential of the untreated clay. The common mycotoxins Aflatoxin, Ochratoxin, Zearalenone, Vomitoxin, Fumonisin and T-2 Mycotoxin were tested. Of those, Aflatoxin is practically completely adsorbed by the clay. This is particularly important as Aflatoxin is one of the most potent carcinogens known and is found in wheat, rice, sweetcorn, sunflower, peanuts and many other products



The research also proved that the clay can provide thixotropic behaviour and viscosity control for industrial resins and adhesives. It can also enhance the mechanical properties of polypropylene and mixed recycled plastic composites by increasing their stiffness, strength, modulus and impact resistance.

