SOME ASPECTS OF THE CHEMISTRY OF CLAY MINERALS

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Clay minerals, which form the < 2/u fraction in soils are layered aluminosilicates. The structure consists of aluminosilicate (or Magnesium-silicate) sheets stacked in the C - directon, the individual sheets being sep rated by an interlayer space. Variations in the make up of the aluminosilicate sheet accounts for the variety of clay minerals found in nature.

Isomorphous substitution in the sheet structure, whereby, cations are replaced by others similar in size but bearing lower charges, leads to an excess of negative charge on the sheet. This is balanced by the uptake of cations into the interlayer space.

The interlayer cations undergo ready exchange, giving the clays the important property of cation exchange. Thus, these minerals help the soil to retain soluble inorganic cations, which would otherwise get leached away by the soil water.

When the interlayer ions are the protons the clays become highly acidic. Easily polarised interlayer cations such as Al^{3+}, also make the clays acidic. Such clays function as strong solid acids the acidity being confined to the interlayer region. Various organic compounds can also penetrate into the interlayer region by a process known as intercalation. When acid clay intercalates an organic molecule, this molecule is placed in a highly acidic environment. Thus the acid clays are able to catalyse a broad spectrum of organic reactions such as hydrations, dehydrations, alkylations, esterification and hydrolysis. As a result, the clay minerals have attracted considerable attention as cheap industrial catalysts. They are also responsible for the deactivation of

pesticides and weedicide residues in the soils and are thought to have played a major role in the petroleum gnesis.

On account of their porous nature the clay minerals have large surface areas and show a propensity for adsorption of various organic molecules. The decolourisation of vegetable oils is one such commercial application of clay minerals. Clay minerals also form good supports for tje immobilisation of enzymes.

The Chemistry of Clay Minerals is thus not only varied and interesting but also of considerable commercial and environmental significance.