Clays & clay Minerals

- In many cases a knowledge of How a soil behaves is sufficient for solution of a geotechnical engineering problem.
- But there are cases and situations where an understanding of why certain soils behave as they do, can be important if a proper solution is to be obtained.
- To meet the above objective, it is necessary to examine the composition of soils in terms of their mineralogy and pore fluid and interaction of these phases with each other and the nature of surrounding environment.

Minerals may be defined as

- Any of a class of substances occuring in nature usually comprising inorganic substances, as quartz, feldspar of definite chemical composition and usually definite crystal structure.

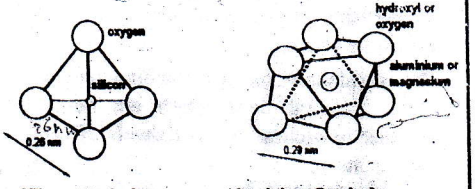
- The term CLAY is sometimes ambiguous. When used as a particle size term, it refers to all constituents of a soil smaller then some given size, usually 2μ (0.002mm). As mineral term, it refers to specific minerals termed as the "CLAY MINERALS".
- Not all caly mineral particles are finer than 2μ nor all non clay minerals are coarser than 2μ.

- The amount of clay size and clay mineral in any soil may not be the same.
- It is best to use clay size when referring to compositions in terms of particle size and 'clay minerals' content or 'clay content' when referring to mineral compositions
- Non clay soils (e.g. sand, gravel, silt of higher particle size) are relatively inert materials. Their interactions are predominantly physical in nature and determined by- particle size, shape, surface texture, size distribution.

- CLAYS are small crystalline particles of one or more members of a small group of minerals.
- These are primarily Hydroys Aluminium Silicates, with magnesium or iron occupying all or part of the aluminium positions in the mineral and with alkalies (e.g. sodium or potassium) or alkaline earth (e.g. calcium or magnesium) also present as an essential constituent in some of them.

Basic Structural Units

Clay minerals are made of two distinct structural units.



Silicon tetrahedron **Aluminium Octahedron**

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