

Two methods of shale density determination commonly used by Exlog at the wellsite are:

- (i) Single-solution shale density kit (Density Gradient Method) which consists of a column of variable density solution fluid (bromoform and neothene) in which beads of known density are suspended. A calibration curve of density versus depth is prepared. Shale cuttings immersed in the column will sink to the level at which their density is the same as the fluid; density is then read off from the calibration curve.
- (ii) Multi-solution shale density kit ("sink or float" method) which consists of a set of liquids of varying densities. By placing a piece of shale in such a liquid, its density can be determined when it either sinks or floats through the liquid.

(b) Shale Factor

Smectite is the principle component of clay during normal sedimentation. This is a flocculated sheet silicate which has a large capacity to absorb and retain water between the individual molecular sheets and between the flocculate particles. With burial and continual compaction, smectite will undergo diagenesis due to increasing temperature and pressure. Ionic exchange occurs and structured water becomes liberated to the pores. Providing that the hydraulic conductivity is sufficiently high to remove this water, compaction will continue. The outer layers of water bonded to the clay particles may next be removed as smectite alters diagenetically with depth to mixed-layer clays and finally, to illite. This alteration involves compaction of pore spaces, orientation of particles and reduction in inter-layer and intraparticle area, thereby reducing the total area available for chemical adsorption. If the hydraulic conductivity is insufficient to remove the liberated water as it is flushed, then at depth the clays will be geopressed and of a "younger" diagenetic age.