Specific surface area

Surface area is determined by measuring the amount of a liquid or gas required to cover the surface of the soil (Yong and Warkentin, 1966). The method applied in this study was based on the weight of ethylene glycol adsorbed as monomolecular layer on the clay surface. The method for this test was adopted from the Laboratory Geotechnical Research Centre, Montreal, Canada. Organic free samples from section 1.0 above were used in this experiment. The sample (approximately 1.0g) was firstly weighed together with an aluminium-weighing dish and was then placed on the covered petri dish. The sample was then dried in an evacuated dessicator over silica gel and periodically (every hour) weighed until a constant weight was obtained. When this was reached, reagent grade ethylene glycol monoethyl ether (EGME) was added by pipette to cover the surface of the dried soil. It was then left to equilibrate for one hour.

The silica gel in the bottom of the dessicator was replaced with the $CaCl_2$-EGME solvate. $CaCl_2$–EGME was made by mixing 20g of EGME with 100g of hot oven dried $CaCl_2$ into a 1L beaker and it was then allowed to cool down before spread it on the bottom of the dessicator. Sample-EGME slurry was placed in the petri dish and covered with a ventilated cover. The sample was then placed in the dessicator where it was evacuated with high vacuum pump for 45 minutes and left under vacuum for 1 hour prior to weighing. The process was repeated successively with longer time intervals until constant weight was reached. The calculation of the surface area is explained below:

It has been calculated that 2.86×10^{-4} g EGME is equal to monolayer of $1m^2$ surface area. Then, the surface area (m^2/g) of the soil was calculated as: -

$$\frac{\text{Weight of EGME retained (mg)}}{\text{Weight of dry soil (mg)}} \quad X \quad \frac{(1m^2)}{(0.286 \text{ mg EGME})}$$