

Environmental Geotechniques – Engi 7718
Assignment No. 2

A clay with a CEC of 120 meq/100 g and a SSA of 700 m²/g is permeated with a 2×10^{-3} M solution of AlCl₃ in water at room temperature.

- a) Calculate the thickness of the diffuse double layer, in Å.
- b) Calculate the surface potential, in mV
- c) To observe the exponential decrease in potential with distance from the surface of the clay, select three distances equal to 25%, 50% and 75% of your DDL thickness and calculate the potentials at each of these distances.
- d) Calculate the cation concentrations, in ions/m³ at the same three distances selected in part c).
- e) If the medium was ethyl alcohol ($D_{\text{ethyl alcohol}} = 24.3$) instead of water, discuss the differences in the surface potential, the cation concentration at the surface, and the thickness of the double layer that would be observed.

Show all your steps, and work in the SI units as given in the class notes.