PHYSICS II: Problem Set 5

P5.1 : Giancoli 24.60.

P5.2 : A large thundercloud is 10km in diameter, 1km above the ground, and has a voltage 100 MV relative to the ground. Estimate the electrostatic energy of the cloud. Give your answer in tons of TNT equivalent. (1 kiloton TNT = 4×10^{12}J is a conventional unit for measuring the energy of an explosion, 4×10^{12}J is an energy generated when 1 kiloton of TNT explodes. Nuclear bombs have energies of 10 KT TNT and more)

P5.3 : A water molecule H_2O is strongly asymmetrical (polar). Assume that all molecules in a glass of water are aligned, say all Os are pointing exactly up. Estimate the resulting electric field and voltage in the glass of water. (Your estimate can be crude, just use the same length 1Å=10^{-8}cm to estimate the size of the molecule, the distance between the molecules, the asymmetry of H positions, and displacement of electrons from the Hs to O.)