PH 223 Week 5

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These problems are borrowed/adapted from *Physics for Scientists and Engineers*, the first two from Chapter 26, and the third from Chapter 22.

Activity 1

(a) How much work does the charge escalator do to move 1.0 µC of charge from the negative terminal to the positive terminal of a 1.5 V battery?

(b) How much charge does a 9.0 V battery transfer from the negative to the positive terminal while doing 27 J of work?

(c) Light from the sun allows a solar cell to move electrons from the positive to the negative terminal, doing 2.4×10^{-19} J of work per electron. What is the emf of this solar cell?

Activity 2

You need to construct a 100 pF capacitor for a science project. You plan to cut two $L \times L$ metal squares and insert small spacers between their corners. The thinnest spacers you have are 0.20 mm thick. What is the proper value of L?

Activity 3

Two neutral metal spheres on wood stands are touching. A negatively charged rod is held directly above the top of the left sphere, not quite touching it. While the rod is there, the right sphere is moved so that the spheres no longer touch. Then the rod is withdrawn. Afterward, what is the charge state of each sphere? Use charge diagrams to explain your answer.