

You are spending the summer working for a chemical company. Your boss has asked you to determine where a chlorine ion of effective charge  $-e$  would situate itself near a carbon dioxide ion. The carbon dioxide ion is composed of 2 oxygen ions each with an effective charge  $-2e$  and a carbon ion with an effective charge  $+3e$ . These ions are arranged in a line with the carbon ion sandwiched midway between the two oxygen ions. The distance between each oxygen ion and the carbon ion is  $3.0 \times 10^{-11}m$ . Assuming that the chlorine ion is on a line that is perpendicular to the axis of the carbon dioxide ion and that the line goes through the carbon ion, what is the equilibrium distance for the chlorine ion relative to the carbon ion on this line? For simplicity, you assume that the carbon dioxide ion does not deform in the presence of the chlorine ion. Looking in your trusty physics textbook, you find the charge of the electron is  $1.60 \times 10^{-19}C$ .