Chapter 22, Problem 19

The figure shows an electric dipole. What is the magnitude of the dipole's electric field at point P? Assume that \( q = 4.36 \times 10^{-6} \, \text{C} \), \( d = 6.52 \times 10^{-6} \, \text{m} \), and \( r = 1.73 \, \text{cm} \).

![Diagram of an electric dipole](image)

Number Units

*1 Units

Significant digits are disabled; the tolerance is +/-2%

Chapter 22, Problem 45

An electron on the axis of an electric dipole is 33 nm from the center of the dipole. What is the magnitude of the electrostatic force on the electron if the dipole moment is \( 3.5 \times 10^{-28} \, \text{C} \cdot \text{m} \)? Assume that 33 nm is much larger than the dipole charge separation.

Number Units

*1 Units

Significant digits are disabled; the tolerance is +/-2%

Chapter 22, Problem 80

Calculate the electric dipole moment of an electron and a proton 5.76 nm apart.

Number Units

*1 Units

Significant digits are disabled; the tolerance is +/-2%

Chapter 22, Problem 24
A thin nonconducting rod with a uniform distribution of positive charge $Q$ is bent into a circle of radius $R$ (see the figure). The central perpendicular axis through the ring is a $z$ axis, with the origin at the center of the ring. What is the magnitude of the electric field due to the rod at (a) $z = 0$ and (b) $z = \infty$? (c) In terms of $R$, at what positive value of $z$ is that magnitude maximum? (d) If $R = 2.25$ cm and $Q = 4.24 \, \mu$C, what is the maximum magnitude?

(a) Number Units

(b) Number Units

(c) Number Units

(d) Number Units

*1 - significant digits are disabled; the tolerance is +/-2%
*2 - significant digits are disabled; the tolerance is +/-2%
*3 - significant digits are disabled; the tolerance is +/-2%
*4 - significant digits are disabled; the tolerance is +/-2%

Chapter 22, Problem 27

In the figure two curved plastic rods, one of charge $+q$ and the other of charge $-q$, form a circle of radius $R = 7.84$ cm in an $xy$ plane. The $x$ axis passes through both of the connecting points, and the charge is distributed uniformly on both rods. If $q = 17.4$ pC, what is the magnitude of the electric field produced at $P$, the center of the circle?

Number Units

Significant digits are disabled; the tolerance is +/-2%