Graded Group Problem #1

You are working in a biotech lab on a project to analyze certain biological molecules. Each biological molecule can be charged and has a unique charge to mass ratio. Your task is to help find a way to separate the molecules so they can be zapped with a laser and their spectra analyzed. The post-doc you are working with has an idea to use a thin glass rod that is uniformly charged to provide an electric field that can apply a force to the charged molecules. The idea would be to use an end of the rod to manipulate molecules – sort of "poke" them. The post-doc wants you to determine the electric field parallel to the axis of the glass rod at some distance d from the end of the rod. Assume the glass rod has a length, L, and uniform charge, Q. Make sure label all variables and to check limiting cases.

$1/4\pi\varepsilon_o = k = 9 \times 10^9 \ Nm^2/C^2$
$V_{sphere} = 4\pi r^3/3$
$A_{sphere} = 4\pi r^2$

NOTE:
Use a *Group Problem Solving Guide* to answer this problem.
Clearly indicate your names as well as your lab time.