The Millikan Oil Drop Activity, Student Handout

When Millikan performed his Oil Drop Experiment, he determined the charge of a single electron. Millikan found that the negative charges on falling oil droplets were repeating multiples of the same negative charge. He assumed that the smallest multiple or difference between readings was the smallest possible negative charge and therefore the charge of a single electron.

In today's activity, you will gather data and try to determine the charge of a single "electron," represented by an object. You will weigh sealed containers of like objects and subtract the mass of the empty container to get the masses of the objects inside. Analyze your data representing the masses of like objects. The resulting mass of objects in a single container will equal some repeating multiple of what a single object weighs. By analogy, your data will represent differences in the number of electrons on an oil drop. Thus you will be determining the "charge" of a single electron, helping you to better understand Millikan's thinking.

Your challenge is to determine what the mass of a single object should be, just as Millikan figured out what the charge of a single electron should be. Millikan figured a single oil drop consisted of a multiple number of electrons just as each of your containers hold a number of similar objects (representing electrons). Remember, no fair peeking!

Using a data collection sheet, record the sample number at your balance, and the masses (rounded to nearest .01 g) of the 16 containers plus an empty container. Perform the needed calculations to determine the number of "electrons" in each container and eventually the "charge" (by analogy from mass data) of a single electron.

(Note: You will need to reorganize your data in a different way, perhaps from largest mass to smallest in a list or spreadsheet to better see relationships between the containers and to make some of the calculations.)

The smallest repeating difference (to nearest 0.1 g) between reorganized data is ____ g). Therefore the "charge" of a single electron is _____ "units." Attach your work showing your reorganization of data. State how you determined the mass of a single object and then how the mass of a single object in this activity relates to Millikan's findings. Also evaluate how well this activity helped your understanding of Millikan's thought process.