Honors Chemistry Lab
Aluminum

Objective:

Find out the thickness and number of aluminum atoms that are stacked up to make a piece of aluminum foil. We will assume the aluminum atoms are stacked on top of each other directly and that the atoms behave as solid spheres during the stacking process.
In the box at the end of this lab you and your lab group are to predict how many atoms there are

Procedure:

1. Each member of your group will predict the number of Al atoms that make up the thickness of a piece of aluminum foil.
2. Prepare a data table to record your measurements.
3. Determine the mass of the aluminum cylinder in grams. Record this to the 0.001 place
4. Find the volume of the cylinder by water displacement in a plastic graduated cylinder. Maintain sig figs!
5. Obtain a piece of aluminum foil and cut it to obtain a 15cm x 15cm square.
6. Measure the exact length and width of the foil in units of cm.
7. Determine the mass of the Al foil in grams.

Analysis:

Data: Remember units and sig figs

a.) Predict the number of Al atoms in thickness of foil.
b.) Mass of Al cylinder
c.) Initial volume of water in the graduated cylinder
d.) Final volume of water in the graduated cylinder
e.) Length of Al foil
f.) Width of Al foil
g.) Mass of Al foil

Calculations: (Remember you MUST show ALL calculations!)

1. What is the volume of the aluminum cylinder?
2. Since both the cylinder and the foil are both Al, use the mass to volume ratio of the cylinder to find the volume of the foil.
3. From the known volume of the foil find the thickness of the foil.
4. The size of an aluminum atom was measured by a process called x-ray diffraction and found to be about 2.5×10^{-8} cm in diameter. How many atoms thick is the Al foil?
5. Knowing that every 27 grams of aluminum have 6.02×10^{23} atoms find the total number of aluminum atoms in your foil.

Conclusion Questions: (Write in complete sentences. Avoid using "it". Plagiarism is an automatic 0.)

1. How well did your predicted number of aluminum atoms compare to the actual number of aluminum atoms in the thickness of your aluminum foil?
2. How did your number of atoms compare to other lab groups? Explain reasons for any discrepancies or sources of error.
3. By the rules of significant figures, how many digits can you report the thickness (in cm) and number of atoms to?
4. Who, what, where, when: What is the ore that contains most of the aluminum that we use for refining aluminum? Who developed a method for reducing this ore to elemental aluminum? Where and when was this process discovered?