Our ability to conduct such analysis arises from the fundamental concepts that are developed in a high school physics classroom. This paper lays out a description of these concepts in light of learning about the basics of Rutherford Backscattering Analysis.

[handwritten: redundant → intro → put it together → tighter]

Generation of high energy particles

[handwritten: more blend for subject interest — websites? refs??]

In order to conduct more precise experiments than the ones conducted *[handwritten: cite]* by Rutherford, the generation of high energy particles is highly controlled. *[handwritten: cite]* large Vandegraff generator is used to accelerate charged particles instead of getting these particles from a radioactive source. In this manner the energy of *[handwritten: how?]* the particles can be controlled by the voltage of the generator. This voltage is *[handwritten: cite?]* used to set up an electric field that is used to accelerate these charged particles. For the purposes of this activity we will use alpha particles (He+2), *[handwritten: are these real or for these facilities?]* which is commonly used in Rutherford backscattering analysis. The typical voltage differences produced by the generator are on the order of millions of *[handwritten: relevant] [handwritten: facilities?]* volts, much larger than Vandegraff generators that are used in classrooms!

To better understand how these particles are conditioned, we will analyze the result of a charged particle in the electric field created by the generator.

Part I:

4 × 10⁶ Volts   0 Volts

He+2•

1.5 meters
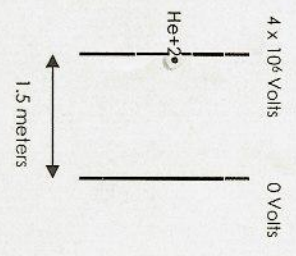
1. On the diagram above draw in lines to represent the electric field between the two plates.

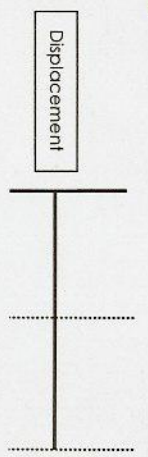2. Calculate the electric field strength between the two plates.

3. Draw a vector to represent the force on the particle due to the electric field.

4. Calculate the force on the particle.

5. Calculate the energy of the particle when it reaches plate B.

[handwritten: Cite? Are these relevant for these facilities?]

6. Calculate the particle's velocity when it reaches plate B. (Mass of a alpha particle is 2 protons + 2 neutrons)

[handwritten: Are these significant relativistic effects? Cumnel.]

Part II:

[handwritten: Refs, Sites, websites please]

After the initial conditioning of the particles they are directed to the sample in which is to be analyzed. Between the accelerator and the target the particles are focused into a beam through the use of magnetic fields. Draw the displacement, velocity and acceleration versus time graphs for the particles from the time they start in the accelerator to the time they hit the sample. Consider there to be no acceleration after the particles have left the accelerator.

[handwritten: top of page. Refer]

Displacement

[handwritten: I don't see how you want this figure to be Unclear.]