14 In the alpha particle scattering experiment a beam of alpha particles is directed at a thin metal foil.

(a) In 1911 Rutherford concluded that the atom has a central charge contained in a very small volume.

Explain how the results of the experiment led to this conclusion.

(2)

(b) Rutherford wrote, "The main deductions from the theory are independent of whether the central charge is positive or negative."

Discuss why the observations did not allow Rutherford to conclude whether the central charge is positive or negative.

You may wish to use diagrams to illustrate your response.

(4)

(c) We now know that the nucleus is positively charged.

An alpha particle with kinetic energy of 6.29 MeV approaches a platinum nucleus and is repelled. The proton number of platinum is 78.

Calculate the minimum distance of the alpha particle from the platinum nucleus.

Assume that the alpha particle and the nucleus are point charges.

(3)

Distance = ...

(Total for Question 14 = 9 marks)