Homework No. 8

1. Low energy ion scattering spectroscopy is performed with a scattering angle of 138° and incident ion energy of 600 eV.

   (a). What is the atomic mass of the lightest element that can be detected if the probe ions are (i) ^{40}Ar, (ii) ^{4}He?

   (b). What is the difference in scattered ion energy between detected elements of atomic masses of 100 and 101 if the probe ions are (i) ^{40}Ar, (ii) ^{4}He?

   (c) What is the advantage and disadvantage of ^{40}Ar compared to ^{4}He as probe ions?

2. Derive the equation

$$k_M = \left[\frac{m \cos\theta + (M^2 - m^2 \sin^2\theta)^{1/2}}{m + M} \right]^2$$

   Simplify this equation for

   (a) $m = M$

   (b) $m \ll M$

   (c) $\theta \simeq 90°$