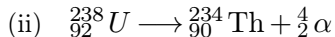


## Answers to Problem 1

- (a) An  $\alpha$  - particle is a nucleus of helium  ${}^4_2\text{He}$ .
- (b) B repulsion ( same charge ) electrons would be *deflected* by the electrons of the gold atom, and for this reason they would not even reach ( and then collide ) the nucleus !
- (c) (i) The *half-life* period  $T_{\frac{1}{2}}$  is the time that must elapse :
- the initial number of radioactive nuclei ( $N_0$ ) to be reduced by a factor of 2
  - the initial activity of the radioactive sample ( $A_0$ ) to be reduced by a factor of 2

Notice: You can choose your definition either in terms of number (N) or activity (A).

That is because N and A are proportional ( to each other ).



- (d) (i) We have to realize that 3 half-lives have gone by, therefore the age is  $3T_{\frac{1}{2}} = 1.4 \times 10^{10}$  years.
- (ii) We assume that no lead ( none of the intervening daughters ) was lost from the rocks.