

- (b) (i) the radiation needs to pass through the body (to be detected) **(1)**
- (ii) (otherwise) the activity of the source becomes too weak
(during measurements) **(1)**
- (iii) the decaying source may remain in the body for a long time
and could cause damage **(1)**
[or the activity of the source will be low unless a large
quantity is used ($T_{1/2} \propto 1/\lambda$)]

3

- (c) corrected count rate at 0.2 m (= 2550 - 50) = 2500 (c min⁻¹) **(1)**
corrected count rate at least distance (= 6000 - 50) = 5950 (c min⁻¹) **(1)**

use of $I = k \frac{I_0}{x^2}$ (or in the form $\frac{I_1}{I_2} = \left(\frac{x_2}{x_1}\right)^2$) **(1)**

(allow C.E. for using uncorrected count rate)

gives least distance = $0.20 \times \left(\frac{2500}{5950}\right)^{1/2}$ **(1)**

least distance = 0.13 m **(1)**

5

[10]