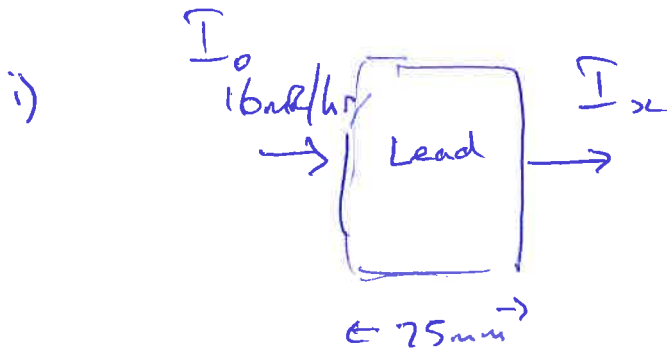


①



$$\text{HVL} = 0.178 \text{ cm}$$

Determine absorption
coeff. μ

$$\mu = -\frac{\ln 0.5}{0.178} = 3.894 \text{ cm}^{-1}$$

-3.894×7.5

$$\begin{aligned} I_x &= I_0 e^{-\mu x} \\ &= 16 \times 10^{-3} e^{-3.894 \times 7.5} \\ &= \underline{3.316 \times 10^{-5} \text{ R/hr}} \end{aligned}$$

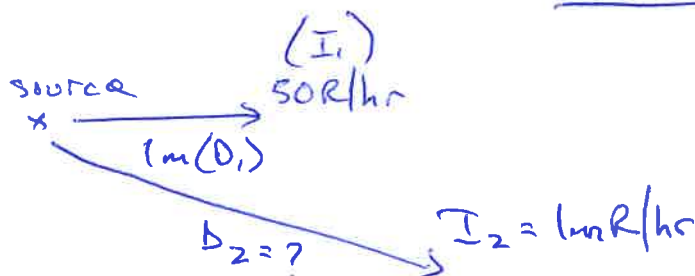
(ii) $t = 15 \text{ min}$ $\text{DR} = 0.75 \text{ mR/hr}$

$$\begin{aligned} D &= \text{DR} \times t \\ &= 0.75 \times 10^{-3} \times \frac{15}{60} \\ &= \underline{187.5 \mu\text{R}} \end{aligned}$$

(iii) $D_{\text{max}} = 1.5 \text{ mR}$

$$\begin{aligned} t_{\text{max}} &= \frac{D}{\text{DR}} = \frac{1.5 \times 10^{-3}}{0.75 \times 10^{-3}} \\ &= \underline{2 \text{ hrs.}} \end{aligned}$$

(iv)



$$\begin{aligned} D_2 &= \left(\frac{D_1^2 \cdot I_1}{I_2} \right)^{0.5} \\ &= \underline{223.61 \text{ m}} \end{aligned}$$

(v)

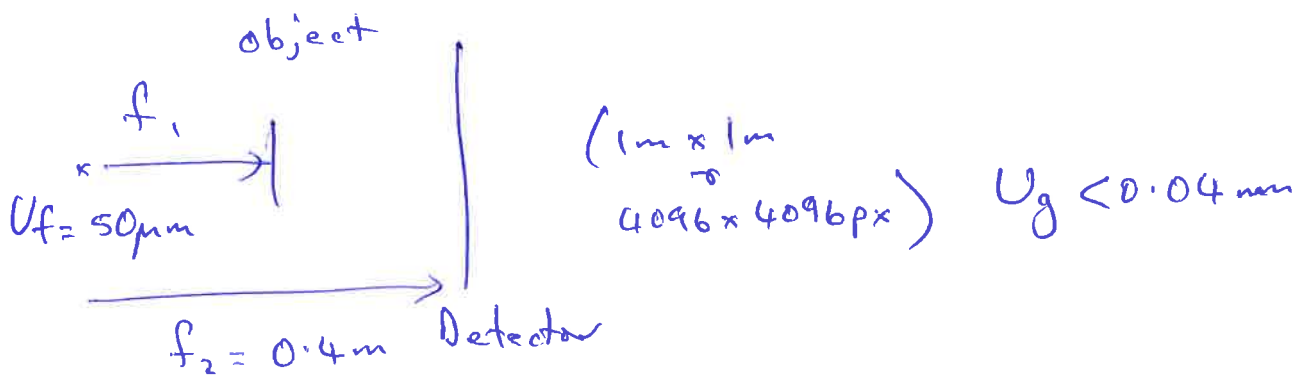
Source $\xrightarrow{D_1 = 3.5m} \bar{I}_1 = 42R/hr$

$$D_2 (50mR/hr) = \left(\frac{3.5^2 \times 42}{50 \times 10^{-3}} \right)^{0.5} = \underline{101.44m}$$

$$D_2 (10mR/hr) = \underline{226.83m}$$

$$D_3 (1mR/hr) = \underline{717.29m}$$

(vi)



$$Ug = Uf \left(\frac{f_2 - f_1}{f_1} \right) \rightarrow f_1 = f_2 \left(\frac{Uf}{Ug + Uf} \right)$$

$$= 0.4 \left(\frac{50 \times 10^{-6}}{0.04 \times 10^{-3} + 50 \times 10^{-6}} \right)$$

$$= \underline{0.222m}$$

Dimensions of Image at Detector:

$$\text{Magnification} = \frac{f_2}{f_1} = \frac{0.4}{0.222} = \underline{1.802}$$

$$\therefore (4mm \times 6mm) \times 1.802$$

Detector
Object
Image

$$= \underline{7.208mm \times 10.812mm}$$