

Contoh :

- 1). Berkas Sinar Merah (Sinar dengan intensitas yang kuat) dengan panjang 1000 nm. Berapa eV energi Cahaya Merah tsb. berapa besar mommentumnya dan besar kec. elektronnya !

Penyelesaian :

Menghitung eV

$$\textcircled{1} E = \frac{hc}{\lambda}$$

- $h = 6,626 \times 10^{-34} \text{ J}$
- $c = 3 \times 10^8 \text{ m/s}$
- $\lambda = 1000 \text{ nm} = 1 \times 10^{-6} \text{ m}$

$$E = \frac{(6,626 \times 10^{-34}) (3 \times 10^8)}{1 \times 10^{-6}}$$
$$= \frac{1,9878 \times 10^{-25}}{1 \times 10^{-6}}$$
$$= 1,9878 \times 10^{-19} \text{ J}$$

eV =

$$1 \text{ eV} = 1,6 \times 10^{-19} \text{ J}$$
$$E = \frac{1,9878 \times 10^{-19}}{1,6 \times 10^{-19}}$$
$$= 1,24 \text{ eV}$$

- \textcircled{2} Momentum foton

$$P = \frac{E}{c}$$

$$P = \frac{1,9878 \times 10^{-19}}{3 \times 10^8}$$

$$P = 6,63 \times 10^{-28} \text{ kgm/s}$$

- \textcircled{3} $E = \frac{1}{2} m v^2$

dengan : $m = 9,109 \times 10^{-31} \text{ kg}$ (massa elektron)

$$E = 1,9878 \times 10^{-19} \text{ J}$$
$$v = \sqrt{\frac{2E}{m}}$$

$$= \sqrt{\frac{2 \times 1,9878 \times 10^{-19}}{9,109 \times 10^{-31}}}$$

$$= \sqrt{\frac{3,9756 \times 10^{-19}}{9,109 \times 10^{-31}}}$$

$$= \sqrt{4,363 \times 10^1}$$

$$= 6,61 \times 10^5 \text{ m/s}$$
$$= 660,642 \text{ m/s.}$$

Panjang gelombang Cahaya

$$E = 3,3 \text{ eV}$$

$$h = 6,626 \times 10^{-34} \text{ J}\cdot\text{s}$$

$\bullet =$

$$c = 3,0 \times 10^8 \text{ m/s}$$

$$1 \text{ eV} = 1,6 \times 10^{-19} \text{ J}$$

Jawab:

$$E = \frac{hc}{\lambda} = 3,3 \times (1,6 \times 10^{-19})$$

$$= 5,28 \times 10^{-19}$$

$$\lambda = \frac{hc}{E}$$

$$= \frac{6,62 \times 10^{-34} \cdot 3 \times 10^8}{5,28 \times 10^{-19}}$$

$$= \frac{1,9878 \times 10^{-25}}{5,28 \times 10^{-19}}$$

$$\lambda = 3,76 \times 10^{-7} \text{ m}$$

$$= 376 \text{ nm}$$