

Contoh:

1. Berkas sinar merah (sinar dengan intensitas yang kuat) dengan panjang 1000 nm. Berapa eV energi cahaya merah tsb. Berapa besar momentumnya dan besar kec. elektronnya.

Jawab:

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

$$f = \dots$$

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

$$E = \frac{(6.626 \times 10^{-34}) \times (3.0 \times 10^8)}{1000 \times 10^{-9}}$$

$$E = \frac{1.9878 \times 10^{-25}}{10^{-6}}$$

$$E = 1.9878 \times 10^{-19} \text{ J}$$

$$E = \frac{1.9878 \times 10^{-19}}{1.6 \times 10^{-19}}$$

Ubah ke satuan eV.
1 eV = $1.6 \times 10^{-19} \text{ J}$

$$E \approx 1.24 \text{ eV}$$

$$b) p = \frac{h}{\lambda} = \frac{6.626 \times 10^{-34} \text{ J}\cdot\text{s}}{10^{-6} \text{ m}}$$

$$p = 6.63 \times 10^{-28} \text{ kg}\cdot\text{m/s}$$

$$c) k = \frac{1}{2} m v^2 \longrightarrow v = \sqrt{\frac{2E}{m}}$$

$$v = \sqrt{\frac{2 \times 1.9878 \times 10^{-19}}{9.109 \times 10^{-31}}}$$

$$= \sqrt{\frac{3.926 \times 10^{-19}}{9.109 \times 10^{-31}}}$$

$$= \sqrt{4.363 \times 10^{11}}$$

$$= 6.61 \times 10^5 \text{ m/s}$$

$$= 660,642 \text{ m/s}$$

2. cahaya matahari memancarkan cahaya sebesar 3.3 eV. mengenai kulit anda. Apa yang terjadi pada kulit anda. (Panjang gelombang cahaya) ?

$$E = 3.3 \text{ eV}$$

$$h = 6.626 \times 10^{-34} \text{ J/s}$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

$$1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$$

Jawab:

$$E = \frac{hc}{\lambda} = 3.3 \times (1.6 \times 10^{-19}) = 5.28 \times 10^{-19}$$

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

$$= \frac{6.626 \times 10^{-34} \cdot 3 \times 10^8}{5.28 \times 10^{-19}}$$

$$= \frac{1.9878 \times 10^{-25}}{5.28 \times 10^{-19}}$$

$$\lambda \approx 3.76 \times 10^{-7} \text{ m} = 376$$