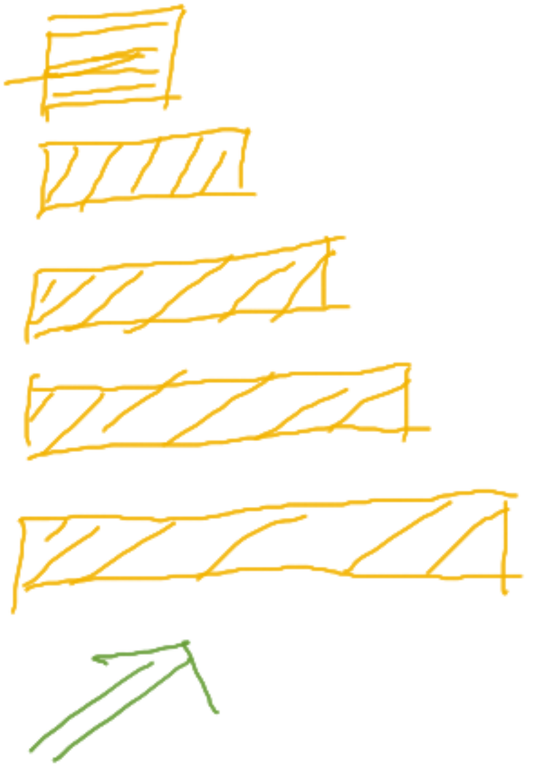
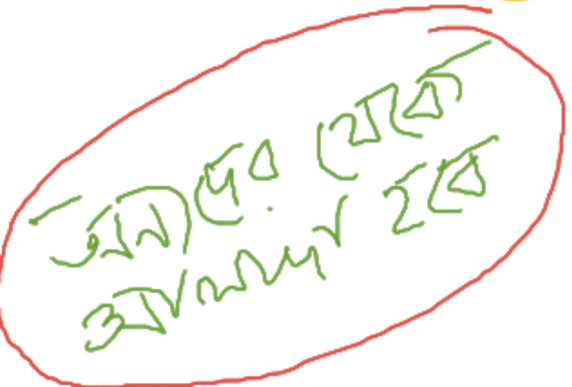
বই পড়ার নাম



- চিন্তার দিগন্ত বাড়বে
- স্কিলটি ক্যারিয়ার চিন্তা করতে শেখাবে
- উদ্ভাবনী চিন্তা করতে পারবে



বই পড়ার ফল

স্মৃতি কর্মক্ষম থাকবে।

আলজেইমার দূরে থাকবে।

স্ট্রেস/ডিপ্রেশন কমাবে।

শারীরিক মানসিক আরও উপকার হবে।

Hints for the problems of Chapter 38

Problem #1 Hints

Photon energy $E = hf$

$= hc/\lambda$

$0.6eV = 6.63 \times 10^{-34} \cdot f$

Light velocity $c = \lambda f$

$\lambda = ?$

Problem # 2

$\lambda = 590\ nm$

$= 590 \times 10^{-9}\ m$

nm	10^{-9}	nanometer
μm	10^{-6}	micrometer
mm	10^{-3}	millimeter
m	$\longrightarrow$	
km	10^{+3}	

pm	10^{-12}	pico-meter
fm	10^{-15}	femto- "

Kinetic energy

$$\frac{1}{2}mv^2 = hf$$

$$\frac{1}{2}mv^2 = \frac{hc}{\lambda}$$

$$v = \sqrt{\frac{2hc}{\lambda m}} \quad m/sec.$$

#5

$$E = hf$$

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

$$\lambda = \frac{1}{1650763.73}\ m$$

Photoelectric effect:

$$E = KE_{max} + \phi$$

E ↑ hf

KE_{max} ↓ $\frac{1}{2}mv^2$

ϕ ← work function

energy needed to dislodge an electron from an atom

$$\frac{dQ}{dt} = I$$

$$\Rightarrow \vec{I} = \frac{V}{R}$$

$KE = E - \phi$

$= \frac{hc}{\lambda} - 2 \cdot 2\,eV$

$eV_s =$

Kinetic Energy $= eV_s$

$\frac{\text{Energy}}{\text{charge}} =$ potential

#17

$$E = K_{max} + \phi$$

$$K_{max} = E - \phi$$

$$= 1.3\,eV$$

$$\frac{1}{2}mv^2 = 1.3\,eV$$

$$v = ?$$

$$\phi = 4.5\,eV$$

$$E = 5.8\,eV$$

$$v = ?$$

#27

Change in wavelength in Compton scattering

$$\Delta\lambda = \frac{h}{mc}(1-\cos\phi)$$

$$\lambda' - \lambda = \frac{h}{mc}(1-\cos\phi)$$

$\phi = 30^\circ$

$\lambda = 2.4$ pm

$\lambda' = ?$

c = velocity of light

m = electron mass

λ = incident wavelength of x-ray

λ' = outgoing " " the x-ray

$\lambda' > \lambda$

Subatomic particles

Radius $r \sim 10^{-12}$ m — 10^{-15} m

picometer to femtometer range.

Example: proton, neutron, electron, atom

matter wavelength $\lambda = \frac{h}{p}$ — Planck's constant / momentum

or de Broglie wavelength $= \frac{h}{mv}$

#46

Kinetic energy $\Rightarrow \frac{1}{2} m_e v^2 = 1000\ eV$

Momentum $p = m_e v$

$\frac{p^2}{2m_e} = \frac{m_e^2 v^2}{2m_e}$

$p^2 = 2m \times 1000\ eV$

$p = \sqrt{2m_e \times 1000\ eV}$

$\lambda = \frac{h}{p}$

Mass of electron $m_e = 9.1 \times 10^{-31}\ kg$

#47

$V = 25$ keV

Steps:

1. Get KE
2. p (momentum)
3. λ (matter wave)

We know $\frac{KE}{e} = V$

$KE = e \cdot 25000\,eV$

$= 1.6 \times 10^{-19} \times 25\,K$