SET 2

EXERCISE 1

Any metallic surface struck by radiation of sufficiently high frequency *v* emits electrons: this is the **photoelectric effect**.

1/ Write the principle of conservation of energy.

2/ In an experiment, a sodium plate is illuminated by radiation with a wavelength of $\lambda = 3000$ Å. What stopping potential would be needed to stop the electrons?

3/ Calculate the speed of the emitted electrons when the sodium plate is exposed to a light beam with a wavelength of $\lambda = 5000$ Å.

The threshold frequency of sodium is given as $\nu_0 = 5.569 \times 10^{14}$ Hz.

EXERCISE 2

1/ Among the following metals, which ones can be used as a photocathode sensitive to radiation with a wavelength of $\lambda = 4000$Å?

Pt ($\lambda_0 = 2200$Å) ; Au ($\lambda_0 = 2500$Å) ; Cs ($\lambda_0 = 4963$Å) and Na ($\lambda_0 = 5200$ Å).

1/ Which metal is used if the speed of the electron is 4.6×10^5 m·s^{-1}?

EXERCISE 3

In an experiment, an aluminum plate is successively illuminated by radiation with wavelengths $\lambda_1 = 2534.8$ Å and $\lambda_2 = 2967.3$ Å.

If, in the first case, the electric current is stopped by a stopping potential $U_1 = 1.885$ V, and in the second case by a stopping potential $U_2 = 1.172$ V, determine the value of Planck's constant.

Given data: $h = 6.625\ 10^{-34}$ J.s ; $C = 3\ 10^8$ ms^{-1} ; $e = 1.6\ 10^{-19}$ Coulomb ;

$m_e = 9{,}1\ 10^{-31}$ kg ; 1eV = $1.6\ 10^{-19}$ J.