# Essential Pre-Uni Physics D9.5

A Level
C C C

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

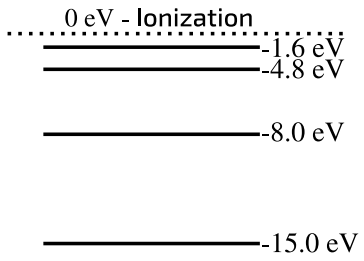


**Figure 1:** Energy level diagram of the atom this question is concerned with.

## Part A Ground state

A $10\,\mathrm{eV}$ photon passes through this atom when it is in the ground state. How much energy is the atom likely to absorb from the photon? Give your answer in electron volts.

## Part B First excited state

Repeat the question if the atom starts in the $-8.0\,\mathrm{eV}$ state. You should give a different answer to Part A if at all possible.

## Part C Incident electron

For the situation where a $10\,\mathrm{eV}$ **electron** passes through the atom when it is in its ground state, how much energy is the atom likely to absorb from the **electron**? You should have a different answer to Part A.

# Essential Pre-Uni Physics J1.9

GCSE C C C A Level P P P

Complete the nuclear equation. Don't forget the neutrino / antineutrino if it is a beta decay! A periodic table is available here, however you shouldn't need it.

$^{23}_{13}\mathrm{Al} \rightarrow \quad \ldots$ (Beta+ decay)

- $^{23}_{12}\mathrm{Mg} + {}^{0}_{1}\mathrm{e} + {}^{0}_{0}\overline{\nu}$
- $^{23}_{12}\mathrm{Mg} + {}^{0}_{1}\mathrm{e} + {}^{0}_{0}\nu$
- $^{23}_{13}\mathrm{Mg} + {}^{0}_{1}\mathrm{e} + {}^{0}_{0}\nu$

# Essential Pre-Uni Physics D7.2

A Level

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

A laser diode requires $3.2\,\mathrm{V}$ across it to make it work. This means that its photons will have an energy of $3.2\,\mathrm{eV}$. Calculate the wavelength of the light emitted.

# Essential Pre-Uni Physics D9.3

A Level

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

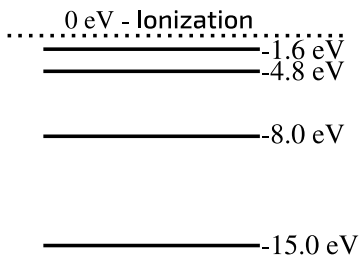


**Figure 1:** Energy level diagram of the atom this question is concerned with.

If the atom is in the $-1.6\,\mathrm{eV}$ state, and the electron descends to the ground state in three separate stages, what is the wavelength of the least energetic photon emitted?

# Essential Pre-Uni Physics D7.7

A Level

C C C

Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

Caution - when working with particles, do not use $c = f\lambda$. Question D7.9 shows you why.

## Part A Momentum from KE

Calculate the momentum of an electron if its kinetic energy is $10\,\mathrm{keV}$.

## Part B Momentum from wavelength

An electron's wavelength is $3.0 \times 10^{-7}\,\mathrm{m}$. What is its momentum?

# Essential Pre-Uni Physics D6.4

A Level
C C C

Useful physical constants can be found in the hint tabs.

## Part A Maximum speed of photoelectrons

Calculate the maximum speed of the photoelectrons emitted when a material with an $8.4 \times 10^{-20}\,\mathrm{J}$ work function is illuminated by light of frequency $7.0 \times 10^{14}\,\mathrm{Hz}$.

## Part B Minimum speed of photoelectrons

What is the minimum speed of the photoelectrons emitted?

# Essential Pre-Uni Physics J1.1

GCSE C C C A Level P P P

Complete the nuclear equation. Don't forget the neutrino / antineutrino if it is a beta decay! A periodic table is available here, however you shouldn't need it.

$^{241}_{95}\mathrm{Am} \rightarrow \quad \ldots$ (Alpha decay)

- $^{241}_{94}\mathrm{Np} + {}^{0}_{1}\mathrm{e} + {}^{0}_{0}\nu$
- $^{237}_{93}\mathrm{Np} + {}^{4}_{2}\mathrm{He}$
- $^{241}_{96}\mathrm{Np} + {}^{0}_{-1}\mathrm{e} + {}^{0}_{0}\overline{\nu}$