

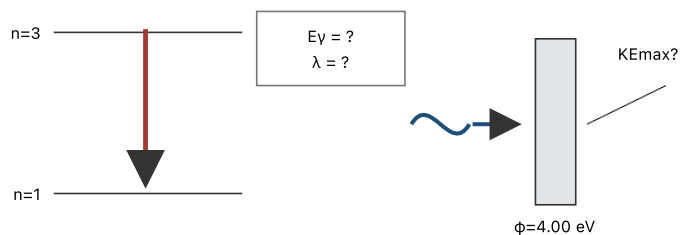
MODERN PHYSICS DAY 14: REVIEW AND MULTIPLE-REPRESENTATIONS FRQ WORKSHOP

CED 15.1–15.8 · Skill 2.B · FRQ: Multiple Representations

QUICK CHECK

Which sequence correctly models an emitted atomic photon striking a metal?

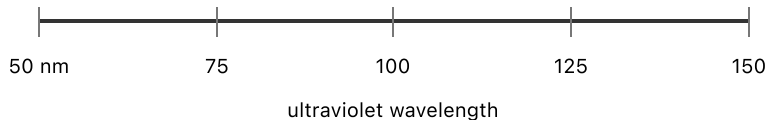
- A. level gap $\rightarrow$ photon E and $\lambda \rightarrow$ compare E with $\phi \rightarrow KE_{\max}$ B. intensity $\rightarrow$ atomic level $\rightarrow$ mass defect
C. half-life $\rightarrow$ wavelength $\rightarrow \phi$ D. Z change $\rightarrow$ blackbody peak $\rightarrow KE_{\max}$

FEATURED MR FRQA hydrogen electron drops from $n = 3$ to $n = 1$. The emitted photon strikes a metal with work function 4.00 eV .**ANNOTATE BEFORE CALCULATING****NOTES / REASONING**

PART A: ATOMIC LEVEL TO PHOTON

(a) Calculate E_3 , E_1 , and the photon energy. Show the signs of the atomic energies.

(b) Calculate the photon wavelength, then place one line on the supplied wavelength axis.

ULTRAVIOLET SPECTRUM AXIS

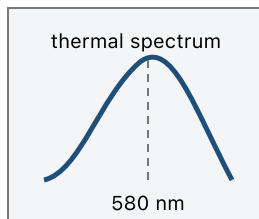
(c) State whether the transition is emission or absorption and justify from the arrow direction.

PART B: PHOTON TO PHOTOELECTRON

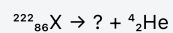
(d) Determine whether electrons are ejected. Calculate KE_{max} and the stopping voltage.

(e) Complete the diagram with a labeled photon and ejected-electron arrow. Your arrow labels must agree with your calculated values.

(f) The intensity doubles at the same wavelength. State what changes and what remains fixed.

MIXED REPRESENTATION CHECK**THREE COMPACT REVIEW PANELS**

alpha decay



mass defect

$$\Delta m = 0.0100 \text{ u}$$

$$E = ?$$

1. A thermal spectrum peaks at 580 nm. Find the temperature using $b = 2.90 \times 10^6 \text{ nm} \cdot \text{K}$.

2. Complete the alpha daughter for ${}^{222}_{86}\text{X}$ and state whether the element changes.

3. Find the energy for $\Delta m = 0.0100 \text{ u}$.